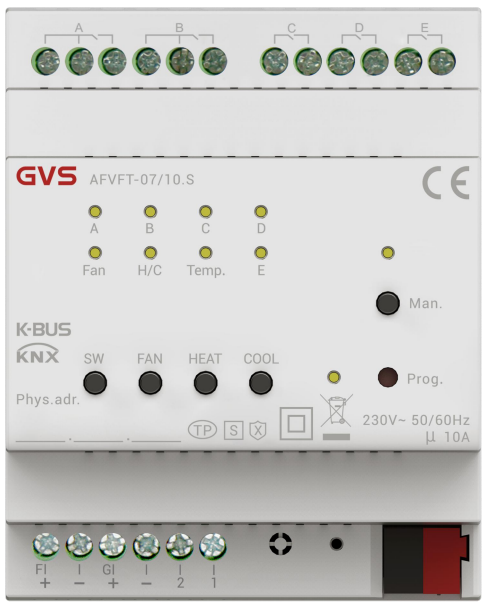
User Manual

K-BUS 0-10V Fan Coil Actuator with Secure_V1.1

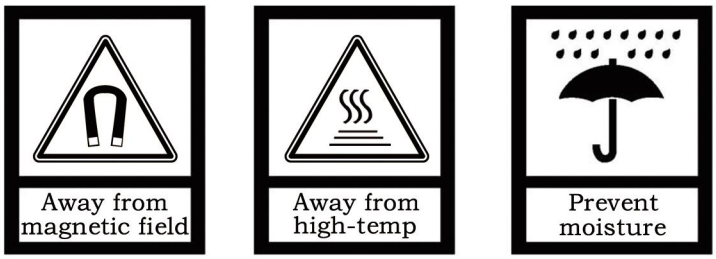
AFVFT-07/10.S



KNX/EIB Intelligent Installation Systems

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.**

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Chapter 1 General

The 0-10V Fan Coil Actuator with Secure is mainly used for the fan and valve control, can be installed in HVAC control system. The motor supports 230V AC drive and brushless DC motors with 0-10V drive interface. The device can be also used to control the lamp. Moreover, it supports manual operation which is on the front of the device to facilitate engineering commission.

The 0-10V Fan Coil Actuator with Secure is a modular installation device for fast installation in the distribution board on 35 mm mounting rails to DIN EN 60 715. The electrical connection is implemented by using screw terminals. The connection to the KNX bus is implemented using the supplied bus connection terminal, and no need an extra voltage supply.

The assignment of the physical address and the setting of the parameters can be done using the engineering tool software ETS (version ETS5 or higher) with the knxprod file.

In order to ensure that all functions of this product are used correctly, it is necessary to check whether there is any problem with the wiring before use. At the same time, attention should be paid to the technical characteristics of the load device when setting the parameters, especially the fan coil. Some technical characteristics are inherent to the device. If the settings are not appropriate, it may cause damage to the load device or may not operate properly.

This manual provides detailed technical information about the 0-10V Fan Coil Actuator with secure for users as well as assembly and programming details, and explains how to use the 0-10V Fan Coil Actuator with secure by the application examples.

The functions of the 0-10V Fan Coil Actuator with secure is summarized as follows:

- Support 2 external input interfaces, used as dry contact detection or NTC temperature detection
- Switch output: connect some electrical loads, such as lighting, sockets. All channels have the function of general switch, staircase lighting, light flashing and switch delay, scene,operation hours counter, logic and force operation
- Room temperature controller, support heating, cooling control modes, and HVAC modes, temperature logic algorithm supports 2-point and PI control, with 2-pipes or 4pipes system
- 2 channels of 0-10V output can be used for fan or valve control
- Fan control: support three or percentage level fan speed, with general operation, forced operation, Auto. operation, limitation function and behaviour operation for bus failure and bus recovery etc.
- Valve control: connect with 2pipes or 4pipes system, support three valve control types: 2state-ON/OFF, PWM and 3point, open and close, and support disable/enable heat and cool, valve status response, valve purge etc.
- Support Scene function
- Support the KNX Data Secure

Chapter 2 Technical Data

Power supply	Bus voltage	21-30DC, Via the KNX bus
	Bus current	<43.0mA/24V；<36.0mA/30V(work) <15.5mA/24V；<13.0mA/30V(standby)
	Bus consumption	<390mW(standby)
Relay outputs	Rated voltage	230V AC
	Rated current	10A
0-10V outputs	Output voltage	0-10V DC, with isolation
	Load current	Up to 10mA
2 external inputs	Can be individually configured function of NTC 10K temperature detection or dry contact input	
	Measuring temperature range −5°C ... + 45°C	
	Cable length	≤5M
Connection	KNX	Via bus connection terminals（red/black）， Ø0.8 mm
	Output	Screw terminals Wire Range0.5-2.5mm^2 Torque 0.4N-m
Operation/ display	Programming button and Red LED	Programming physical address
	Green LED flashing	The application layer works normally
Temperature range	Operation	-5°C……+45°C
	Storage	-25°C……+55°C
	Transport	-25°C……+70°C
Ambient conditions	Max. air humidity	<93%，except dewing
Design	Modular installation device (MDRC)	
Installation	On 35 mm mounting rail, and in clean, dry indoor	

Dimension/Weight	72mm ×90 mm ×64mm/0.3KG

Load type	**Rated power**	**Life cycles**
Incandescent lamp	2300W	>30000
Halogen lamp	2300W	>5000
Standard ballast	2300W	>5000
Electronic ballast	2000W	>5000
Fluorescent lamp (uncompensated)	2300W	>5000
Fluorescent lamp (parallel compensated)	2000W	>5000
Motor	1000W	>6000
LED (Inrush current 260A/120us)	450W	>30000

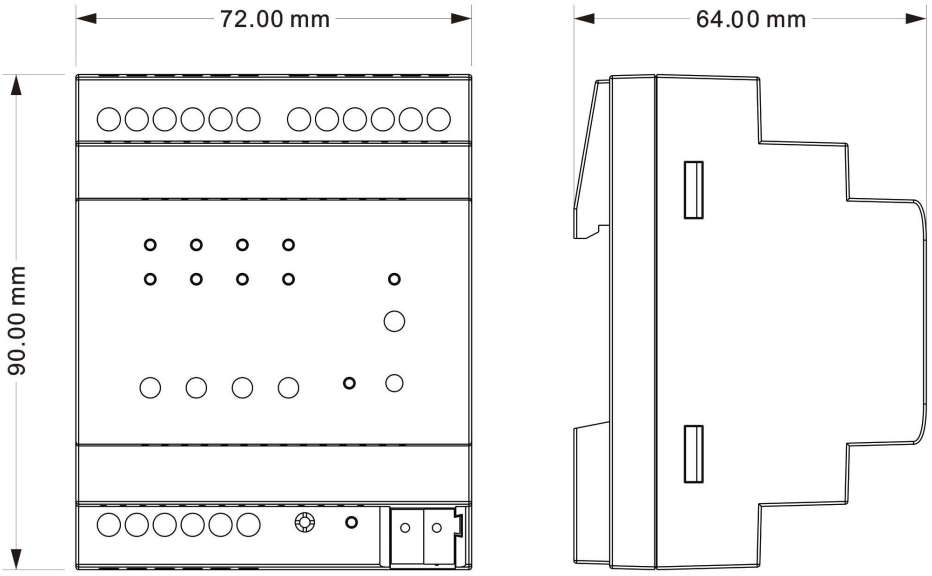
The above load is only for single lamp. In the case of several lamps in parallel, the power of load will be reduced, although the power is unchanged, but the instantaneous impact of current will increase, and easy to make the relay contacts melted. So, in normal use, subject to the measured current, the measured maximum inrush current must be within the allowable range.

Application program:

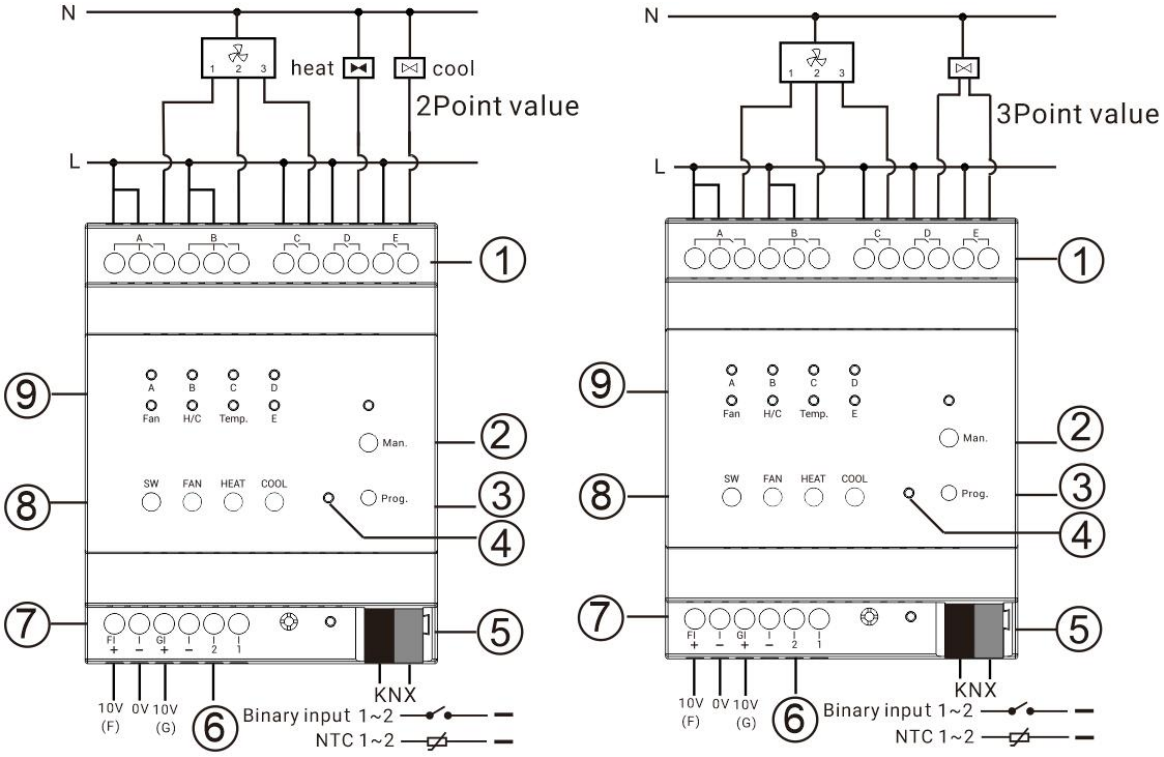
Model	**Max. number of communication objects**	**Max. number of group addresses**	**Max. number of associations**	**Secure group addresses**
AFVFT-07/10.S	123	250	250	250

Chapter 3 Dimension and Connection Diagram

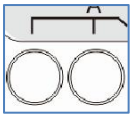
3.1. Dimension diagram



3.2. Connection diagram



①5 fold relay outputs: via the parameters can be set as fan speeds(A/B/C), valves (D for Heating,E for Cooling) or general switch outputs

Note:  the silk screen mark the two terminals are internally connected.

②Man./Auto. operation switch button: switch to Man. operation via long press 1s, and the LED is on in the front of button.

③Programming button, to assign physical address.

④Programming LED: Red LED for assigning the physical address,Green LED for displaying application layer running normally.

⑤KNX bus connection terminal.

⑥2 -Fold external inputs, can be individually configured function of NTC 10K temperature detection or dry contact input.

⑦Two channel 0-10V outputs: via the parameters can be set as the fan or valve outputs.

⑧Operate buttons. From left to right: Switch control, Fan speed, Heating, Cooling.

Illustrate:

1）SW: Switch output button, via long operation to select the output channels, via short operation switch on/off the current selected channel. The output LED flashing display the selected channel, fast flashing is that relay contact is open, slow flashing is that the relay contact is closed.

2）FAN: Via long operation to switch off the fan, via short operation to switchover the fan speeds.

3）HEAT：Switch on/off fully the heat valve.

4）COOL：Switch on/off fully the cool valve.

⑨LED display: A,B,C,D,E display switch output status;

Fan red -- the fan speed 1, Fan green --the fan speed 2, Fan blue-- the fan speed 3;

H/C red on -- heating valve open, H/C blue on -- cooling valve open; H/C off -- heating/cooling valve closed;

H/C off -- flashing valve purge;

Temp. On -- local temperature error.

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 Parameter setting description in the ETS

The description of the parameter settings in the ETS system is described in the form of function blocks.

4.1. KNX Secure

0-10V Fan Coil Actuator with Secure is a KNX device that complies with the KNX secure standard. That is, you can run the device in safe way.

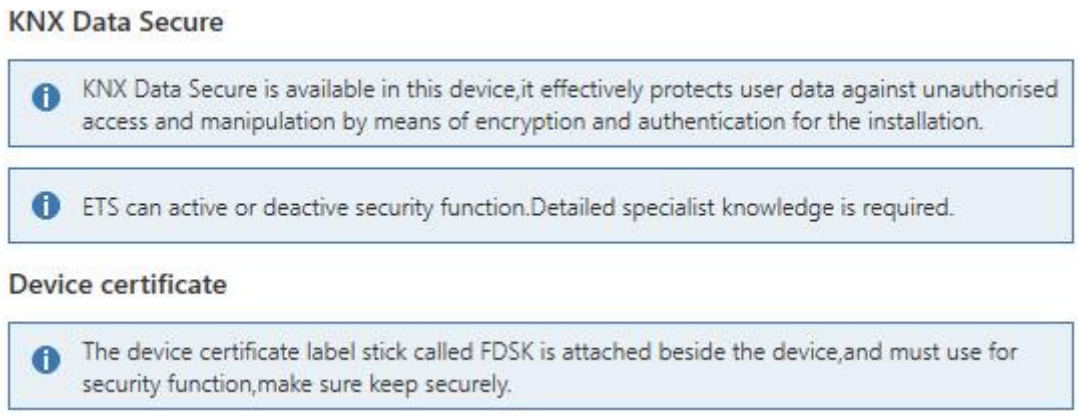


Fig.4.1 (1) "KNX Secure" parameter window

The device with KNX secure will be displayed notes on ETS, as shown as Fig.4.1(1).

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



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

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

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

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

✧ On the first download of the device, a window pops up in the ETS to prompt the user to enter the key, as shown in Fig.4.1 (2) below.

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

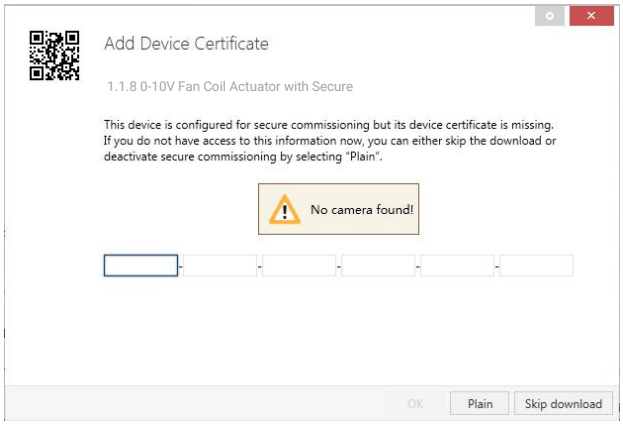


Fig.4.1(2) Add Device Certificate window

✧ 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.4.1(3) below.

The certificates can be also added to the selected device in the project, as shown in Fig.4.1(4).

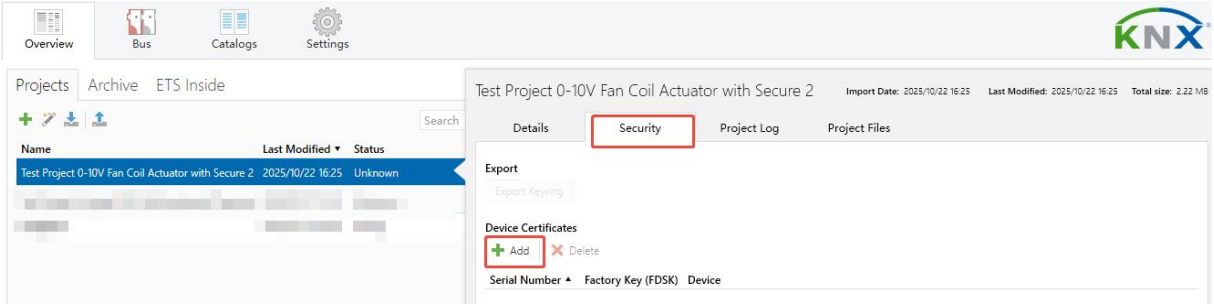


Fig.4.1(3) Add Device Certificate

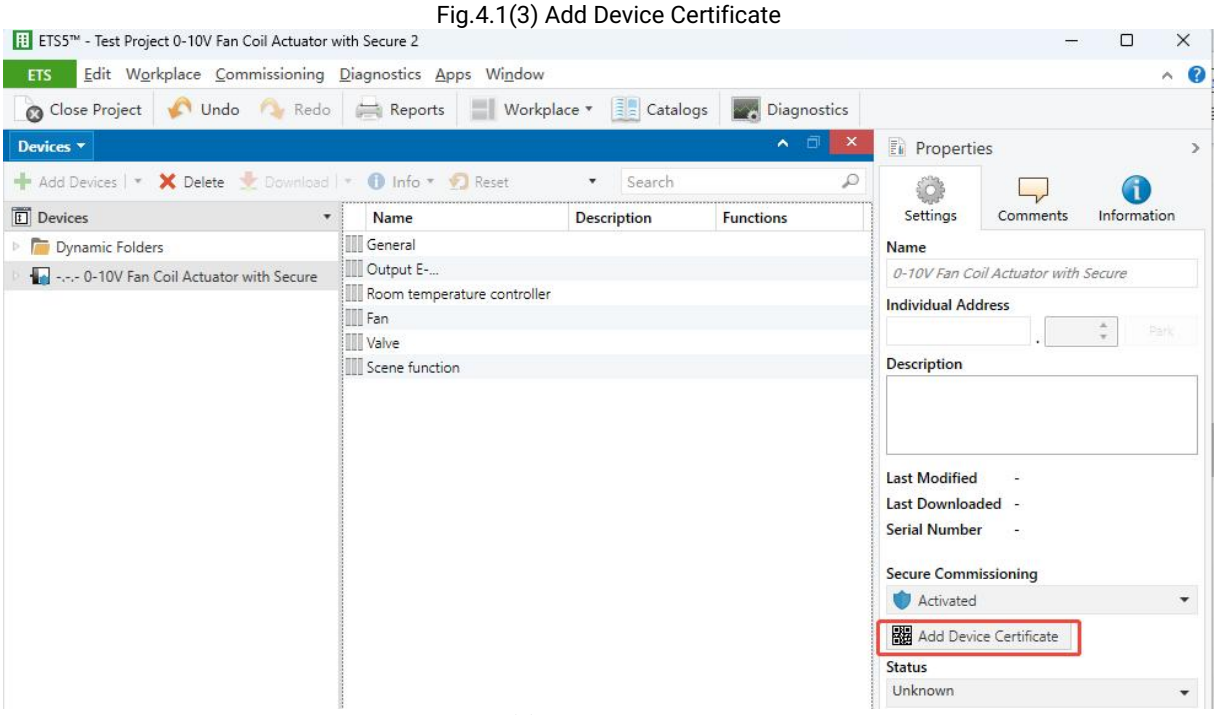


Fig.4.1(4) Add Device Certificate

✧ 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.4.1(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).

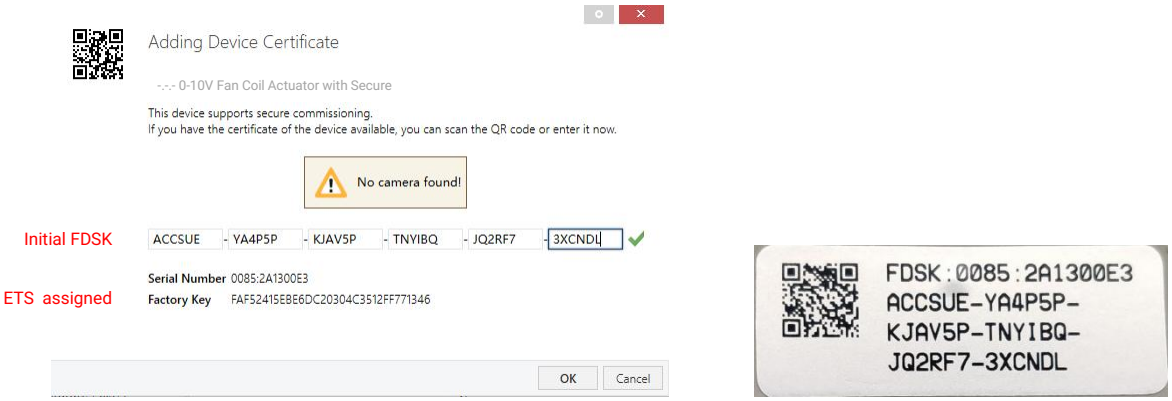


Fig.4.1(5)

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.4.1(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.4.1(6)), and then the device can be successfully downloaded again.

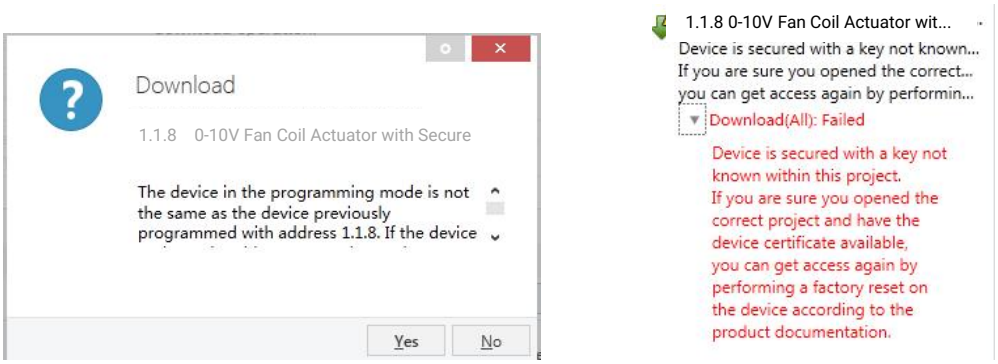


Fig.4.1(6) Example

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.4.1(7) below.



Fig.4.1(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.4.1(8) below, the file extension is .knxkeys.

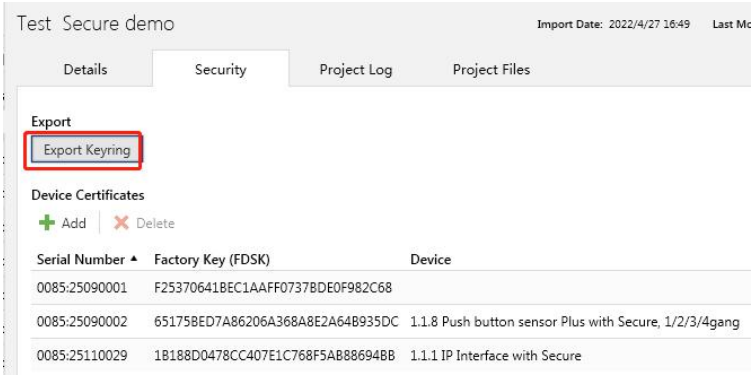


Fig.4.1(8)

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.

4.2. Parameter window“General”

Parameter window “General” can be shown in fig. 4.2,this is mainly set some basic parameters for the 0-10V Fan Coil Actuator with Secure.

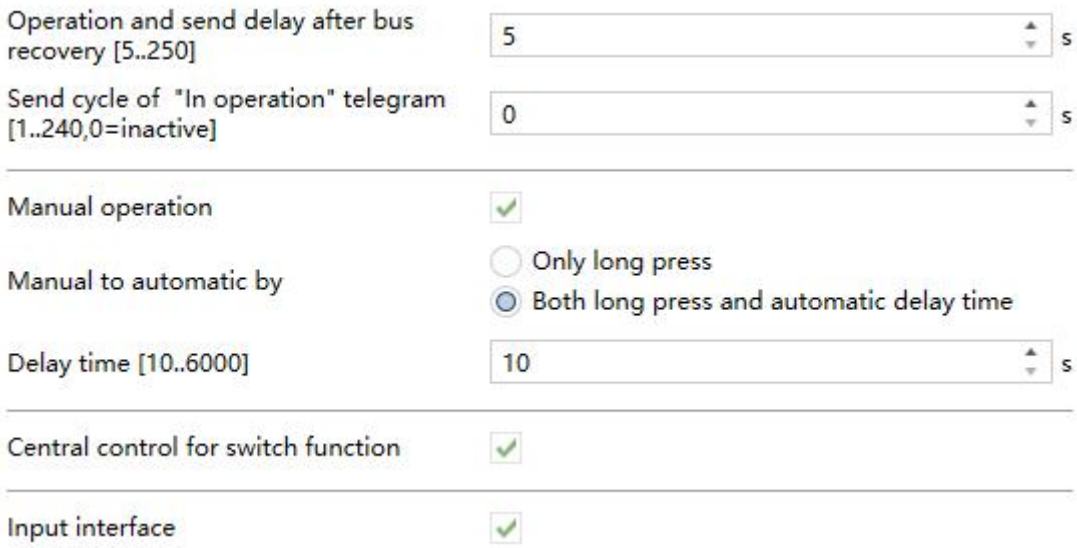


Fig.4.2 Parameter window“General”

Parameter“Operation and send delay after bus recovery [5..250]”

This parameter defines the delay time of the all operation after the device power voltage recovery.

The actions are only executed or the telegrams are only sent when the delay is completed.

This delay time does not include the initialization time of the device. After the power supply voltage is restored, the initialization time of the device startup is about 3 s. It means the delay time starts after the device initialization.

Note: During delay, the programming green LED is on, after the delay is completed, the green LED flashes, and the relay can be operated.

Parameter“Sending cycle of “in operation”telegram (1...240s, 0 = inactive):”

This parameter sets the interval time this module cyclically sends telegram through the bus to indicate the normal operation of this module.

When it is set as “0”, the object "in operation" will not send a telegram.

If the setting is not "0", the object "in operation" will send a telegram with logic "1" to the bus according to the set time period.

Options: **1.....240s,0=inactive**

In order to reduce the bus load as much as possible, the maximum time interval should be selected according to actual needs.

Note: The time period starts after the device initialization, regardless of the operation delay.

Parameter"Manual operation"

This parameter is for setting whether to enable manual operation.

When enabled, the following parameters are visible:

——Parameter"Manual to automatic by"

Options:

Only long press

Both long press and automatic delay time

If set "only long press", the manual/auto. Operation only can be switched via long press the Man. Button.

If set "both long press and automatic delay time", the manual/auto. Operation can be switched via long press the Man. Button. or the set time for the manual to automatic has elapsed.

——Parameter"Delay time *1s [10...6000]"

The parameter appears when "Both long press and automatic delay time" is selected in the parameter "Manual to automatic by". It is used for setting the time for an automatic reset from the "manual operation" to "automatic operation" state after the last push button operation.

Options:**10..6000**

Parameter"Central control for switch function"

This parameter is for setting whether to enable central control for switch function.

If enable，the object"Central switch" is visible，all channels with central control enabled can be switched together via the object.

Parameter"Input interface"

When this parameter is enabled, the "Input" is visible. This function is described in detail in chapter 4.3

4.3. Parameter window“Input X”

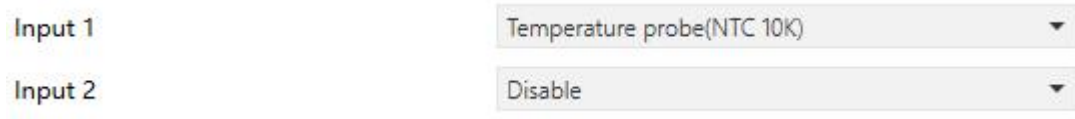


Fig.4.3 Parameter window “Input”

Parameter"Input x"(x=1, 2)

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

Disable

Temperature probe(NTC 10K)

BI: Switch sensor

BI: Scene control

BI: Send String(14bytes)

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

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

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

4.3.1.Temperature probe

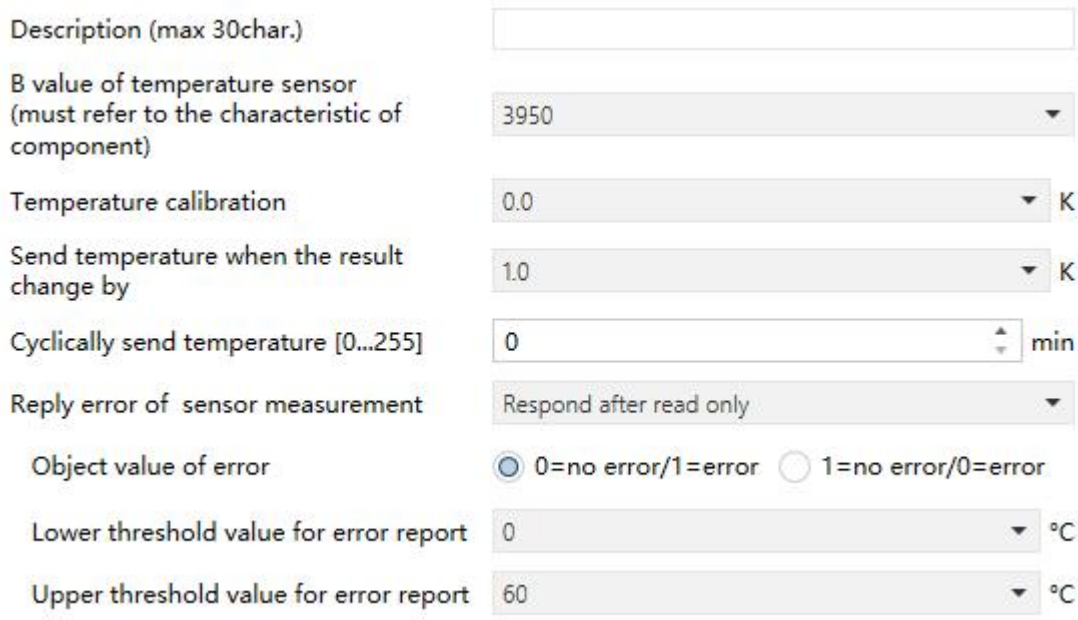


Fig.4.3.1 Parameter setting of temperature probe

Parameter"Description (max 30char.)"

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

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

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

3275

3380

...

4200

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

Parameter"Temperature calibration"

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

Options:

-5.0K

...

0.0K

...

5.0K

Parameter"Send temperature when the result change by"

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

Disable

0.1K

0.2K

0.3K

0.5K

1.0K

...

10.0K

Parameter"Cyclically send temperature [0..255]"

Setting the time for cyclically sending the temperature detection 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 detection. Options:

No respond

Respond after read only

Respond after change

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

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

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

——Parameter"Object value of error"

This parameter for defining object value of error. Options:

0=no error/1=error

1=no error/0=error

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

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

——Parameter"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**

——Parameter"Upper threshold value for error report"

This parameter is for setting the upper threshold value for temperature error. When the temperature higher

than the threshold, temperature error object will send telegram.

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

4.3.2.Binary input

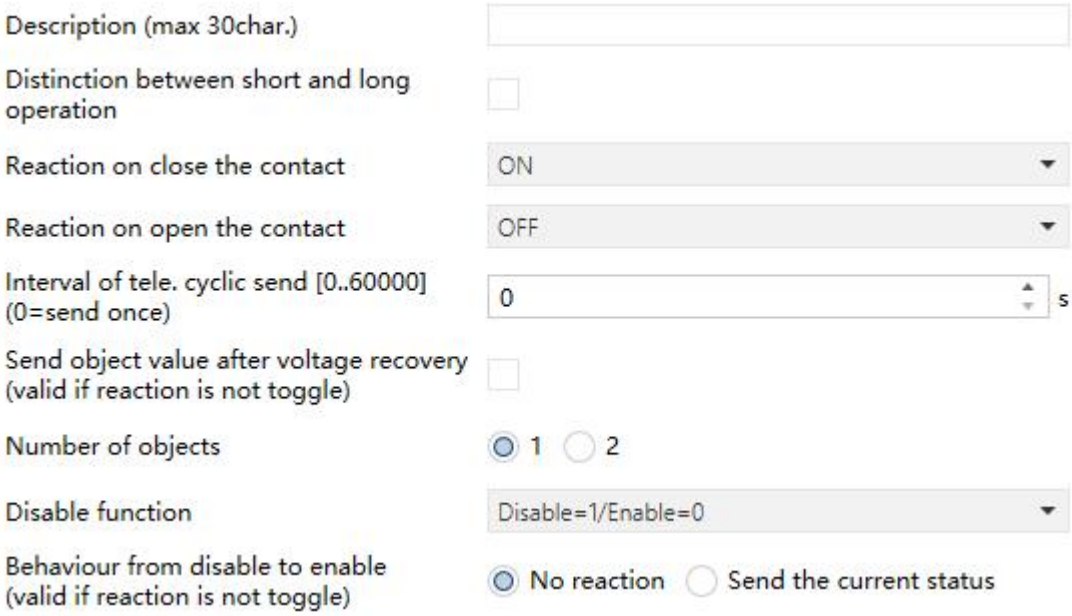


Fig.4.3.2(1) Parameter setting of switch sensor

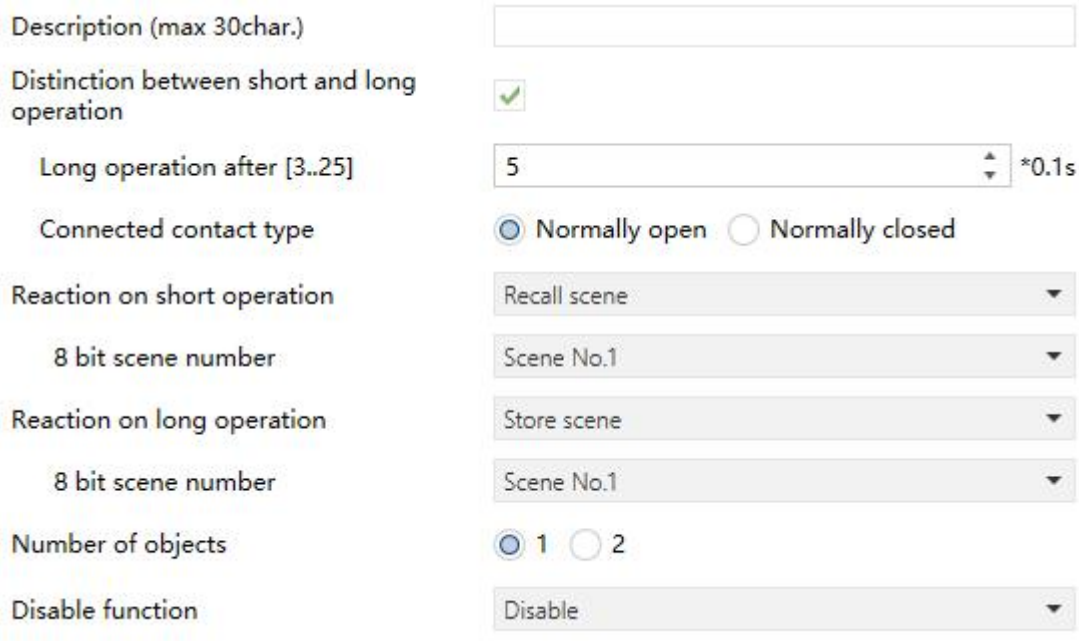


Fig.4.3.2(2) Parameter setting of scene control

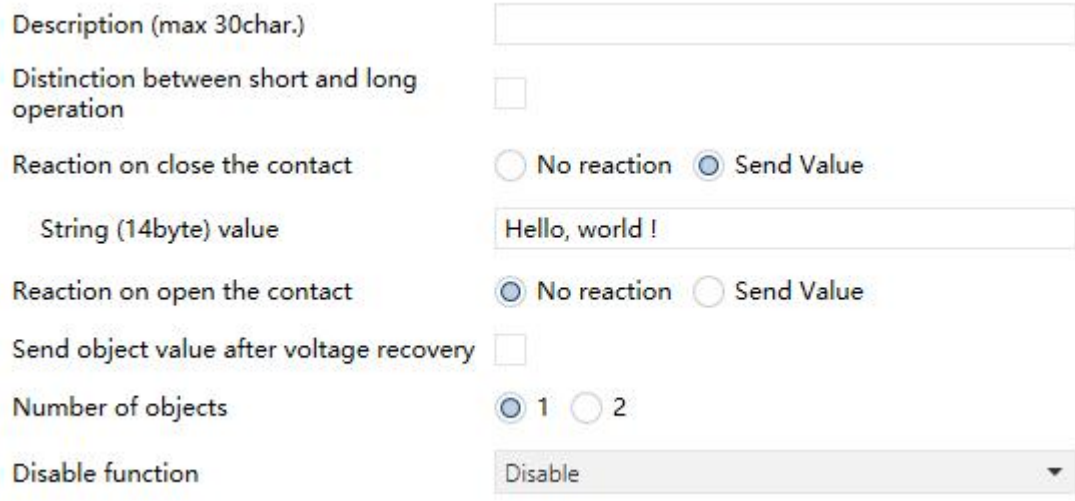


Fig.4.3.2(3) Parameter setting of sending sting

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.

