



# KNX 17/19CH Mix Actuator User Manual

(Applicable model: MHR17U.1, M/MHD02R17U.1)

Version: V1.0.0

Published on Dec.06, 2019

## Content

|  |    |
|--|----|
| <b>Legal Statement</b> .....                         | I  |
| <b>Update History</b> .....                          | II |
| <b>1 Introduction</b> .....                          | 1  |
| 1.1 Import Data .....                                | 2  |
| 1.1.1 Import Database to ETS (.knxprod) .....        | 2  |
| 1.1.2 Import Projects (.knxproj) .....               | 7  |
| 1.2 Open Configuration Window .....                  | 8  |
| <b>2 General Setting</b> .....                       | 9  |
| <b>3 Channel Setting</b> .....                       | 11 |
| 3.1 General Setting .....                            | 11 |
| 3.2 Staircase Light Setting .....                    | 12 |
| 3.3 Scene Setting .....                              | 13 |
| 3.4 Delay Setting .....                              | 14 |
| <b>4 Dimming Setting</b> .....                       | 16 |
| 4.1 General Setting .....                            | 16 |
| 4.2 Dimming Configuration (A > Dimming Config) ..... | 17 |
| 4.3 Enable Staircase Light .....                     | 19 |
| 4.4 Scene Setting .....                              | 20 |
| <b>5 Curtain Setting</b> .....                       | 22 |
| 5.1 General Setting .....                            | 22 |
| 5.2 Curtain Status Setting .....                     | 24 |
| 5.3 Curtain Scene Setting .....                      | 25 |
| <b>6 HVAC Setting</b> .....                          | 27 |
| 6.1 HVAC Setting .....                               | 27 |
| 6.2 Heating/Cooling Valve Setting .....              | 28 |

---

|     |   |    |
|-----|---|----|
| 6.3 | Fan Setting.....                                | 30 |
| 6.4 | Heating/Cooling Valve Status Setting.....       | 31 |
| 6.5 | Fan Status Setting.....                         | 33 |
| 7   | Download Data .....                             | 35 |
| 7.1 | Interface Setting .....                         | 35 |
| 7.2 | Download Data.....                              | 36 |
| 8   | Object Instruction.....                         | 37 |
| 8.1 | Objects “General” .....                         | 37 |
| 8.2 | Objects “Channel” .....                         | 38 |
| 8.3 | Objects “Dim Output” .....                      | 39 |
| 8.4 | Objects “Curtain Output” (Shutter/Blinds) ..... | 41 |
| 8.5 | Object “HVAC” .....                             | 42 |

## Legal Statement

HDL has all the intellectual property rights to this document and contents thereof. Reproduction or distribution for third parties are prohibited without written authorization from HDL. Any infringement of HDL's intellectual property rights will be investigated the legal liability.

The contents of this document will be updated as the updates of product versions or other reasons. Unless otherwise agreed upon, this document is to be used as a guidance only. All the statements, information and recommendations in this document makes no warranty expressed or implied.

HDL Automation Co., Ltd.

## Update History

The form below contains the information of every update. The latest version contains all the updates of all former versions.

| No. | Version | Update Information | Date         |
|-----|---------|--------------------|--------------|
| 1   | V1.0.0  | Initial release    | Dec.06, 2019 |
|     |         |                    |              |
|     |         |                    |              |
|     |         |                    |              |
|     |         |                    |              |

## 1 Introduction

This user manual offers the information on the configuration of KNX 17/19CH Mix Actuator (Model: M/MHR17U.1, M/MHD02R17U.1, hereinafter referred to as KNX 17/19CH Actuator).

The following tools might be included:

- KNX 17CH Mix Actuator (Model: M/MHR17U.1) or KNX 19CH Mix Actuator (Model: M/MHD02R17U.1)
- A computer with ETS5 software
- KNX USB interface (Model: M/USB.1)
- KNX power supply and auxiliary power supply
- KNX project files
- Dedicated KNX cable(s)

### Notice:

- ① Please refer to the datasheet attached to the product for the information of installation, wiring, specifications, etc.
- ② The pictures in this user manual are for reference only and the actual product should prevail.

## 1.1 Import Data

### 1.1.1 Import Database to ETS (.knxprod)

- Import Catalogs:** click “Catalogs” → “Import...” in the main page of ETS5 software and select local database files with the suffix of .knxprod, as shown in Figure 1-1.

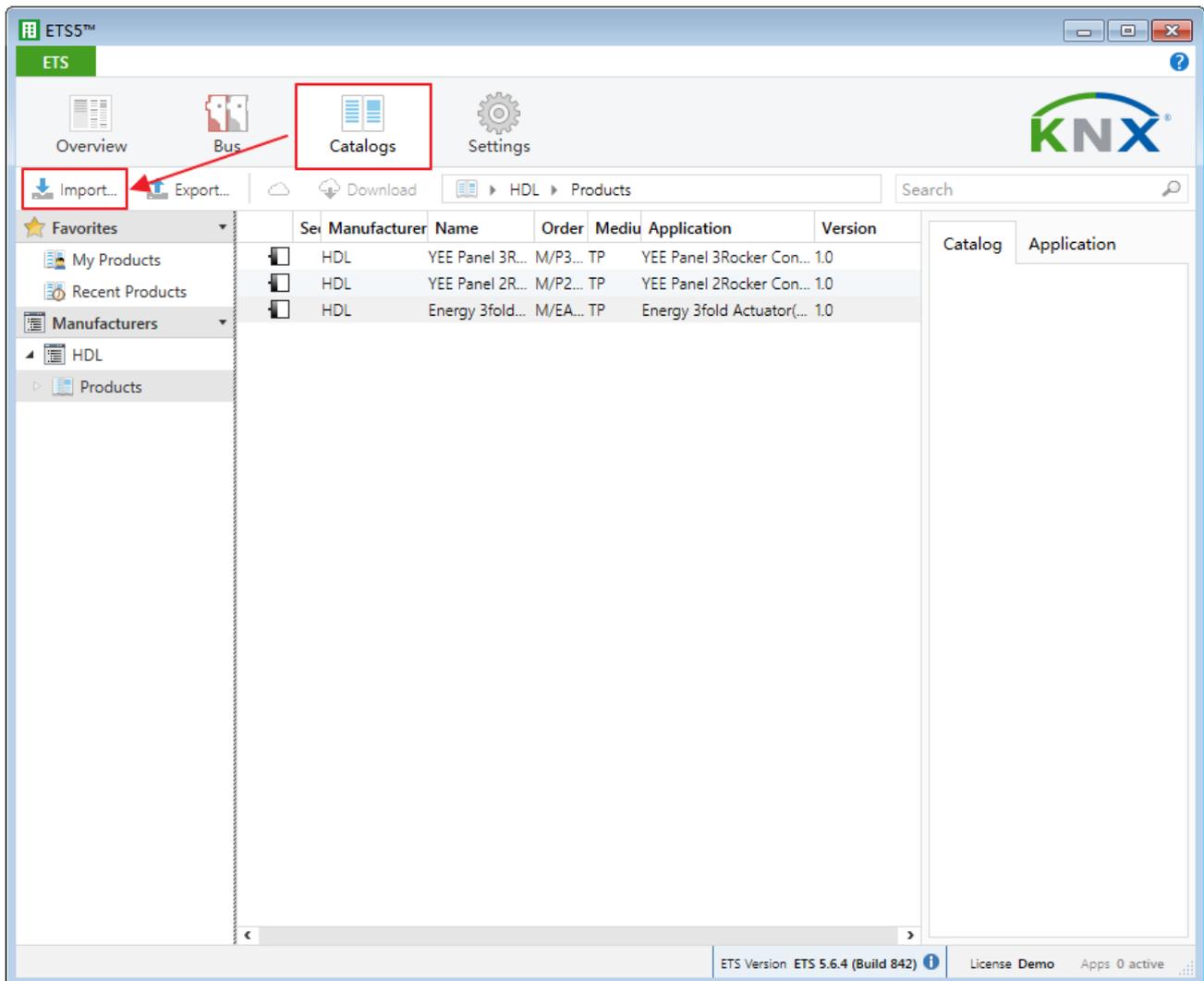


Figure 1-1 Import catalog

- 2. Create Projects:** as shown in Figure 1-2, in “Your Projects” tab from ETS5 software’s “Overview” page, click “+” to create projects. After editing project name, please keep other setting items by default.