——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"Interval of tele. cyclic send [0..60000] (0=send once)"

This parameter is visible when no distinction between short and long operation. Set the interval of telegram cyclic send. Options: **0..60000 s, 0 is only send once**

——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.

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"

These parameter is visible when distinction between short and long operation. Judge the short and long operations, and send strings according to the settings. Options:

No reaction

Send Value

——Parameter"Reaction on close/open the contact"

These 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.

Parameter"Number of objects"

This parameter is visible when the parameters "Reaction on short/close operation" or "Reaction on long/open operation" are 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

——Parameter“Behaviour from disable to enable(valid if reaction is not toggle)”

This parameter is visible when “BI: Switch sensor” is selected and no distinction between short and long operation. Set the behaviour from disable to enable(valid if reaction is not toggle). Options:

No reaction

Send the current status

4.4. Parameter window“Output X”

The parameter setting interface “Output X” is shown in Fig. 4.4(1). The setting of this interface acts on the entire channel of the relay. In addition to setting the commonly used switching functions, it can also set the report of system power-on and switch status.

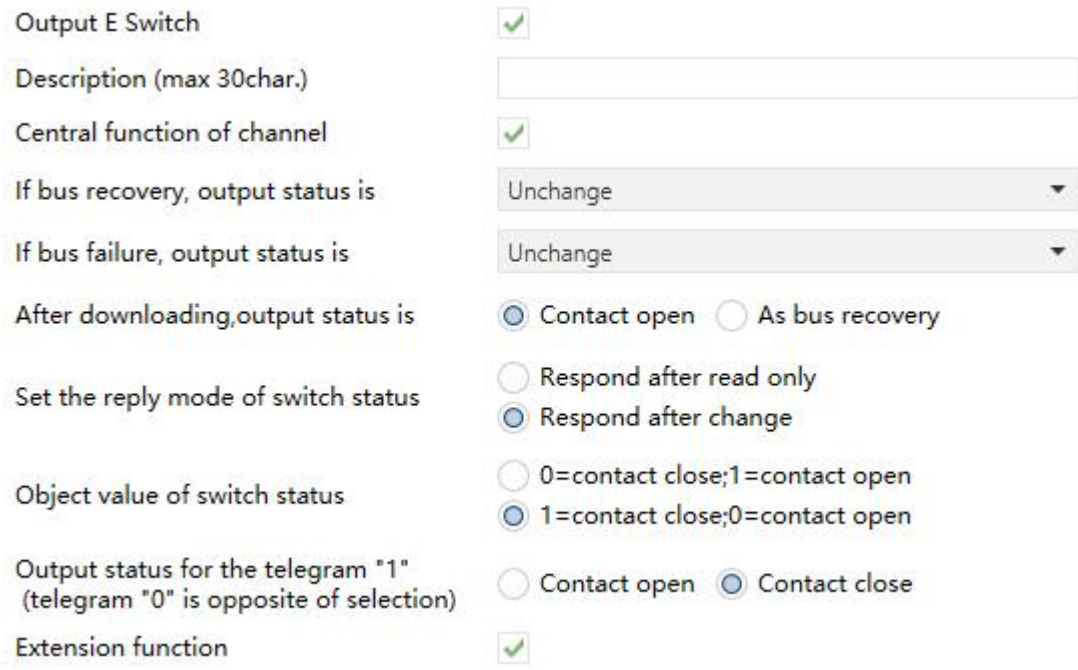


Fig.4.4(1) Parameter window“Output X”

Parameter“Output X Switch”(X=A/B/C/D)

This parameter is for setting whether to enable output x switch.

When enabled, the following parameters are visible:

Parameter“Description (max. 30char.)”

This parameter is used to set the custom description of channel, up to input 30 characters.

Parameter“Central function of channel”

This parameter is for setting whether to enable central function of channel.

When enabled, the channel will be controlled by the central control object "Central switch".

Parameter“If bus recovery, output status is”

The Parameter sets the position of the relay contacts when the device bus is powered up. Options:

Unchange

Contact open

Contact close

As before as bus fail

When selecting “Unchange”, the contact will not change when bus power on.

When selecting “Contact open”, the contact will be opened when bus power on.

When selecting “Contact close”, the contact will be closed when bus power on.

When selecting “As before bus voltage fail”, the contact position when bus power on is the same as that before power off.

Parameter"If bus failure, output status is"

The output can adopt a defined status after the bus voltage failure via this parameter. Options:

Unchange

Contact open

Contact close

When selecting “Unchange”, the contact will not change when bus power on.

When selecting “Contact open”, the contact will be opened when bus power on.

When selecting “Contact close”, the contact will be closed when bus power on.

Parameter"After downloading, output status is"

This parameter set the contact position of the output after downloading. Options:

Contact open

As bus recovery。

When selecting “Contact open”, the contact is open after application downloading.

When selecting “As bus recovery”, the contact will action according to the setting of parameter “If bus recovery, contact is” after application downloading.

Parameter"Set the reply mode of switch status"

This parameter defines how to respond the current switch status to the bus. There are two Option to select. Options:

Respond after read only

Respond after change

If selecting "Respond after read only", the status telegram will not be sent out until receiving a read request telegrams via the object “Switch status” from the bus.

If selecting “Respond after change”, when switch status of the channel changes, object “Switch status” will immediately send the current report telegram to the bus.

Parameter"Object value of switch status :"

Options:

0=contact close; 1=contact open

1=contact close; 0=contact open

When setting "0=contact close; 1=contact open", the value of object “switch status” is 0 indicates the contact of the relay will be closed; when is 1, indicates the contact of the relay will be closed will be open.

When setting "1=contact close; 0=contact open" indicates the opposite meaning.

Note: After programming or system reset, the switch status is determined, the object "switch status"

will send status messages to the bus; if not, it will not be sent.

Parameter"Output status for the telegram "1"(telegram "0" is opposite of selection)"

This parameter defines the contact position when switch on the switch, which will be triggered by the communication object “Switch”. When enabling “Input 0” in the logic function, it will use the communication object “Switch” to modify the value of “Input 0”, rather than triggering the switch operation. In this case, this parameter setting is no significance. Options:

Contact open

Contact close

When select “Contact open”, the contact position is open, when receive telegram “1”, the contact will be open; when receive telegram “0”, the contact close;

When select “Contact close”, the contact position is close, when receive telegram “1”, the contact will be closed; when receive telegram “0”, the contact open.

Note: When the logic function input 0 enables, the object "switch" used as input of input 0, the operation of general switch will become invalid.

Parameter"Extension function"

This parameter is for setting whether to enable extension function. .

The parameter setting interface “Ox: Function” will be seen when enabled, and able to set the special functions individually in Fig. 4.4(2).

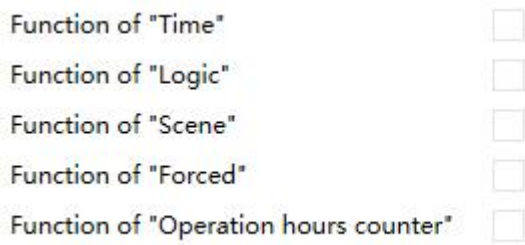


Fig.4.4(2) Special function enable setting interface "Ox: Function"

4.4.1.Parameter window“X: Time”

This parameter window is visible when the parameter “Function of Time” is enabled in the window “X: Function” in Fig. 4.4(2), as shown as Fig. 4.4.1. And the object “Enable time function” will be also visible, which is used to disable the time function. After disabled, clear the current timer, stop running and ignore the delayed operation.

Parameter“Type of time function”

The parameter defines the type of the time function, there are three options for the mode of work. Options:

Delay

Flashing

Staircase

4.4.1.1.“Delay”

The parameter window “X: Time-Delay” setting interface in Fig. 4.4.1.1 will be shown when selecting “Delay”. The delay switch can be started via the object "Delay function".

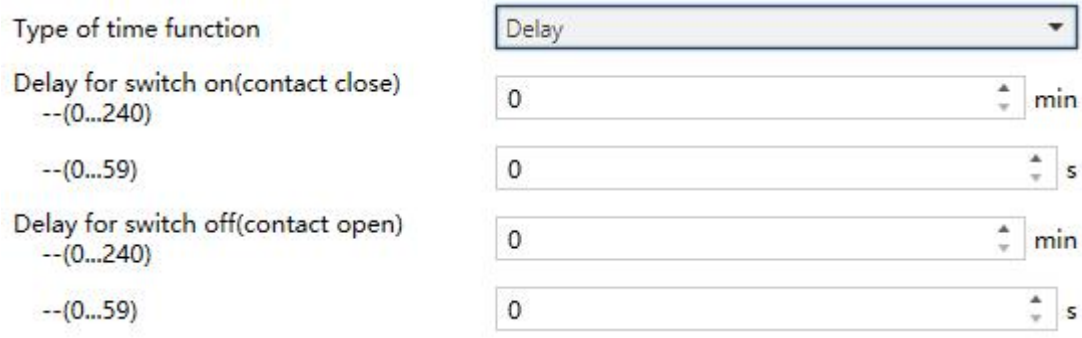


Fig.4.4.1.1 Parameter window“X:Time-Delay”

Parameter“Delay for switch on(contact close): (0...240)/ (0...59)”

This parameter defines the delay time of switching on. Options: **0...240 min/0...59 s**

Setting the delay time to switch off when object receive the control telegram.

Parameter“Delay for switch off(contact open): (0...240) / (0...59)”

This parameter defines the delay time of switching off. Options: **0...240 min/0...59 s**

After receiving the delay off telegram, the switch is off once the delay over.

If receiving the re-trigger telegram again during delay, the delay will be reset.

4.4.1.2. "Flashing"

The parameter window "X: Time-Flashing" setting interface in Fig. 4.4.1.2 will be shown up when selecting "Flashing" in the parameter "Type of time function". The flashing switch function is mainly used for lamp aging test.

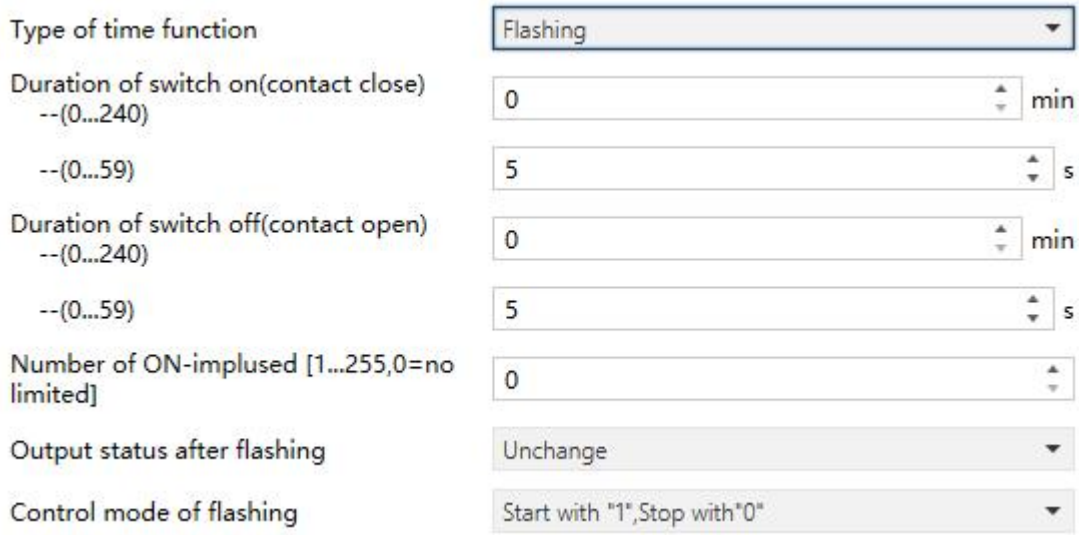


Fig.4.4.1.2 Parameter window"X:Time-Flashing"

Flashing function can be started via the object "Flashing function". It is able to set the flashing time in Duration of switch on(contact close)" or "Duration of switch off(contact open)", which will restart the flashing when receiving the start flashing telegram, and define the contact position after flashing.

Parameter"Duration of switch on(contact close): (0...240) , (0...59)"

This parameter defines the duration of the switch on the output when flashing. Options:

0...240 min

0...59 s

Parameter"Duration of switch off(contact open): (0...240) , (0...59)"

This parameter defines the duration of the switch off the output when flashing. Options:

0...240 min

0...59 s

Note: It will not be executed unless the time is lower than the relay threshold switch frequency. Since there will be not sufficient energy to do it because of the frequent relay switching, and it may cause the time delay. The same situation will happen after the bus voltage recovery.

Parameter"Number of ON-impulsed [1...255, 0=no limited]"

This parameter sets the flashing times. 0 means no limited. A flashing includes an on and an off. Options:

0...255

Parameter"Output status after flashing"

This parameter defines the relay contact position after flashing. Options:

Unchange

Open

Close

Parameter"Control mode of flashing"

This parameter is used to select the control mode of the flashing output. Options:

Start with "1", Stop with "0"

Start with "0", Stop with "1"

Start with "0/1", can not be stop

It will start flashing with value "1" when selecting "start with "1", stop with "0"", it will stop flashing with "0". The stop position is defined via last parameter.

It will start flashing with value "0" when selecting "start with "0", stop with "1""; it will stop flashing with "1". The stop position is defined via last parameter.

It will start flashing with either "1" or "0" when selecting "start with "1/0", can not be stopped"; under this circumstance it cannot terminate the flashing by value until operation over, unless it is blocked by other operation or wait for execution finish.

4.4.1.3. "Staircase"

The parameter window "X: Time-Staircase" setting interface in Fig. 4.4.1.3 will be visible when selecting "Staircase" in the parameter "Type of time function".

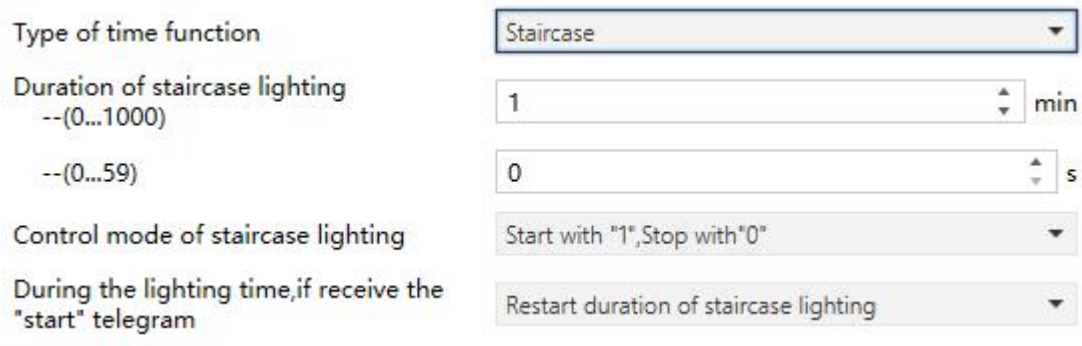


Fig.4.4.1.3 Parameter window"X:Time-Staircase"

The staircase lighting can be started via the object "Staircase function". The value that switches on the staircase lighting can be set via a parameter. The duration time of the lighting on is also set via a parameter.

Parameter"Duration of staircase lighting--(0...1000) --(0...59)"

This parameter describes the duration time when switching on the staircase light function. Options:

0...1000 min

0...59 s

Parameter"Control mode of staircase lighting"

This parameter defines the control mode on/off of the staircase lighting. Choose suitable control mode according to the needs. Options:

Start with "1", Stop with "0"

Start with "1", no reaction with "0"

Start with "0/1", can not be stop

Start with "1", OFF with "0"

When selecting "Start with '1', stop with '0'" , it will switch on the staircase lights with the value "1"; it will stop the time counting operation with "0" and don't change the contact position until changed by other operations;

When selecting "Start with '1', no reaction with '0'", it will switch on the staircase lights with the value "1" and no reaction with "0";

When selecting "Start with '0/1', can not be stop", it will switch on the staircase lights either with "0" or "1" but cannot stop it until the duration time finished or changed by other operation;

When selecting "Start with '1', OFF with '0'", it will switch on the staircase lights with the value "1", and off with "0".

Parameter"During the lighting time ,if receive the'start'telegram"

Options:

Restart duration of staircase lighting

Extend duration time

Ignore the "start" telegram

If selecting “restart duration of staircase lighting”, if the object “Staircase function” again receive the telegram of starting staircase lighting during the duration time, then the staircase lighting will restart and the duration time will be restart.

If selecting "Extend duration time", if the object “Staircase function” again receive the telegram of starting staircase lighting during the duration time, then the duration of the staircase lighting will be extended based on the current timing. For example, the duration of the staircase light is set to 60 seconds, and the current time is 20 seconds, then after receiving a start telegram, the lighting time of the staircase light will become 40+60=100seconds, and the staircase lighting will automatically turn off after 100 seconds. If multiple start telegrams are received continuously, the duration time will continue to accumulate before the maximum time limit is reached.

If selecting “Ignore the ‘switch on’ telegram”, then it will ignore the receiving telegram of the object “Staircase function” during the duration time.

4.4.2.Parameter window“X: Logic”

This parameter window is visible when the parameter “Function of Logic” is enabled in the window “X: Function” in Fig. 4.4(2), as shown as Fig. 4.4.2.

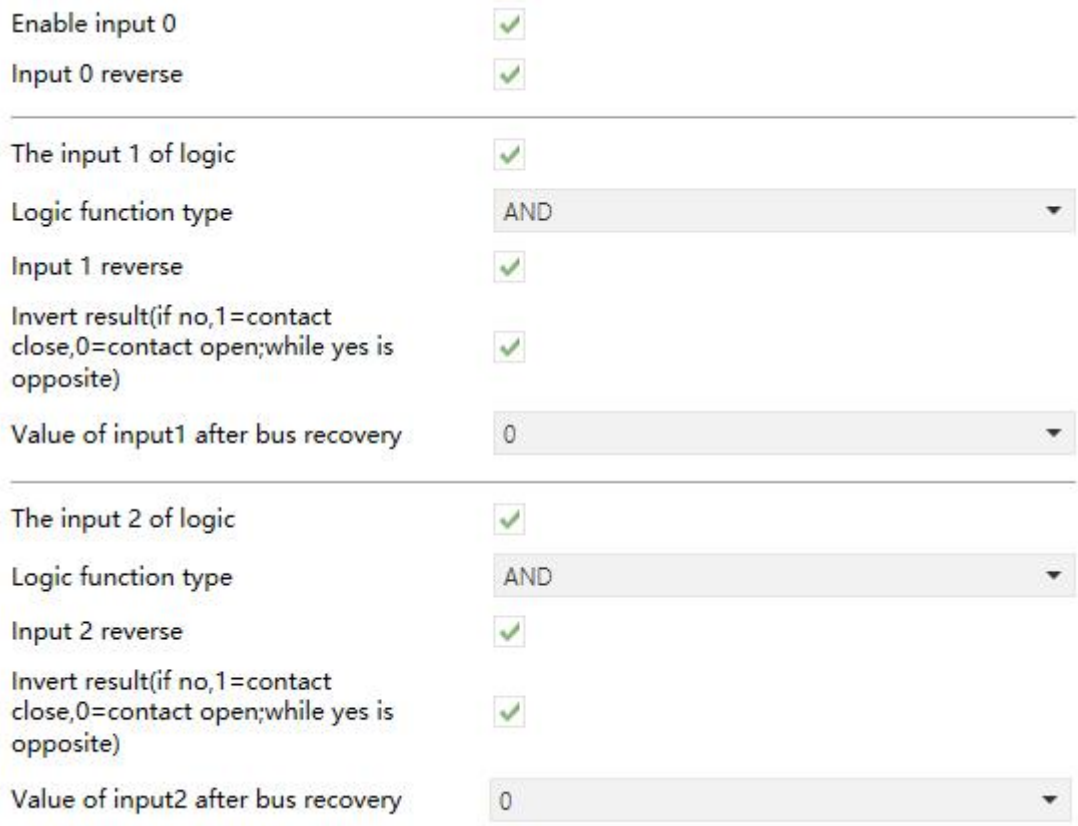


Fig.4.4.2 Parameter window “X：Logic”

There are 2 logic communication objects to decide the status of each output, which are related to the "Switch".

It will re-operate when receiving a new object value as the final output status (close the contact with “1”, open it with “0”).

The values of the communication object “Logic 1” makes logic operation with “switch” firstly, and then the result after that will makes operations with the value of “Logic 2”. This operation will ignore the objects which are unable, and continue to the next step with the ones who are enabled.

Parameter“Enable input 0”

This parameter is used to enable the function of logic operation of “input 0”, whose value are wrote by the object "Switch".

In the both cases of “Input 0” enabled and not enabled, there are a little different parameters. All parameters of logic function have described in the following. If input 0 is disabled, the parameters will be less. If there are not certain parameters in the case, then it is also not available with the function of these parameters.

数“Input 0/1/2 reverse”

This parameter defines whether negate the value of Input 0/1/2. Negate it with “Enable”, don’t with

"Disable".

Parameter"The input x of Logic"(x=1, 2)

This parameter is used to enable input 1 and input 2. If enable, their communication objects "Logic 1" and "Logic 2" will be also visible.

Parameter"Logic function type"

This parameter set logic function type, provided three standard logic operations: AND, OR, XOR, and a GATE function.

Explanation of gate function: it will use the next logic value as the enable mark of the previous logic. If the enable mark of the next logic is "1", that means it is able to use the previous logic value as the operation result. E.g. the value of Input 1 is 1, that means the value of Input 0 can be used as the operation result; if the value 2 is 1, that means the operation value of Input 0/1 can be used as the result. Options:

AND

OR

XOR

GATE

Below result of logic operation is possible:

Logic function	Object values					Description
	Input0(Switch)	Input1	Result of Input 0/1	Input2	Output	
AND	0 0 1 1	0 1 0 1	0 0 0 1	0 1 0 1	0 0 0 1	The result is 1 if both input values are 1.
OR	0 0 1 1	0 1 0 1	0 1 1 1	0 1 0 1	0 1 1 1	The result is 1 if one of both input values is 1
XOR	0 0 1 1	0 1 0 1	0 1 1 0	0 1 0 1	0 0 1 1	The result is 1 if both input values have a different value.
GATE	0 0 1 1	Closed Open Closed Open	0 1	Closed Open Closed Open	0 1	The input 0 of value is only allowed through if the GATE (input 1 and input 2) is open. Otherwise the

						input0 of value is ignored.

Note:

1. The value of the communication object "Input 1" makes logic operation with “Switch” firstly, and then the result will makes operations with the value of “Input 2”, and the final operation result as the final output (close the contact with “1”, open it with “0”).

2. If an input is not enabled, the input is ignored.

3. If logical result needs to be negated, the first negated, then the next step.

4, The signal can be passed if the GATE is open, otherwise it is ignored. For example, the input 0 of value is ignored when the GATE of input 1 is closed, and the output is directly determined by the input 2.

Parameter"Invert result(if no,1=contact close,0=contact open;while yes is opposite)"

This parameter defines whether negate the logical operation results. Negate it with “Enable”, don’t with “Disable”.

Parameter"Value of input1 after bus recovery"

This parameter defines the default value of the object “Logic 1”after bus voltage recovery. Options:

0

1

Value before power off

Parameter"Value of input2 after bus recovery"

This parameter defines the default value of the communication object “Logic 2” after bus voltage recovery, “1” or “0” is optional. Options:

0

1

Value before power off

4.4.3.Parameter window"X: Scene"

This parameter window is visible when the parameter "Function of Scene" is enabled in the window "X: Function" in Fig. 4.4(2), as shown as Fig. 4.4.3. Here can set 8 scenes.



Fig.4.4.3 Parameter window "x: Scene"

Parameter"Overwrite scene stored values during download"

This parameter sets whether to override the scene save value during application download.

If it is disabled, the stored values before the download can be not overwritten by the parameterized scene value. When the scene is called, the scene saved before the download is still enabled until it is replaced by the new storage scene.

If it is enabled, the stored values will be overwritten by the parameterized scene value during the download. When the scene is called, the scene will be set according to the parameters until it is replaced by the new storage scene.

Parameter"x> channel is assigned to (1...64 ,0= no assignment)"(x=1~8)

It is able to allocate 64 different scene numbers to every output. There are 8 various scenes can be set per output. Options: **1...64, 0=no assignment**

Note: 1-64 in the parameter setup corresponds to the scene number 0-63 received by the communication object "Scene". If a scene is stored via a learning telegram, the new scene will be active immediately and still be valid even if power failure.

——Parameter"Output status is"

This parameter defines the switch output status when recall the scene. Options:

Contact open

Contact close

4.4.4.Parameter window“X: Forced”

This parameter window is visible when the parameter “Function of Forced” is enabled in the window “X: Function” in Fig. 4.4(2), as shown as Fig. 4.4.4.

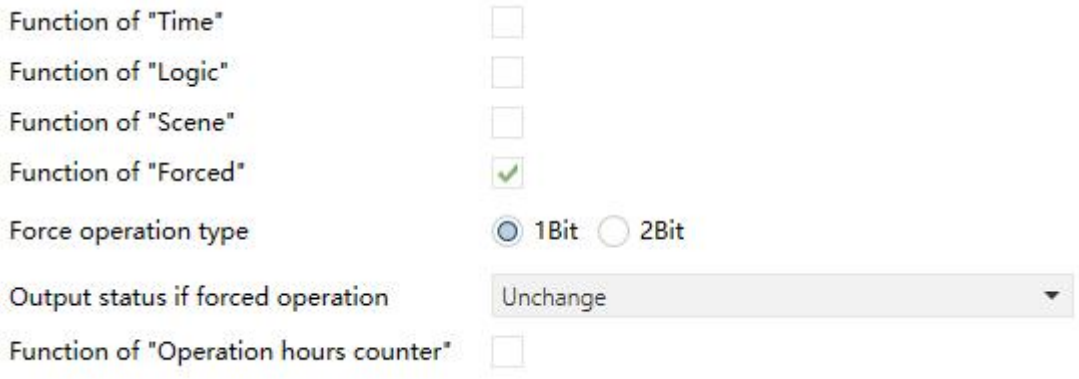


Fig.4.4.4Parameter window “X：Forced”

This function will be used in some special situation such as emergency, and are activated by the object “Forced output” with the highest priority in the system, which means only forced operation are valid in this case.

Parameter“Force operation type”

This parameter defines the control type of force operation. Options:

1bit

2bit

If selecting "1bit", the object "Forced output" receives the telegram "1" to activate force operation, telegram “0” to cancel the force operation.

If selecting "2bit" when the object “Forced output” receives a telegram value, the action as follow:

Value of the object "Forced output, X"	**Action**
00b（0），01b（1）	Cancel force operation, other operation can be performed
10b（2）	Force switch off (OFF)
11b（3）	Force switch on（ON）

When cancel the forced operation, the position of relay contact is unchanged. However, if time function(Delay/Flashing/Staircase) is running before forced operation, then time order is interrupted, if cancel the forced operation, time counting has not finished, it will not continuously operate time function.

Parameter“Output status if forced operation”

This parameter is visible if the option “1 bit” is selected via last parameter, which defines the contact position of force operation. Options:

Unchange

Contact open

Contact close

Unchange: the position of contact will keep on the current status.

Contact open: the position of contact is opened.

Contact close: the position of contact is closed.

Forced operations have the highest priority, and all other operations are ignored during forced operations. Controlling telegrams received during forced operation is ignored.

4.4.5.Parameter window“X: Operation hours counter”

This parameter window is visible when the parameter “Function of Operation hours counter” is enabled in the window “X: Function” in Fig. 4.4(2), as shown as Fig. 4.4.5.The function is use for counting the time of relay on.

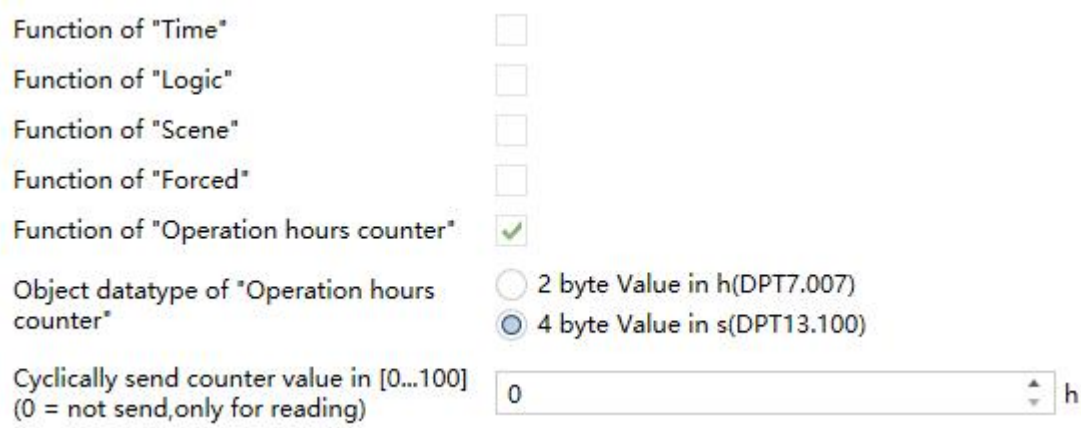


Fig.4.4.5 Parameter window “X：Operation hours counter”

Parameter"Object datatype of Operation hours counter"

This parameter is used to select data type of the operation hours counter. Options:

2 byte Value in h(DPT 7.007)

4 byte Value in s(DPT 13.100)

The "2 byte Value in h (DPT 7.007)" option indicates that the count value is 2 bytes; the "4 byte Value in s (DPT 13.100)" option indicates that the count value is 4 bytes.

Parameter"Cyclically send counter value in [0..100] (0=not send, only for reading)"

The parameter determines the time interval to send the telegram which is used for counting the time of relay on. Available Options: **0...100 h**

“0” means do not send. “1-100”means 1 hours to 100 hours cyclically send the value. When the parameter "Object of switch and operation hours counter" is set to 2 bytes, the operation time is in hours; when it is 4 bytes, the operation time is in s.

4.4.6.Explanation of priority

The priority for various operations of switch actuator control:

Initialization(After the parameter download is completed)→Manual operation (Long press the manual button to switch to manual operation, and the button of the channel has operation)→force operation→general operation

Apply to the following points:

1．Manually operating the switch actuator has the highest priority, higher than force operation, if the force is activated, the status will back to force operation when you exit the manual operation.

2．Suppose running the time function currently, if the channel has manual operation, it will be interrupted and ignored if time counter don't complete.

3．Under the manual operation, any message received is invalid and will not be recorded.

4.5. Parameter window“Room temperature controller”

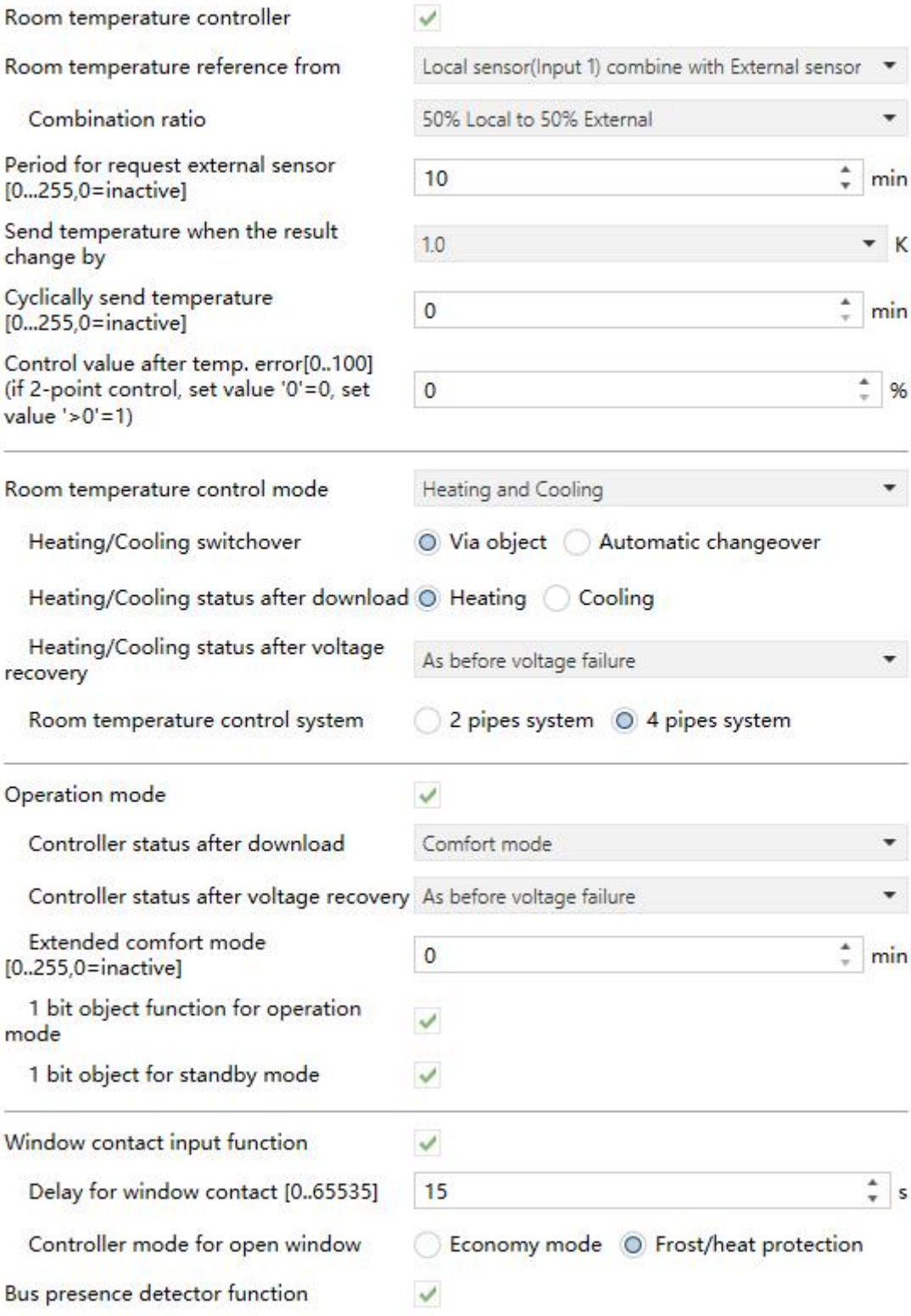


Fig.4.5 Parameter window “Room temperature controller”

Parameter"Room temperature controller"

This parameter is for setting whether to enable room temperature controller.

When enabled, the following parameters are visible:

Parameter"Room temperature reference from "

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

Local sensor(Input 1)

Local sensor(Input 2)

External sensor

Local sensor(Input 1) combination with External sensor

Local sensor(Input 2) combination with External sensor

Parameters as follow are visible when "Local sensor(Input 1/2) combination with External sensor" is selected:

——Parameter"Combination ratio"

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

10% Loacal to 90% External

20% Loacal to 80% External

…

80% Loacal to 20% External

90% Loacal to 10% External

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

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

——Parameter"Period for request external sensor [0...255,0=inactive]"

This parameter is for setting the time period for read request external temperature sensor.

Options: **0..255 min**

——Parameter"Send temperature when the result change by [0...10]"

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

Disable

0.1K

0.2K

0.3K

...

10.0K

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

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

Options: **0..255 min**

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

Note: If the local controller is selected, heating and cooling will switch automatically, and the heating/cooling control mode configured in the scene will be invalid.

——Parameter"Heating/Cooling status after download"

This parameter is for setting the heating/cooling control mode of device when power on RTC after download. Options:

Heating

Cooling

——Parameter"Heating/Cooling status after voltage recovery"

This parameter is for setting the heating/cooling control mode of device when power on RTC 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 device function, 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.

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

...

34.5°C

35.0°C

Automatic H/C mode changeover dead zone

——Parameter"Upper dead zone"

——Parameter"Lower dead zone"

These two parameters are visible when "Heating and Cooling" and "Automatic changeover" are selected.

These parameters are for setting the dead zone range of auto switchover heating/cooling.

Options:

0.5K

1.0K

...

10.0K

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

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

——Parameter"Min. setpoint temperature [5..37] "

——Parameter"Max. setpoint temperature [5..37] "

These parameters are for setting limit the adjustable range of the setpoint temperature, the minimum value should be less than the maximum value. If the setpoint temperature beyond the limited range, the will output the limited temperature. Options:

5°C

6°C

...

37°C

Parameters as follow are visible when operation mode enabled:

——Parameter"Controller status after download"

This parameter is for setting the operation mode when power on RTC after download. Options:

Standby mode

Comfort mode

Economy mode

——Parameter"Controller status after voltage recovery "

This parameter is for setting the operation mode when power on RTC 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]"

此 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 activation. If receive telegram 1 again during the delay time, the time is re-timing. 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.

If change the operation mode, exit the timing, but switch the heating/cooling 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.

Parameter"Window contact input function"

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

When enabled, the following parameters are visible:

——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 the window is open within the set value, the window is not open. If the time is out of the set value, the window is open. Options: **0..65535 s**

——Parameter"Controller mode for open window"

This parameter is visible when operation mode and window contact input function are enabled. If window status is open, perform corresponding operation according to configuration. (When the window is open, you can operate the switch, setpoint temperature and heating/cooling mode. For the operation mode, if a control message is received, it is logged in the background and executed after the window is closed. If no logging is received, return to the previous operating mode.)

Economy mode

Frost/heat protection

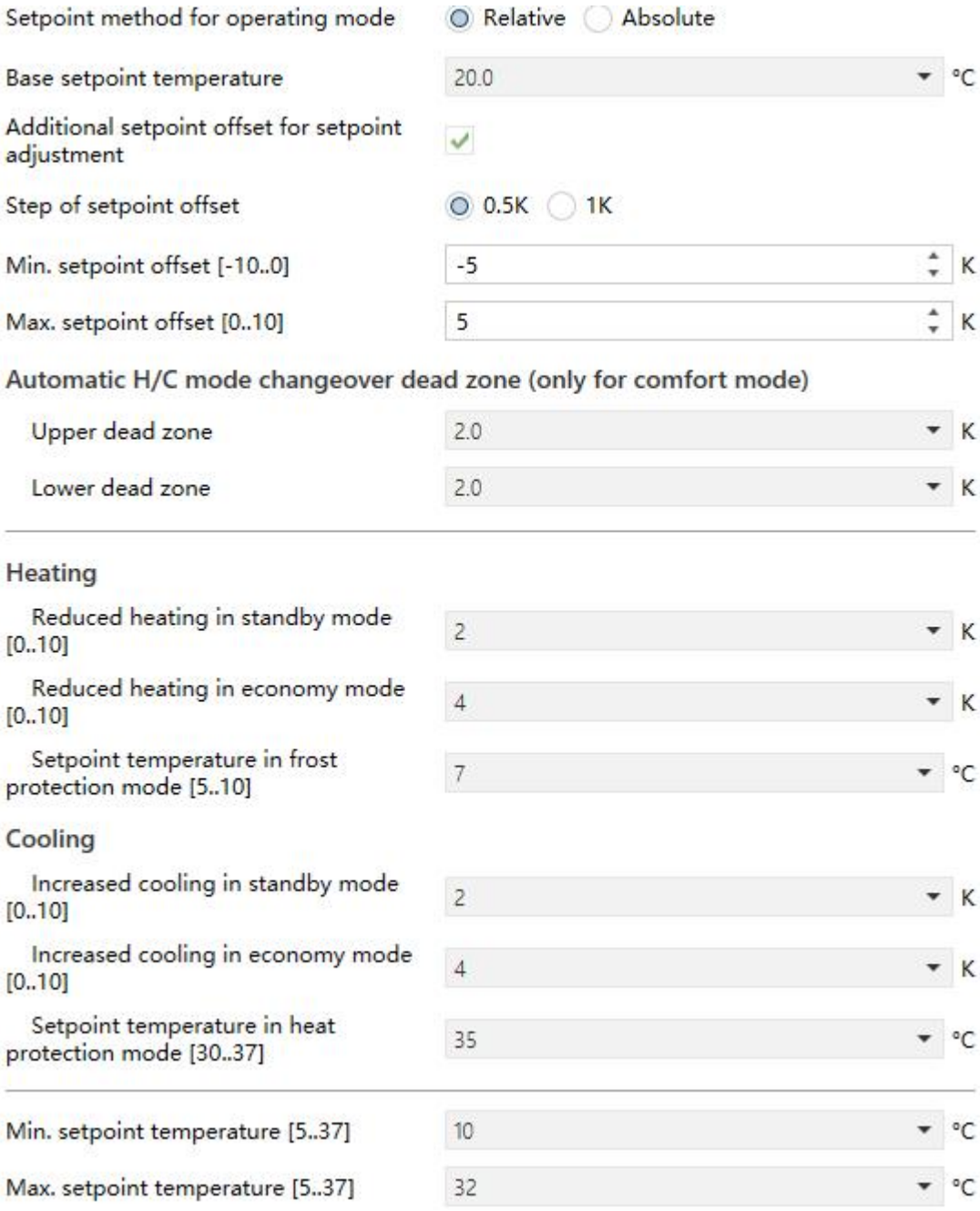
Parameter"Bus presence detector function"

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

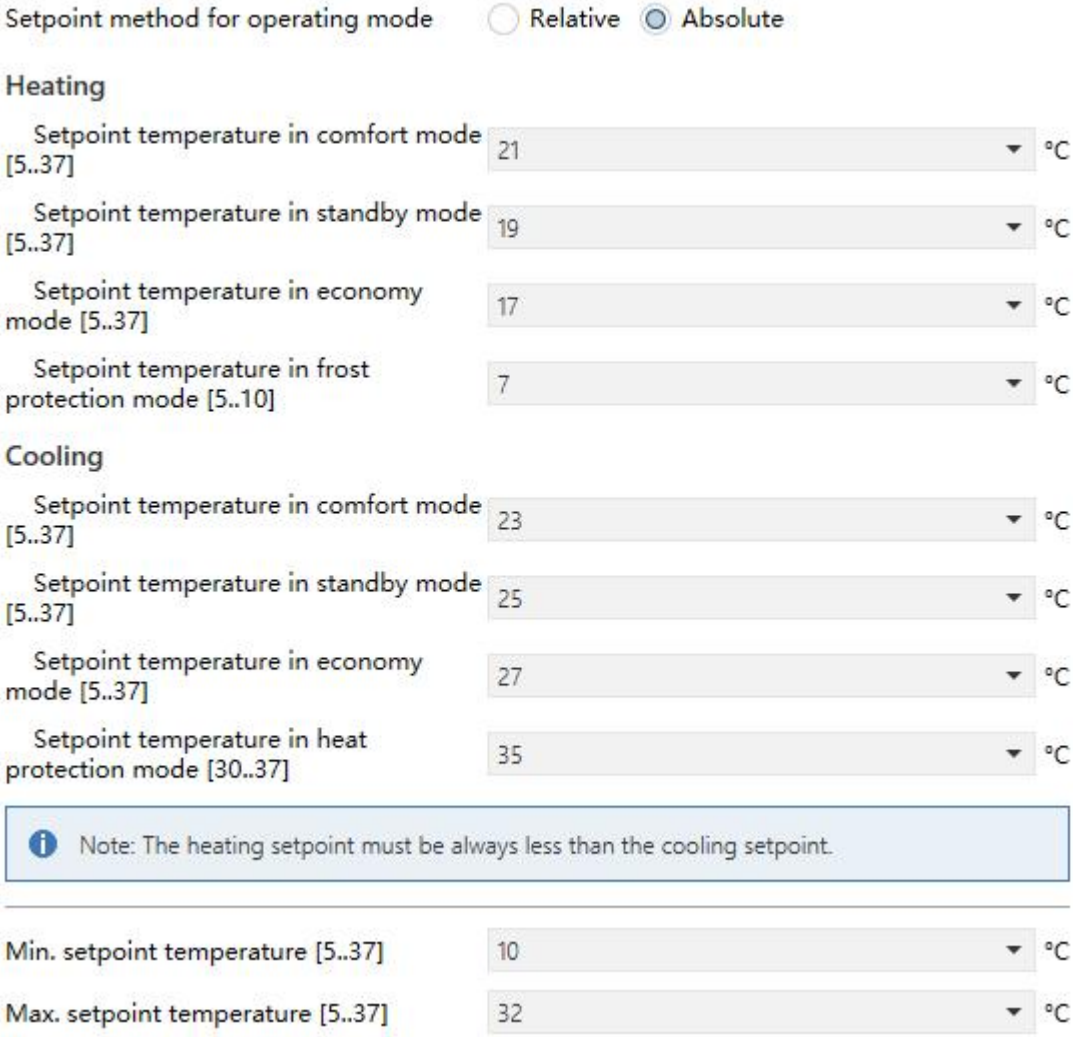
If presence is detected, enter the comfort mode and recovery original mode after leaving. If there is a telegram/manual to adjust the mode, it will not recovery the previous mode after leaving. (If receive presence status cyclically, no comfort mode re-triggered, and only can be after leaving.)

4.5.1.Parameter window ”Setpoint”

This parameter window is displayed according to the room temperature control mode.



Relative



Absolute

Fig.4.5.1 Parameter window"Setpoint"

Parameter"Setpoint method for operating mode"

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

Relative

Absolute

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

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

4.5.1.1.Relative

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

Parameter"Base setpoint temperature"

This parameter is for setting the basic setpoint temperature, form witch the initial setpoint temperature of the room comfort mode is obtained. Options:

10.0°C

10.5°C

...

35.0°C

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

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.

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.

Parameters as follow are visible when"Additional setpoint offset for setpoint adjustment" 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 = current 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**

Automatic H/C mode changeover dead zone(only for comfort mode)

Parameter"Upper dead zone"

Parameter"Lower dead zone"

These two parameters are visible when control mode "Heating and Cooling" and "Automatic changeover" are 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) > or = the setpoint temperature + the upper dead zone, then mode heating switch to cooling;

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

Heating/Cooling

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 standby mode. Options:

0K

1K

...

10K

Heating: The setpoint of standby mode is the temperature setpoint minus the reference value.

Cooling: The setpoint of standby mode is the temperature setpoint plus the reference 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 temperature setpoint minus the reference value;

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

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

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.

Parameter"Min. setpoint temperature [5..37]"

Parameter"Max. setpoint temperature [5..37] "

These parameters are for setting limit the adjustable range of the setpoint temperature, the minimum value should be less than the maximum value. If the setpoint temperature beyond the limited range, the will output the limited temperature. Options:

5°C

6°C

...

37°C

4.5.1.2. Absolute

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

Heating/Cooling

Parameter"Setpoint temperature in comfort [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, "Heating and Cooling" is selected, the note is visible. The heating setpoint value must be less than or equal to the cooling of the same operation mode, if not, it can not be configured on ETS.

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

Points 2 and 3 also apply to “Via object”.

Note: for relative/absolute adjustment, in protection mode, the setpoint temperature is only configured via ETS. 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.

Parameter“Min. setpoint temperature [5..37]”

Parameter“Max. setpoint temperature [5..37] ”

These parameters are for setting limit the adjustable range of the setpoint temperature, the minimum value should be less than the maximum value. If the setpoint temperature beyond the limited range, the will output the limited temperature. Options:

5°C

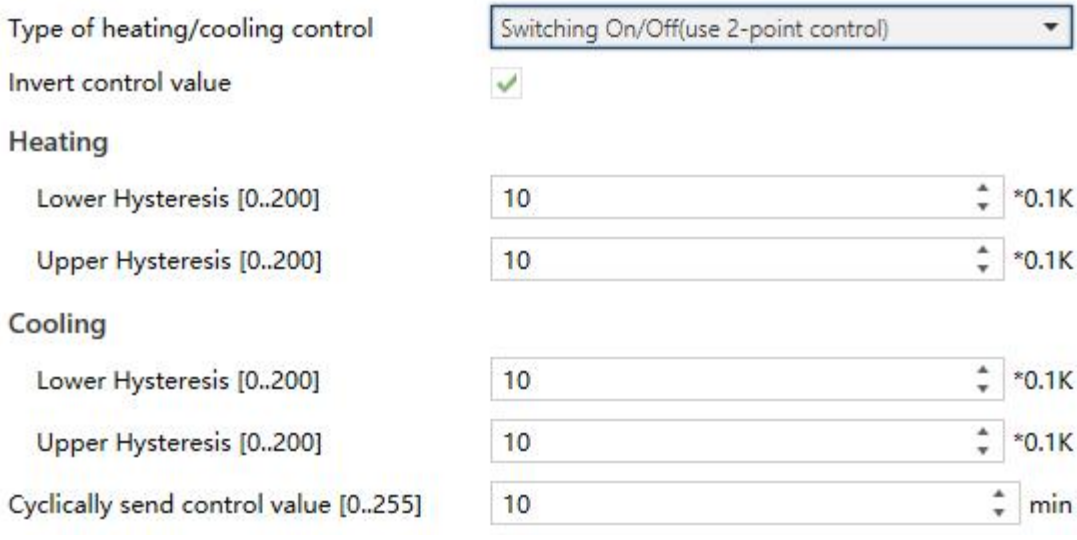
6°C

...

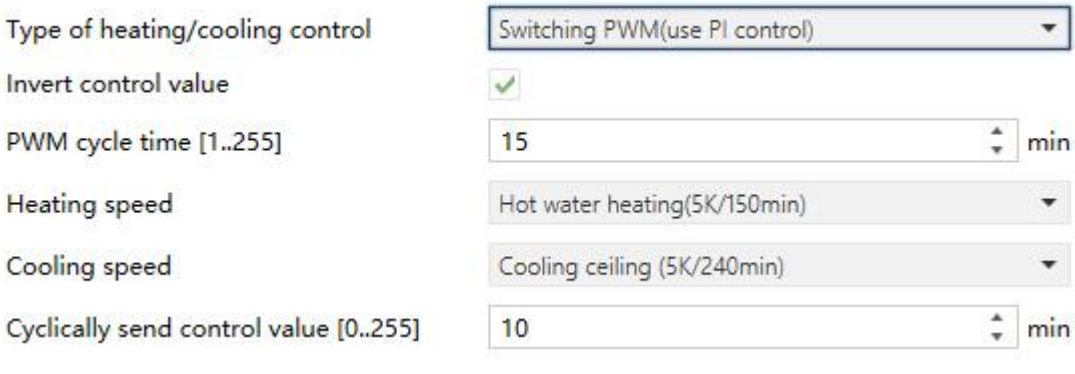
37°C

4.5.2.Parameter window ”Heating/Cooling control”

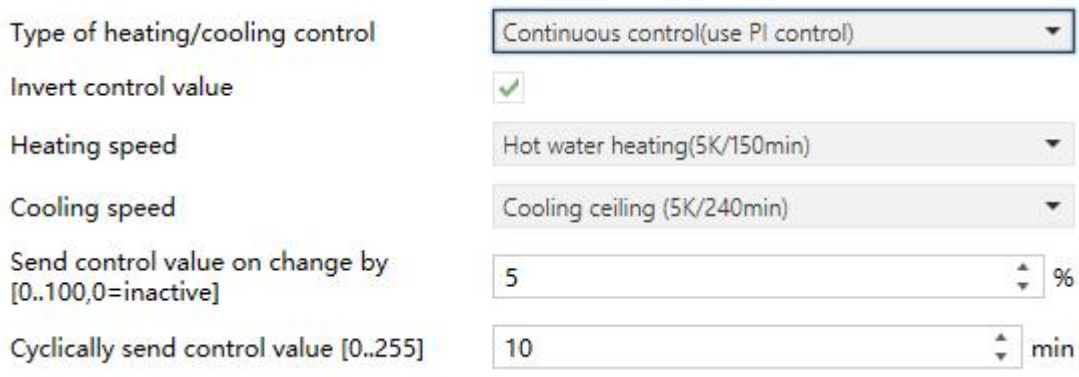
This parameter window is displayed according to the room temperature control mode.



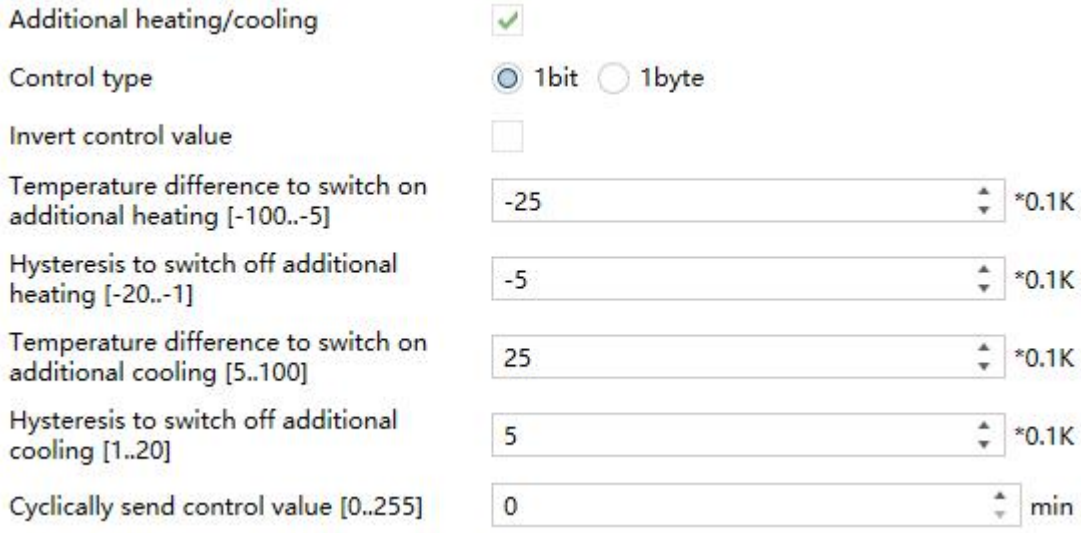
Switching on/off(use 2-point control)



Switching PWM(use PI control)



Continuous control(use PI control)



Additional heating/cooling

Fig.4.5.2(1) Parameter window "Heating/Cooling control"

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

Parameter"Type of heating control"

Parameter"Type of cooling control"

Parameter"Type of heating/cooling control"

This parameter is visible when selecting "Heating and Cooling & 2-pipe" option,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.

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

Two parameters as follow are suitable for 2 point control:

Heating/Cooling

Parameter"Lower Hysteresis [0...200]"

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

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

Under heating control,

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

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

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

Under the cooling control,

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

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

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

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

1. When hysteresis interval is small, the temperature range will be small, however, frequent sending of control value will bring large load to the bus;

2. When hysteresis interval is large, the switch switching frequency will be low, but it is easy to cause uncomfortable temperature change.

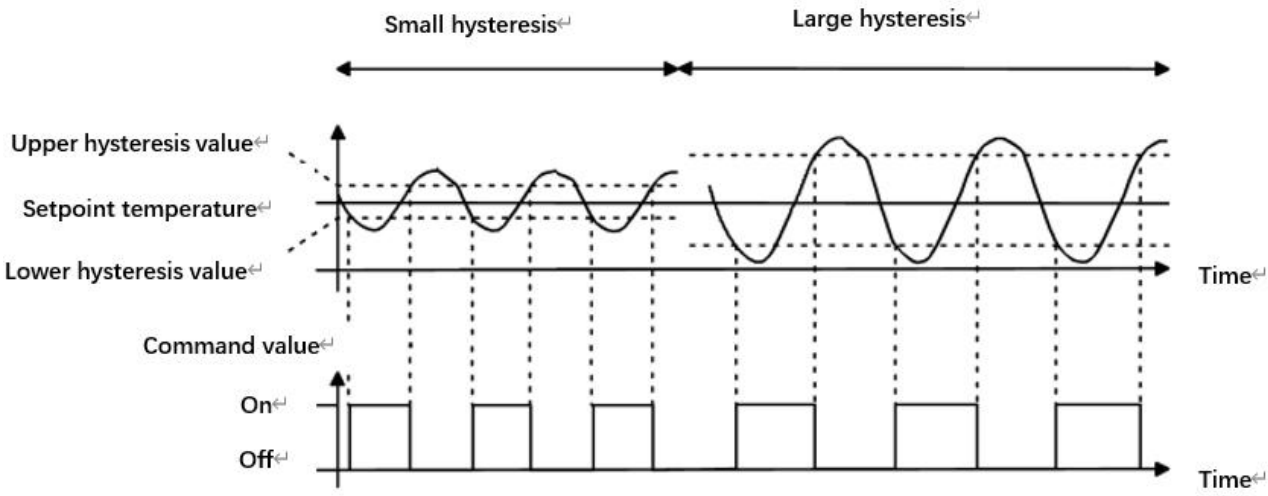


Fig.4.5.2(2) Effects of hysteresis on control value switch action(heating) under2-point control mode

Parameters as follow are suitable for PWN control:

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.

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]”

——Parameter“Reset time [0..255]”

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..255min (I 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**

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	15-20mln
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.

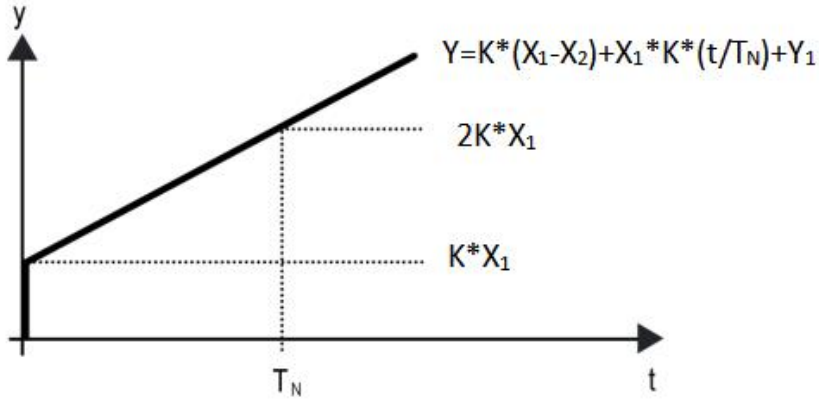


Fig.4.5.2(3) control value of PI control mode

Y: control value

Y1: last control value

X1: temperature deviation = set temperature - actual temperature

X2: last temperature deviation = set temperature - actual temperature

T_N: integration time

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

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

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

Setting and influence of user-defined parameters:

Parameter setting	Effect
K: If the scale range is too small	Quick adjustment, and overshoot will occur
K: If the scale range is too small	Slow adjustment, but no overshoot
T_N: If the integration time is too short	Quick adjustment, but there will be oscillation
T_N: If the integration time is too long	Slow adjustment, no obvious oscillation

Parameter"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**

Parameter"Additional heating/cooling"

This parameter is for setting whether to enable additional heating/cooling.

When enabled, the following parameters are visible:

——Parameter"Control type"

This parameter is for setting the control type for the additional heating/cooling.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.

When enabled, sending the control value to the bus through objects after inverting the control value.

For additional heating valve:

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

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

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

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

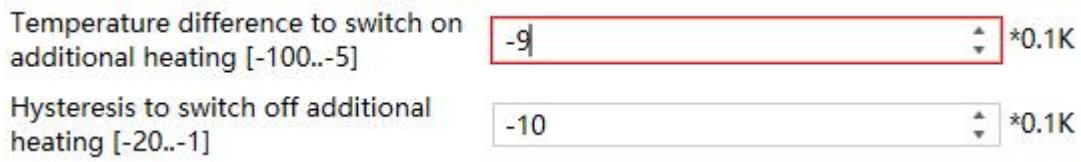
——Parameter"Hysteresis to switch off additional heating [-20..-1]"

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

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

Options: **-20… -1 *0.1K**

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



For additional cooling valve:

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

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

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

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

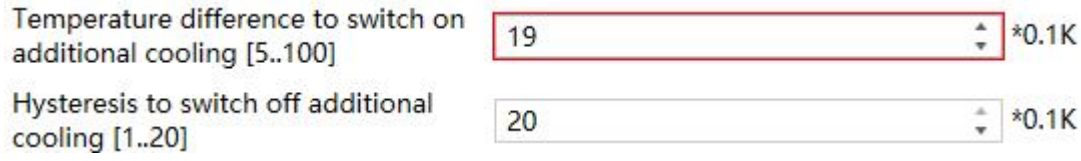
——Parameter"Hysteresis to switch off additional cooling [1..20]"

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

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

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

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



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

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

Options: **0..255 min**

4.6. Parameter window“Fan”

The below parameters are basically same whatever the driver interface of fan control is relay or 0-10V. The function of each parameter will be described in detail below.



Fig.4.6 Parameter window “Fan type”

Parameter“Fan type and drive interface”

This parameter is for setting the fan type and driver interface.Options:

Disable

One level->Relay control(CH A)

Two level->Relay control(CH A&B)

Three level->Relay control(CH A-C)

One level->0-10V(CH F)

Three level->0-10V(CH F)

Percentage level->0-10V(CH F)

One level->Relay control(CH A): Relay output channel A is used to control fan speed, can control the fan with one level fan speed.

Two level->Relay control(CH A&B): Relay output channel A&B is used to control fan speed, can control the fan with two level fan speed.

Three level->Relay control(CH A-C): Relay output channel A-C is used to control fan speed, can control the fan with three level fan speed.

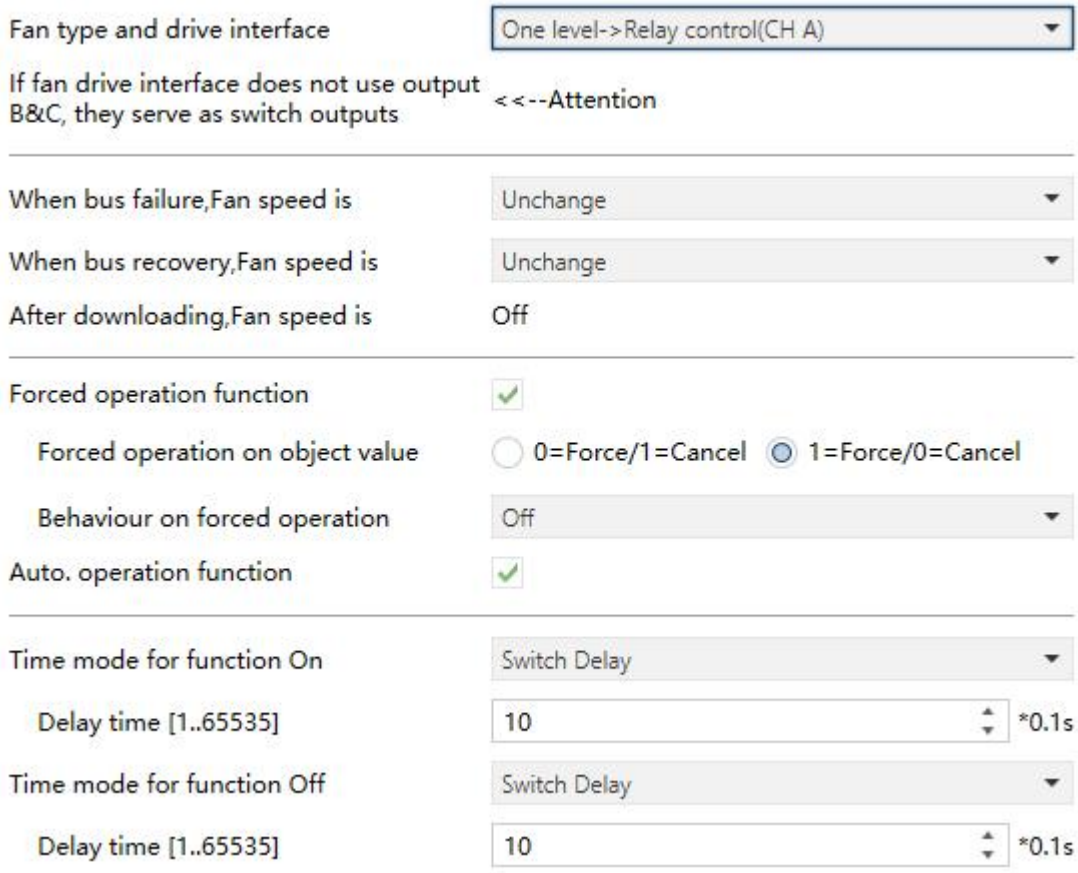
One level->0-10V(CH F): 0-10V output channel F is used to control fan speed, can control the fan with one level fan speed.

Three level->0-10V(CH F): 0-10V output channel F is used to control fan speed, can control the fan with three level fan speed.

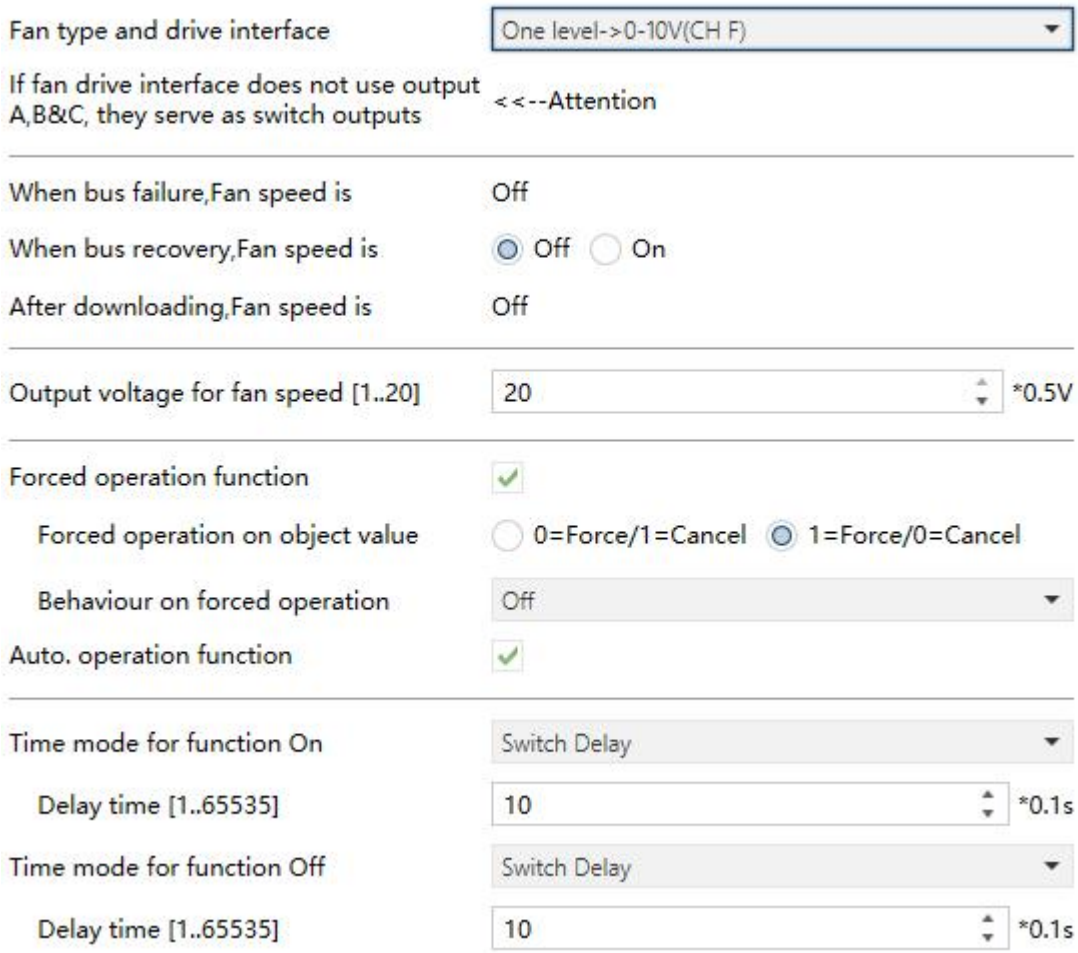
Percentage level->0-10V(CH F): 0-10V output channel F is used to control fan speed, can control the fan with percentage level fan speed.

4.6.1.Parameter window“Fan type -- One level”

The parameters of “Fan type -- One level” are setting as shown in figure 4.6.1, to set the parameter of one level fan. The parameter setting is shown as follows:



One level->Relay control(CH A)



One level->0-10V(CH F)

Fig.4.6.1 Parameter window "Fan type -- One level"

This chapter only describes the configuration for one level fan speed:

Parameter"When bus failure, Fan speed is"

This parameter defines the fan speed when power failure.

When selecting "One level->Relay control(CH A)", Options:**Unchange/OFF/ON**

When selecting "One level->0-10V(CH F)", default: **OFF**

Parameter"When bus recovery, Fan speed is"

This parameter defines the fan speed when power recovery.

When selecting "One level->Relay control(CH A)", Options: **Unchange/OFF/ON/As before as bus fail**

When selecting "One level->0-10V(CH F)", Options: **OFF/ON**

Unchange: the status do not change.

OFF: turn off fan.

ON: turn on fan.

As before as bus fail: the status before power failure.

Note: It is advised to connect the bus and the auxiliary supply voltage firstly before connecting fan, to avoid possibility of damage for fan due to incorrect connection.

Parameter"After downloading, fan speed is"

This parameter indicates to turn off the fan after the application is programmed.

Parameter"Output voltage for fan speed [1..20]"

This parameter is visible when "One level->0-10V(CH F)" is selected. Set the output voltage for fan speed.

Options:**1...20*0.5V**

Parameter"Forced operation function"

This parameter is used to enable the forced operation function. If "Enable", the 1 bit communication object "Forced operation"will visible, the following two parameter will also visible, for setting the object value and the action of "Forced operation".

——Parameter"Forced operation on object value"

This parameter is used to activate the object value of forced operation.Options:

0=Force/1=Cancel

1=Force/0=Cancel

0=Force/1=Cancel: when object"Forced operation "receiving value "0", activate force operation. When receiving "1", cancel force operation.

1=Force/0=Cancel: when object"Fan Forced operation"receiving value "1", activate force operation. When receiving "0", cancel force operation.

——Parameter"Behaviour on Forced operation"

This parameter defines how the fan should respond with the Forced operation. Options:

Unchange

OFF

ON

Unchanged: the current speed is remained.

ON: the fan is switched on.

OFF: the fan is switched off.

The Forced operation has the Second highest priority, so its action is influenced by the minimum time and switching delay of the follow parameter setting.

Parameter"Auto. operation function"

This parameter is uesed to enable/disable the auto. Operation of the fan. When enabled, automatic mode is enabled, an Automatic operation Parameter window (fig.4.6.1.1) appears. And the Auto. operation will be influenced by the follow two parameters "switching delay" and "minimum time".

Parameter"Time mode for function ON"

The function time at fan ON is defined with this parameter. Options:

None

Switch delay

Minimum time

None: the fan ON is executed immediately.

Switch delay: the fan is switched on using this delay. The delay time can be set by the parameter “Delay time *0.1s [1…65535]”. If the object “Fan speed” received more than telegram “1” in a row,the delay time is counted from the first telegram“1” ,instead of the last one.

Note: The operation ON after reset is also effected by this delay time.That is to say when the delay time is over,then the fan activated.

Minimum time: the fan remains ON for at least this time. The minimum time for ON can be set by the parameter “Minimum time *0.1s [1…65535]”. If the telegram of OFF the Fan during the period of this minimum time,the OFF operation is only executed after.