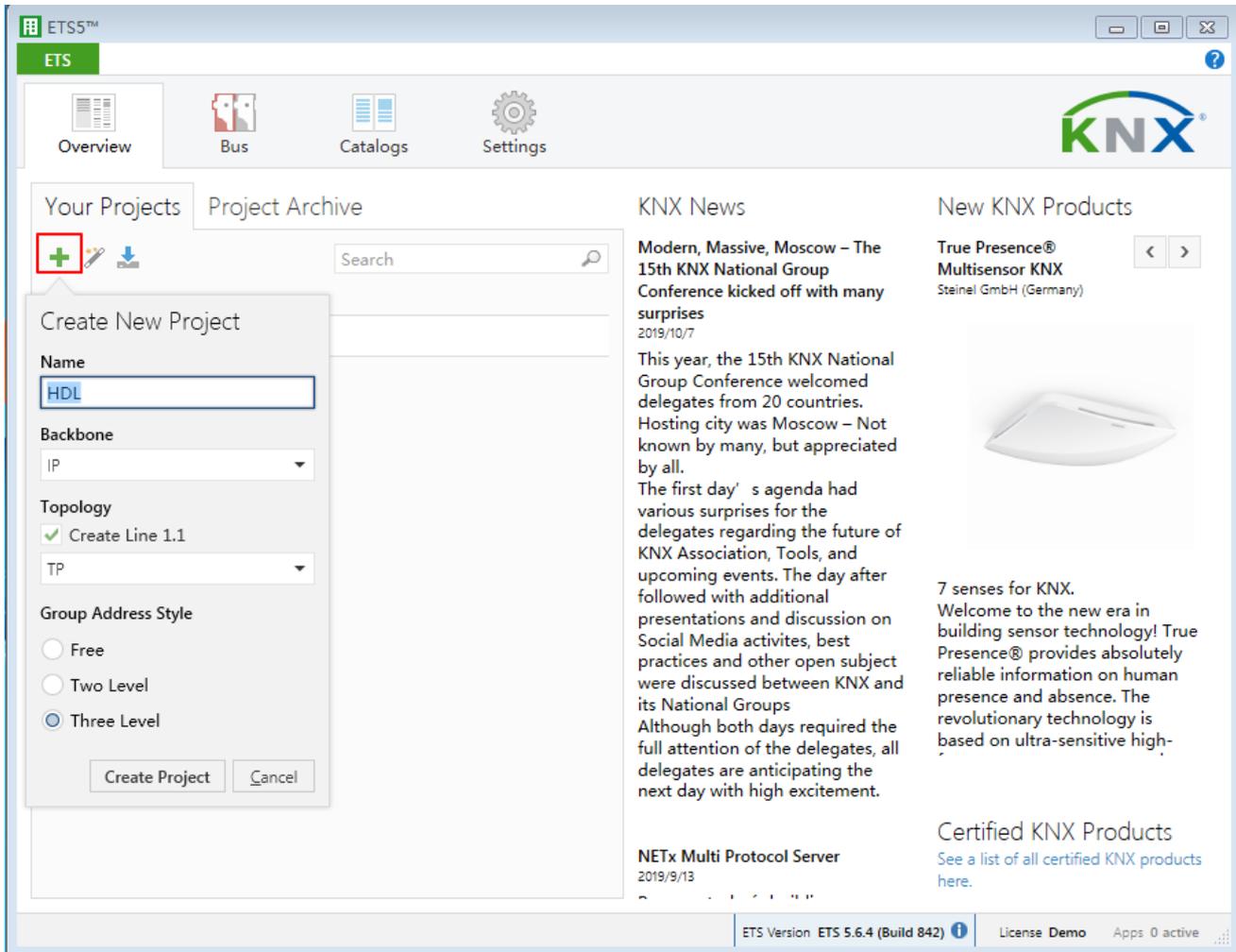


Figure 1-2 Create projects

### 3. Add Devices to Projects:

- ① After creating a project, the project page will show up by default. Click “Buildings” and select “Topology”, as shown in Figure 1-3.

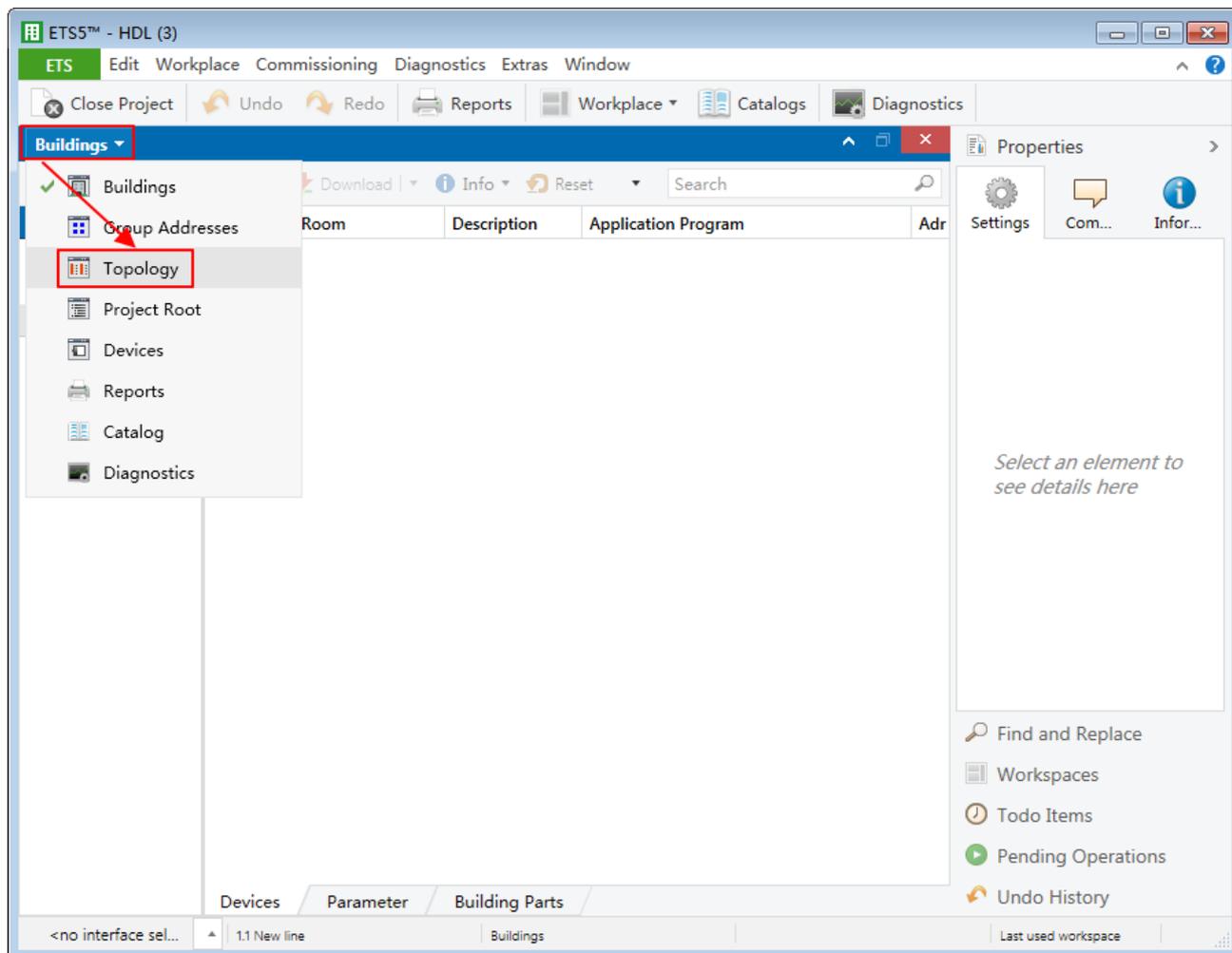


Figure 1-3 Add devices to projects

- ② Figure 1-4 shows “Topology” page, click the arrow beside “Add Areas” and select “Devices”, and the catalog page will show up below.

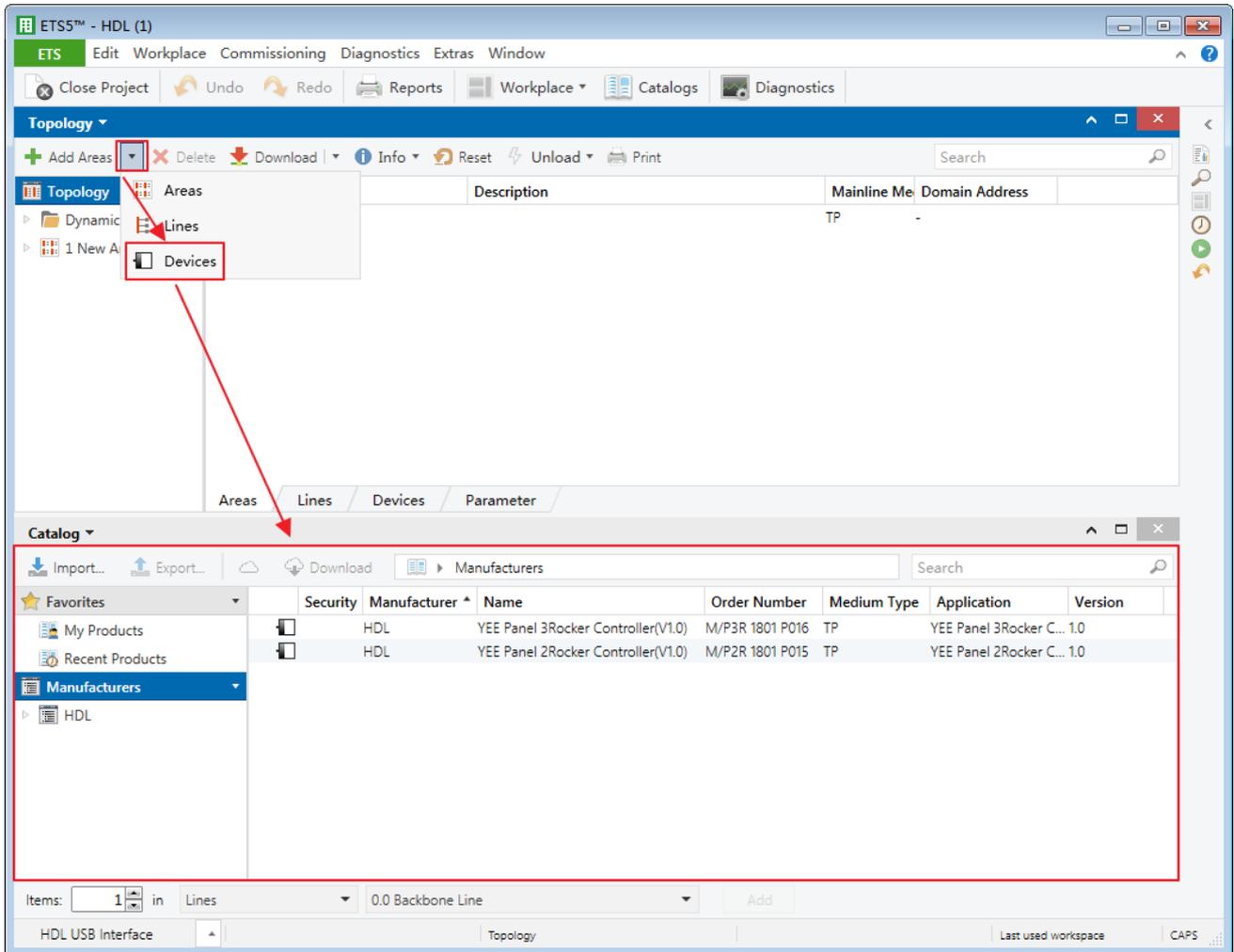


Figure 1-4 Add devices to projects

- ③ As shown in Figure 1-5, click “HDL” in “Manufactures” column and select devices to be added to the project on the right. Drag devices to the above area (Method 1) or click “Add” button to add devices after clicking the location needed to add projects below (Method 2).

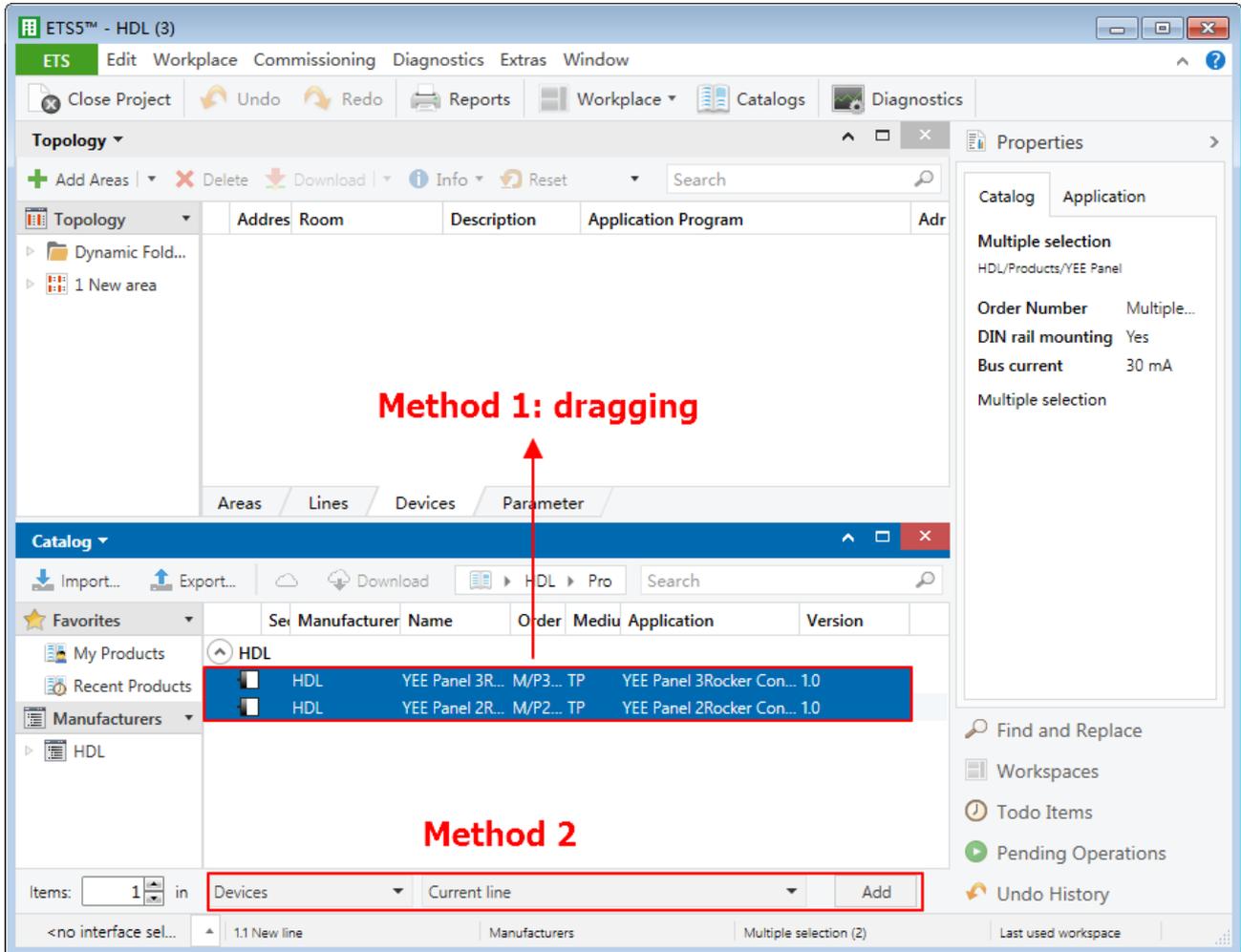


Figure 1-5 Add devices to projects

### 1.1.2 Import Projects (.knxproj)

As shown in Figure 1-6. Open ETS5 and click “Import project” button of “Your Project” tab of “Overview” page and import obtained KNX project files with the suffix of .knxproj/.pr5. After importing projects, added/created projects will be listed below. Double click to edit.

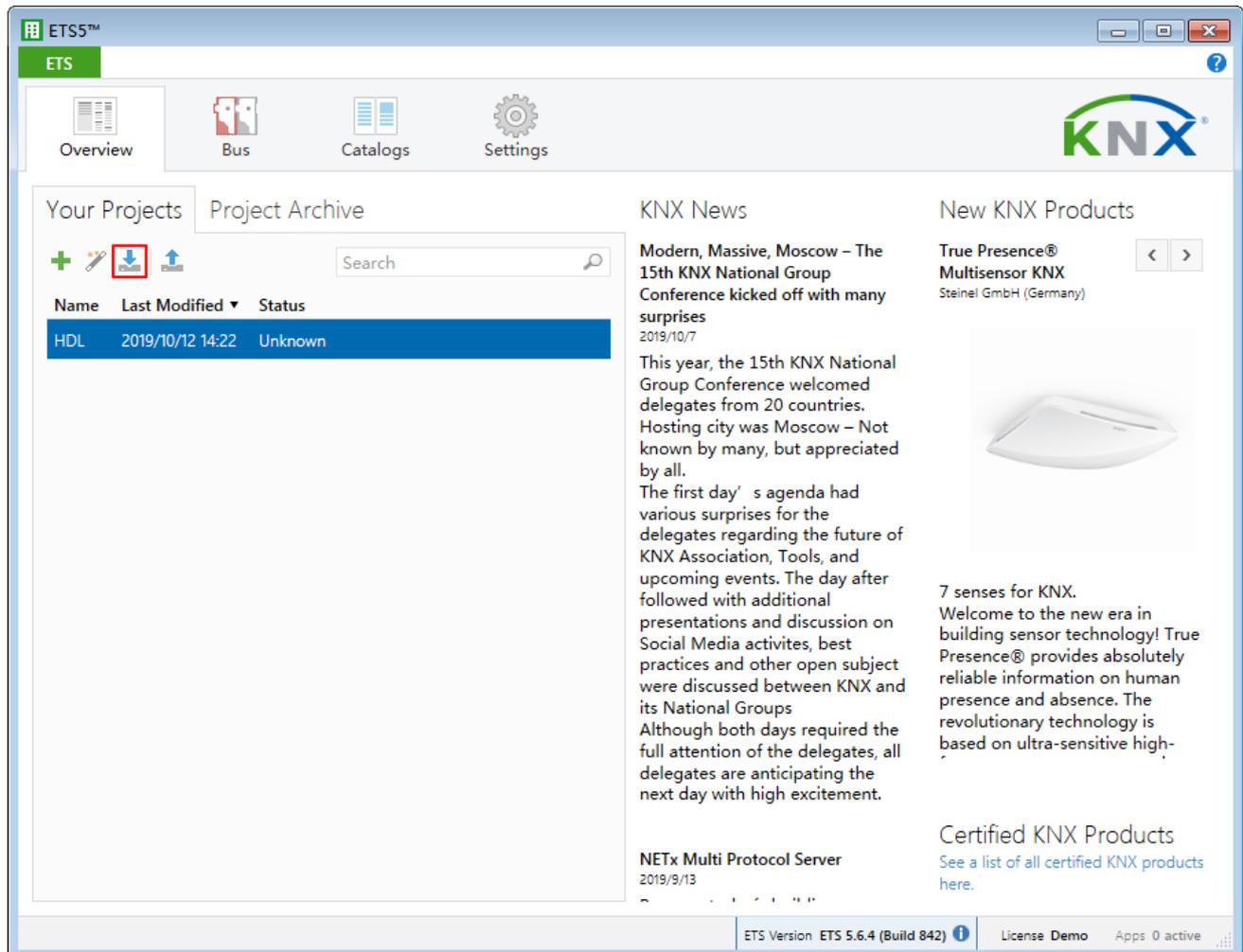


Figure 1-6 Import projects

## 1.2 Open Configuration Window

Double click the project to be configured. Click “Workspace” → “Open New Panel” → “Topology” to open the window, as shown in Figure 1-7.