——Parameter“Delay time [1..65535]”

The fan is switched on using this delay. Options: **1…65535 *0.1s**

——Parameter“Minimum time [1..65535]”

The fan remains ON for at least this time. Options: **1…65535 s**

Parameter“Time mode for function OFF”

The function time at fan OFF is defined with this parameter. Options:

None

Switch delay

Minimum time

None: the fan OFF is executed immediately.

Switch delay: the fan is switched off using this delay. The delay time can be set by the parameter “Delay time *0.1s [1…65535]”

Minimum time: the fan remains OFF for at least this time. The minimum time for OFF can be set by the parameter “Minimum time *0.1s [1…65535]”. If the telegram of ON the Fan during the period of this minimum time,the ON operation is only executed after.

——Parameter“Delay time [1..65535]”

The fan is switched off using this delay. Options: **1…65535 *0.1s**

——Parameter“Minimum time [1..65535]”

The fan remains OFF for at least this time. Options: **1…65535 s**

4.6.1.1.Parameter window“Auto.”

When the parameter "Auto. operation function" is enabled in Figure 4.6.1, the interface for automatic operation is visible. The interface of Figure 4.6.1.1 is used to set the automatic operation of level 1 fan speed, and the threshold can be defined. Automatically, the control value of the fan speed comes from the local or external controller. When selecting the external controller,, one control value or two control values can be set in the function parameters. For example, in the fan coil control system, only heating or cooling, at this time, the fan control only needs to set a control value. If there is heating in the system and there is cooling, then the fan control setting two control values will be more appropriate.

Normal operation and automatic operation cannot occur at the same time, that is, after the automatic operation is activated by the object "Automatic function", if there are other operations (such as normal operation, forced operation, manual operation), the automatic operation will exit by itself, and the object "Automatic function" is required. Activated again, the object "Status Automatic" reports whether the automatic operating status is active.

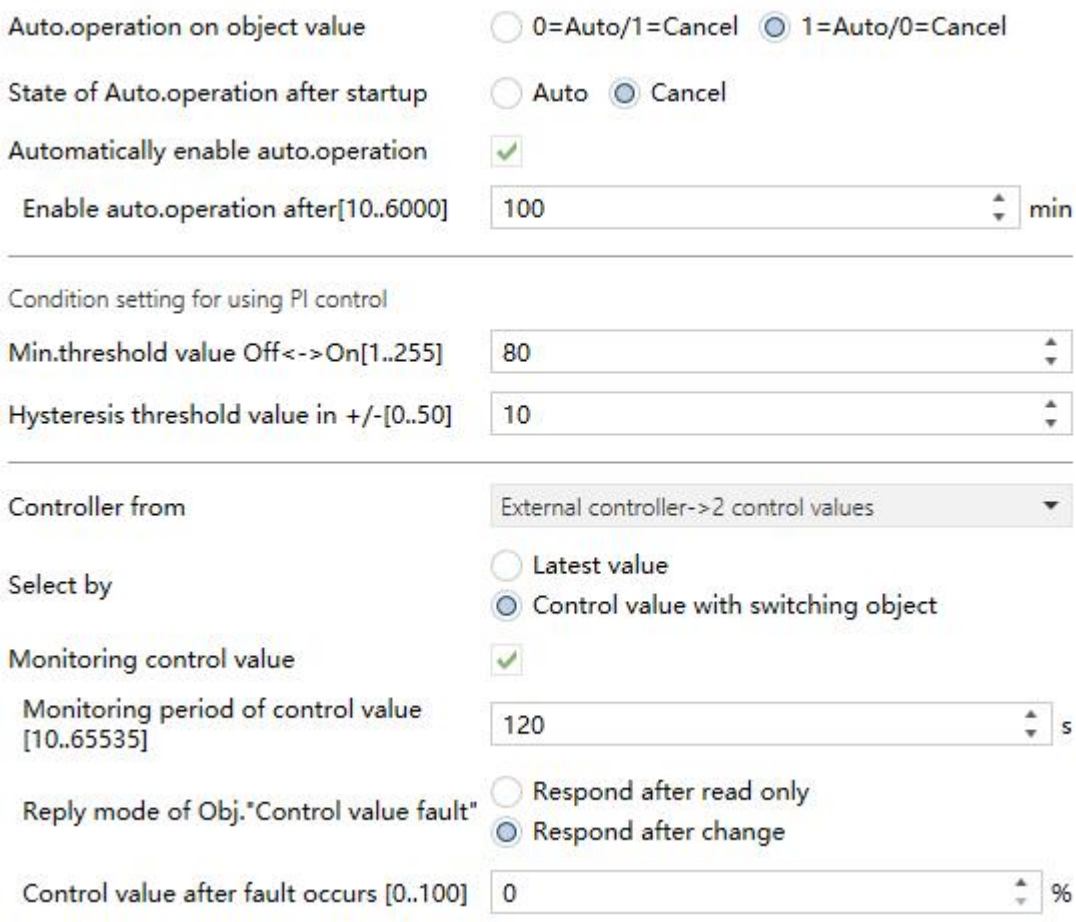




Fig.4.6.1.1 Parameter window"Auto."

Parameter"Auto. Operation on object value"

This parameter sets the value of the message used to activate the automatic operation. Options:

0=Auto/1=Cancel

1=Auto/0=Cancel

0=Auto/1=Cancel: when the object "Automatic function" receives the telegram value "0", it activates the automatic operation. When it receives "1", it exits the automatic operation;

1=Auto/0=Cancel: when the object "Automatic function" receives the telegram value "1", it activates the automatic operation. When it receives "0", it exits the automatic operation.

Parameter"State of Auto. operation after startup"

This parameter sets whether automatic operation is enabled when the device starts up. Options:

Auto

Cancel

Auto: after the device is started, the automatic operation is enabled by default.

Cancel: after the device is started, the automatic operation is disabled by default.

Parameter"Automatically enable auto. operation"

This parameter sets whether the auto-enable feature of automatic operation is enabled.

When it is enabled, when enabled, the next parameter is visible.

When the normal operation exits the automatic operation, in the absence of any operation, the automatic setting returns to the automatic operation after the time set by the next parameter is reached.

——Parameter"Enable auto.operation after [10..6000]"

This parameter sets the time from automatic return to automatic operation from normal operation.

Options: **10..6000 min**

Condition setting for using PI control

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

Parameter"Min. threshold value OFF<->ON [1...255]"

This parameter defines the min.threshold. The fan can automatically change its operating state according to the threshold range in which the control value is located. The control value is determined by the object "Control value". Options: **1...255**

If the control value is greater than or equal to the threshold set by the parameter, the fan is turned on.

If the control value is less than this threshold, the fan is turned off.

Parameter"Hysteresis threshold value in +/- [0...50]"

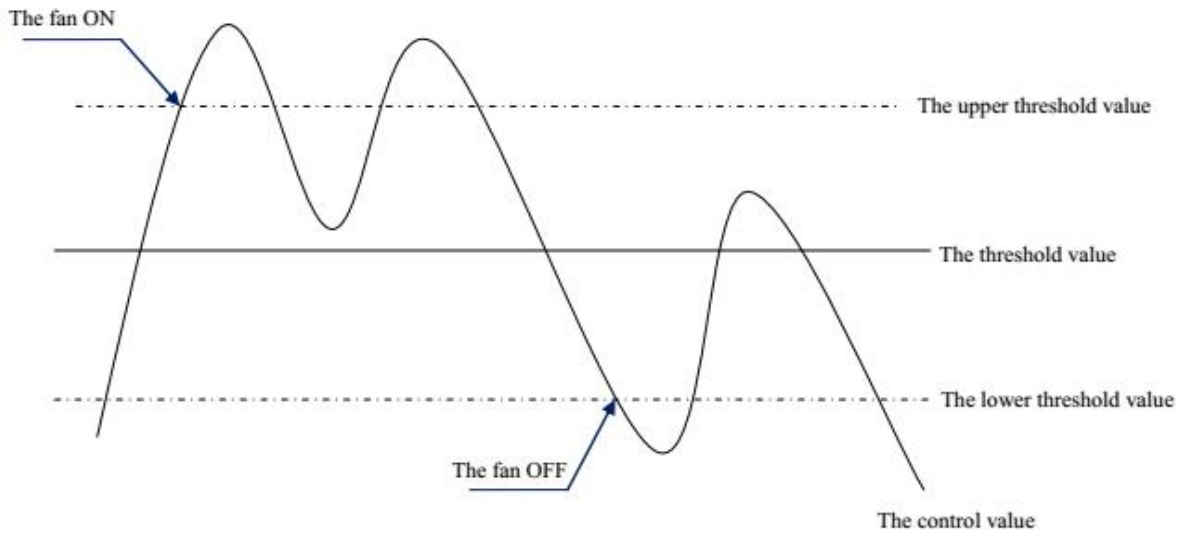
This parameter sets the hysteresis value of the threshold. The hysteresis can avoid unnecessary action of the fan when the control value fluctuates near the threshold.

Options:**0...50**

If it is 0, there is no hysteresis. Once the control value crosses the threshold, the fan will switch immediately;

Assuming a lag value of 10 and a threshold of 50, there will be an upper threshold of 60 (threshold + lag value) and a lower threshold of 40 (threshold - lag value), then when the control value is between 40 and 60, it will not cause The action of the fan still maintains its previous state.

Only less than 40 will turn off the fan, and more than or equal to 60 will turn on the fan as shown below:



Condition setting for using 2-point control

Under 2-point control, controller will decide the fan power on/off 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 as follow are visible when "Local controller" is selected:

Parameter"Min. temperature difference OFF<->ON [1...200]"

This parameter is for setting the min.temperature difference between fan speed OFF and fan speed ON.

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

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

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

This parameter is for setting the hysteresis value of the temperature difference, which can avoid the

unnecessary action of the fan when the control value fluctuates near the temperature difference.

Options: **0..50 *0.1K**

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

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

The following parameters in this subsection are descriptions of fan speed control values.

Parameter"Controller from"

This parameter is for setting the resource of the fan controller reference and the number of control values.

Options:

Local controller

External controller->1 control value

External controller->2 control values

External controller->1 control value: External controller, only one control value. Generally suitable for only heating, cooling, or 2 pipes fan coil control systems.

External controller->2 control values: External controller, there are two control values. It is usually used in fan coil control systems that support both heating and cooling.

——Parameter"Select by"

This parameter is visible when 2 control values are selected in the previous parameter, it is used to set the switching mode of the control value. Options:

Latest value

Control value with switching object

Latest value: The fan coil actuator will control the fan speed based on the latest control value received from the bus.

Control value with switching object: After selecting this option, the object "Switching control value1/2" is visible to switch the control value of fan speed, message 0 corresponds to control value 1, and message 1 corresponds to control value 2.

Note: When this option is selected, after the automatic operation is activated, it is necessary to enable the control value to be 1 or 2 first, then the received control value is valid. It does not respond to the received control value until it is clarified. The value received by the object "Switching control value1/2" is also logged when the automatic operation is not activated.

After the automatic operation exits, the (valid) control value received from the bus will be recorded. After the automatic operation is activated again, the fan speed will be operated according to the latest control value or fault control value. The effective control value refers to the currently selected control value. If it is control

value 1, then control value 2 is invalid.

Parameter"Monitoring control value"

To set whether to enable monitoring of external control values.

When enabled, the following parameters are visible:

——Parameter"Monitoring period of control value[10..65535]"

To set the monitoring period of external control value. If the control value is not received within this time, the device will consider the external controller error and the fan coil will output according to the control value set by the next parameter. Options: **10...65535 s**

——Parameter"Reply mode of Obj. "Control value fault"

To define the feedback method when the external control value is incorrect. Options:

Respond after read only

Respond after change

Respond after read only: The object "Control value fault" sends the current state to the bus only when the device receives the read status from bus.

Respond after change: When the fault status changes or the device receives a request to read the status, the object "Control value fault" immediately sends a message to the bus to report the current status.

——Parameter"Control value after fault occurs [0..100]"

When an error occurs in the external controller, the fan coil will output the fan speed according to the control value set by this parameter. Options: **0...100 %**

Parameter"Limitation function"

The parameter set the fan speed limitation under the Auto. Operation.

Enable: the following parameters is visible.And 4 communication objects"Fan Limitation x (x=1,2,3,4)" for limitation of the fan switching are enabled.

The four limitations can be used for example for the control of various operation modes such as:

Limitation 1: e.g. for frost/heat protection

Limitation 2: e.g. for comfort operation

Limitation 3: e.g. for night shutdown

Limitation 4: e.g. for standby operation

In normal cases, the thermostat takes these operating modes into account in its control variable for the room controller.

The sequence of the displayed parameters corresponds with their priorities, i.e. the parameter with the highest priority has limitation 1 followed by limitation 2, 3 and 4. So the highest priority is assigned to limitation 1, e.g. Frost/Heat protection; the lowest priority is assigned to limitation 4, e.g. standby operation.

The limitation is activated if a telegram with the value 1 is received on the limitation object. The limitation is deactivated if a telegram with the value 0 is received on the limitation object.

The direct operation and the forced operation can end the Auto. Operation, but the limitations status can be

maintained, it will affect the Auto. Operation again when the Auto. Operation is activated again. And even if the limitations can be also activated during the forced operation, but they only affect the Auto. Operation.

If a limitation is activated during the Auto. Operation, the switching of the fan is switchover to the parameterized status regardless of the control value. For example, a limit is set to “ON”, the fan is only switched on when the limit is activated. If there are several limitations, their priorities need to be considered.

After the limitations are cancelled or the Auto. Operation is re-activated, the fan switching and the control value are recalculated and executed. This means that the fan switching will be executed according to the latest control value.

After programming or bus voltage recovery, if the control value has been not received before the Auto. Operation active and the limitations are not activated, now the output is no action.

——Parameter“Fan with limitation x (x=1,2,3,4)”

With this parameter, the fan switching can be set in active limitation. There are the same parameters for each of the individual four limitations. Options:

Disable

Unchange

OFF

ON

Disable: the limitation is not effect to the Auto. Operation, but the status can be activated.

Unchange: the fan status is remained the current status when the limitation is activated.

OFF: the fan is only switched off when the limitation is activated.

ON: the fan is only switched on when the limitation is activated.

4.6.1.2. Parameter window“Status”

The Parameter window “Status” is shown in fig.4.6.1.2. Here the status messages are defined for the Fan-one level.



Fig.4.6.1.2 Parameter window“Status”

Parameter"Reply mode of Obj."Status Fan ON/OFF" (1bit)"

This parameter is used to set the feedback way of fan working status.Options:

Respond after read only

Respond after change

Respond after read only: The object "Status Fan ON/OFF" sends the current state to the bus only when the device receives the read status from bus.

Respond after change: When the fan coil operation status changes or the device receives a request to read the status, the object "Status Fan ON/OFF" immediately sends a message to the bus to report the current status.

Parameter"Reply mode of Obj. "status Automatic"(1bit)"

This parameter is visible when the automatic operation is enabled, and defines the reply mode of the automatic operation status.

The object "Status Automatic" sends a message "1" to indicate that the automatic operation is activated, and "0" to indicate that the automatic operation is exited. Options:

Respond after read only

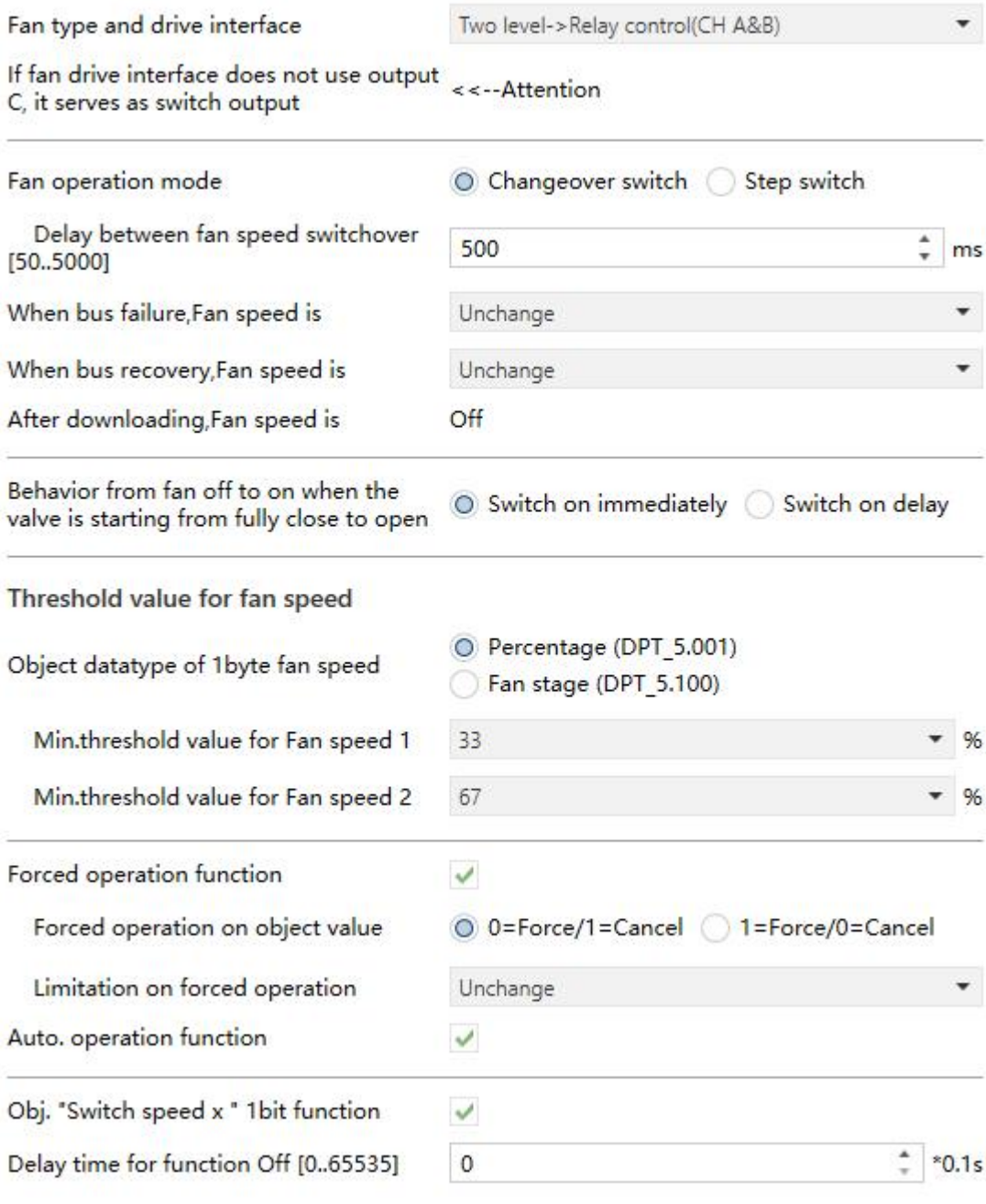
Respond after change

Respond after read only: The object "Status Automatic" sends the current state to the bus only when the device receives the read status from bus.

Respond after change: When the automatic operation status changes or the device receives a request to read the status, the object "Status Automatic" immediately sends a message to the bus to report the current status.

4.6.2.Parameter window“Fan type -- Two/Three level”

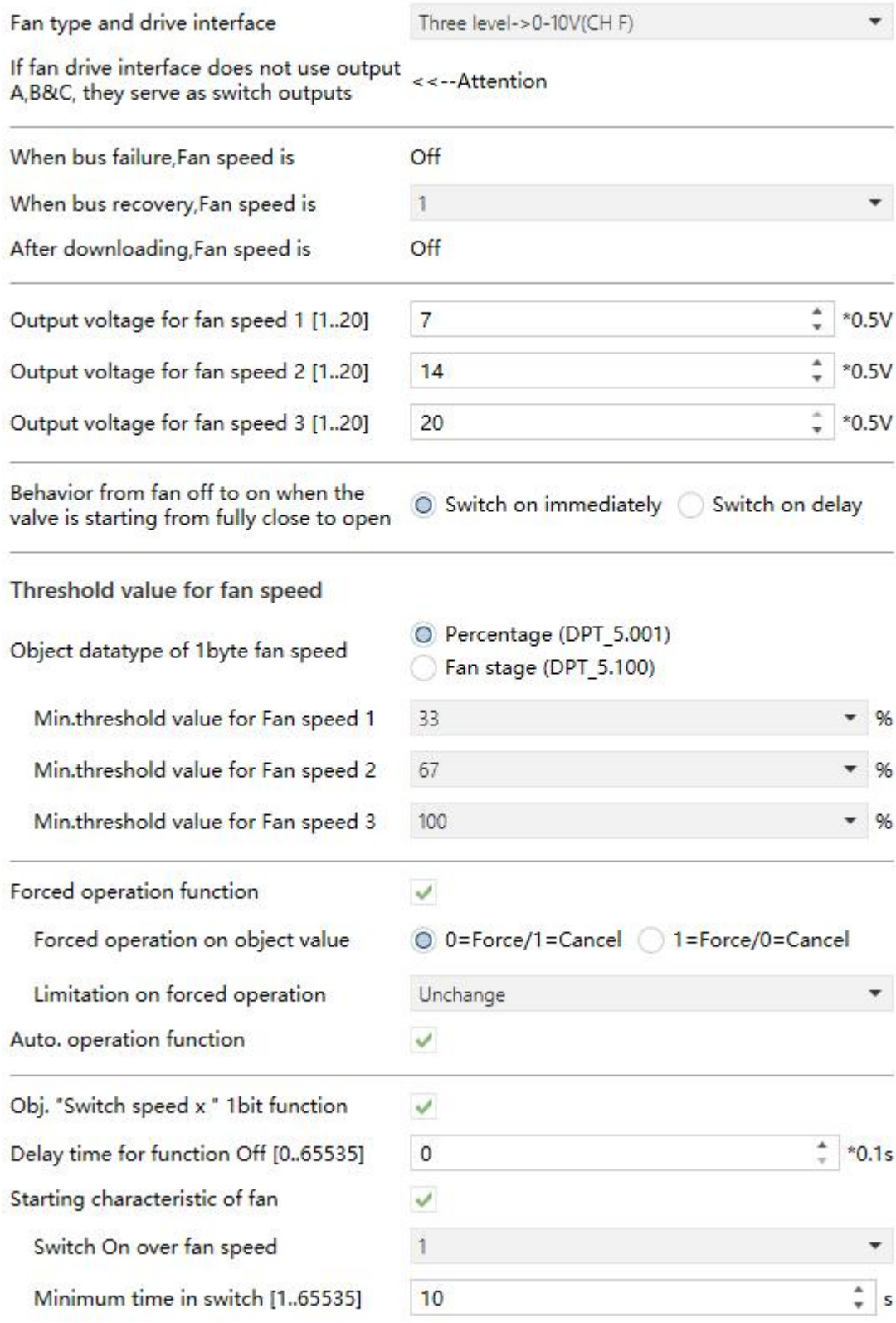
The parameter window “Fan type -- Two/Three-level” setting interface is shown in Figure 4.6.2. The parameter settings are as follows:



Two level->Relay control(CH A&B)



Three level->Relay control(CH A-C)



Three level->0-10V(CH F)

Fig.4.6.2 Parameter window"Fan type - Two/Three-level"

The fan coil parameters of 2 level fan speed and 3 level fan speed are the same. This chapter only describes the configuration for two and three level fan speed:

Since there is no fan with only 1 fan speed as described in the previous section, there is no need to consider too many technical parameters. In the case of multiple fan speeds, not only the starting characteristics of the fan but also the operating mode of the fan like changeover switch or step switch etc. must be considered. Only when you know the technical characteristics of the fan, the parameters can be properly set.

Parameter"Fan operation mode"

This parameter is visible when "Two level->Relay control(CH A&B)" or "Three level->Relay control(CH A-C)" is selected. Set the operating mode of the fan and needs to be considered in conjunction with the technical characteristics of the fan. Options:

Changeover switch

Step switch

Changeover switch: it can set the delay time of fan speed changeover, see next parameter. This type of control can switch the fan speed to any level, such as directly switching from the first level fan speed to the third stage fan speed, but in any case, the three channels have only one output.

Step switch: under this control type, the 3rd-level fan speed is equivalent to the superposition of three one-level fan speeds. For example, when the 3rd-level fan speed is used, all three channels output simultaneously (such as Output 1&2&3). When the 2nd-level fan speed is used, 2 channels output at the same time (such as Output 1&2).

Note: This parameter must be considered in conjunction with the technical parameters of the fan.

——Parameter"Delay between fan speed switchover[50…5000]"

This parameter is visible when the operating mode is selected as "Changeover switch" and is used to define the conversion delay, which is a specific element of the fan and should be considered in all cases.

Options: **50...5000 ms**

When a fan speed converted telegram is received, the target fan speed will be performed after the delay has elapsed.

If the device receives a new fan speed during the switching delay, the delay time will not be interrupted, but the last received fan speed is executed.

Parameter"When bus failure, Fan speed is"

This parameter notes the action of the fan when the bus is powered down. Options:

When selecting "Two level->Relay control(CH A&B)", Options: **Unchange/OFF/1/2**

When selecting "Three level->Relay control(CH A-C)", Options: **Unchange/OFF/1/2/3**

When selecting "Three level->0-10V(CH F)", default: OFF

OFF: Turn off the fan.

1, 2 or 3: The fan is turned on to fan speed 1, 2 or 3.

Parameter"When bus recovery, fan speed is"

This parameter defines the action of the fan after the bus voltage is recovered. Options:

When selecting "Two level->Relay control(CH A&B)", Options: **Unchange/OFF/1/2/As before as bus fail**

When selecting "Three level->Relay control(CH A-C)", Options: **Unchange/OFF/1/2/3/As before as bus fail**

When selecting "Three level->0-10V(CH F)", Options: **OFF/1/2/3**

OFF: Turn off the fan.

1, 2 or 3: The fan is turned on to fan speed 1, 2 or 3.

As before as bus fail: The fan speed is the same as the speed before the bus is powered down.

Note: Before connecting the fan, in order to obtain a defined fan switch status, it is recommended to connect the bus voltage first to avoid the possibility of damage to the fan due to incorrect connections.

Parameter"After downloading, fan speed is"

This parameter indicates to turn off the fan after the application is programmed.

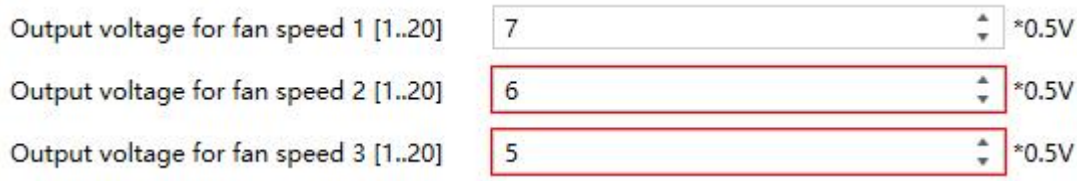
Parameter"Output voltage for fan speed 1 [1..20]"

Parameter"Output voltage for fan speed 2 [1..20]"

Parameter"Output voltage for fan speed 3 [1..20]"

This parameter is visible when "Three level->0-10V(CH F)" is selected. Set the output voltage for fan speed 1/2/3.

Note: the output voltage value must meet the condition 1<2<3, if not, they can not be modified on ETS, and display red box warning, as shown as follow:



Parameter"Behavior from fan off to on when the valve is starting from fully close to open"

This parameter is for setting behavior from fan off to on when the value is starting from fully close to open.

Options:

Switch on immediately

Switch on delay

Switch on delay: When the valve is starting from fully close to open, the fan switch on immediately.

Switch on delay: When the valve is starting from fully close to open, the fan switch on delay.

——Parameter"Delay time [30..450]"

This parameter is visible when "Switch on delay" is selected, set the delay time for starting the fan when the valve is fully closed to open. Options: **30...450s**

Threshold value for fan speed

Parameter"Object datatype of 1byte fan speed"

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

Percentage (DPT_5.001)

Fan stage (DPT_5.100)

Parameter"Min.threshold value for Fan speed 1/2/3"

To define the min. threshold value to switch to each fan speed, that is, the value of the communication object "Fan speed--1byte".

Fan speed 1, options: **0..255 or 0..100 %, 0= Not allow fan off, minimum operation speed is 1**

Fan speed 2/3, options: **1..255 or 1..100 %**

Note:1.When the value of fan speed 1 is greater than 0, if the object value is less than the fan speed 1, the fan speed will be off.

2.The fan speed value must meet the condition fan speed 1 < 2 < 3, if not, they can not be configured on ETS.

Parameter"Forced operation function"

To enable forced operation.

When it is enabled, the 1-bit communication object "Forced Operation" is visible, and the following two parameters are also visible. It is used to set the activation value of the forced operation and the action that can be performed under the forced operation.

——Parameter"Forced operation on object value "

To set the telegram value to activate the forced operation. Options:

0=Force/1=Cancel

1=Force/0=Cancel

0=Force/1=Cancel: When the object "Forced Operation" receives the message value "0", the forced operation is activated. When "1" is received, the forced operation is cancelled.

1=Force/0=Cancel: When the object "Forced Operation" receives the message value "1", it activates the forced operation. When it receives "0", it cancels the forced operation.

Note: During forced operation, the minimum operating time of fan speed for automatic operation still needs to be considered, except for the starting fan speed, as it has its own minimum running time.

Forced operation is not activated by default after bus reset or after programming.

——Parameter"Limitation on forced operation"

To define the limitation fan speed under forced operation. Options:

Unchange

1

1, off

2

2, 1

2, 1, off

3

3, 2

3, 2, 1

Off

Unchange: The fan speed of the fan remains unchanged and maintains the current operating state.

1: Only fan speed 1 is operated.

1, off: Only fan speed 1 and shut down the fan can be operated.

2: Only fan speed 2 can be operated.

2, 1: Only fan speeds 1 and 2 can be operated.

2, 1, off: Only fan speed 1, 2 and shut down the fan can be operated.

3: Only fan speed 3 can be operated.

3, 2: Only fan speed 3, 2 can be operated.

3, 2, 1: Only fan speed 1, 2 and 3 can be operated.

Off: Only shut down the fan can be operated.

Note: In the case of forced operation activation, if the current fan speed is not within the allowable range, the fan speed will switch to the nearest allowable current fan speed. For example, the current fan speed is 1, and the allowed fan speed is 2 3, then when the forced operation is activated, the fan speed will automatically switch to 2, if the fan speed is adjusted to 1 by manual mode, the running fan speed will also be 2.

In another case, if the current fan speed is 0, the allowed fan speed is 1, 2, 3, and the starting fan speed is 3. When the forced operation is activated, the fan starts at fan speed 3 and then automatically switches to fan speed 1; if the current fan speed is 2, the allowed fan speed is 1, 2, when a forced operation is activated, a fan speed 0 message is received, then the fan speed will switch to 1.In this case, the fan speed switches to the fan speed near the target fan speed.

Parameter"Auto. operation function"

This parameter is used to enable automatic operation of the fan.

When it is enabled, the parameter interface 4.6.2.1 will be visible.

Parameter"Obj. 'Switch speed x' 1bit function"

This parameter is used to enable object of 1bit fan speed.

When it is enabled, three 1-bit objects "Fan speed 1", "Fan speed 2" and "Fan speed 3" are visible.

When the object receives the telegram "1", the fan speed is turned on. When any object of the three objects receives the telegram "0", the fan is turned off.

If three objects continuously receive multiple ON/OFF telegrams in a short time, the fan speed will be controlled with the telegram value received by the last object.

Note: In normal operation mode, the minimum dwell time set by the parameter in automatic mode is ignored. Therefore, the response of the direct operation can be detected in time.

In order to protect the fan, the delay time of the fan speed switching is still valid. At the same time, when

the forced operation is activated, it is necessary to consider the fan speed that can be operated under the force operation.

Parameter"Delay time for function OFF[0...65535]"

This parameter defines the delay off time of the fan. For example, if the fan speed of the current fan is speed1 and the control telegram of the fan OFF is received, and the fan will maintain the current fan speed and start the delay counting. After the time defined by the parameter, the OFF operation will be executed.

Options: **0...65535 *0.1s**

Note: When the fan is running in automatic mode, this parameter is evaluated and executed only if the parameter "Minimum time in fan speed [0...65535]" is 0.

Parameter"Starting characteristic of fan"

This parameter is visible when "Three level->Relay control(CH A-C)" or "Three level->0-10V(CH F)" is not selected.

This parameter defines the starting characteristics of the fan, which is also a technical feature of the fan. Usually to ensure the safe start of the fan motor, it is better to start the fan motor at a higher fan speed when the fan is turned on, so that the fan motor obtains a higher torque during the starting phase. For example, the fans and floor fans used in our lives are usually started from the second-stage fan speed when the fan is turned on, and then switched to the minimum fan speed. Some fans start up similarly.

When it is enabled, the following two parameters are visible.

Note: Since the startup feature is a technical feature of the fan, so the startup behavior has a higher priority than the forced operation.

If the fan itself has no starting characteristics, you can ignore the parameters related to the characteristic, just select "No".

For example, the starting fan speed is 3, the fan speed allowed for the forced operation is 2, and is currently in the OFF state. When a control telegram with a fan speed of 1 is received, the fan will be turned on at fan speed 3 and then turned to fan speed 2. The needed fan speed 1 will not run due to mandatory operating restrictions.

For the step switch type of fan, the starting characteristics are different. The step switch type fan is usually the continuous opening fan speed, and the changeover switch type fan is the direct opening fan speed. Therefore, when defining the parameters of the start-up characteristics, it is also necessary to consider the switch type of the fan.

The minimum dwell time for fan speed switching in automatic mode is only considered after the start-up phase, which is inactive during the start-up phase. The minimum dwell time for the fan speed on during the start-up phase can be set additionally, see the parameters below.

——Parameter"Switch on over fan speed"

This parameter sets the fan speed used by the fan when starts from the OFF state.

Options: **1/2/3**

However, in order to ensure the normal operation of the fan, when setting these parameters related to the

characteristics of the fan, it is best to first understand these characteristics, and then set the parameters properly to avoid damage to the fan.

——Parameter"Minimum time in switch[1..65535]"

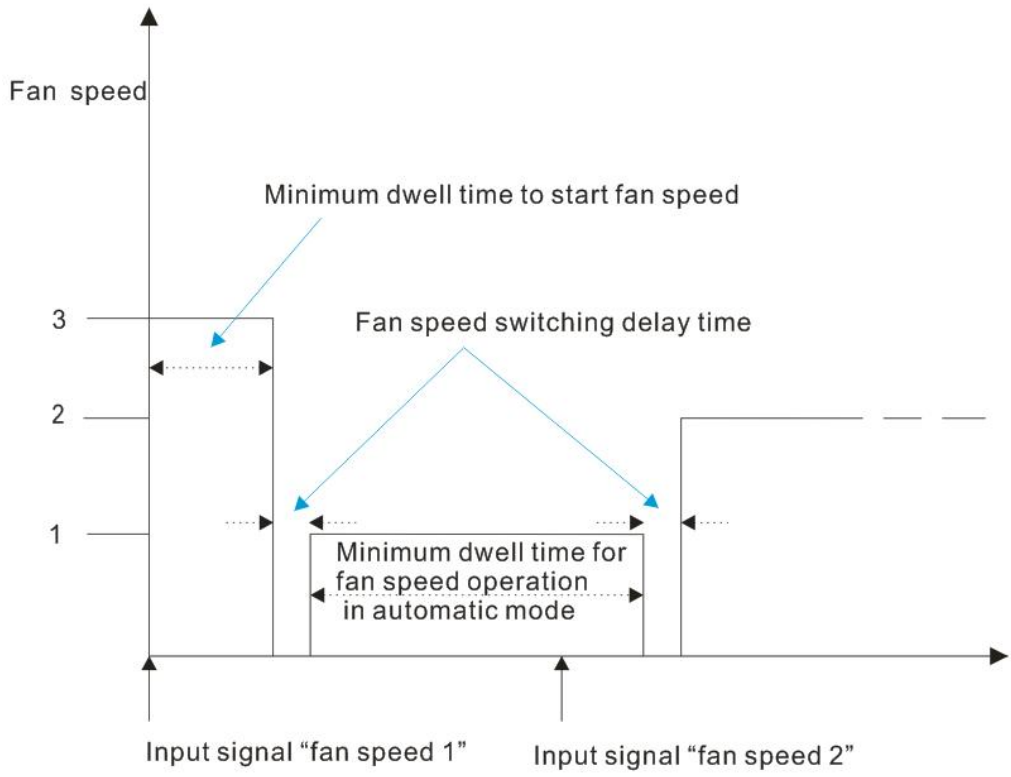
This parameter defines the minimum dwell time at which a certain fan speed is turned on during the start-up phase. Options: **1...65535 s**

When the fan is turned on, it starts at the starting fan speed first, and then switch to the target fan speed after the minimum dwell time expires. This target fan speed may be the fan speed of the fan after resetting or the fan speed triggered by other operations.