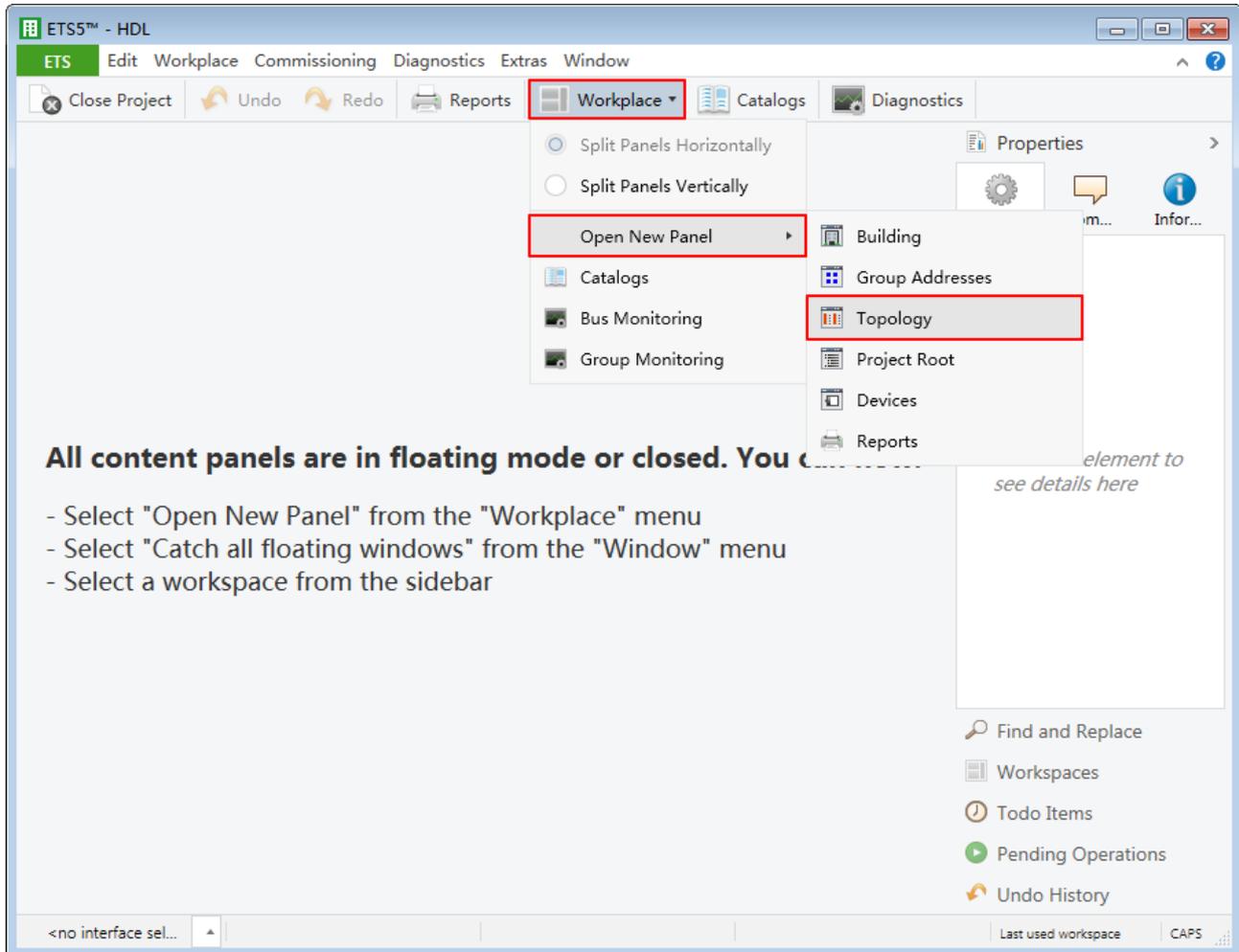


Figure 1-7 Open configuration window

## 2 General Setting

In topology skeleton on the left side of topology page, click the devices to be set and select “General” in “Parameter” option, as shown in Figure 2-1.

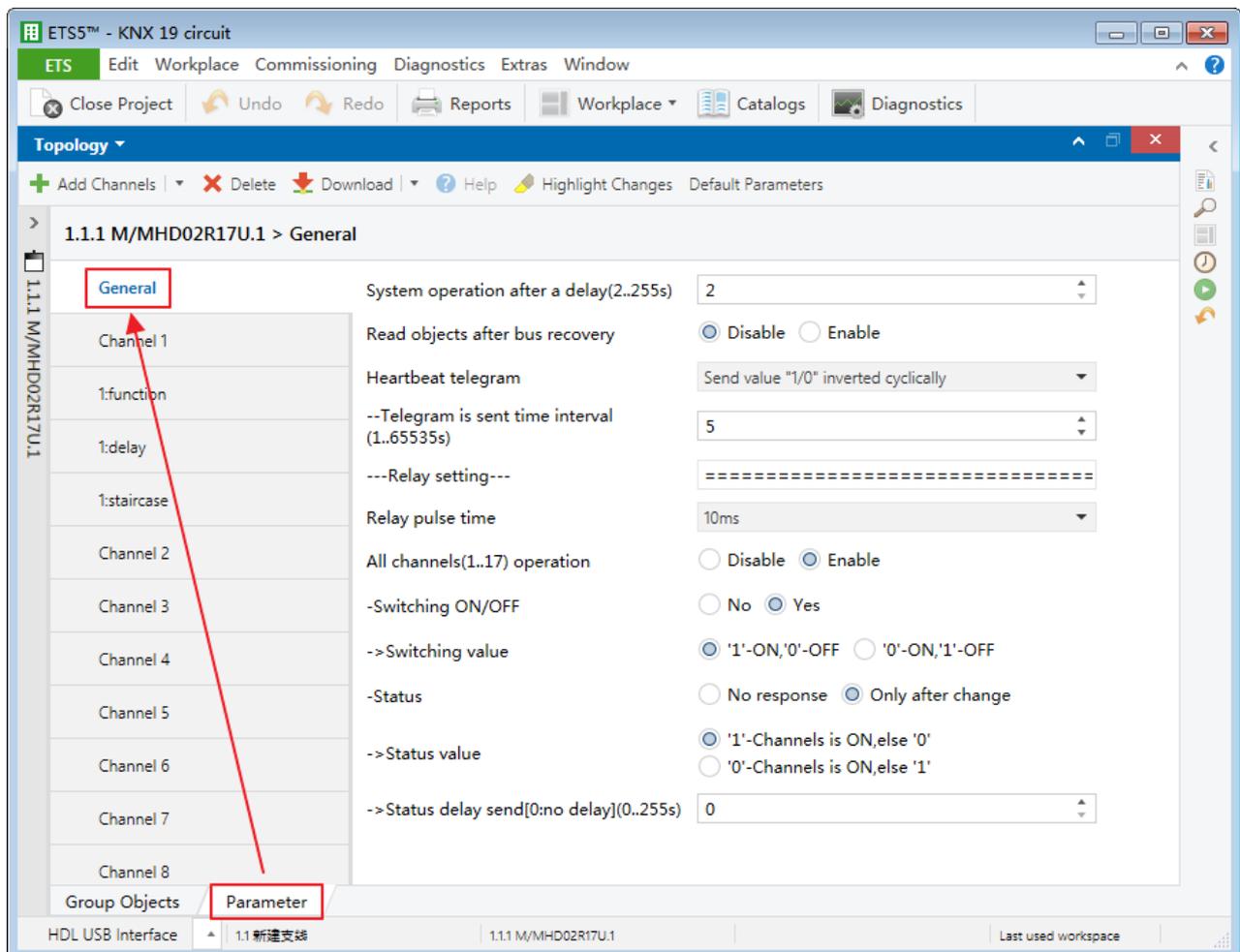


Figure 2-1 General Setting

The setting items are explained below:

1. System operation after a delay: time-delay function, namely a delay time between powering on the device and activating the system, which ranges from 2 to 255s. The default value is 2s.
2. Read objects after bus recovery: to enable reading objects after the bus voltage recovery.
3. Heartbeat telegram: choose to send “1”, “0”, or “1, 0” cyclically.
  - Telegram is sent time interval: to set the time interval of sending heartbeat telegram, which ranges from 1 to 65535s. The default value is 5s.

4. Relay pulse time: to set the pulse time of relay, which ranges from 10 to 250ms. The default value is 20ms.
5. All channels operation: to enable switching on/off all channels.
  - Switching ON/OFF: after “All channels operation” is enabled, all channel switches can be controlled. The data type of switch can be selected in “Switching value” below, including “1-ON, 0-OFF” and “0-ON, 1-OFF”.
  - Status: to enable switch status feedback. After enabled, feedback type can be selected in “Status value” below, including “1-Channel is ON, else 0” and “0-Channel is ON, else 1”. The delay time of switch status feedback can be set in “Status delay send” below.

## 3 Channel Setting

This chapter takes “Channel 1” as an example to introduce the function and setting of single channel.

### 3.1 General Setting

Click “Parameter” → “Channel 1” to open the page, as shown in Figure 3-1.

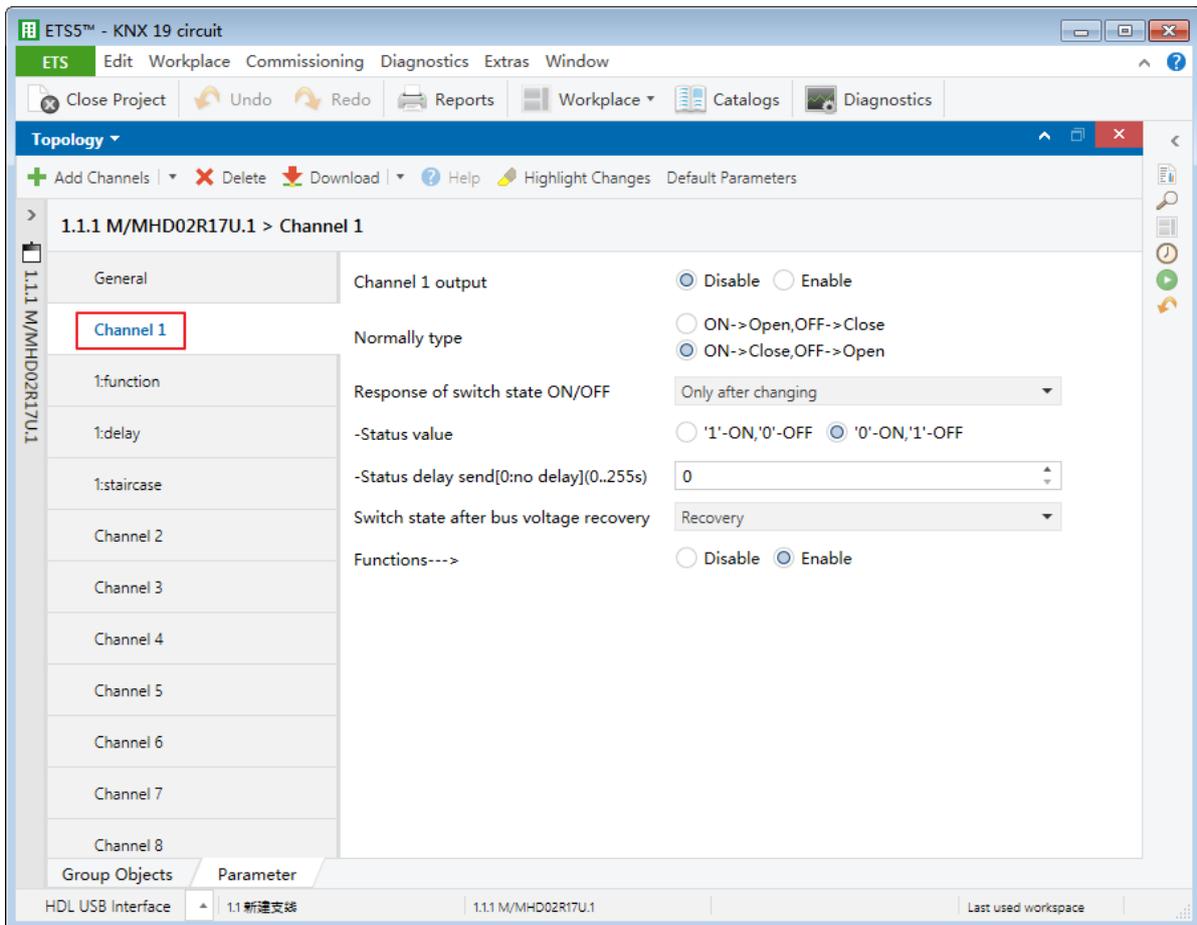


Figure 3-1 General setting

The setting items are explained below:

1. Channel 1 output: to enable outputting Channel 1.
2. Normally type: to select channel output type, including “ON → Open, OFF → Close” and “ON → Close, OFF → Open”. The default type is “ON → Close, OFF → Open”.

3. Response of switch state ON/OFF: to select switch status feedback type, including “No response”, “Always response” and “Only after changing”.
  - Status value: if “Always response” or “Only after changing” is selected, feedback type can be selected, including “1-ON, 0-OFF” and “0-ON, 1-OFF”.
  - Status delay send: if “Always response” or “Only after changing” is selected, the delay time of switch status feedback can be set, which ranges from 0 to 255s.
4. Switch state after bus voltage recovery: to select switch status after the bus voltage recovery, including “Unchange”, “Recovery”, “On” and “OFF”.
5. Functions: to display/hide function setting page in parameter list, including “delay”, “scene” and “staircase” setting page.

## 3.2 Staircase Light Setting

After “Functions” is enabled in channel general setting, click “function” tab and enable “staircase lighting” in the open page, and click “staircase” tab on the left, as shown in Figure 3-2.