During the start-up phase, the delay time between the two fan speeds must also be considered.

Example: Starting characteristics of a fan with 3 fan speeds

Assume that the current state of the fan is off, the starting fan speed is level 3, the target fan speed is level 1, and the final fan speed is level 2, as shown in the following figure:



The above figure shows that if the fan is currently in the off state, when it receives a telegram of "Fan Speed 1", it will start "Fan Speed 3". After the minimum stay time of the start fan speed is over, it switches the fan speed. The fan speed switching needs a delay time (this is a technical parameter of the fan, which is conducive to protect the fan), After the delay time expires, the fan switches to the target fan speed "fan speed 1", in the "fan speed 1" operation, if the fan receives a "fan speed 2" telegram, then you need to consider whether the automatic mode is activated. If the automatic mode is activated, you need to consider the minimum dwell time of the fan speed operation. If it is direct operation, you do not need to consider dwell time of the fan speed operation, the fan runs at "Fan Speed 2".

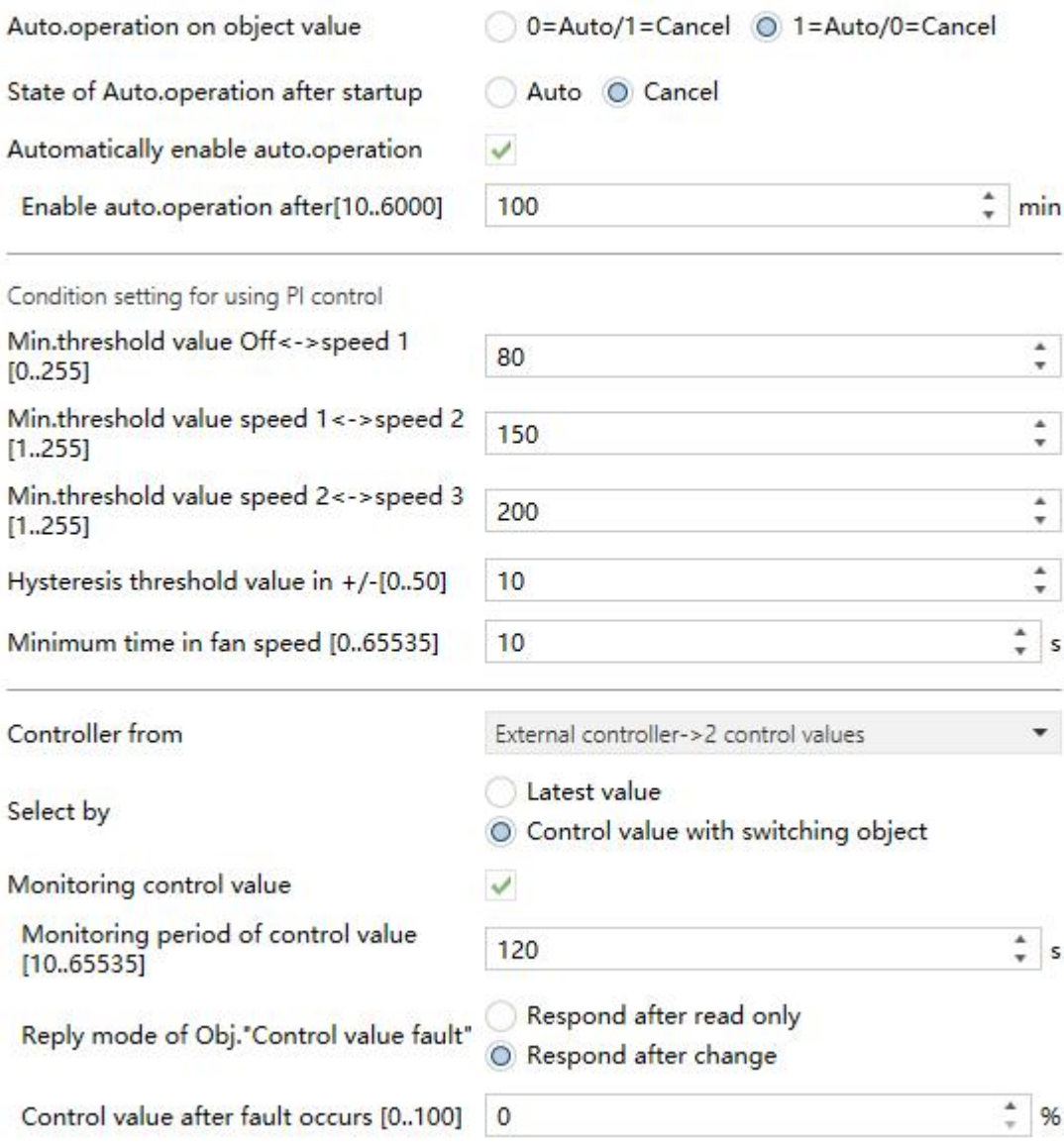
4.6.2.1. Parameter window“Auto.”

This parameter window (Fig.4.6.2.1) is visible if in Fig. 4.6.2 the option Enable has been selected in the parameter “Auto. Operation function”.

Here set the auto. Operation of level 2/3 fan, the threshold values for switch over of the fan ON/OFF is defined.

If the coil controller is from the local,the fan will automatically ON/OFF the fan based on the control value or temperature difference in the threshold value range.The control value is defined by the PI algorithm of the device internal program,which will not be sent to the bus.

If the coil controller is from the bus,the speed is determined by the control value of the bus. Furthermore,there are 4 limitations can be set.



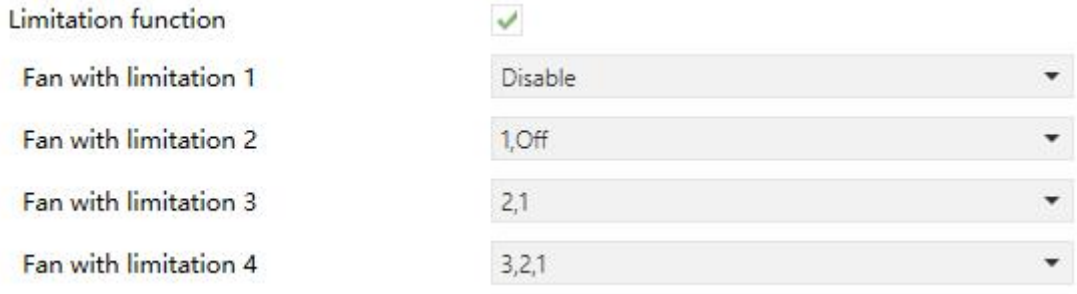


Fig.4.6.2.1 Parameter window"Auto."

Parameter"Auto. operation on object value"

This parameter defines how to react to a telegram value of activating the auto.Operation. Options:

0=Auto/1=Cancel

1=Auto/0=Cancel

0=Auto/1=Cancel: Automatic is activated by a telegram with value 0 and inactive by value 1.

1=Auto/0=Cancel: Automatic is activated by a telegram with value 1 and inactive by value 0.

Parameter"State of Auto. operation after startup"

This parameter sets whether automatic operation is enabled when the device starts up.

Auto

Cancel

Auto: after the device is started, the automatic operation is enabled by default.

Cancel: after the device is started, the automatic operation is disabled by default.

Parameter"Automatically enable auto. operation"

This parameter sets whether the auto-enable feature of automatic operation is enabled.

When it is enabled, the next parameter is visible.

When the normal operation exits the automatic operation, in the absence of any operation, the fan returns to the automatic operation after the time set by the next parameter is reached.

——Parameter"Enable auto. Operation after [10..6000]"

This parameter sets the time when returns to automatic operation from normal operation.

Options: **10..6000 min**

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"Min. threshold value OFF<-->speed 1 [0...255]"

This parameter defines the min. threshold for turning off the fan and speed 1, options: **0...255, 0=Not allow fan off, minimum operation speed is 1**

If the control value is larger than or equal to the threshold set by the parameter, the running speed 1;

If the control value is less than this threshold, the fan is turned off.

Note: The fan determines the switch or fan speed of the fan based on the threshold range in which the control value is located. The following two parameters are similar.

Parameter"Min. threshold value speed 1<-->speed 2 [1...255]"

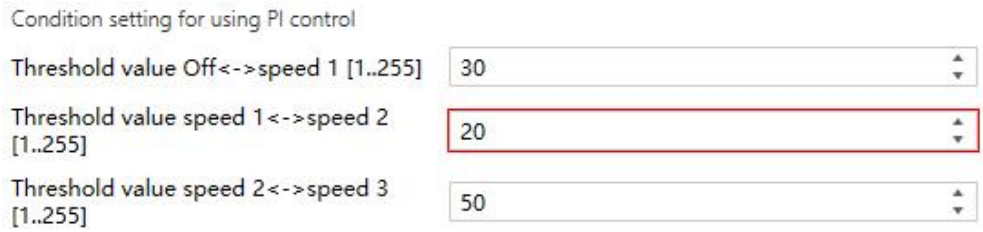
This parameter defines the min. threshold for switching the fan speed to speed 2, and if the control value is greater than or equal to the threshold set by the parameter, then speed 2 is operated. Options: **1...255**

Parameter"Min. threshold value speed 2<-->speed 3 1...255]"

This parameter defines the min. threshold for switching the fan speed to speed 3, and if the control value is greater than or equal to the threshold set by the parameter, then speed 3 is operated. Options:**1...255**

Note: The controller evaluates these thresholds in ascending order, that is, first checks the threshold of OFF <-> fan speed 1, then fan speed 1 <-> fan speed 2, then fan speed 2 <-> fan speed 3.

The correctness of function execution is only guaranteed in this case: OFF <-> fan speed 1 threshold is less than fan speed 1 <-> fan speed 2 threshold, fan speed 1 <-> fan speed 2 threshold is less than fan speed 2 <-> fan speed 3 threshold. If not, they can not be modified on ETS, and display red box warning, as shown as follow:



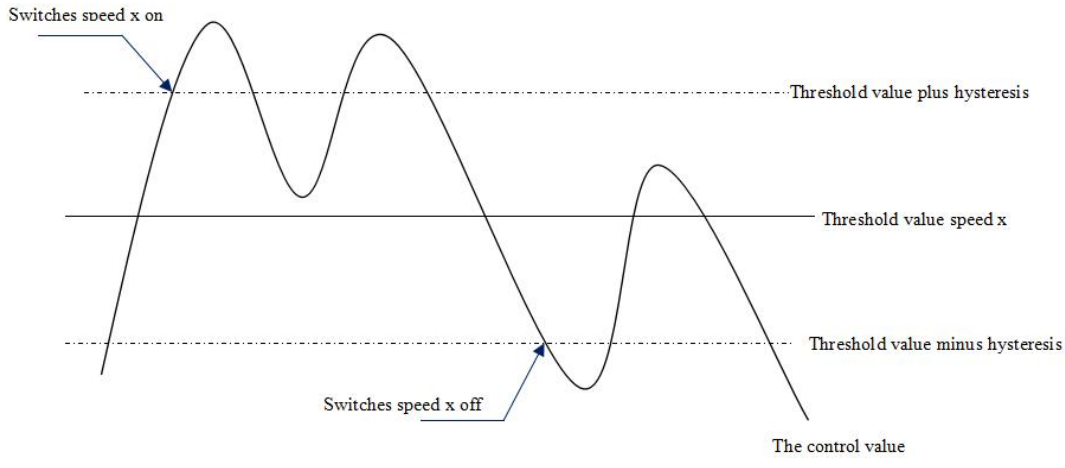
Parameter"Hysteresis threshold value in +/- [0...50]"

This parameter sets the hysteresis value of the threshold. The hysteresis can avoid unnecessary action of the fan when the control value fluctuates near the threshold. Options: **0...50**

If it is 0, there is no hysteresis. Once the control value is greater than the threshold, the fan will switch the fan speed immediately;

Assuming a lag value of 10 and a threshold of 50, there will be an upper threshold of 60 (threshold + lag value) and a lower threshold of 40 (threshold - lag value), then when the control value is between 40 and 60, it will not cause the action of the fan and still maintains its previous state.

Only less than 40 or greater than (or equal to) 60 will change the operating state of the fan. As shown below:



Note:

In the case of hysteresis enabled, if threshold overlap occurs, the action of the fan is specified as follows:

1) The hysteresis determines the control point at which the fan speed transition occurs;

2) If the fan speed transition occurs, this new fan speed is determined by the control value and the threshold, without considering the hysteresis;

For example (1):

OFF <-> fan speed 1 threshold is 10

Fan speed 1 <-> fan speed 2 threshold is 20

Fan speed 2 <-> fan speed 3 threshold is 30

Lag is 15%

The behavior of the fan when the fan speed rises from OFF:

The fan's OFF state will change at a control value of 25 (≥10+15), and the new fan speed will be 2 (because 25 is between 20 and 30, no need to consider hysteresis), so fan speed 1 is ignored ;

The behavior of the fan when the fan speed drops from 3:

The fan speed 3 of the fan will change at a control value of 14 (<30-15), and the new fan speed will be 1 (because 14 is between 10 and 20, no need to consider hysteresis), so fan speed 2 is ignored. .

For example (2):

OFF <-> fan speed 1 threshold is 10

Fan speed 1 <-> fan speed 2 threshold is 40

Fan speed 2 <-> fan speed 3 threshold is 70

Lag is 5

The behavior of the fan when the fan speed rises from OFF:

The OFF state of the fan will change at a control value of 15% (≥10+5).

If the received control value is 41, the new fan speed will be 2 (because 41 is between 40 and 70, no need to consider hysteresis), so fan speed 1 is ignored;

If the control value received is 39, the new fan speed will be 1 (since 39 is between 10 and 40, no need to consider hysteresis).

The behavior of the fan when the fan speed drops from 3:

The fan speed 3 of the fan will change at a control value of 64 (<70-5).

If the received control value is 39, the new fan speed will be 1 (because 39 is between 10 and 40%, no need to consider hysteresis), so fan speed 2 is ignored.

3) In any case, when the control value is 0, the fan will be turned off.

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 as follow are visible when "Local controller" is selected:

Parameter"Min. temperature difference speed OFF<-->speed 1 [0..200]"

This parameter is for setting the min. temperature difference between fan speed off and fan speed 1.

Options:**0..200*0.1K, 0=Not allow fan off, minimum operation speed is 1**

If the temperature difference is greater than or equal to this setting temperature difference, fan speed 1 will start running; if less than this setting temperature difference, the fan will be turned off.

Parameter"Min. temperature difference speed 1<-->speed 2[1..200]*0.1K"

Define the min. temperature difference for switching the fan speed 2, if the control value is greater than or equal to this setting temperature difference, the fan speed 2 will start running.

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

Parameter"Min. temperature difference speed 2<-->speed 3 [1..200]*0.1K"

Define the min. temperature difference for switching the fan speed 3, if the control value is greater than or equal to this setting temperature difference, the fan speed 3 will start running.

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

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

This parameter is for setting the hysteresis value of the temperature difference, which can avoid the unnecessary action of the fan when the control value fluctuates near the temperature difference. Options: **0..50 *0.1K**

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

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

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

This parameter defines the dwell time before the fan switches from the current fan speed to a higher fan speed or a lower fan speed, that is, the minimum time for a fan speed operation.

If you want 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 for a long enough time, the fan speed can be switched quickly. Available options: **0...65535 s**

0: means no delay switching.

Note:The dwell time set by this parameter is only enabled in automatic mode.

Parameter"Controller from"

The description of the fan speed control value is not described in this chapter. For details, please refer to section 4.6.1.1,parameter "Controller from".

Parameter"Limitation function"

The description of the limitation function is not described in this chapter. For details, please refer to section 4.6.1.1,parameter "Limitation function".

——Parameter"Fan with limitation x (x=1,2,3,4)"

With this parameter, the fan switching can be set in active limitation. There are the same parameters for each of the individual four limitations. Options:

Disable

Unchange

1

1, off

2

2, 1

2, 1, off

3

3, 2

3, 2, 1

Off

Disable: the limitation is not effect to the Auto. Operation, but the status can be activated.

Unchange: the fan status is remained the current status when the limitation is activated.

1: the fan is only switched 1 when the limitation is activated.

1, off: the fan is only switched 1 and off when the limitation is activated.

2: the fan is only switched 2 when the limitation is activated.

2, 1: the fan is only switched 2 and 1 when the limitation is activated.

2, 1, off: the fan is only switched 2 ,1 and off when the limitation is activated.

3: the fan is only switched 3 when the limitation is activated.

3, 2: the fan is only switched 3 and 2 when the limitation is activated.

3, 2, 1: the fan is only switched 3, 2 and 1 when the limitation is activated.

OFF: the fan is only switched off when the limitation is activated.

4.6.2.2. Parameter window“Status”

The parameter window “Status” setting interface is shown in Figure 4.6.2.2. This interface is used to set the running status information of the fan with Two/Three-level fan speed.

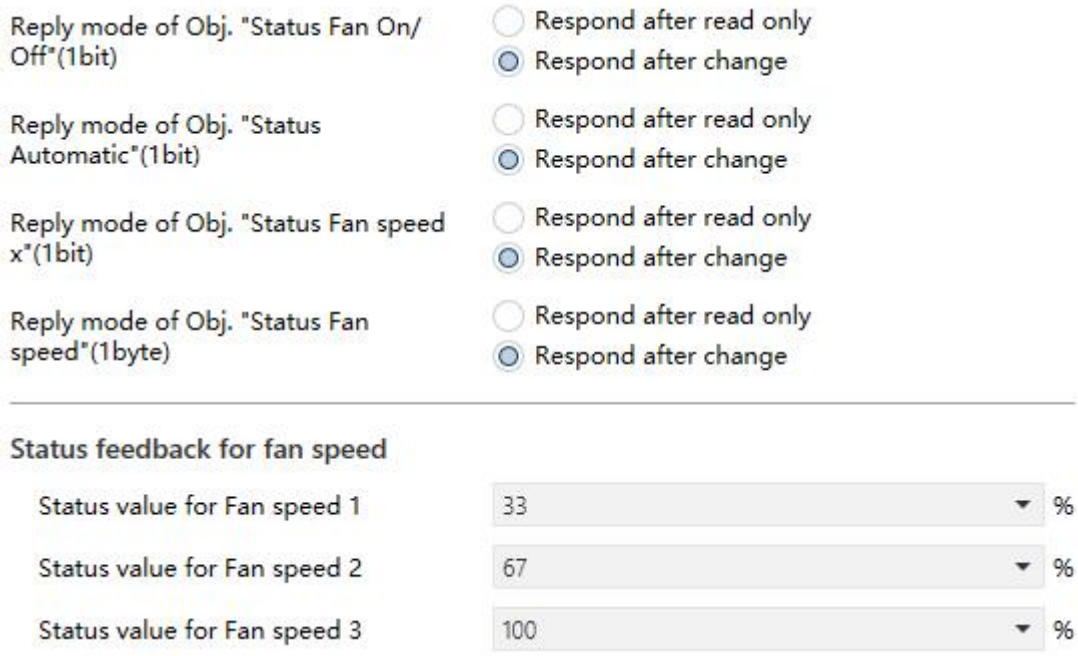


Fig.4.6.2.2 Parameter window“Status”

Parameter“Reply mode of Obj.“Status Fan ON/OFF”(1bit)”

This parameter defines the reply mode of the fan switch status. Options:

Respond after read only

Respond after change

Respond after read only: The object "Status Fan ON/OFF" sends the current state of the fan to the bus only when the device receives the read fan ON/OFF status from bus.

Respond after change: When the fan on/off status changes or the device receives a request to read the status, the object "Status Fan ON/OFF" immediately sends a telegram to the bus to report the current status.

Parameter“Reply mode of Obj.“Status Automatic”(1bit)”

This parameter is visible when the automatic operation is enabled, and defines the reply mode of the automatic operation status.

The object "Status Automatic" sends a telegram "1" to indicate that the automatic operation is activated, and the telegram "0" to indicate that the automatic operation is canceled. Options:

Respond after read only

Respond after change

Respond after read only: The object "Status Automatic" sends the current state of automatic operation to the bus only when the device receives the read status from bus.

Respond after change: When the automatic operation status changes or the device receives a request to read the status, the object "Status Automatic" immediately sends a telegram to the bus to report the current

status.

Parameter"Reply mode of Obj."status fan speed x"(1bit)"

This parameter defines the reply method for the fan speed status. Three 1-bit objects "Status Fan speed 1", "Status Fan speed 2" and "Status Fan speed 3" are used to reply the status of each level of fan speed. Options:

Respond after read only

Respond after change

Respond after read only: The object sends the current state to the bus only when the device receives the read status from bus.

Respond after change: When the status changes or the device receives a request to read the status, the object immediately sends a telegram to the bus to report the current status.

Parameter"Reply mode of Obj."Status fan speed "(1byte)"

This parameter is visible when "Obj."Switch speed x" 1bit function" enabled, sets the reply mode of the current running fan speed state. The object is "Status fan speed" and is of 1 byte type. The status value of each stage fan speed output is defined by the next parameter. Options:

Respond after read only

Respond after change

Respond after read only: The object sends the current state to the bus only when the device receives the read status from bus.

Respond after change: When the status changes or the device receives a request to read the status, the object immediately sends a telegram to the bus to report the current status.

Status feedback for fan speed

Parameter"Status value for Fan speed 1/2/3"

This parameter sets the status feedback value for each fan speed. Options: **1..255 or 1..100 %**, the state value of OFF is specified as 0.

Fan speed 1<2<3, if this condition is not met, parameters in ETS cannot be configured.

4.6.3.Parameter window“Fan type -- Percentage level”

The parameter window “Fan type -- Percentage-level” setting interface is shown in Figure 4.6.3. The parameter settings are as follows:

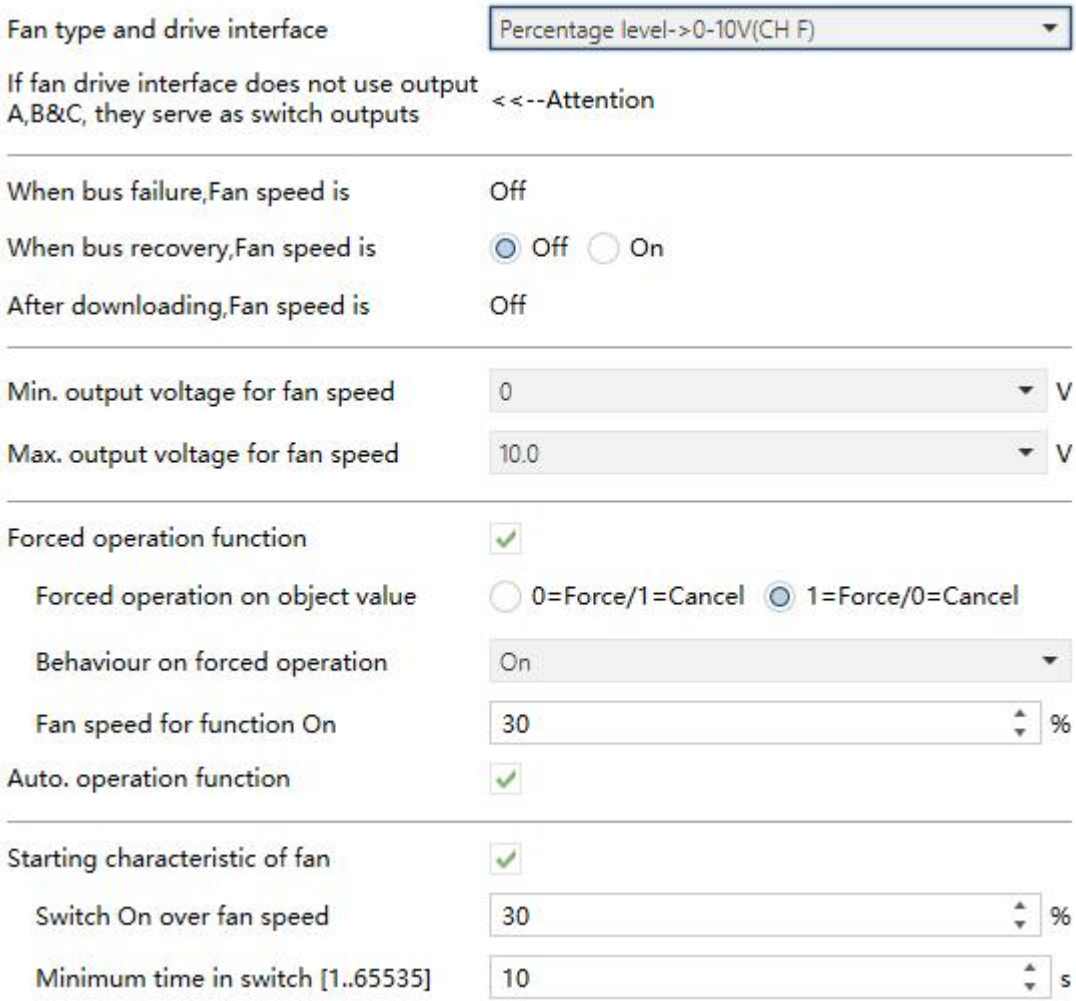


Fig.4.6.3 Parameter window“Fan type -- Percentage level”

Parameter“When bus failure, Fan speed is”

This parameter indicates when the bus is powered down, fan speed is OFF.

Parameter“When bus recovery, Fan speed is”

his parameter defines the action of the fan after the bus voltage is recovered. Options:

OFF

ON

Note: Before connecting the fan, in order to obtain a defined fan switch status, it is recommended to connect the bus voltage first to avoid the possibility of damage to the fan due to incorrect connections.

——Parameter“Fan speed for function On”

This parameter is visible when previous parameter is selected “On”, used for setting the fan speed for function on.Options:**1...100%**

Parameter“After downloading, fan speed is”

This parameter indicates to turn off the fan after the application is programmed.

Parameter"Min. output voltage for fan speed"

This parameter defines the Min. Output voltage for fan speed. Options:

0V

0.5V

...

3.0V

Parameter"Max. output voltage for fan speed"

This parameter defines the Max. Output voltage for fan speed.Options:

5.0V

5.5V

...

10.0V

Parameter"Forced operation function"

To enable forced operation.

When it is enabled, the 1-bit communication object "Forced Operation" is visible, and the following two parameters are also visible. It is used to set the activation value of the forced operation and the action that can be performed under the forced operation.

——Parameter"Forced operation on object value"

To set the telegram value to activate the forced operation. Options:

0=Force/1=Cancel

1=Force/0=Cancel

0=Force/1=Cancel: When the object "Forced Operation" receives the message value "0", the forced operation is activated. When "1" is received, the forced operation is canceled.

1=Force/0=Cancel: When the object "Forced Operation" receives the message value "1", it activates the forced operation. When it receives "0", it cancels the forced operation.

——Parameter"Behaviour on Forced operation"

This parameter defines the behaviour on forced operation. Options:

Unchange

OFF

ON

Unchanged: the current speed is remained.

ON: the fan is switched on.

OFF: the fan is switched off.

The Forced operation has the Second highest priority, so its action is influenced by the minimum time and switching delay of the follow parameter setting.

——Parameter"Fan speed for function On"

This parameter defines the fan speed for function on. Options:**1...100%**

Parameter"Auto. operation function"

This parameter is uesed to enable/disable the auto. Operation of the fan. When enabled, automatic mode is enabled, an Automatic operation Parameter window (fig.4.6.3.1) appears.

Parameter"Starting characteristic of fan"

This parameter defines the starting characteristics of the fan, which is also a technical feature of the fan. Usually to ensure the safe start of the fan motor, it is better to start the fan motor at a higher fan speed when the fan is turned on, so that the fan motor obtains a higher torque during the starting phase.

When it is enabled, the following two parameters are visible.

Note: Since the startup feature is a technical feature of the fan, so the startup behavior has a higher priority than the forced operation.

If the fan itself has no starting characteristics, you can ignore the parameters related to the characteristic, just select "Disable".

For example, the starting fan speed is 30%, the fan speed allowed for the forced operation is 20%, and is currently in the OFF state. When a control telegram with a fan speed of 10% is received, the fan will be turned on at fan speed 30% and then turned to fan speed 20%. The needed fan speed 10% will not run due to mandatory operating restrictions.

For the step switch type of fan, the starting characteristics are different. The step switch type fan is usually the continuous opening fan speed, and the changeover switch type fan is the direct opening fan speed. Therefore, when defining the parameters of the start-up characteristics, it is also necessary to consider the switch type of the fan.

The minimum dwell time for fan speed switching in automatic mode is only considered after the start-up phase, which is inactive during the start-up phase. The minimum dwell time for the fan speed on during the start-up phase can be set additionally, see the parameters below.

——Parameter"Switch on over fan speed"

This parameter sets the fan speed used by the fan when starts from the OFF state.

Options:**1...100%**

In order to ensure the normal operation of the fan, when setting these parameters related to the characteristics of the fan, it is best to first understand these characteristics, and then set the parameters properly to avoid damage to the fan.

——Parameter"Minimum time in switch[1..65535]"

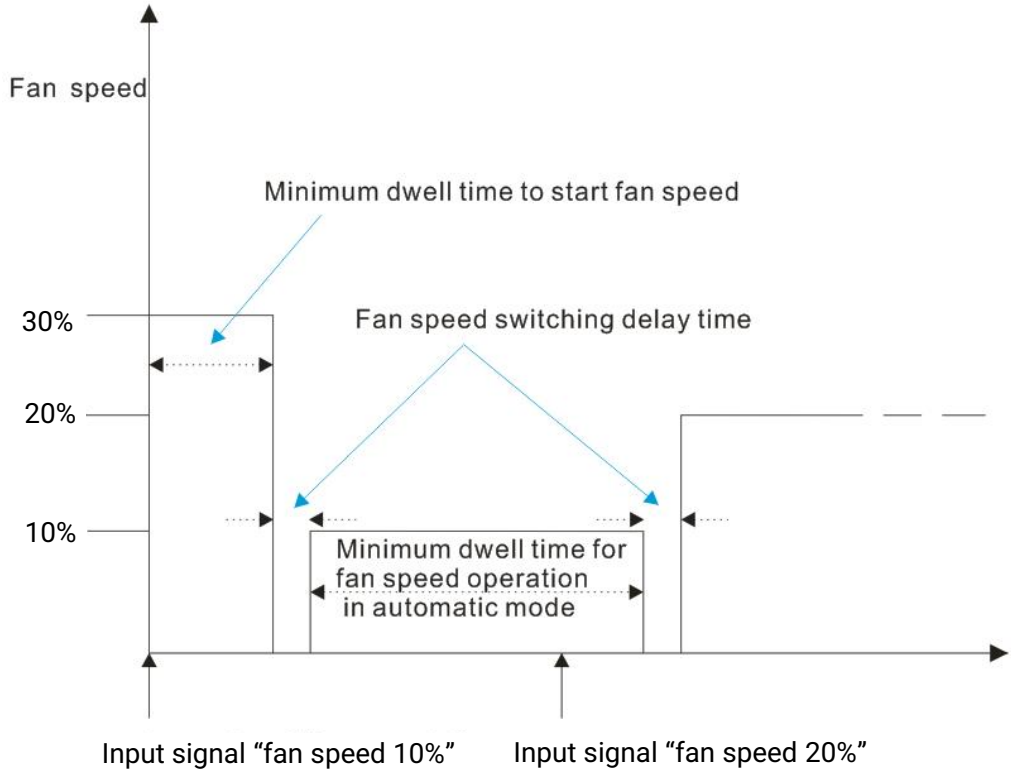
This parameter defines the minimum dwell time at which a certain fan speed is turned on during the start-up phase. Options: **1...65535 s**

When the fan is turned on, it starts at the starting fan speed first, and then switch to the target fan speed after the minimum dwell time expires. This target fan speed may be the fan speed of the fan after resetting or the fan speed triggered by other operations.

Example: Starting characteristics of a fan with 30% fan speeds

Assume that the current state of the fan is off, the starting fan speed is 30%, the target fan speed is 10%,

and the final fan speed is 20%, as shown in the following figure:



The above figure shows that if the fan is currently in the off state, when it receives a telegram of “Fan Speed 10%”, it will start “Fan Speed 30%”. After the minimum stay time of the start fan speed is over, it switches the fan speed. The fan speed switching needs a delay time (this is a technical parameter of the fan, which is conducive to protect the fan), After the delay time expires, the fan switches to the target fan speed "fan speed 10%", in the "fan speed 10%" operation, if the fan receives a "fan speed 20%" telegram, then you need to consider whether the automatic mode is activated. If the automatic mode is activated, you need to consider the minimum dwell time of the fan speed operation. If it is direct operation, you do not need to consider dwell time of the fan speed operation, the fan runs at "Fan Speed 20%".

4.6.3.1. Parameter window“Auto.”

This parameter window (Fig.4.6.3.1) is visible if in Fig. 4.6.3 the option Enable has been selected in the parameter “Auto. Operation function”.

Here set the auto. Operation of level percentage fan, the threshold values for switch over of the fan ON/OFF is defined.

If the coil controller is from the local,the fan will automatically ON/OFF the fan based on the control value or temperature difference in the threshold value range.The control value is defined by the PI algorithm of the device internal program,which will not be sent to the bus.

If the coil controller is from the bus,the speed is determined by the control value of the bus. Furthermore,there are 4 limitations can be set.

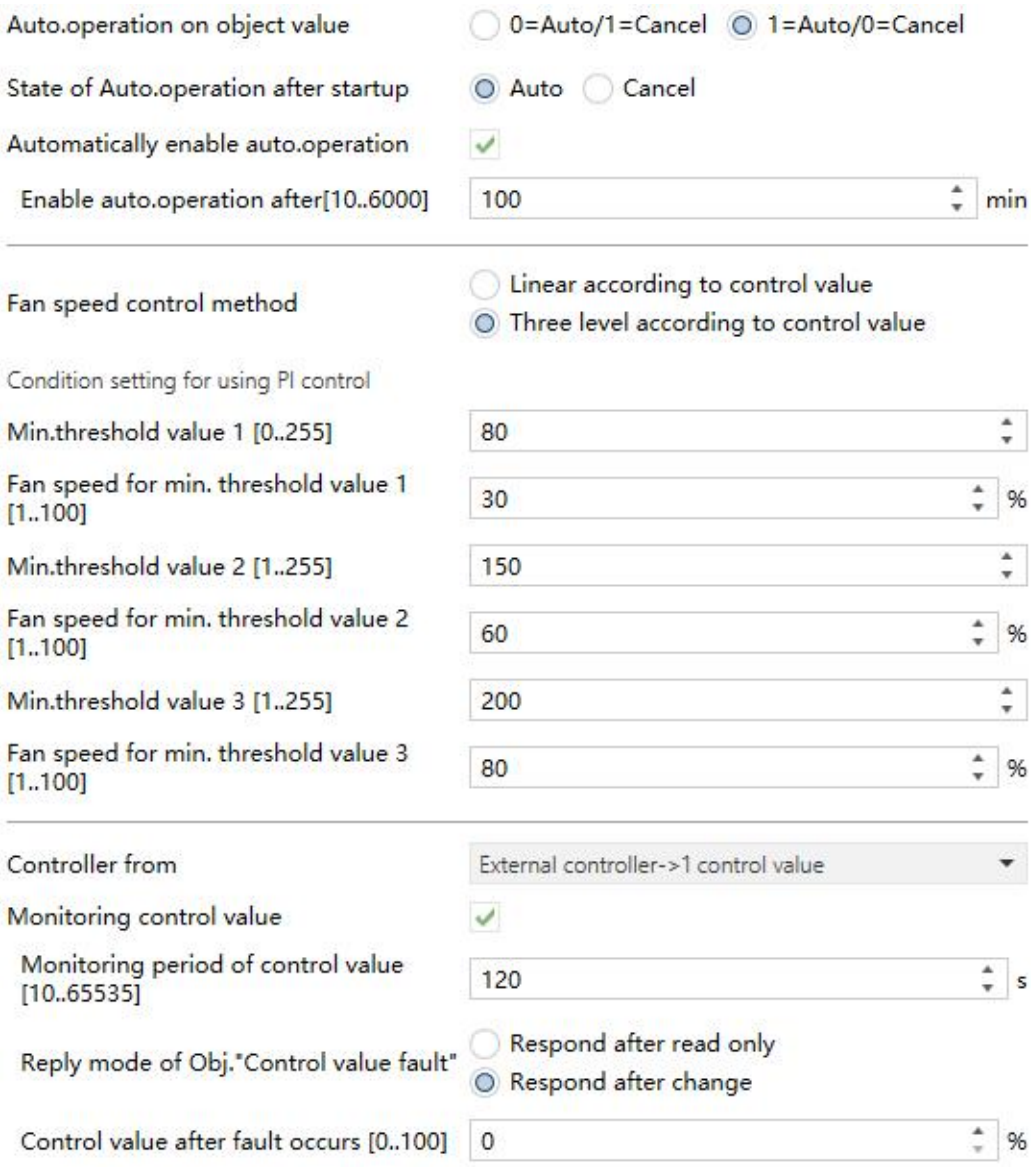




Fig.4.6.3.1 Parameter window"Auto."