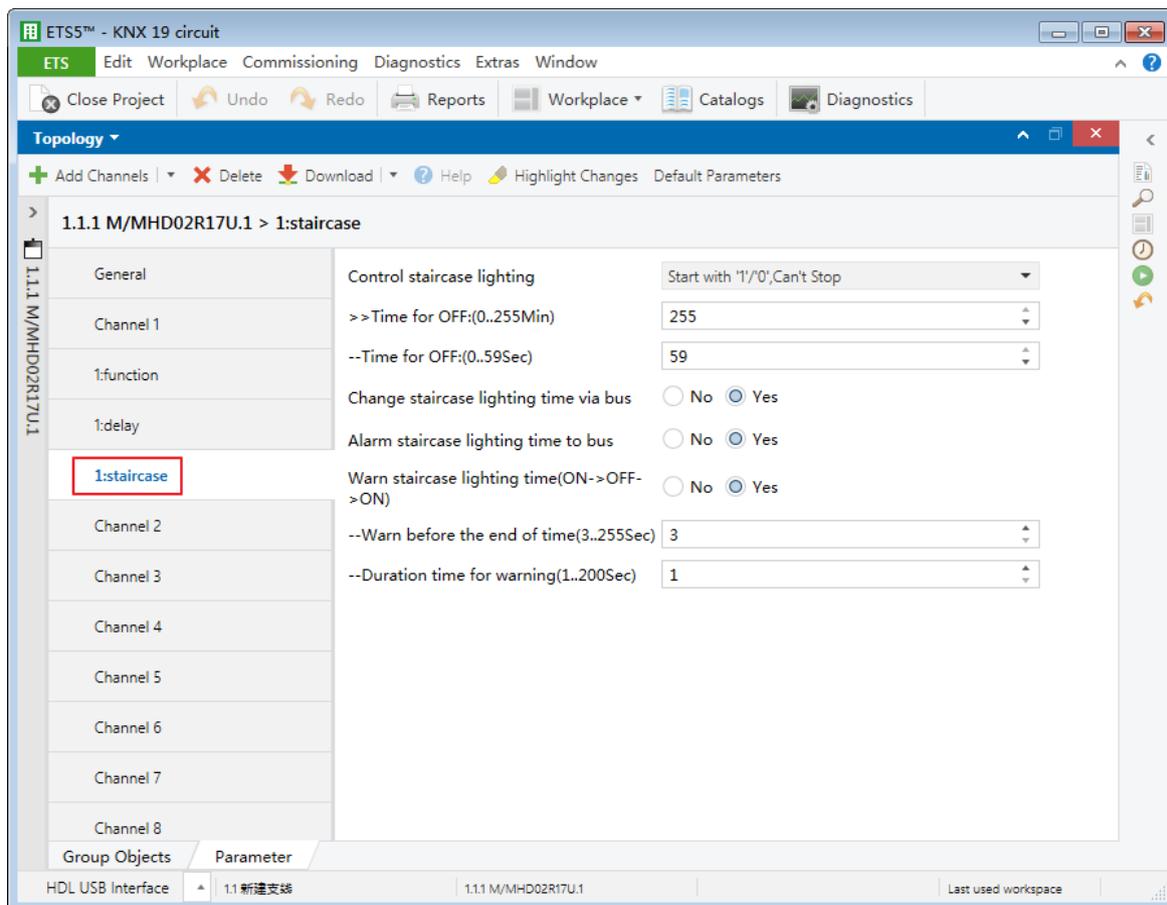


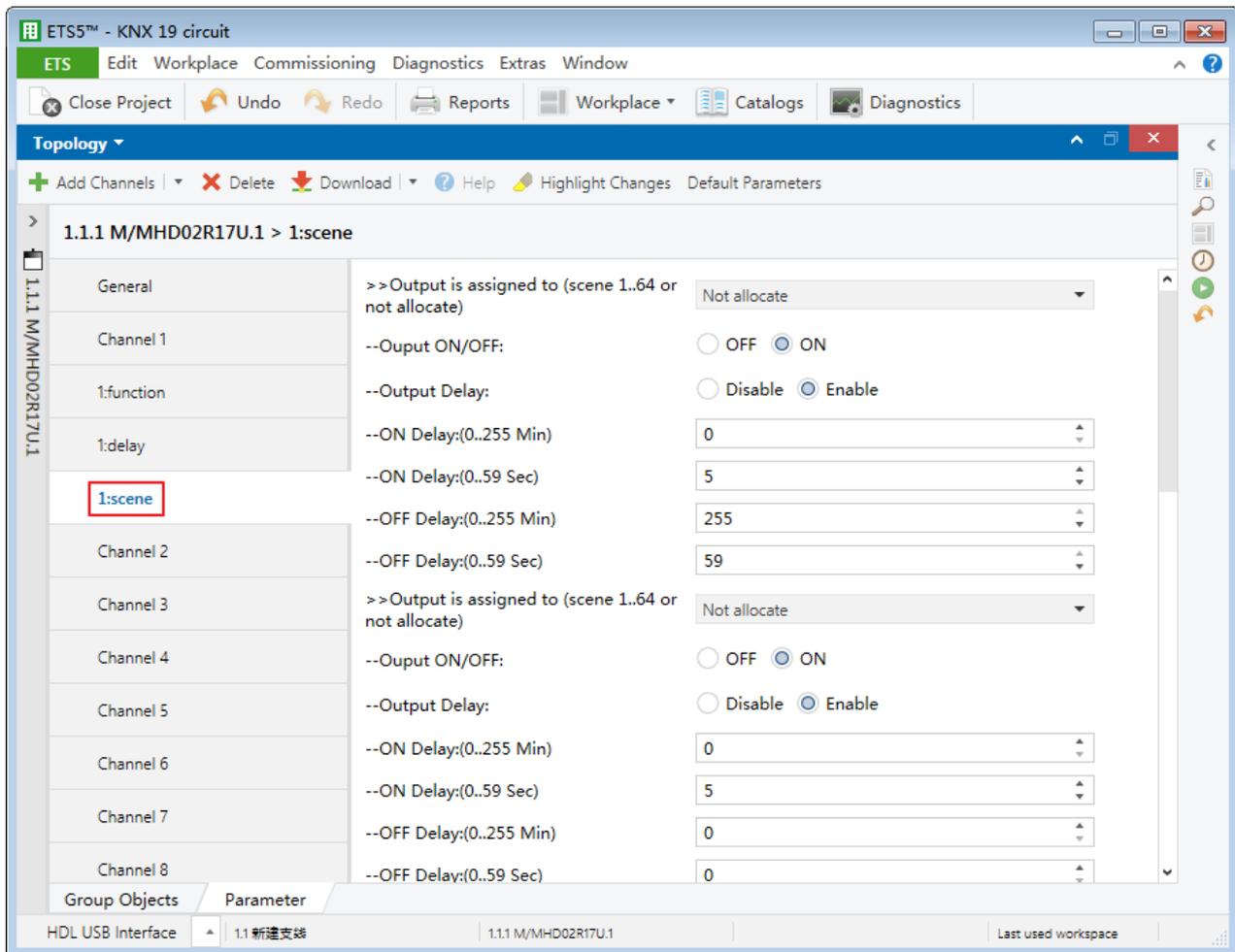
Figure 3-2 Staircase light setting

The setting items are explained below:

1. Control staircase lighting: to select staircase light control type, including “writing 1 to 1-bit object to turn on staircase light, writing 0 to turn off”, “writing 1 to 1-bit object to turn on staircase light, writing 0 is invalid” and “writing 1 or 0 to 1-bit object to turn on staircase light”.
  - Time for OFF: to set the working duration of staircase light, which ranges from 0 to 255min 59s. The default value is 5s.
2. Change staircase lighting time via bus: choose to change the working duration of staircase light via the bus.
3. Alarm staircase lighting time to bus: choose to send an alarm to the bus when staircase light is turned on/off.
4. Warn staircase lighting time: set warning signal (in a flashing light) to inform staircase light will be turned off soon.
  - Warn before the end of time: to send warning signal before staircase lighting is turned off. The time interval ranges from 3 to 255s. For example, when “3s” is set, warning signal will be sent 3s before staircase light is turned off.
  - Duration time for warning: to set the working duration of warning signal, which ranges from 1 to 200s. The default value is 1s.

### 3.3 Scene Setting

After “Functions” is enabled in channel general setting, click “function” tab and enable “scene” in “Function” of the open page, and click “scene” tab on the left, as shown in Figure 3-3.



**Figure 3-3 Scene setting**

The setting items are explained below:

Output assigned to: choose to output corresponding scene number (Up to 64 scene numbers available).

- Output ON/OFF: to switch on/off scene output.
- Output delay: after enabled, the delay time of switching on/off scene output can be set in “ON Delay” and “OFF Delay” below, which ranges from 0 to 255min 59s.

### 3.4 Delay Setting

After “Functions” is enabled in channel general setting, click “function” tab on the left and enable “delay” in “Functions” of the open page, and click “delay” tab on the left, as shown in Figure 3-4.

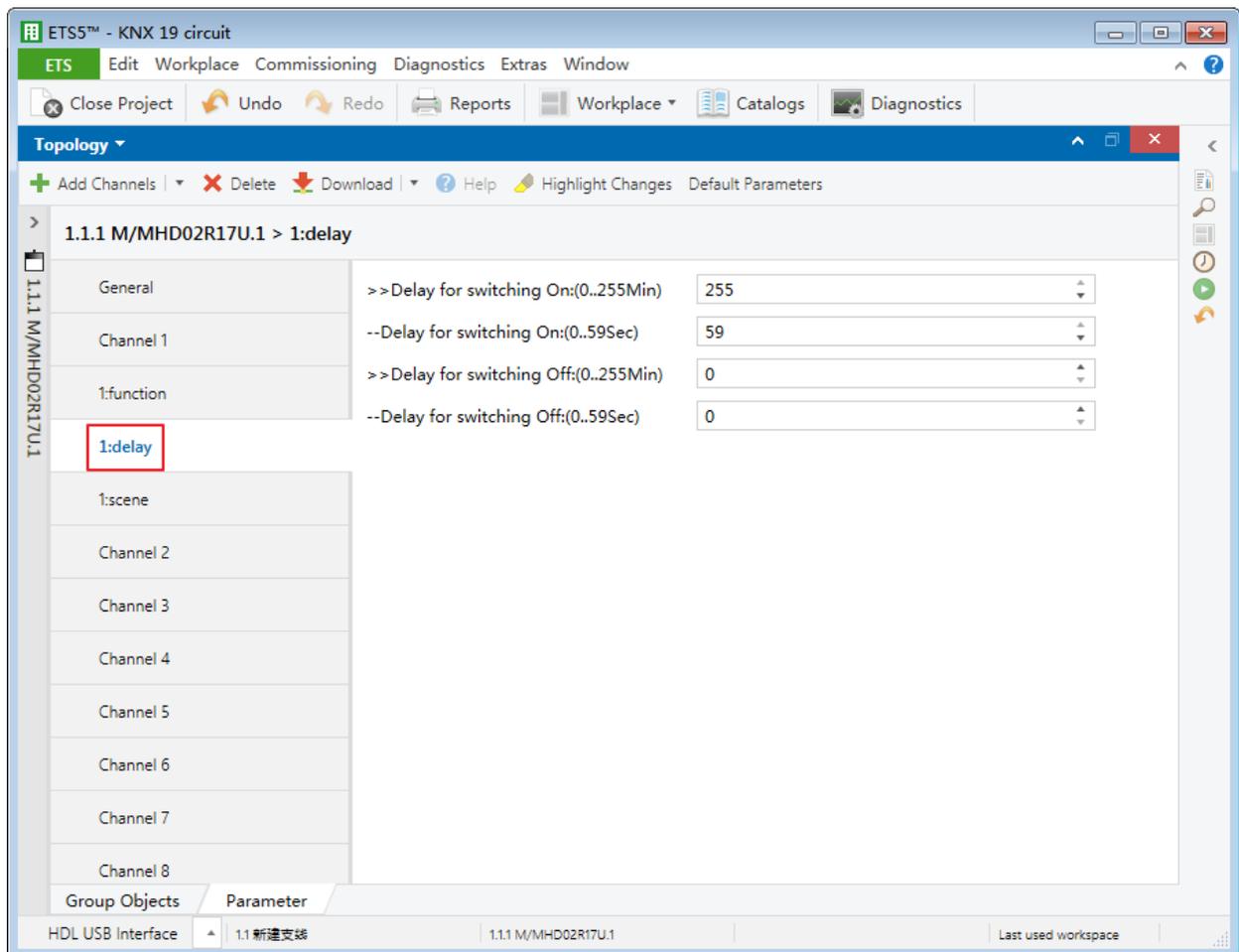


Figure 3-4 Delay setting

The setting items are explained below:

1. Delay for switching On: to set the delay time of switching on a relay, which ranges from 0 to 255min 59s.
2. Delay for switching Off: to set the delay time of switching off a relay, which ranges from 0 to 255min 59s.

## 4 Dimming Setting

This chapter takes “Channel A (Dimming)” as an example to introduce the dimming and function setting.

**Note:** Dimming channel is only applicable for KNX 19CH Actuator.

### 4.1 General Setting

Click “Parameter” → “Channel A (Dimming)” to open the page, as shown in Figure 4-1.

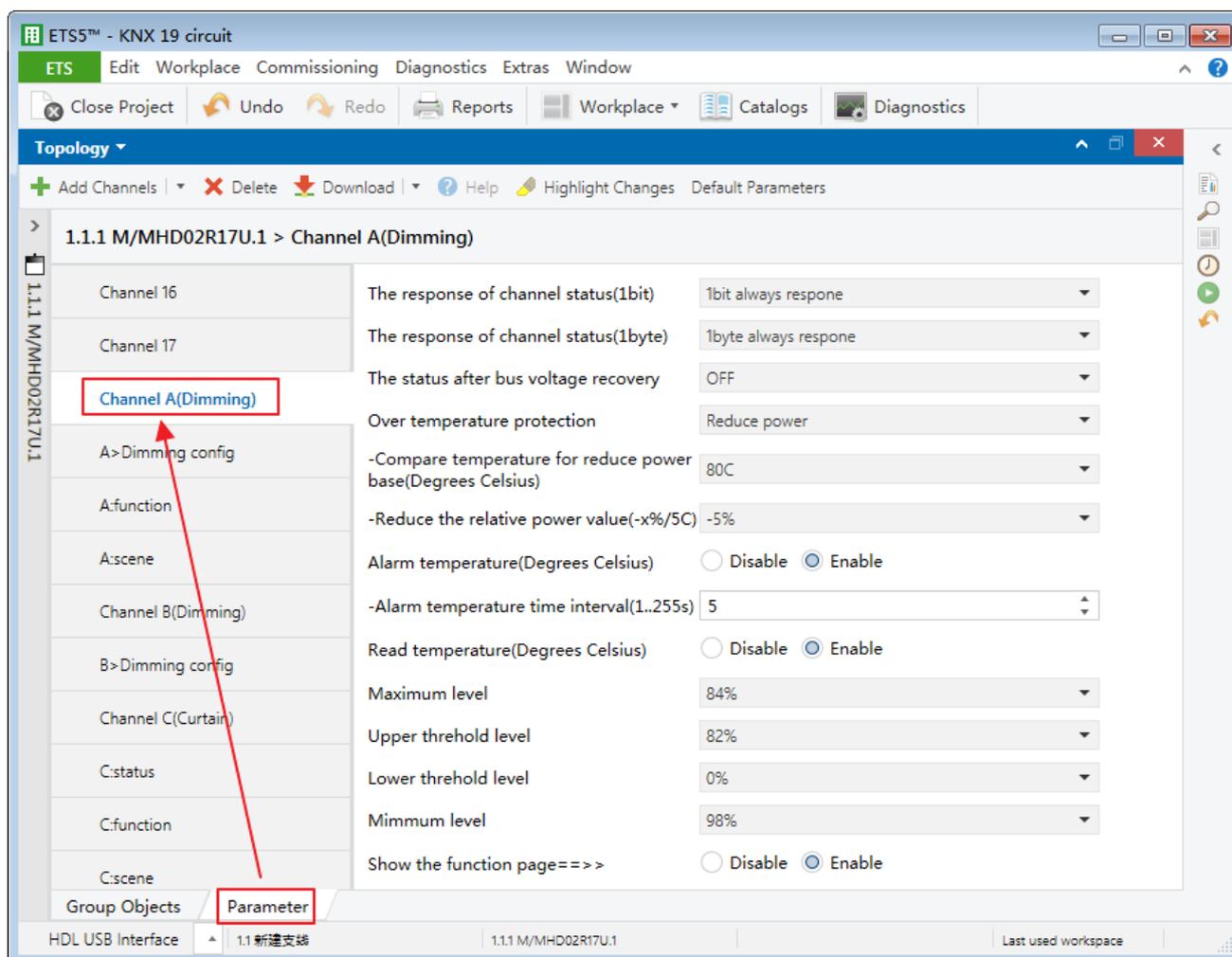


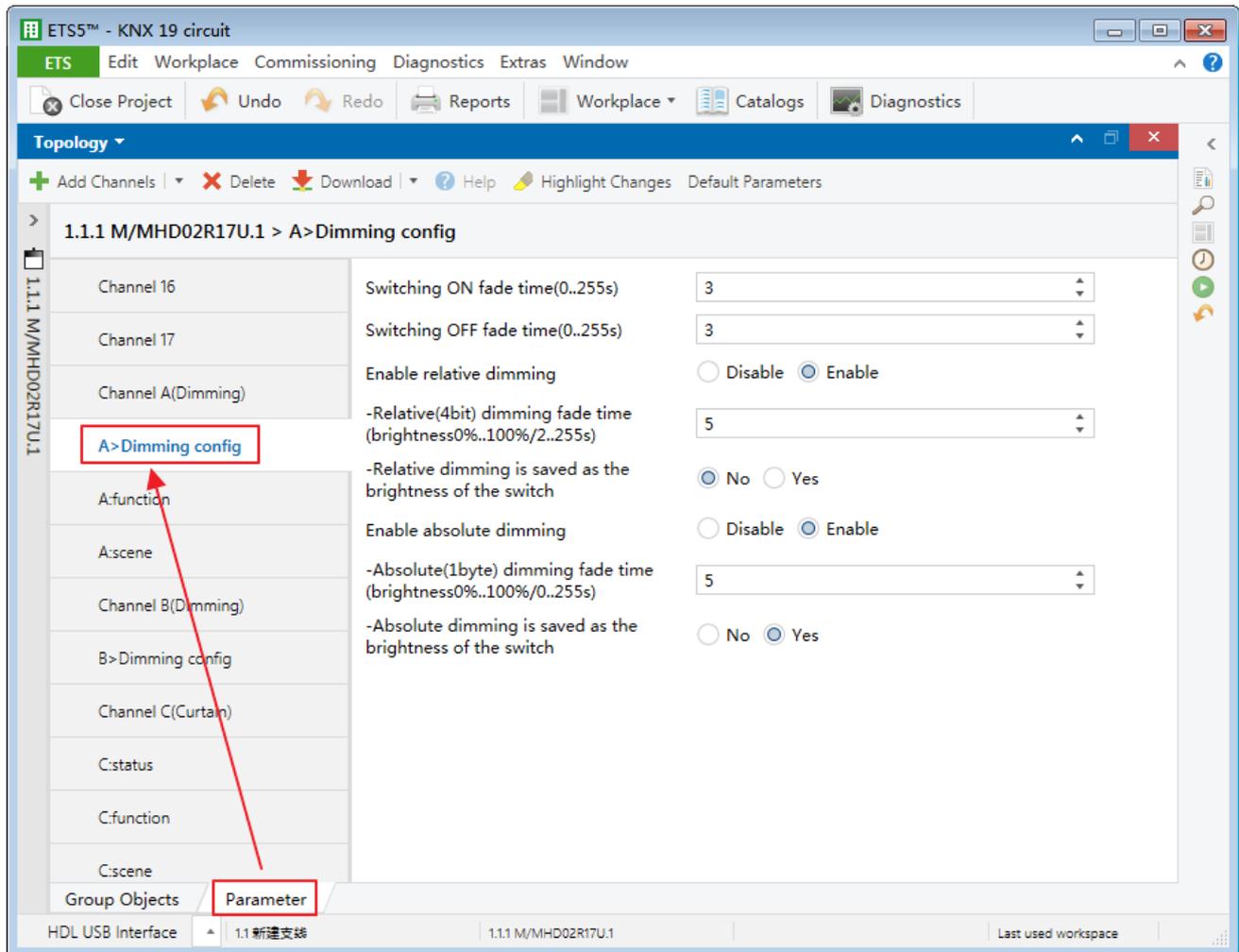
Figure 4-1 General setting

The setting items are explained below:

1. The response of channel status (1bit): to set channel status feedback type, including “Invalid”, “1 bit always response” and “1 bit only changed”.
2. The response of channel status (1byte): to set channel status feedback type, including “Invalid”, “1 byte always response” and “1 byte only changed”.
3. The status after bus voltage recovery: to set the dimming status after the bus voltage recovery, including “OFF”, “Defined brightness value” (The brightness value can be set in “Brightness value”), and “Last brightness value”.
4. Over temperature protection: to set over-heating protection type, including “Invalid”, “Alarm”, “OFF”, and “Reduce power”.
  - Alarm/OFF: if “Alarm/OFF” is selected, the temperature triggering over-heating protection can be set in “Compare temperature for alarm base” (which ranges from 70°C to 90°C, the default value is 80°C). The time interval of sending temperature alarm can be set in “Alarm temperature time interval” (which ranges from 1 to 255s, the default value is 5s).
  - Reduce power: if “Reduce power” is selected, reduced power can be set in “Reduce the relative power value”, which ranges from 5% to 50% per 5°C. The default value is 10%.
5. Read temperature (Degrees Celsius): to enable reading temperature, whose unit is celsius (°C).
6. Maximum level: to set the maximum dimming value.
7. Upper/Lower threshold level: to set the upper/lower threshold value.
8. Minimum level: to set the minimum dimming value.
9. Show the function page: to display/hide function setting page in parameter list.

## 4.2 Dimming Configuration (A > Dimming Config)

Click “Parameter” → “A > Dimming config” to open the page, as shown in Figure 4-2.