Parameter"Auto. operation on object value "

This parameter defines how to react to a telegram value of activating the auto.Operation. Options:

0=Auto/1=Cancel

1=Auto/0=Cancel

0=Auto/1=Cancel: Automatic is activated by a telegram with value 0 and inactive by value 1.

1=Auto/0=Cancel: Automatic is activated by a telegram with value 1 and inactive by value 0.

Parameter"State of Auto. operation after startup"

This parameter sets whether automatic operation is enabled when the device starts up.

Auto

Cancel

Auto: after the device is started, the automatic operation is enabled by default.

Cancel: after the device is started, the automatic operation is disabled by default.

Parameter"Automatically enable auto. operation"

This parameter sets whether the auto-enable feature of automatic operation is enabled.

When it is enabled, the next parameter is visible.

When the normal operation exits the automatic operation, in the absence of any operation, the fan returns to the automatic operation after the time set by the next parameter is reached.

——Parameter"Enable auto. Operation after [10..6000]"

This parameter sets the time when returns to automatic operation from normal operation.

Options: **10..6000 min**

Parameter"Fan speed control method"

This parameter is used to set the fan speed control method. Options:

Linear according to control value

Three level according to control value

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"Min. threshold value 1 [0..255]"

Parameter"Fan speed for threshold value 1 [1..100]"

Parameter"Min. threshold value 2 [1..255]"

Parameter"Fan speed for threshold value 2 [1..100]"

Parameter"Min. threshold value 3 [1..255]"

Parameter"Fan speed for threshold value 3 [1..100]"

These parameter defines the threshold control value and corresponding output fan speed percentage.

Control value 1, options: **0...255,0=Not allow fan off, minimum operation speed is 1**

Control value 2/3, options: **1...255**

Fan speed percentage, options: **1...100%**

Note:

1. Fan speed percentage corresponds to the Max./Min. Output voltage for fan speed. Fan speed is automatically controlled and adjusted by comparing the control value with the voltage value.

2. If the control value is less than threshold 1, the fan speed is 0%.

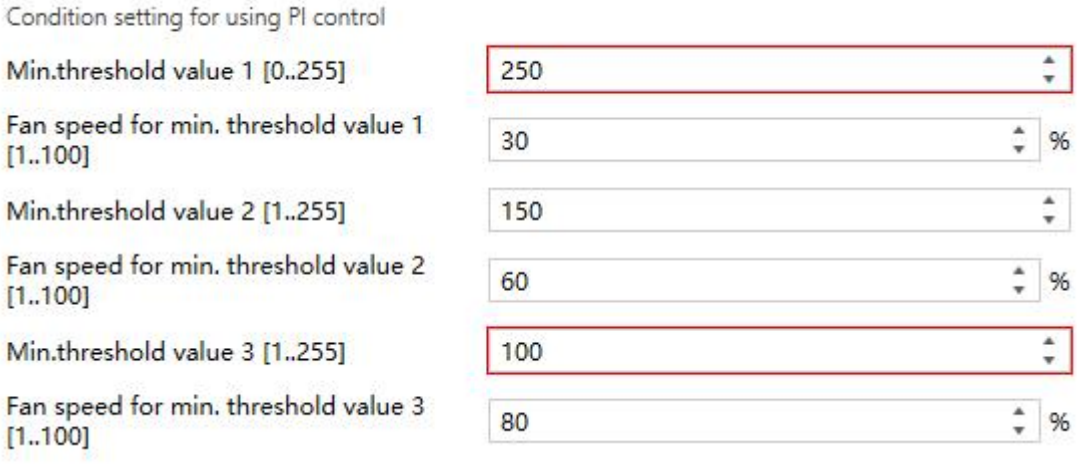
3. If the control value is greater than or equal to threshold 1 and less than threshold 2, then fan speed 1 is operated.

4. If the control value is greater than or equal to threshold 2 and less than threshold 3, then fan speed 2 is operated.

5. If the control value is greater than or equal to threshold 3, then fan speed 3 is operated.

Note: The controller evaluates these thresholds in ascending order, that is, first checks the threshold 1 , then threshold 2, then threshold 3.

The correctness of function execution is only guaranteed in this case: threshold 1 <threshold 2 < threshold 3. If not, they can not be modified on ETS, and display red box warning, as shown as follow:



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 as follow are visible when "Local controller" is selected:

Parameter"Min. Temperature difference 1 [1..200]"

Parameter"Min. Fan speed for temperature difference 1 [0..100]"

Parameter"Min. Temperature difference 2 [1..200]"

Parameter"Min. Fan speed for temperature difference 2 [1..100]

Parameter"Min. Temperature difference 3[1..200]"

Parameter"Fan speed for min. temperature difference 3 [1..100]"

These parameter defines the temperature difference threshold and corresponding output fan speed percentage.

Temperature difference 1, options: **0...200*0.1K, 0=Not allow fan off, minimum operation speed is 1**

Temperature difference 2/3, options: **1...200*0.1K**

Fan speed percentage: **1...100%**

Note:

1. If the temperature difference is less than threshold 1, the fan speed is 0%.

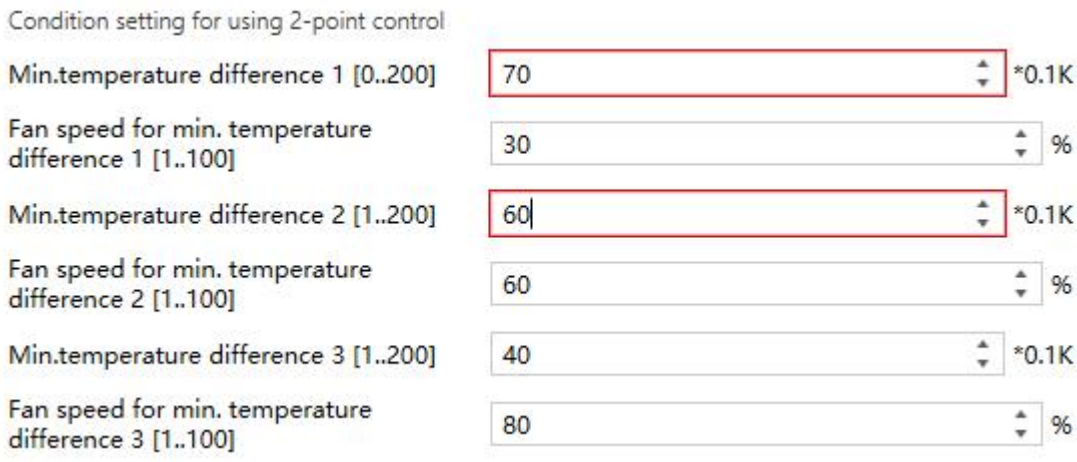
2. If the temperature difference is greater than or equal to threshold 1 and less than threshold 2, then fan speed 1 is operated.

3. If the temperature difference is greater than or equal to threshold 2 and less than threshold 3, then fan speed 2 is operated.

4. If the temperature difference is greater than or equal to threshold 3, then fan speed 3 is operated.

Note: The controller evaluates these thresholds in ascending order, that is, first checks the temperature difference 1 , then temperature difference 2, then temperature difference 3.

The correctness of function execution is only guaranteed in this case: temperature difference 1 <temperature difference 2 < temperature difference 3. If not, they can not be modified on ETS, and display red box warning, as shown as follow:



Parameter"Controller from"

The description of the fan speed control value is not described in this chapter. For details, please refer to section 4.6.1.1,parameter "Controller from".

Parameter"Limitation function"

The description of the limitation function is not described in this chapter. For details, please refer to section 4.6.1.1,parameter "Limitation function".

——Parameter"Fan with limitation x (x=1,2,3,4)"

With this parameter, the fan switching can be set in active limitation. There are the same parameters for each of the individual four limitations.

This options are visible when "Three level according to control value" is selected:

Disable

Unchange

1

1, off

2

2, 1

2, 1, off

3

3, 2

3, 2, 1

Off

This options are visible when"Linear according to control value" is selected:

Disable

Unchange

off

on

Disable: the limitation is not effect to the Auto. Operation, but the status can be activated.

Unchange: the fan status is remained the current status when the limitation is activated.

1: the fan is only switched 1 when the limitation is activated.

1, off: the fan is only switched 1 and off when the limitation is activated.

2: the fan is only switched 2 when the limitation is activated.

2, 1: the fan is only switched 2 and 1 when the limitation is activated.

2, 1, off: the fan is only switched 2 ,1 and off when the limitation is activated.

3: the fan is only switched 3 when the limitation is activated.

3, 2: the fan is only switched 3 and 2 when the limitation is activated.

3, 2, 1: the fan is only switched 3, 2 and 1 when the limitation is activated.

off: the fan is only switched off when the limitation is activated.

on: the fan is only switched on when the limitation is activated, the operating fan speed is determined by the following parameters.

Parameter as follow are visible when “on” is selected:

——Parameter“Limitation 1/2/3/4 lower limit”

——Parameter“Limitation 1/2/3/4 upper limit”

These parameter defines the limitation 1~4 lower/upper limit.

4.6.3.2. Parameter window“Status”

The parameter window “Status” setting interface is shown in Figure 4.6.3.2. This interface is used to set the running status information of the fan with Percentage-level fan speed.

The parameter settings are similar to chapter 4.6.2.2, not repeat here.



Fig.4.6.3.2 Parameter window“Status”

4.6.4. Explanation of priority

The priority for various operations of fan control:

Initialization(After the parameter download is completed)→Manual operation (Long press the manual button to switch to manual operation, and the button of the channel has operation)→force operation→General or automatic operation

Apply to the following points:

1.Manually operating the switch actuator has the highest priority, higher than force operation, if the force is activated, the status will back to force operation when you exit the manual operation.

2.Manual operation is mainly used for on-site emergency or debugging, so technical features of fan, such as starting fan speed, delay/minimum running time, conversion time, etc. are not considered, but the response is directly output.

3.Manual operation will make automatic operation exit, automatic operation can be activated again via its object after manual operation is exited. If it is one-level fan, force operation will also make automatic operation exit, multi-level fans only limit the fan speed within the allowable range.

4.During manual operation, forced command received will be recorded, and the control value of automatic operation will also be recorded.

4.7. Parameter window“Valve”

This chapter introduces HVAC system of the valve control unit, following the fan control of the previous section. The fan coil actuator can be used to control 2-pipe or 4-pipe system.

The fan and the HVAC system can be parameterized independently. Therefore, when we use the fan coil actuator to control the valve, we need to consider both the fan and HVAC system parameter settings and reasonably set them in order to the two parts to better work together.

The valve is the end product of central air-conditioning, thus the function of the room controller is mainly used in places with central air-conditioning, to give a room heating, cooling and ventilation.

Pipe systems description:

In daily life, a fan coil unit can be configured as a 4-, 3- or 2-pipe system.

The 2 pipe system consists of just a single water circuit, which is heated or cooled alternately to suit the season. In a 2 pipe fan coil unit, there is only one heat exchanger with a valve for heating or cooling, the control value for heating or cooling is provided by a thermostat, only warm or only cold water is supplied centrally to the pipe system.

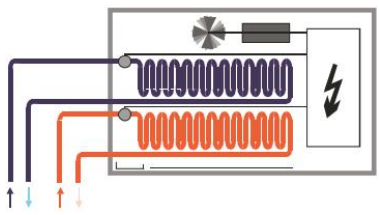
In many HVAC systems, cooling is undertaken exclusively with a 2 pipe fan coil unit. The heating function is undertaken by a conventional heater or an electrical heater in the fan coil unit.

The 3 pipe system has a similar design to the 4 pipe system. It has a separate inlet for heating and cooling water as well as two separate heat exchangers with one valve each.In contrast to a 4 pipe system the 3 pipe system has a common return flow for heating or cooling water.

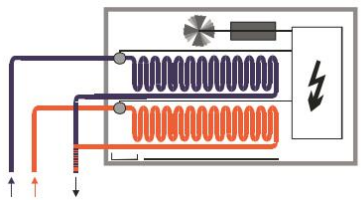
Note: this device don not support 3-pipe system.

In a 4 pipe system, separate water circulation loops are used for heating and cooling water. Thus there are also two separate heat exchangers for heating and cooling which are each triggered via a single valve in the fan. Warm and cold water is provided centrally to two separate pipe system.That is to say the heating and cooling can not be used at the same time.

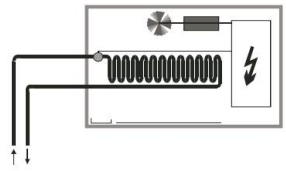
Connections of 4-pipe system: Connect the relevant valve of the pipe to the heating/cooling output of the device to control flow the warm and cool water.



4 pipe system



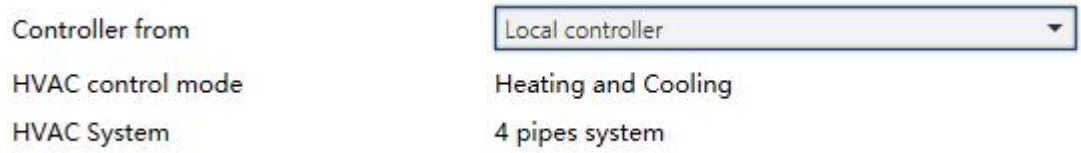
3 pipe system



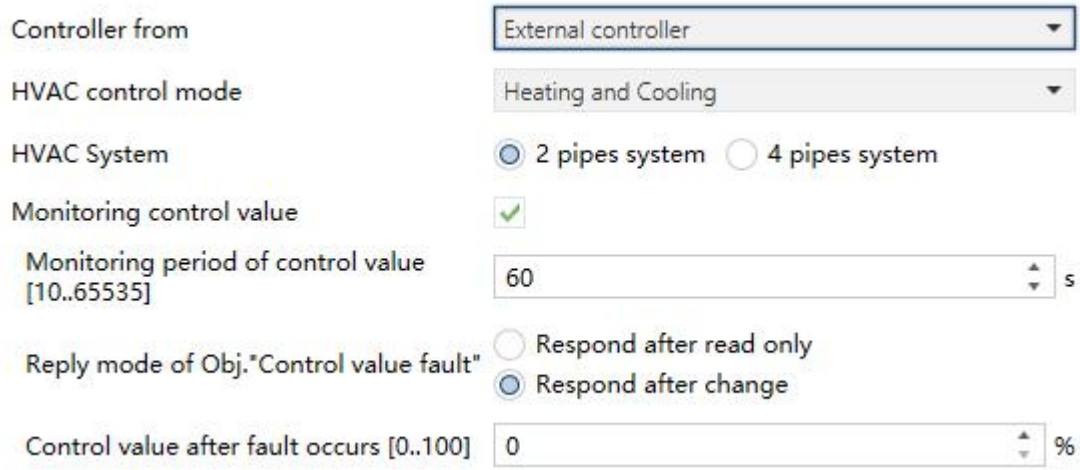
2 pipe system



Controller from - Disable



Controller from - Local controller



Controller from - External controller

Fig.4.7 Parameter window "Valve"

Parameter"Controller from"

This parameter is used to set the valve controller. Options:

Disable

Local controller

External controller

Parameter as follow are visible when "Disable" is not selected:

Parameter"HVAC control mode"

This parameter is used to set the HVAC control mode.

When selecting "local controller", display accord to the room temperature control mode.

When selecting "external controller", Options: **Heating/Cooling/Heating and Cooling**

Heating: The fan coil can only achieve heating function.

Cooling: The fan coil can only achieve cooling function.

Heating and cooling: The fan coil can achieve both heating and cooling function.

Parameter"HVAC System"

This parameter is visible when "Heating and Cooling"is selected, for indicating HVAC system, i.e. the type of pipe in which the fan coil enters and exits the water.

Options:**2 pipes system/4 pipes system**

2 pipes system: Two-pipe system, using one inlet and outlet pipe for heating and cooling, that is, hot water and cold water share a valve control;

4 pipes system: Four-pipe system, which has its own inlet and outlet pipes for heating and cooling, and requires two valves to control the ingress and egress of hot and cold water.

Parameters as follow are visible when "External controller" is selected:

Parameter"Number of control value"

This parameter is visible when select "4-pipes system". It is used to indicate that there are two control values under 4 pipes system, one for controlling the heating valve and the other controlling the cooling valve.

Parameter"Monitoring control value"

This parameter sets whether to enable monitoring the control value.

When enabled, the following parameters are visible:

——Parameter"Monitoring period of control value[10..65535]"

This parameter sets the time period for monitoring the control value. If the control value has not been received within this time, the device will consider the external controller error and the valve will output according to the control value set by the next parameter.

Available options: **10...65535 s**

——Parameter"Reply mode of Obj. "Control value fault"

This parameter defines the reply mode when the external control value is incorrect. Options:

Respond after read only

Respond after change

Respond after read only: The object "Control value fault" sends the current state to the bus only when the device receives the read status from other bus device or bus.

Respond after change: When the status changes or the device receives a request to read the status, the object "Control value fault" immediately sends a message to the bus to report the current status.

——Parameter"Control value after fault occurs [0..100]"

When an error occurs in the external controller, the device will output the valve according to the control value set by this parameter. Options: **0...100 %**

4.7.1.Parameter window“Heating/Cooling”

The parameter window “Vx:Heating” and “Vx: Cooling” setting interface are shown in Figures 4.7.1(1) and 4.7.1(2). These two interfaces are mainly used to set the control mode and related parameters of the heating and cooling valve. Different valve types are applicable to different control modes. Therefore, when setting the control mode, it needs to be considered in combination with the valve type.(Control modes and parameters of the valve under both 2 pipes and 4 pipes system are similar, here no longer explain.)

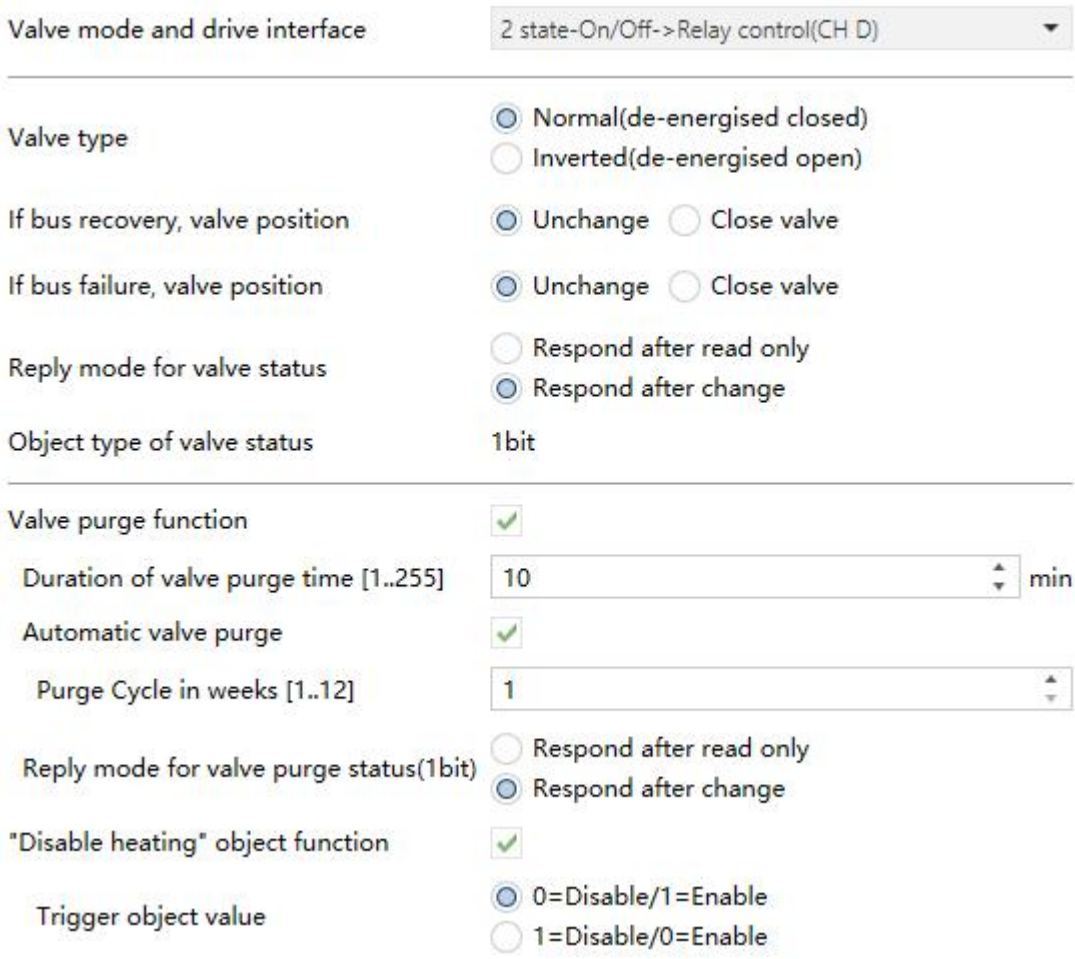


Fig.4.7.1(1) Parameter window “Vx: Heating”

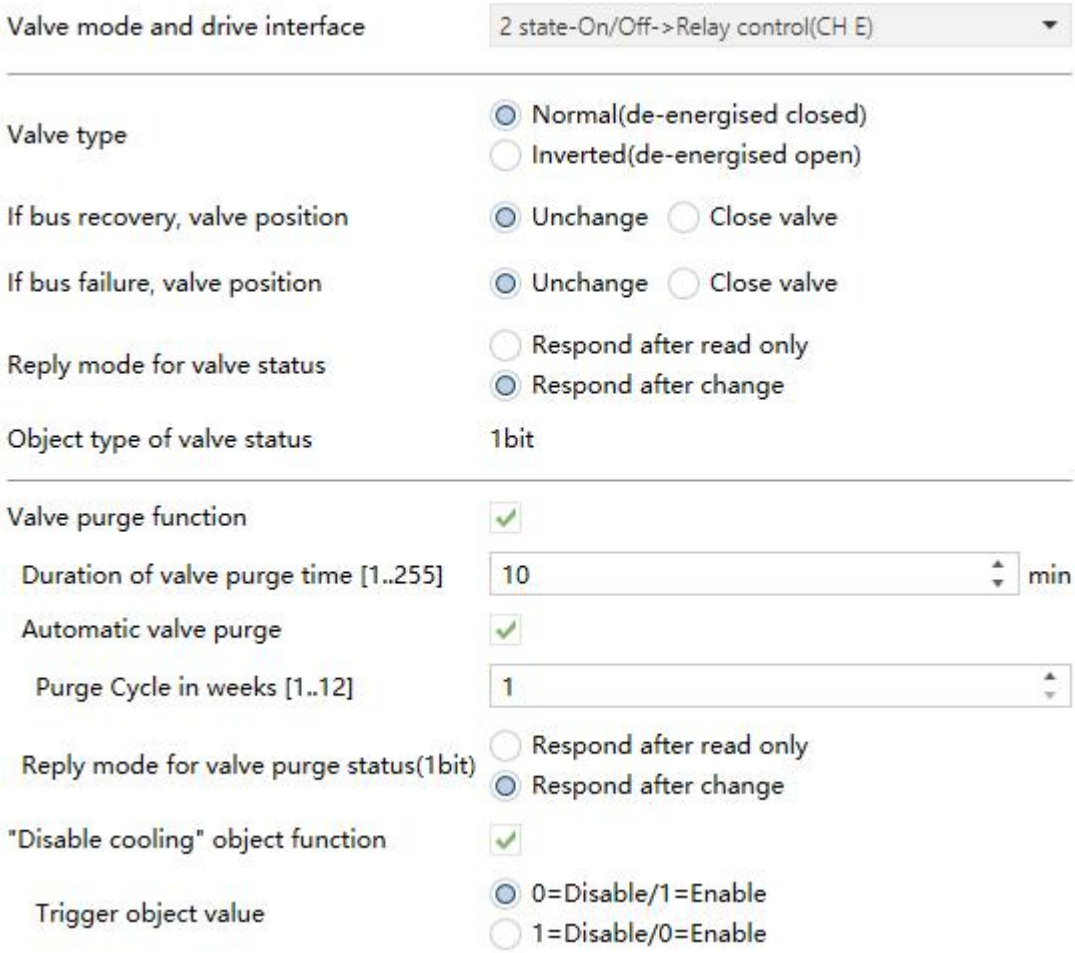


Fig.4.7.1(2) Parameter window"Vx: Cooling"

Parameter"Valve mode and drive interface"

This parameter is used to set the valve mode and driver interface. Options:

According to the HVAC control mode and HVAC system display, Options:

Disable

2 state-On/Off->Relay control(CH D)

2 state-On/Off->Relay control(CH E)

Continuous, PWM->Relay control(CH D)

Continuous, PWM->Relay control(CH E)

3 point, open and close->Relay control(CH D&E)

2 state-On/Off->0-10V(CH F)

Continuous->0-10V(CH F)

2 state-On/Off->0-10V(CH G)

Continuous->0-10V(CH G)

2 state-ON/OFF: two-point switch control mode, suitable for ordinary on-off valve, the valve is based on the received switch control value switch output.

Continuous, PWM: PWM continuous control mode, the valve performs periodic switching output according to the control value received by the object.

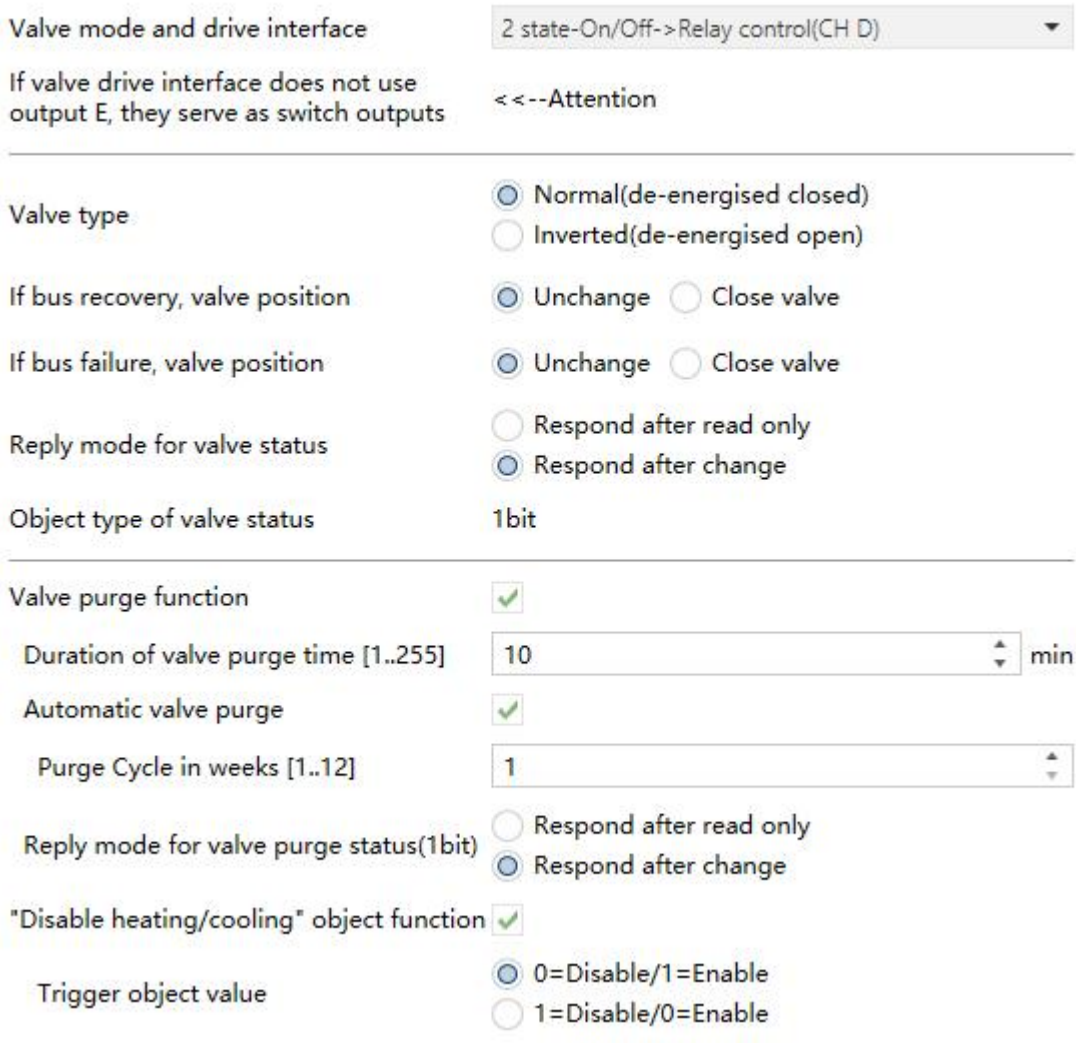
Continuous: continuous control mode, the valve performs periodic switching output according to the control value received by the object.

3 point, open and close: the control type is suitable for driving three-wire valves, and the valve opening is controlled according to the control value of the valve.

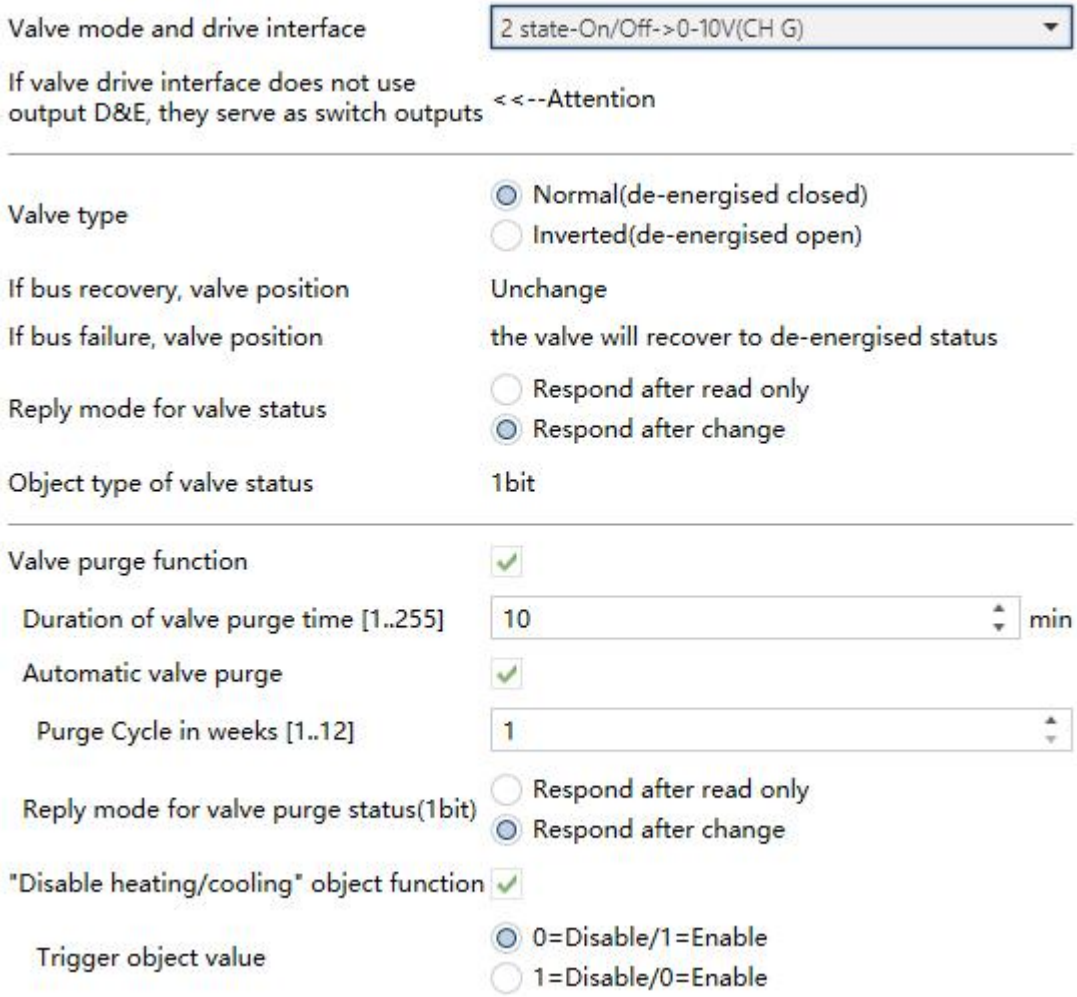
The following takes the heating valve parameter interface as an example to illustrate the parameter settings of four different modes, and the cooling valve is similar.

4.7.1.1.2 state-ON/OFF

The parameter setting interface is shown in Figure 4.7.1.



Relay control



0-10V

Fig.4.7.1.1 Parameter window “2 state-ON/OFF”

Parameter"Valve type"

This parameter sets the direction of the valve switch. Options:

Normal(de-energised closed)

Inverted(de-energised open)

For on-off valves, "Normal (de-energised closed)" is suitable for normally closed switching valves, and "Inverted (de-energised open)" is suitable for always opening switching valves.

Parameter"If bus recovery,valve position"

This parameter sets the position of the valve after the bus voltage is reset.

When selecting “Relay control”, options: **Unchange/Close valve**

When selecting “0-10V”, default: **Unchange**

Unchange: After the bus voltage is recovery, the valve status remains unchanged.

Close valve: Valve closed.

Parameter"If bus failure,valve position"

This parameter sets the position of the valve after the bus voltage is powered down.

When selecting “Relay control”, options: **Unchange/Close valve**

When selecting “0-10V”, default: **the valve will recover to de-energised status**

Options:

Unchange

Close valve

Unchange: After the bus voltage is powered down, the valve status remains unchanged.

Close valve: valve closed.

the valve will recover to de-energised status: After the bus voltage is powered down, the valve will recover to de-energised status.

Note: After the application programming , the valve status is off by default.

Parameter“Reply mode for valve status”

This parameter defines how the valve status responds. Options:

Respond after read only

Respond after change

Respond after read only: The object “Valve status, Heat/Cool” sends the current status to the bus only when the device receives a status read from bus.

Respond after change: When the status changes or the device receives a request to read the status, the object “Valve status, Heat/Cool” immediately sends a telegram to the bus to report the current status.

Parameter“Object type of valve status”

This parameter indicates the object type of valve status is 1 bit.

Parameter“Valve purge function”

This parameter is used for setting whether to enable valve purge function .

When it is enabled, a 1-bit communication object "Trigger valve purge, Heat/Cool" is visible for triggering the valve cleaning operation while the following parameters are visible.

——Parameter“Duration of valve purge time[1...255]”

This parameter sets the duration of the valve cleaning. During this time, the valve is fully open. When this time passes, the state before cleaning is re-established. Options: **1…255 min**

If the heating/cooling operation is prohibited during the cleaning, the cleaning will continue.

And during the cleaning, the received operation prohibition telegram and the valve control telegram are both recorded, and the value status will be updated according to the new telegrams after the cleaning is completed.

——Parameter“Automatic valve purge”

Visible when the valve cleaning function is enabled.

Used to enable automatic valve cleaning function, the following parameters can be seen.

——Parameter“Purge Cycle in weeks[1...12]”

This parameter defines the period of automatic valve cleaning. In weeks, the time starts from the power-on of the device, and the cleaning operation is triggered after timing.

Once the cleaning is completed, the time is reset, whether it is done by automatic cleaning or by object-triggered cleaning, which is reset. Options: **1…12**

Note: The manual operation has the highest priority and the cleaning priority is the second highest. If the cleaning time has not expired, the cleaning process is manually interrupted. At the end of this cleaning, the manual exit will not continue the last cleaning.

——Parameter"Reply mode for valve purge status (1bit)"

This parameter is visible when the valve cleaning function is enabled and defines the feedback mode for the valve cleaning status. Options:

Respond after read only

Respond after change

Respond after read only: The object "Valve purge status, Heat/Cool" sends the current status to the bus only when the device receives a status read from bus.

Respond after change: When the status changes or the device receives a request to read the status, the object "Valve purge status, Heat/Cool" immediately sends a message to the bus to report the current status.

Parameter"Disable heating/cooling" object function"

This parameter is used for setting whether to enable disable function .

When it is enabled, a 1-bit communication object "Disable, Heat/Cool" is visible and can be used to disable heating/cooling operations while the following parameters are visible.

——Parameter"Trigger object value"

This parameter sets the value of the message used to disable the heating/cooling operation. Options:

0=Disable/1=Enable

1=Disable/0=Enable

0=Disable/1=Enable: When the object "Disable, Heat/Cool" receives the message value "0", the heating/cooling operation is prohibited, and when "1" is received, it is reactivated.

1=Disable/0=Enable: When the object "Disable, Heat/Cool" receives the message value "1", the heating/cooling operation is prohibited, and when "0" is received, it is reactivated.

Note: When the operation is disabled, the valve position is immediately adjusted back to the off state. When enabled again, the valve state will be updated according to the current control value. During the prohibition period, the received telegram is recorded, and fault monitoring still continues.

The cleaning function and the function of prohibiting the valve control are similar in each control mode. The following two control modes will not be repeated.

4.7.1.2. Continuous, PWM

The parameter setting interface is shown in Figure 4.7.1.2.

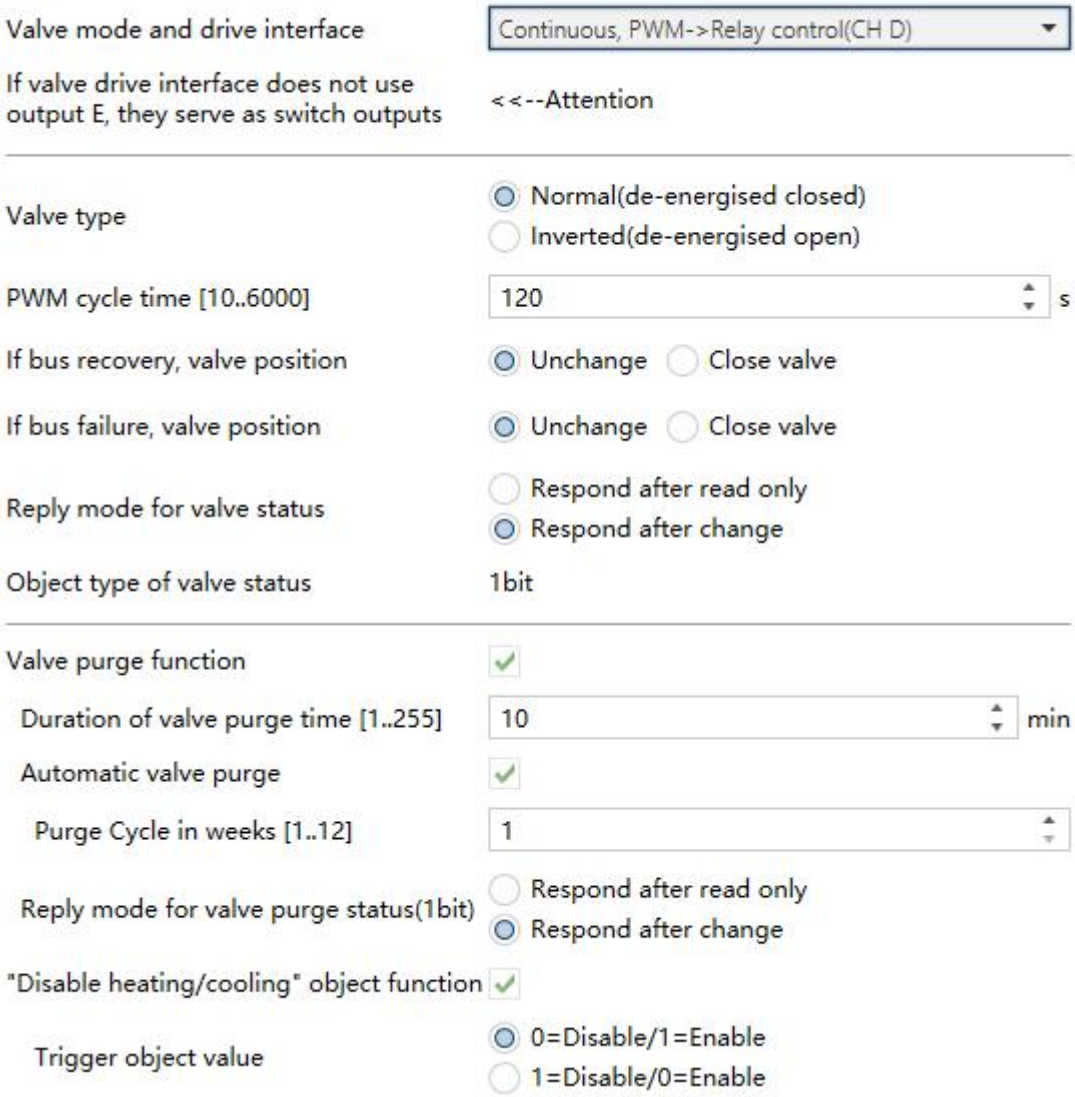
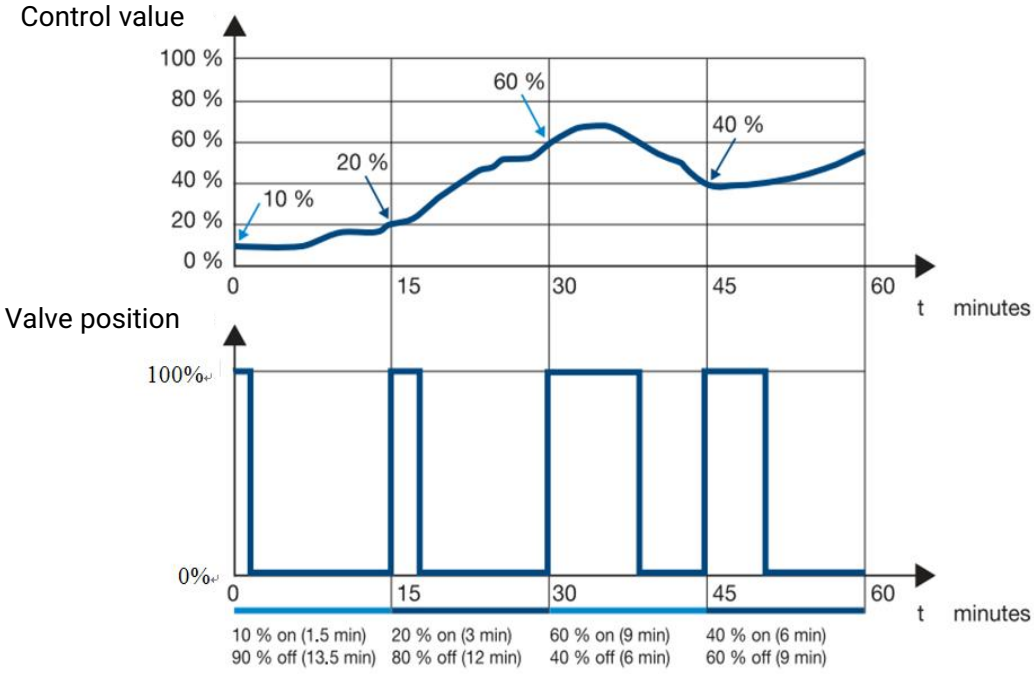


Fig.4.7.1.2 Parameter window “Continuous, PWM”

This control mode is suitable for driving two-wire valves.

This control mode has only two states "fully open" and "completely closed". The valve performs cyclic switching operation according to the control value and PWM cycle. For example, the control value is 20%, the PWM period is 15min, then the valve will open for 3min, close for 12min, control When the value is 60%, then the valve will open for 9min, off for 6min, the control value is evaluated by the temperature controller or sensor device to the current temperature and set temperature, and then sent to the device. The valve adjustment diagram is as follows:



This control mode enables relatively accurate temperature control without temperature overshoot. Simple, low-cost control valves can be used. For example, it can be used in conjunction with an electric valve actuator. The switching frequency of the control valve is relatively high.

This control mode parameter interface is similar to "2state-ON/OFF", and the description of the same parameters will not be repeated here.The difference is that the PWM switching period can be set as follows:

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

Parameter"PWM cycle time [10...6000]"

This parameter is used to set the time period of PWM control. The larger the value, the smaller the valve switching frequency. Conversely, the smaller the value, the more frequent the valve switch.

When selecting “local controller”, Options: **1...255min**

When selecting “External controller”, Options: **10…6000 s**

Note: For Continuous, PWM valves, different switches, status feedback information is as follows:

Valve switch type	Description
Normal (de-energised closed)	When the valve is relayed, the object "Valve status, Heat/Cool" sends the message "0"; when there is current (relay closed), the message "1" is sent.
Inverted (de-energised open)	When the valve has a current (relay closed), the object "Valve status, Heat/Cool" sends a message "0"; when there is no current (relay opened), the message "1" is sent.

Other parameters is similar to chapter 4.7.1.1, not repeat here.

4.7.1.3. Continuous

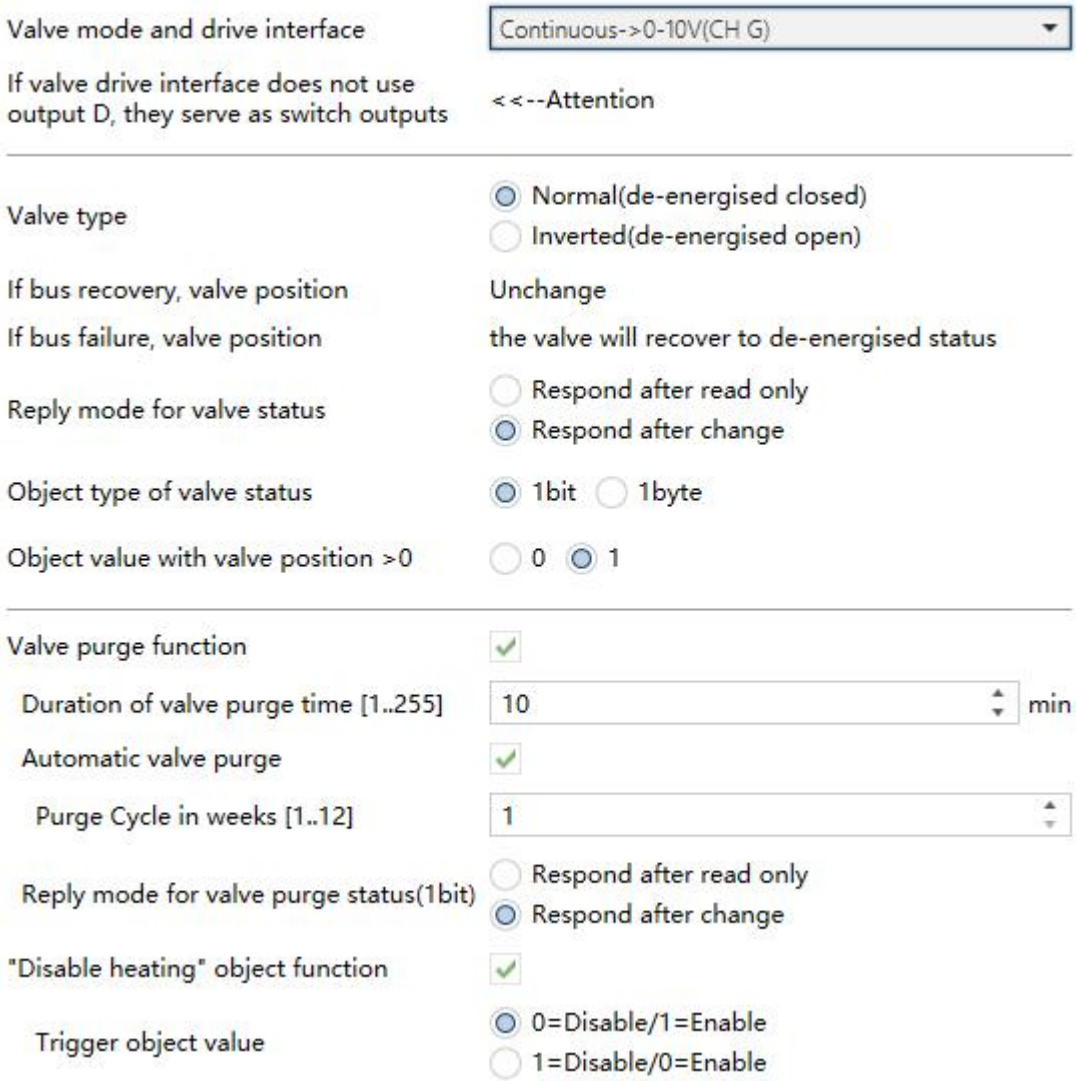


Fig.4.7.1.3 Parameter 设置界面 “Continuous”

Parameter“If bus recovery,valve position”

This parameter indicates after the bus voltage is recovery, the valve status remains unchanged.

Parameter“If bus failure, valve position”

This parameter indicates after the bus voltage is powered down, the valve will recover to de-energised status.

Parameter“Reply mode for valve status”

This parameter defines how the valve status responds. Options:

Respond after read only

Respond after change

Respond after read only: The object “Valve status, Heat/Cool” sends the current status to the bus only when the device receives a status read from bus.

Respond after change: When the status changes or the device receives a request to read the status, the object “Valve status, Heat/Cool” immediately sends a telegram to the bus to report the current status.

Parameter"Object type of valve status"

Set the object type for valve position status feedback. Options:

1bit

1byte

1bit: The next parameter is visible, and a 1-bit object "Valve status, Heat/Cool" is visible for feedback valve switching status.

1byte: A 1byte object "Valve status, Heat/Cool" is visible for feedback valve position status.

——Parameter"Object value with valve position >0"

Options:

0

1

The option "1", when the valve position is greater than 0, the object "Valve status, Heat/Cool" sends the message "1"; When the valve position is 0, the message "0" is sent. And vice versa.

Other parameters is similar to chapter 4.7.1.1, not repeat here.

4.7.1.4.3point, open and close

The parameter setting interface is as shown in Figure 4.7.1.4.

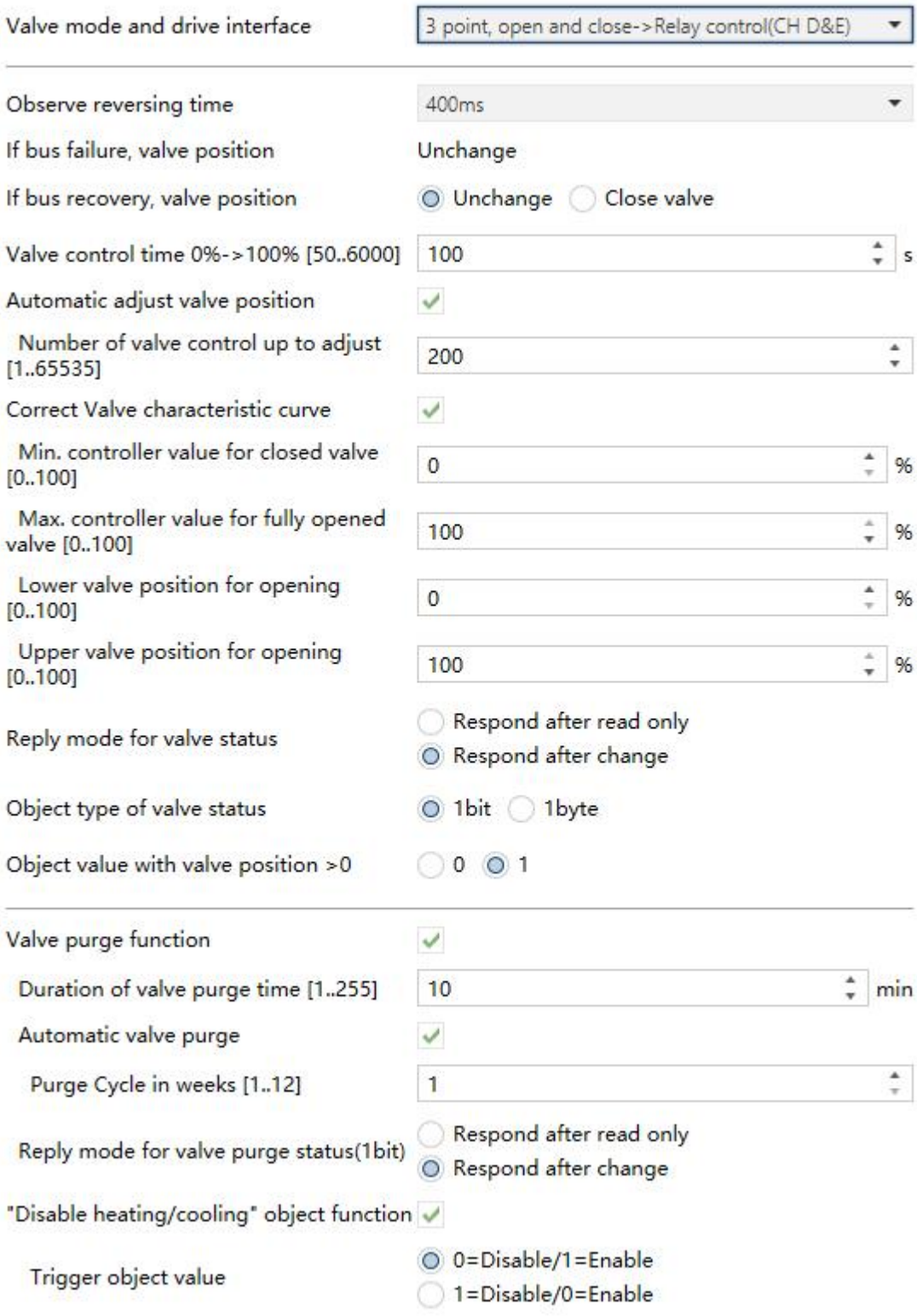
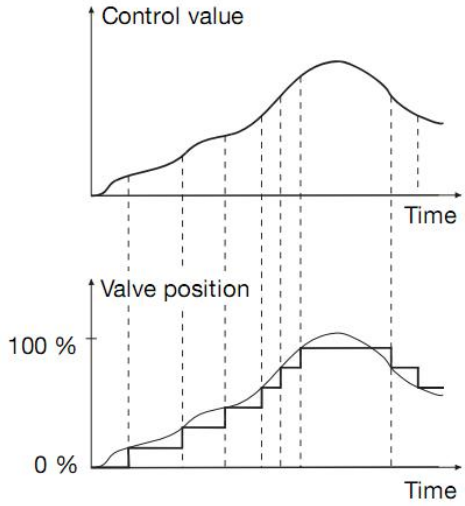


Fig.4.7.1.3 Parameter window “3 point, open and close”

This control mode is suitable for driving three-wire valves. It controls the opening of the valve according to the control value received by the object. It can realize “completely open”, “completely close” or open the valve to a certain position. This control mode is the most accurate. Control method, while the switching frequency of the valve is also very low. For example, if the control value is 20%, then the valve will stop output when it is 20% open. The valve adjustment diagram is as follows:



The parameter functions of this control mode are described below:

Parameter“Observe reversing time”

This parameter sets the time the valve will pause while running the steering, which helps protect the valve. Options:

100ms

200ms

...

1s

1.2s

1.5s

The steering pause time is a technical feature of the valve and should be considered in any operation. When setting this parameter, refer to the technical characteristics of the valve.

Parameter“If bus failure, valve position”

This parameter indicates after the bus voltage is powered down, the valve status remains unchanged.

Parameter“If bus recovery, valve position”

This parameter sets the position of the valve after the system voltage is reset. Options:

Unchange

Close valve

Unchange: The default state of power-on after the system voltage is restored.

Close valve: Valve closed.

Note: The parameter download is not processed as a system reset, and the valve position is adjusted to

0%. Only when it is adjusted to 0%, the valve position can be determined and the next step is performed.

In this control mode, the timing of the automatic cleaning function is counted from the position of the valve.

Parameter"Valve control time 0%→100% [50...6000]"

This parameter sets the time required for the valve to go from fully closed to fully open, the total travel time. Options: **50…6000 s**

Assuming that the travel time set by this parameter is 180s, the current valve position is 20%, and the target position is 60%, then the valve takes 72s from 20% → 60% of the travel time.

The setting of this parameter requires reference to the technical characteristics of the valve.

Parameter"Automatic adjust valve position"

This parameter sets whether the automatic adjustment function of the valve is enabled.

When enabled, the following parameters are visible:

The automatic valve adjustment function mainly plays the role of correcting the position of the valve, Because the valve has undergone many adjustments, due to various reasons, such as temperature, aging of the device, etc, There is a phenomenon that the valve cannot be completely closed or fully opened, so it needs to be re-positioned by this function.

——Parameter"Number of valve control up to adjust[1...65535]"

This parameter sets how many times the valve has been adjusted, and performs an automatic adjustment, that is, the valve position is adjusted to 0%, re-positioning, but only requires a longer travel time. Options: **1…65535**

Assume 100 times, when the valve has been adjusted 100 times, that is, at the 101st adjustment, If the valve is adjusted in the opening direction, no automatic adjustment is made, If the valve is adjusted in the closing direction, an automatic adjustment will be made, Adjust the valve to 0% position and then adjust to the target position. For example, the 100th valve position is 50%, and the 101st is 60%, The valve will not be automatically adjusted until a reverse adjustment command is received; If the 101st is 40%, then the valve is automatically adjusted, running to 0%, and then running to the target position 40%. The time of automatic adjustment is extended by 5% of the total travel time, that is, travel time + total travel time × 5%, The total travel time × 5% must be less than or equal to 1 min. When it is greater than 1 min, take 1 min.

When the automatic adjustment is performed, the number is counted again. When the valve adjustment stops, the count increases once (The positioning adjustment when the parameter download is completed is not counted in the number of times). In the process of performing automatic adjustment, If the control value is received, it will wait until the automatic adjustment is completed., If there is a higher priority operation, then the high priority operation ends and then execute.

The setting of this parameter requires reference to the technical characteristics of the valve.

Parameter"Correct Valve characteristic curve"

This parameter sets whether the valve characteristic adjustment is enabled.

When enabled, the following parameters are visible:

——Parameter"Min. controller value for closed valve [0..100]"

——Parameter"Max. controller value for fully opened valve [0...100]"

——Parameter"Lower valve position for opening [0...100]"

——Parameter"Upper valve position for opening [0...100]"

Characteristic curve for setting the valve output. Options: **0...100 %**

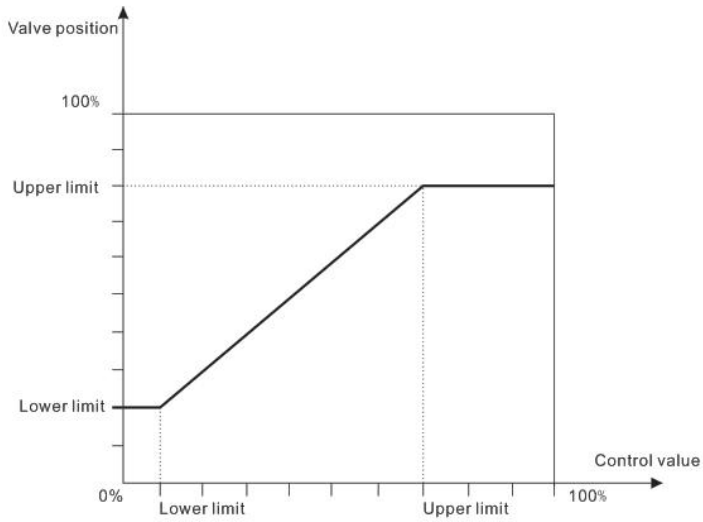
Min. controller value for closed valve: Lower limit control value of valve characteristic curve;

Max. controller value for fully opened valve: Upper limit control value of valve characteristic curve;

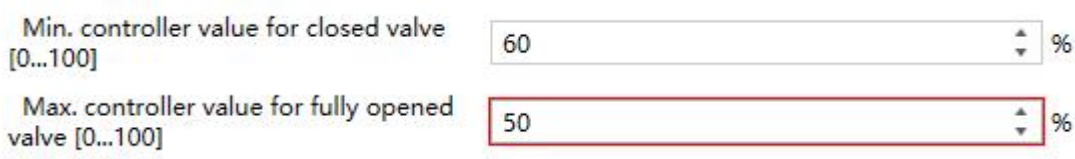
Lower valve position for opening: Lower limit of valve position;

Upper valve position for opening: Upper limit of valve position.

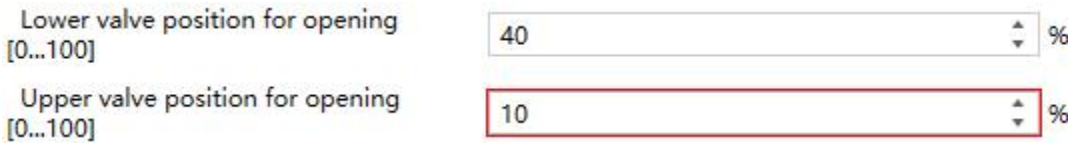
Take the valve with the valve interface as the relay as an example, Assuming the lower limit of the control value is set to 10%, the lower limit of the valve is set to 20%, the upper limit of the control value is set to 70%, and the upper limit of the valve is set to 80%, there is an output characteristic curve as shown below:



Min. controller value < Max. controller value, if or not, you cannot configure these two parameters in ETS:



Lower valve position < Upper lower valve position, if or not, you cannot configure these two parameters in ETS:



Parameter"Reply mode for valve status(1bit)"

This parameter defines how the valve status responds. Options:

Respond after read only

Respond after change

Respond after read only: The object "Valve status, Heat/Cool" sends the current status to the bus only when the device receives a status read from bus.

Respond after change: When the status changes or the device receives a request to read the status, the object "Valve status, Heat/Cool" immediately sends a message to the bus to report the current status.

Parameter"Object type of valve status"

Set the object type for valve position status feedback. Options:

1bit

1byte

1bit: The next parameter is visible, and a 1-bit object "Valve status, Heat/Cool" is visible for feedback valve switching status.

1byte: A 1byte object "Valve status, Heat/Cool" is visible for feedback valve position status.

——Parameter"Object value with valve position >0"

Options:

0

1

The option "1", when the valve position is greater than 0, the object "Valve status, Heat/Cool" sends the message "1"; When the valve position is 0, the message "0" is sent. And vice versa.

Other parameters is similar to chapter 4.7.1.1, not repeat here.

4.7.2. Explanation of priority

The priority for various operations of valve control:

Initialization(After the parameter download is completed)→Manual operation→Purge function→Automatic adjust valve position(Only 3 point, open and close)→Disable valve operation→Fault monitoring or general operation (Trigger via the object "Control value, Cool/Heat")

Apply to the following points:

1. In the faulty mode, if the valve is disabled, the fault monitoring is still continue and there will also send a fault report to bus, but it can not perform the fault action until there is no higher priority operation. The fault status will be reset only when the control value is received, and at the same time, the monitoring cycle will be restarted.

2. During purging, if a higher priority operation(such as the manual operation) interrupts it, the purging will end, and after exit manual operation the last purging will not continue.

3. Correct valve characteristic curve will correct the control value and the valve position of fault monitoring and general operation.

4. Switch to manual mode, if there is no operation channel button, it will not perform action and continue original action. If current valve is closed, operation button performs valve opening(to upper valve position). If current valve is open, operation button performs valve closing(to 0%). During manual operation, the commands of control value, valve purging and valve disable are ignored, but the fault monitoring will be continue, and the control value can reset the cycle of fault monitoring. After exiting manual operation, it will perform action according to the action of fault status, if no fault, it will maintain until a new control command received.

5. Cool/Heat mode can only be switched by control value and manual operation. Due to the higher priority of purge operation, it is not limited by the control mode, for example, it can trigger the purging of the heat mode in the cool mode, and vice versa. If it is performing the purging of the cool mode currently, it will wait for the purging finished before performing the purging of the heat mode, but the control mode is no change, still in the cool mode. If there receive a control value of another mode during purging, it will switch the status of the control mode immediately, but it need to wait for the purging finished before preforming the action according to current control value.

6. In the same control mode, if multiple operations occur within a period of time, it will process according to priority order, that is until high-priority operation to be canceled or end, the low-priority operation can be processed. Assuming currently there are purge function, disable valve operation and control value operation, if cancel the purge operation at the time, it will go back to the valve status of disable operation according to priority order, that is close the valve. If valve is enable again, the valve will tack action according to current control value or fault status.

The following points apply to automatic adjustment of valve position (If enable):

1. If automatic adjustment of valve is interrupted by manual operation or purge function, it will perform again after finishing manual operation and purge function.

2. Automatic adjustment of valve affects disable valve operation, fault action and the action of control value. When valve adjustment times meet the automatic adjustment times, valve travel time will increase, because the valve need to re-position before moving to the target position.

3. Adjustment of valve no matter what the control command(Such as manual operation, purge function, disable valve operation, etc) is to adjust it, when stop the adjustment, the number of adjustments will be increase by one. And it will be reset to 1 after the automatic adjustment is finished.

4. During automatic adjustment of valve operation, if receive new control value, it will wait for the automatic adjustment (Positioning) finished before moving to new target position.

4.8. Parameter window“Scene”

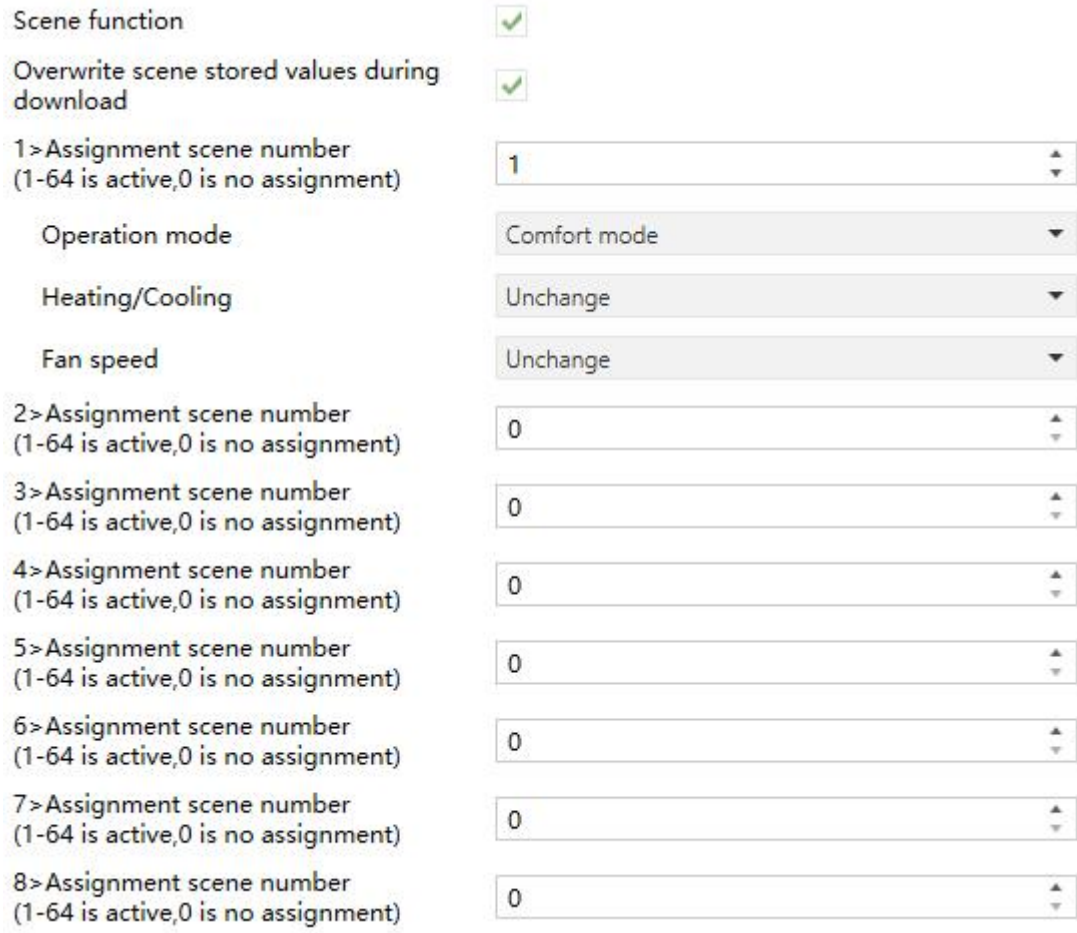


Fig.4.8 Parameter window “Scene”

Parameter "Scene function"

This parameter is for setting whether to enable scene channel.

When enabled, the following parameters are visible:

Parameter "Overwrite scene stored values during download"

This parameter sets whether to override the scene save value during application download.

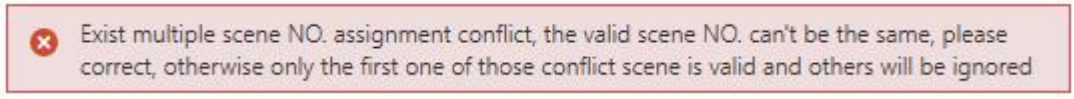
If it is disabled, the stored values before the download can be not overwritten by the parameterized scene value. When the scene is called, the scene saved before the download is still enabled until it is replaced by the new storage scene.

If it is enabled, the stored values will be overwritten by the parameterized scene value during the download. When the scene is called, the scene will be set according to the parameters until it is replaced by the new storage scene.

Parameter "x>Assignment scene number(1-64 is active,0 is no assignment)"(x=1~8)

64 different scene numbers can be assigned. Optional: 1-64 is active, 0 is no assignment.

Note: The effective scene number in the parameter setting option is 1~64, and the corresponding message is 0~63. The scene function can be saved.



Parameter as follow are visible when "0" is not selected:

——Parameter"Operation mode"

This parameter is visible when the valve selects the external controller, or when the local controller is selected and RTC operation mode is enabled. Set the RTC operation mode.

Options:

Comfort mode

Standby mode

Economy mode

Frost/heat mode

——Parameter"Temperature"

This parameter is visible when the valve selects the local controller and the RTC operation mode is not enabled. Set the RTC setpoint temperature. Options:

Unchange

5℃

6℃

...

37℃

Note: must meet the condition Min.setpoint temperature<temperatur<Max.setpoint temperature, if not, they can not be configured on ETS.

——Parameter"Fan Speed"

This parameter is visible when "One/Two/Three level/Percentage" is selected, set the fan speed.

When selecting "One/Percentage level", Options:**Unchange/Off/On**

When selecting "Two level", Options:**Unchange/Off/1/2**

When selecting "Three level", Options:**Unchange/Off/1/2/3**

——Parameter"Fan speed for function On"

This parameter is visible when "Percentage level" and "On" are selected. Set the fan speed for function on.

Options:**1..100%**

——Parameter"Heating/Cooling"

This parameter is visible when HVAC control mode is selected "Heating and Cooling". Set the Heating/Cooling mode. Options:

Unchange

Heating

Cooling

Chapter 5 Description of Communication Object

The communication object is the medium through which the device communicates with other devices on the bus, that is, only the communication object can perform bus communication.

The function of each communication object of each function block is described in detail below.

Note: "C" in the property bar of the table below represents the communication function of the communication object.

"W" represents the value of the communication object can be rewritten by the bus.

"R" represents the value of the communication object can be read through the bus.

"T" stands for communication object with transmission function.

"U" means that the value of the communication object can be updated.

5.1. "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	Central switch			1 bit	C	-	W	-	-	switch	Low

Fig.5.1 "General"Communication Object

No.	Object function	Name	Type	Flags	DPT
1	**In operation**	**General**	**1bit**	**C,R,T**	**1.001 switch**
This object is always visible, used to send telegram "1" to the bus periodically to proof the device is under normal working condition.					
2	**Central switch**	**General**	**1bit**	**C,W**	**1.001 switch**
This object is used for the central control for all switch outputs if the central control of output is enabled. Telegram value is defined by the parameter "Output status for the telegram "1"(telegram "0" is opposite of selection)".					

Table5.1"General"Communication Object

5.2. “Input”Communication Object

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
4	Input 1 - ...	Actual temperature, Sensor			2 bytes	C	R	-	T	-	temperature (°C)	Low
5	Input 1 - ...	Temperature error report, Sensor			1 bit	C	R	-	T	-	alarm	Low

Temperature probe(NTC 10K)

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
4	Input 1 - ...	Switch			1 bit	C	R	W	T	U	switch	Low

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
4	Input 1 - ...	Close, Switch			1 bit	C	R	W	T	U	switch	Low
5	Input 1 - ...	Open, Switch			1 bit	C	R	W	T	U	switch	Low

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
3	Input 1 - ...	Disable			1 bit	C	-	W	-	-	enable	Low
4	Input 1 - ...	Short, Switch			1 bit	C	R	W	T	U	switch	Low
5	Input 1 - ...	Long, Switch			1 bit	C	R	W	T	U	switch	Low

BI:Switch sensor

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
4	Input 1 - ...	Scene			1 byte	C	-	-	T	-	scene control	Low

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
4	Input 1 - ...	Close, Scene			1 byte	C	-	-	T	-	scene control	Low
5	Input 1 - ...	Open, Scene			1 byte	C	-	-	T	-	scene control	Low

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
3	Input 1 - ...	Disable			1 bit	C	-	W	-	-	enable	Low
4	Input 1 - ...	Short, Scene			1 byte	C	-	-	T	-	scene control	Low
5	Input 1 - ...	Long, Scene			1 byte	C	-	-	T	-	scene control	Low

BI:Switch control

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
4	Input 1 - ...	String			14 bytes	C	-	-	T	-	Character String (ISO 8859-1)	Low

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
4	Input 1 - ...	Close, String			14 bytes	C	-	-	T	-	Character String (ISO 8859-1)	Low
5	Input 1 - ...	Open, String			14 bytes	C	-	-	T	-	Character String (ISO 8859-1)	Low

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
3	Input 1 - ...	Disable			1 bit	C	-	W	-	-	enable	Low
4	Input 1 - ...	Short, String			14 bytes	C	-	-	T	-	Character String (ISO 8859-1)	Low
5	Input 1 - ...	Long, String			14 bytes	C	-	-	T	-	Character String (ISO 8859-1)	Low

BI:Send String(14bytes)

Fig.5.2 “Input”Communication Object

No.	Object function	Name	Type	Flags	DPT
4	**Actual temperature, Sensor**	**Input 1 - {{...}}**	**2byte**	**C,R,T**	**9.001 temperature**
The communication object is used for transmitting the temperature value detected by the external temperature sensor of the device to the bus. Range:-50~99.9℃ The name in parentheses changes with the parameter “Description (max 30 char.)”. If description is empty, display “Input x - ...” by default. The same below.					
5	**Temperature error report, Sensor**	**Input 1 - {{...}}**	**1bit**	**C,R,T**	**1.005 alarm**
The communication object is used to send the error report of the external temperature sensor, and the object value is defined according to the parameters.					
3	**Disable**	**Input 1 - {{...}}**	**1bit**	**C,W**	**1.003 enable**
The communication object is used to disable/enable the function of contact input, apply to binary					

input function, including switch, scene and send string.

4	**Switch**	**Input 1 - {{...}}**	**1bit**	**C,R,W,T,U**	**1.001 switch**
4	**Close/Short, Switch**	**Input 1 - {{...}}**	**1bit**	**C,R,W,T,U**	**1.001 switch**
5	**Open/Long, Switch**	**Input 1 - {{...}}**	**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

4	**Scene**	**Input 1 - {{...}}**	**1byte**	**C,T**	**18.001 scene control**
4	**Close/Short, Scene**	**Input 1 - {{...}}**	**1byte**	**C,T**	**18.001 scene control**
5	**Open/Long, Scene**	**Input 1 - {{...}}**	**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 scene for 0.

4	**String**	**Input 1 - {{...}}**	**14byte**	**C,T**	**16.001 character string (ISO 8859-1)**
4	**Close/Short, String**	**Input 1 - {{...}}**	**14byte**	**C,T**	**16.001 character string (ISO 8859-1)**
5	**Open/Long, String**	**Input 1 - {{...}}**	**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.

Table5.2 “Input”Communication Object

5.3. "Output"Communication Object

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
9	Output A-...	Switch			1 bit	C	-	W	-	-	switch	Low
10	Output A-...	Switch status			1 bit	C	R	-	T	-	switch	Low
11	Output A-...	Enable time function			1 bit	C	-	W	-	-	enable	Low
12	Output A-...	Delay function			1 bit	C	-	W	-	-	switch	Low
13	Output A-...	Operation hours counter			4 bytes	C	R	W	T	U	time lag (s)	Low
14	Output A-...	Scene			1 byte	C	-	W	-	-	scene control	Low
15	Output A-...	Forced output			1 bit	C	-	W	-	-	enable	Low
16	Output A-...	Logic 1			1 bit	C	-	W	-	-	boolean	Low
17	Output A-...	Logic 2			1 bit	C	-	W	-	-	boolean	Low

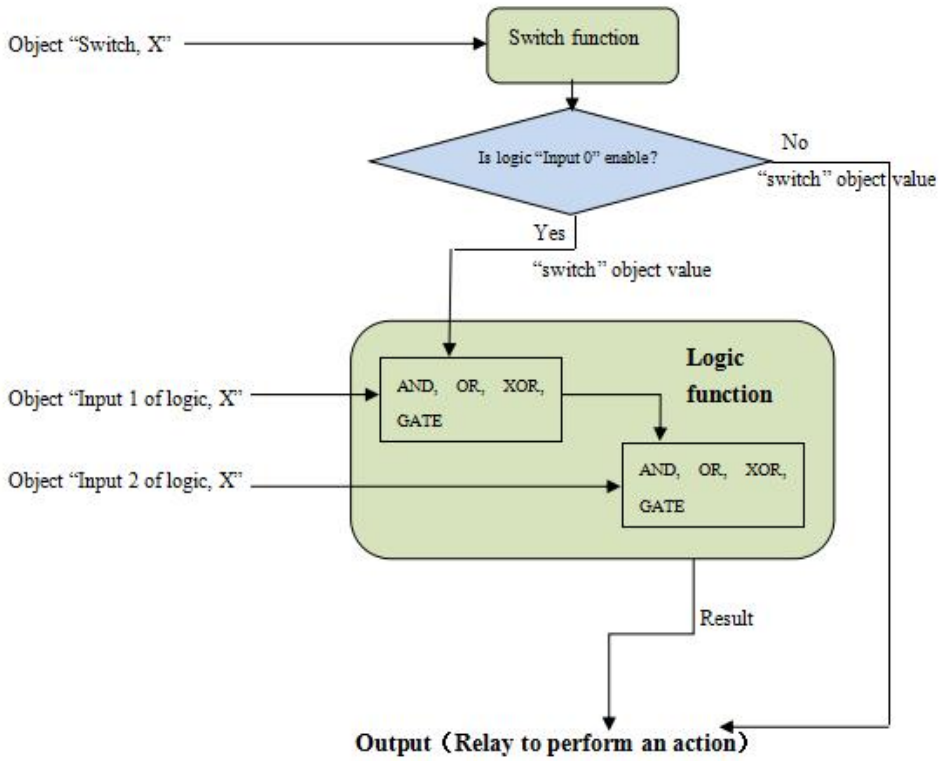
Fig.5.3 "Output"Communication Object

No.	Object function	Name	Type	Flags	DPT
9	**Switch**	**Output 1-{{...}}**	**1bit**	**C,W**	**1.001 switch**

This communication object is used to trigger the switch operation.

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

When "Input 0" in the logic function is enabled, The communication object "switch" is not directly used to trigger the switch operation., the action of the switch will be affected by the logic function. Please refer to the following flow chart for details:



10	**Switch status**	**Output 1-{{...}}**	**1bit**	**C,R,T**	**1.001 switch**

The value of this communication object （Specifically set in the parameter "Object value of switch status" ） Can directly indicate the status of the relay contacts.

If you choose "Respond after read only", only when the device receives a request from the bus to read the status of the channel switch，this object sends the current switch state to the bus;

If you choose “Respond after change”, when the switching state of the channel changes, This object immediately sends the current switch state to the bus.

11	**Enable time function**	**Output 1-{{...}}**	**1bit**	**C,W**	**1.003 Enable**

The communication object is enabled when the time function is enabled. Time function can be prohibited by this communication object, When the communication object receives a message with a logical value of "1", the time function is enabled; When the telegram of "0" is received, the time function is disabled, clear the current timer,stop running and ignore the delayed operation.

When the time function is turned on, the time function is enabled by default when the bus resumes power supply.

12	**Delay function**	**Output 1-{{...}}**	**1bit**	**C,W**	**1.001 Switch**

The communication object is enabled when the parameter "Type of time function" is selected as "Delay", and the delay switch is turned on by this communication object.

12	**Flashing function**	**Output 1-{{...}}**	**1bit**	**C,W**	**1.001 Switch**

The communication object is enabled when "Flashing" is selected in the parameter "Type of time function", and the flashing switch is turned on by this communication object.

12	**Staircase function**	**Output 1-{{...}}**	**1bit**	**C,W**	**1.001 Switch**

The communication object is enabled when the parameter "Type of time function" is selected as "Staircase", and the stair light function is activated by this communication object.

13	**Operation hours counter**	**Output 1-{{...}}**	**2byte** **4byte**	**C,R,W,T,U**	**7.007 time(h)** **13.100 time lag(s)**

This communication object is used to report the time when the load of this loop is powered on, Displayed when the parameter "Function of "Operation hours counter"" is enabled, data type can be selected by "Object data type of "Operation hours counter"", the unit of 2byte type is hour, and the unit of 4byte is second.

14	**Scene**	**Output 1-{{...}}**	**1byte**	**C,W**	**18.001 scene control**

The scene can be called or stored by sending an 8-bit instruction through this communication object. This communication object is enabled as long as the scene function is enabled. The meaning of the 8-bit instruction is explained in detail below.

Set an 8-bit instruction to (binary code): FXNNNNNN

F: “0” is the calling scene; “1” is the storage scene;

X: 0;

NNNNNN: Scene no. (0…63)

The parameter setting option is 1~64. In fact, the scene message received by the communication object "Scene" corresponds to 0~63. If scene 1 is set in the parameter, the communication object "Scene" should receive the scene message 0. As follows:

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

15	**Forced output**	**Output 1-{{...}}**	**1bit 2bit**	**C,W**	**1.003 enable 2.001 switch control**

This communication object is enabled after the enforcement function is enabled.

In 1 bit, when the message value "1" is received, the enforcement mode is enabled. At this time, the device ignores other actions except for enforcement. When the message value "0" is received, the forced execution mode is ended, and the position of the contact at the time of forced operation is set by the parameter.

At 2bit, the contact is forcibly closed when the message value "3" is received; The contact is forcibly disconnected when the message value "2" is received; the enforcement mode is canceled when the message value "1" or "0" is received.

16	**Logic 1**	**Output 1-{{...}}**	**1bit**	**C,W**	**1.002 boolean**
This communication object is enabled when the parameter "The input 1 of logic" is enabled for the logic input of input1.					
17	**Logic 2**	**Output 1-{{...}}**	**1bit**	**C,W**	**1.002 boolean**
This communication object is enabled when the parameter "The input 2 of logic" is enabled for the logic input of input2.					

Table5.3“Output”Communication Object

5.4. “Room temperature controller”Communication Object

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
54	Room temperature controller	Power On/Off			1 bit	C	-	W	-	-	switch	Low
55	Room temperature controller	External temperature sensor			2 bytes	C	-	W	T	U	temperature (°C)	Low
56	Room temperature controller	Base setpoint adjustment			2 bytes	C	-	W	-	-	temperature (°C)	Low
57	Room temperature controller	Setpoint offset			1 bit	C	-	W	-	-	step	Low
58	Room temperature controller	Float offset value			2 bytes	C	-	W	-	-	temperature difference (K)	Low
59	Room temperature controller	Setpoint offset reset			1 bit	C	-	W	-	-	reset	Low
60	Room temperature controller	Heating/Cooling mode			1 bit	C	-	W	-	-	cooling/heating	Low
61	Room temperature controller	Operation mode			1 byte	C	-	W	-	-	HVAC mode	Low
62	Room temperature controller	Comfort mode			1 bit	C	-	W	-	-	enable	Low
63	Room temperature controller	Economy mode			1 bit	C	-	W	-	-	enable	Low
64	Room temperature controller	Frost/Heat protection mode			1 bit	C	-	W	-	-	enable	Low
65	Room temperature controller	Standby mode			1 bit	C	-	W	-	-	enable	Low
66	Room temperature controller	Extended comfort mode			1 bit	C	-	W	-	-	acknowledge	Low
68	Room temperature controller	Window contact			1 bit	C	-	W	T	U	window/door	Low
69	Room temperature controller	Presence detector			1 bit	C	-	W	T	U	occupancy	Low
70	Room temperature controller	Actual temperature, status			2 bytes	C	R	-	T	-	temperature (°C)	Low
71	Room temperature controller	Base temperature setpoint, status			2 bytes	C	R	-	T	-	temperature (°C)	Low
72	Room temperature controller	Setpoint offset, status			2 bytes	C	R	-	T	-	temperature difference (K)	Low
73	Room temperature controller	Current temperature setpoint, status			2 bytes	C	R	-	T	-	temperature (°C)	Low
74	Room temperature controller	Heating/Cooling mode, status			1 bit	C	R	-	T	-	cooling/heating	Low
75	Room temperature controller	Operation mode, status			1 byte	C	R	-	T	-	HVAC mode	Low
76	Room temperature controller	Comfort mode, status			1 bit	C	R	-	T	-	enable	Low
77	Room temperature controller	Economy mode, status			1 bit	C	R	-	T	-	enable	Low
78	Room temperature controller	Frost/Heat protection mode, status			1 bit	C	R	-	T	-	enable	Low
79	Room temperature controller	Standby mode, status			1 bit	C	R	-	T	-	enable	Low
80	Room temperature controller	Heating/Cooling control value			1 byte	C	R	-	T	-	percentage (0..100%)	Low
87	Room temperature controller	Additional heating/cooling control val...			1 bit	C	R	-	T	-	switch	Low
89	Room temperature controller	Power On/Off, status			1 bit	C	R	-	T	-	switch	Low

Fig.5.4 “Room temperature controller”Communication Object

No.	Object function	Name	Type	Flags	DPT
54	**Power on/off**	**Room temperature controller**	**1bit**	**C,W**	**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					
55	**External temperature sensor**	**Room temperature controller**	**2byte**	**C,W, T,U**	**9.001 temperature**
The communication object is used to receive the temperature value detected by the temperature sensor of the device form the bus. Range:-50~99.8℃					
56	**Current setpoint adjustment Base setpoint adjustment**	**Room temperature controller**	**2byte**	**C,W**	**9.001 temperature**
“Current setpoint adjustment” is visible when operation mode is not enabled, and under absolute adjustment. Used to modify the base value of the set temperature; and to modify set temperature value of current room operation mode when absolute adjustment.					

"Base setpoint adjustment" is visible only when relative adjustment, used to modify the base value of the set temperature, that is, the temperature setting value of the comfort mode, and the setting temperature of the standby mode and the economy mode changes according to the relative change.

57	**Setpoint offset**	**Room temperature controller**	**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:

0——Decrease the offset

1——Increase the offset

58	**Float offset value**	**Room temperature controller**	**2byte**	**C,W**	**9.002 temperature difference**

The communication object is visible only when absolute adjustment, and offset function enabled. Used to modify the accumulated offset via 2 byte float value.

59	**Setpoint offset reset**	**Room temperature controller**	**1bit**	**C,W**	**1.015 reset**

The communication object is visible only when absolute adjustment, and offset function enabled. Reset offset value when telegram is 1.

60	**Heating/Cooling mode**	**Room temperature controller**	**1bit**	**C,W**	**1.100 cooling/heating**

The communication object is used for changing the heating and cooling via the bus. Telegrams:

0——Cooling

1——Heating

61	**Operation mode**	**Room temperature controller**	**1byte**	**C,W**	**20.102 HVAC mode**
62	**Comfort mode**	**Room temperature controller**	**1bit**	**C,W**	**1.003 enable**
63	**Economy mode**	**Room temperature controller**	**1bit**	**C,W**	**1.003 enable**
64	**Frost/Heat protection mode**	**Room temperature controller**	**1bit**	**C,W**	**1.003 enable**
65	**Standby mode**	**Room temperature controller**	**1bit**	**C,W**	**1.003 enable**

These communication objects are used to control the RTC operation mode via the bus.

When 1 byte: object 61 is visible, telegrams: 1-comfort, 2-standby, 3-economy, 4-protection, other reserved.

When 1bit:

Object 62—— Comfort mode

Object 63—— Economy mode

Object 64—— Protection mode

Object 65—— 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 ignored.

66	**Extended comfort mode**	**Room temperature controller**	**1bit**	**C,W**	**1.016 acknowledge**

The communication object is used for triggering time to extended comfort mode. Telegrams:

0——No sense

1——Activate comfort mode

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

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

68	**Window contact**	**Room temperature controller**	**1bit**	**C,W, T,U**	**1.019 window/door**

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

Telegrams:

0——Close window

1——Open window

69	**Presence detector**	**Room temperature controller**	**1bit**	**C,W, T,U**	**1.018 occupancy**

The communication object is used to receive the room occupancy status from presence detector.

Telegrams:

0——Unoccupied

1——Occupied

70	**Actual temperature, status**	**Room temperature controller**	**2byte**	**C,R,T**	**9.001 temperature**

The communication object is visible when temperature reference of RTC function is combination of local and external sensor. Used to send the actual temperature after the combination to the bus.

71	**Base temperature setpoint, status**	**Room temperature controller**	**2byte**	**C,R,T**	**9.001 temperature**

The communication object is visible only when relative adjustment. Used to send the current base set temperature to the bus.

72	**Setpoint offset, status**	**Room temperature controller**	**2byte**	**C,R,T**	**9.002 temperature difference**

The communication object is visible only when relative adjustment. Used to send the accumulated offset value of base set temperature to the bus.。

73	**Current temperature setpoint, status**	**Room temperature controller**	**2byte**	**C,R,T**	**9.001 temperature**

The communication object is used to send current set temperature to the bus.

74	**Heating/Cooling mode, status**	**Room temperature controller**	**1bit**	**C,R,T**	**1.100 cooling/heating**

The communication object is used to feedback the telegram of changing cooling and heating function to the bus.

75	**Operation mode, status**	**Room temperature controller**	**1byte**	**C,R,T**	**20.102 HVAC mode**
76	**Comfort mode, status**	**Room temperature controller**	**1bit**	**C,R,T**	**1.003 enable**
77	**Economy mode, status**	**Room temperature controller**	**1bit**	**C,R,T**	**1.003 enable**
78	**Frost/Heat protection mode, status**	**Room temperature controller**	**1bit**	**C,R,T**	**1.003 enable**
79	**Standby mode, status**	**Room temperature controller**	**1bit**	**C,R,T**	**1.003 enable**

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

When 1 byte: object 75 is visible, telegrams: 1-comfort, 2-standby, 3-economy, 4-protection, other reserved.

When 1bit:

Object 76—— Comfort mode

Object 77—— Economy mode

Object 78—— Protection mode

Object 79—— 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.

80	**Heating/Cooling control value Heating control value**	**Room temperature controller**	**1bit 1byte**	**C,R,T**	**1.001 switch 5.001 percentage**
81	**Cooling control value**	**Room temperature controller**	**1bit 1byte**	**C,R,T**	**1.001 switch 5.001 percentage**

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

87	**Additional heating control value Additional heating/cooling control value**	**Room temperature controller**	**1bit 1byte**	**C,R,T**	**1.001 switch 5.001 percentage**
88	**Additional cooling control value**	**Room temperature controller**	**1bit 1byte**	**C,R,T**	**1.001 switch 5.001 percentage**
These communication objects are used to send additional control value of heating or cooling function to the bus. Object datatype is according to parameter setting. If 1bit is selected, when open valve, send telegram 1 to the bus, while close valve, send telegram 0; If 1byte is selected, when open valve, send 100% to the bus, while close valve, send 0%.					
89	**Power On/Off, status**	**Room temperature controller**	**1bit**	**C,R,T**	**1.001 switch**
The communication object is used to send the power on/off status to the bus.					

Table5.4 “Room temperature controller”Communication Object

5.5. “Fan”Communication Object

Number	Name	Object Function	Descrip	Group Addr	Length	C	R	W	T	U	Data Type	Priority
90	Fan	Fan speed			1 bit	C	-	W	-	-	switch	Low
94	Fan	Status Fan On/Off			1 bit	C	R	-	T	-	switch	Low
99	Fan	Automatic function			1 bit	C	-	W	-	-	enable	Low
100	Fan	Status Automatic			1 bit	C	R	-	T	-	enable	Low
101	Fan	Forced operation			1 bit	C	-	W	-	-	enable	Low
102	Fan	Control value 1			1 byte	C	-	W	-	-	percentage (0..100%)	Low
103	Fan	Control value 2			1 byte	C	-	W	-	-	percentage (0..100%)	Low
104	Fan	Switching control value 1/2			1 bit	C	-	W	-	-	switch	Low
105	Fan	Control value fault			1 bit	C	R	-	T	-	alarm	Low
106	Fan	Fan Limitation 1			1 bit	C	-	W	-	-	enable	Low
107	Fan	Fan Limitation 2			1 bit	C	-	W	-	-	enable	Low
108	Fan	Fan Limitation 3			1 bit	C	-	W	-	-	enable	Low
109	Fan	Fan Limitation 4			1 bit	C	-	W	-	-	enable	Low

Fig.5.5 “Fan-one level”Communication Object（1）

Number	Name	Object Function	Descrip	Group Addr	Length	C	R	W	T	U	Data Type	Priority
90	Fan	Fan speed			1 byte	C	-	W	-	-	percentage (0..100%)	Low
91	Fan	Fan speed 1			1 bit	C	-	W	-	-	switch	Low
92	Fan	Fan speed 2			1 bit	C	-	W	-	-	switch	Low
93	Fan	Fan speed 3			1 bit	C	-	W	-	-	switch	Low
94	Fan	Status Fan On/Off			1 bit	C	R	-	T	-	switch	Low
95	Fan	Status Fan speed			1 byte	C	R	-	T	-	percentage (0..100%)	Low
96	Fan	Status Fan speed 1			1 bit	C	R	-	T	-	switch	Low
97	Fan	Status Fan speed 2			1 bit	C	R	-	T	-	switch	Low
98	Fan	Status Fan speed 3			1 bit	C	R	-	T	-	switch	Low
99	Fan	Automatic function			1 bit	C	-	W	-	-	enable	Low
100	Fan	Status Automatic			1 bit	C	R	-	T	-	enable	Low
101	Fan	Forced operation			1 bit	C	-	W	-	-	enable	Low
102	Fan	Control value 1			1 byte	C	-	W	-	-	percentage (0..100%)	Low
103	Fan	Control value 2			1 byte	C	-	W	-	-	percentage (0..100%)	Low
104	Fan	Switching control value 1/2			1 bit	C	-	W	-	-	switch	Low
105	Fan	Control value fault			1 bit	C	R	-	T	-	alarm	Low
106	Fan	Fan Limitation 1			1 bit	C	-	W	-	-	enable	Low
107	Fan	Fan Limitation 2			1 bit	C	-	W	-	-	enable	Low
108	Fan	Fan Limitation 3			1 bit	C	-	W	-	-	enable	Low
109	Fan	Fan Limitation 4			1 bit	C	-	W	-	-	enable	Low

Fig.5.5 “Fan-Two/Three level”Communication Object（2）

Number	Name	Object Function	Descrip	Group Addr	Length	C	R	W	T	U	Data Type	Priority
90	Fan	Fan speed			1 byte	C	-	W	-	-	percentage (0..100%)	Low
94	Fan	Status Fan On/Off			1 bit	C	R	-	T	-	switch	Low
95	Fan	Status Fan speed			1 byte	C	R	-	T	-	percentage (0..100%)	Low
99	Fan	Automatic function			1 bit	C	-	W	-	-	enable	Low
100	Fan	Status Automatic			1 bit	C	R	-	T	-	enable	Low
101	Fan	Forced operation			1 bit	C	-	W	-	-	enable	Low
102	Fan	Control value 1			1 byte	C	-	W	-	-	percentage (0..100%)	Low
103	Fan	Control value 2			1 byte	C	-	W	-	-	percentage (0..100%)	Low
104	Fan	Switching control value 1/2			1 bit	C	-	W	-	-	switch	Low
105	Fan	Control value fault			1 bit	C	R	-	T	-	alarm	Low
106	Fan	Fan Limitation 1			1 bit	C	-	W	-	-	enable	Low
107	Fan	Fan Limitation 2			1 bit	C	-	W	-	-	enable	Low
108	Fan	Fan Limitation 3			1 bit	C	-	W	-	-	enable	Low
109	Fan	Fan Limitation 4			1 bit	C	-	W	-	-	enable	Low

Fig.5.5 “Fan-Percentage level”Communication Object（3）

No.	Object function	Name	Type	Flags	DPT
90	**Fan speed**	**Fan**	**1bit** **1byte**	**C,W**	**1.001 switch** **5.001 percentage** **5.100 fan stage**

For one-level fan speed fans, the object is a 1-bit type for switching fans. Telegram value:

0 ——Fan off

1 ——Fan on

For percentage/2/3-level fan speed fans, the object is 1byte type，it is used to switch the fan speed of each fan. At the same time, only one fan speed is open, at the same time, when opening a new fan speed, you need to consider the starting characteristics of the fan speed.Set the operating wind speed according to the object value.

91/.../93	**Fan speed 1/2/3**	**Fan**	**1bit**	**C,W**	**1.001 switch**

This object is available under 2/3 level fan speed fans.

It is used to turn on the fan speed 1. If the communication object of the fan speed 1~3 receives several ON messages continuously in a short time, the speed of the fan is turned on based on the last received message.

In the communication object with fan speed 1~3, as long as one of the messages receives OFF, the fan will be turned off.

Telegram value:

0 ——Fan off

1 ——Fan on

94	**Status Fan ON/OFF**	**Fan**	**1bit**	**C,R,T**	**1.001 switch**

This object is used to send the switch status of the fan to the bus. As long as the fan speed status is on, the fan is on. Telegram value:

0——Fan off

1——Fan on

95	**Status Fan speed**	**Fan**	**1byte**	**C,R,T**	**5.001 percentage** **5.100 fan stage**

This object is available under percentage/2/3 level fan speed fans.

Used to send the current running fan speed to the bus. The message value is according to parameter setting.

96/.../98	**Status Fan speed 1/2/3**	**Fan**	**1bit**	**C,R,T**	**1.001 switch**

This object is available under 2/3-level fan speed fans and “Obj. “Switch speed x” 1bit function” enabled.

Used to send the operating state of fan speed 1 to the bus. Telegram value:

0——Fan off

1——Fan on

99	**Automatic function**	**Fan**	**1bit**	**C,W**	**1.003 enable**

This object is used to activate automatic operations.

After the bus is reset or programmed, whether the automatic operation is activated depends on the parameters. Normal operation can exit the automatic operation.

Under automatic operation, for percentage/2/3-level fan speed, if the forced operation is activated, the automatic operation is still active，only the state of the fan that is allowed to operate is determined by the forced operation, following the fan speed allowed under the forced operation. For one-level fan speed, the forced operation can exit the automatic operation.

Parameter option "0=Auto/1=Cancel":

0—— Activate automatic operation

1 —— Exit automatic operation

Parameter option "1=Auto/0=Cancel:

0 —— Exit automatic operation

1 —— Activate automatic operation

Normal operations are actions that are triggered by the following objects:

Object 90：Fan X--Fan speed

Object 91-93： Fan X-- Fan speed x (x=1, 2, 3,)

100	**Status Automatic**	**Fan**	**1bit**	**C,R,T**	**1.003 enable**

This object is used to send the status of automatic operations to the bus. The telegram is depends on the parameters.

101	**Forced Operation**	**Fan**	**1bit**	**C,W**	**1.003 enable**

This object is used to activate a forced action. When the forced operation is activated, the fan speed at which the fan can operate is set by the parameter "Limitation on forced operation".

Parameter option "0=Force/1=Cancel":

0 —— Activate forced operation

1 —— Cancel the mandatory operation

Parameter option "1=Force/0=Cancel":

1 —— Activate forced operation

0 —— Cancel the forced operation

102	**Control value** **Control value 1**	**Fan**	**1byte**	**C,W**	**5.001 percentage**
103	**Control value 2**	**Fan**	**1byte**	**C,W**	**5.001 percentage**

Under automatic operation, when the control value of the fan speed is set to 1, the Control value is visible; when the control value is set to 2, the Control value 1/2 is visible.

These three objects are used to receive control values from the bus, and the fan output will output fan speed based on the threshold range in which the control values are located.

104	**Switching control value 1/2**	**Fan**	**1bit**	**C,W**	**1.001 switch**

When the fan speed control value is set to 2, this object is visible and is used to select the control value. Telegram value:

0 ——Control value 1

1 ——Control value 2

105	**Control value fault**	**Fan**	**1bit**	**C,R,T**	**1.005 alarm**

During the monitoring time, when the device does not receive the control value from the external controller, this object will report a control value error. Once the control value is received, the error status is released. Telegram value:

0——No error

1 ——An error occurred

106/.../109	**Fan Limitation 1/2/3/4**	**Fan**	**1bit**	**C,W**	**1.003 enable**

The limitation 1/2/3/4 is active if a telegram “1” is received on the object. The limitation 1/2/3/4 is deactivated if a telegram “0” is received on the object.

When the limitation 1/2/3/4 is activated, the fan speed at which the fan is allowed to operate under limit 1 is set by the parameter "Fan with limitation 1/2/3/4".

Telegram value

0 ——limitation 1/2/3/4 inactive

1 ——limitation 1/2/3/4 active

Note: limitation 1 is only active in automatic mode.

Table5.5 “Fan”Communication Object

5.6. “Valve”Communication Object

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
110	Valve	Control value fault			1 bit	C	R	-	T	-	alarm	Low
111	Valve	Disable,Heat			1 bit	C	-	W	-	-	enable	Low
112	Valve	Control value, Heat			1 byte	C	-	W	-	-	percentage (0..100%)	Low
113	Valve	Valve status, Heat			1 bit	C	R	-	T	-	switch	Low
114	Valve	Trigger valve purge, Heat			1 bit	C	-	W	-	-	enable	Low
115	Valve	Valve purge status, Heat			1 bit	C	R	-	T	-	enable	Low
116	Valve	Disable,Cool			1 bit	C	-	W	-	-	enable	Low
117	Valve	Control value, Cool			1 bit	C	-	W	-	-	switch	Low
118	Valve	Valve status, Cool			1 bit	C	R	-	T	-	switch	Low
119	Valve	Trigger valve purge, Cool			1 bit	C	-	W	-	-	enable	Low
120	Valve	Valve purge status, Cool			1 bit	C	R	-	T	-	enable	Low

Fig.5.6 “Valve”Communication Object

No.	Object function	Name	Type	Flags	DPT
110	**Control value fault**	**Valve**	**1bit**	**C,R,T**	**1.005 alarm**
This object will report a control value error when the device cannot receive a control value from the external controller during the monitoring time. Once the control value is received, the error status is released. Telegram value: 0——No error 1——An error occurred					
111	**Disable, Heat (Heat/Cool)**	**Valve**	**1bit**	**C,W**	**1.003 enable**
116	**Disable, Cool**	**Valve**	**1bit**	**C,W**	**1.003 enable**
Through this communication object, the heating/cooling valve can be disabled or enabled.When disabled, the valve position is immediately adjusted back to 0% (off state), and when enabled again, the valve action is controlled based on the current control value.					
112	**Control value, Heat (Heat/Cool)**	**Valve**	**1bit** **1byte**	**C,W**	**1.001 switch** **5.001 percentage(0..100%)**
117	**Control value, Cool**	**Valve**	**1bit** **1byte**	**C,W**	**1.001 switch** **5.001 percentage(0..100%)**
This communication object is used to receive valve control values from other controllers. Under the 2-tube system, the heating valve and the cooling valve share an object (112) to receive the valve control value. This control value can be 1 bit or 1 byte, depending on the valve control mode type.					
113	**Valve status, Heat(Heat/Cool)**	**Valve**	**1bit** **1byte**	**C,R,T**	**1.001 switch** **5.001 percentage(0..100%)**
118	**Valve status, Cool**	**Valve**	**1bit** **1byte**	**C,R,T**	**1.001 switch** **5.001 percentage(0..100%)**
This object is used to indicate the switch status or position status of the valve. The object type is determined by the parameter settings.					

114	**Trigger valve purge,Heat(Heat/Cool)**	**Valve**	**1bit**	**C,W**	**1.003 enable**
119	**Trigger valve purge, Cool**	**Valve**	**1bit**	**C,W**	**1.003 enable**
This communication object is used to trigger the cleaning function of the valve. When cleaning, the valve is fully opened. Telegram value: 0 ——End purge 1——Trigger purge					
115	**Valve purge status, Heat(Heat/Cool)**	**Valve**	**1bit**	**C,R,T**	**1.003 enable**
120	**Valve purge status, Cool**	**Valve**	**1bit**	**C,R,T**	**1.003 enable**
This communication object is used to indicate the cleaning status of the valve. Once the cleaning function is activated, its status is immediately indicated. Telegram value: 0——Purge function is not activated 1——Purge function activated					

Table5.6 “Valve”Communication Object

5.7. “Scene”Communication Object

Number	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
121	Scene	Scene			1 byte	C	-	W	-	-	scene control	Low
122	Scene	Heating/Cooling mode			1 bit	C	-	-	T	-	cooling/heating	Low
123	Scene	Operation mode			1 byte	C	-	-	T	-	HVAC mode	Low

Fig.5.7 “Scene”Communication Object

No.	Object function	Name	Type	Flags	DPT
121	**Scene**	**Scene**	**1byte**	**C,W**	**18.001 scene control**

The scene can be called or stored by sending an 8-bit instruction through this communication object. This communication object is enabled as long as the scene function is enabled. The meaning of the 8-bit instruction is explained in detail below.

Set an 8-bit instruction to (binary code): FXNNNNNN

F: “0” is the calling scene; “1” is the storage scene;

X: 0;

NNNNNN: Scene no. (0…63)

The parameter setting option is 1~64. In fact, the scene message received by the communication object "Scene" corresponds to 0~63. If scene 1 is set in the parameter, the communication object "Scene" should receive the scene message 0. As follows:

Object message value	Description
0	c1
1	recall scene2
2	recall scene3
…	…
63	recall scene64
128	storage scene1
129	storage scene2
130	storage scene3
…	…
191	storage scene64

122	**Heating/Cooling mode**	**Scene**	**1bit**	**C,T**	**1.100 cooling/heating**

The communication object is visible when the valve controller from external and HAVC control mode selects heating and cooling , used to send the control mode of the scene to the bus.

123	**Operation mode**	**Scene**	**1byte**	**C,T**	**20.102 HVAC mode**

The communication object is visible when the valve controller from external, used to send the operating mode of the scene to the bus.

Table5.7 “Scene”Communication Object