**Figure 4-2 Dimming configuration**

The setting items are explained below:

1. Switch ON fade time: to set the fade-in time of the light, which ranges from 0 to 255s. The default value is 3s.
2. Switch OFF fade time: to set the fade-out time of the light, which ranges from 0 to 255s. The default value is 3s.
3. Enable relative dimming
  - Relative (4 bit) dimming fade time: after relative dimming is enabled, relative dimming time can be set, which ranges from 2 to 255s. The default value is 5s.
  - Relative dimming is saved as the brightness of the switch: after relative dimming is enabled, relative dimming value can be saved as the initial brightness of lights.
4. Enable absolute dimming

- Absolute (1 byte) dimming fade time: after absolute dimming is enabled, absolute dimming time can be set, which ranges from 0 to 255s. The default value is 5s.
- Absolute dimming is saved as the brightness of the switch: after absolute dimming is enabled, absolute dimming value can be saved as the initial brightness of lights.

### 4.3 Enable Staircase Light

After “Show the function page” is enabled in dimming general setting, click “function” tab on the left and enable “staircase lighting” in the open page, and click “staircase” tab on the left, as shown in Figure 4-3.

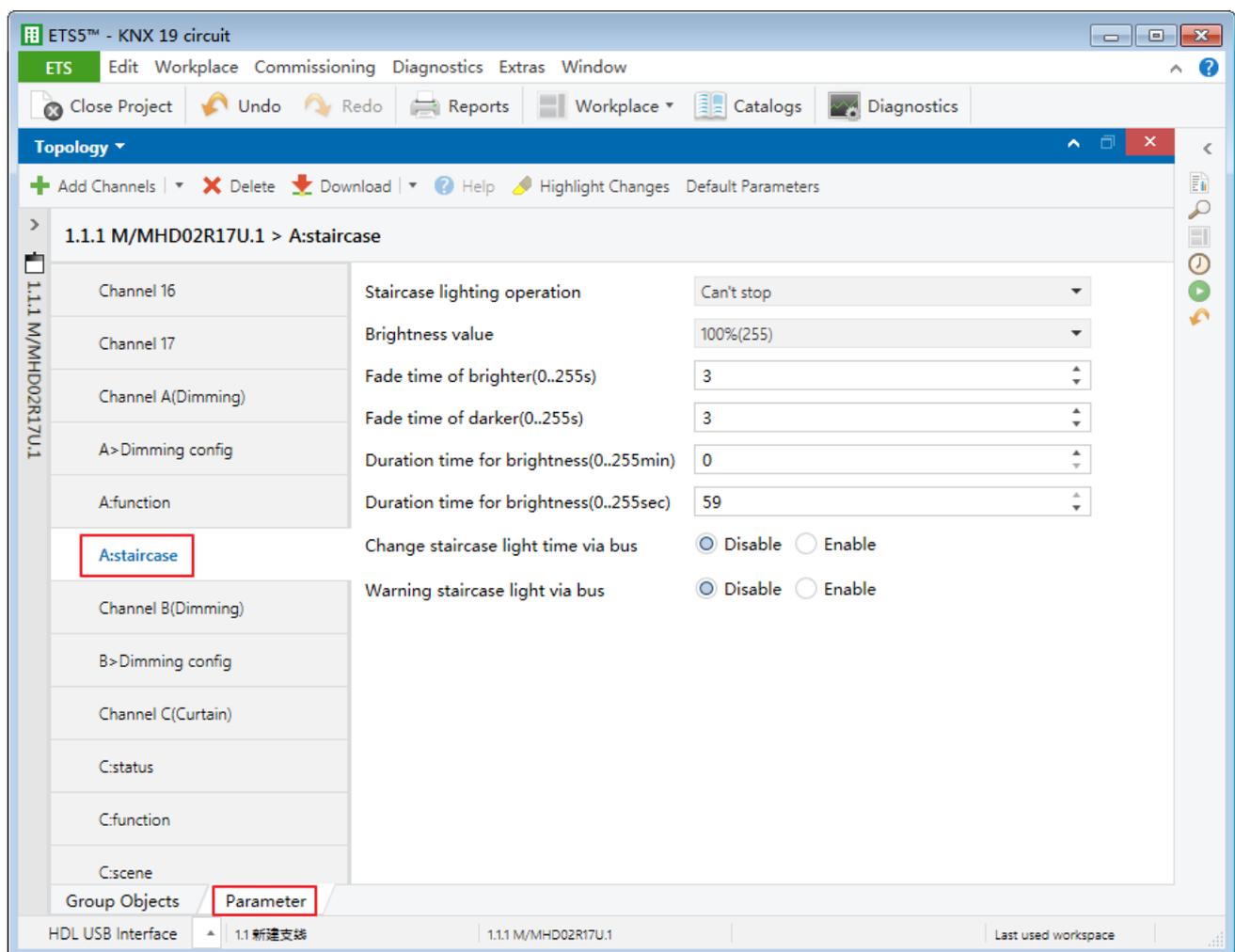


Figure 4-3 Enable staircase light

The setting items are explained below:

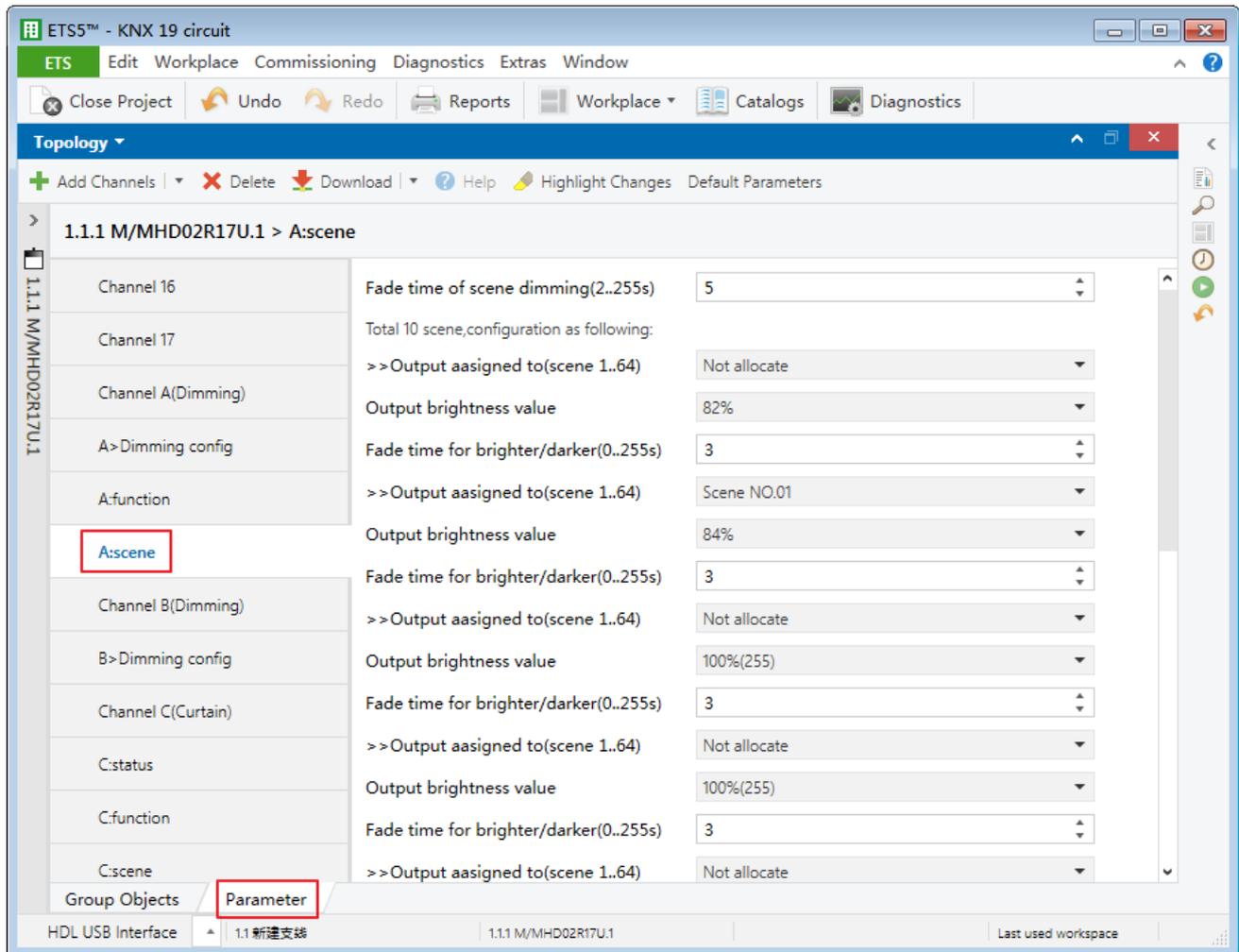
1. Staircase lighting operation: to select the operation type of staircase light, including

“writing 1 to 1-bit object to turn on staircase light, writing 0 to turn off”, “writing 1 to 1-bit object to turn on staircase light, writing 0 is valid” and “writing 1 or 0 to 1-bit object to turn on staircase light”.

2. Brightness value: to set staircase light brightness value.
3. Fade time of brighter: to set the time of getting lights brighter, which ranges from 0 to 255s. The default value is 3s.
4. Fade time of darker: to set the time of getting lights darker, which ranges from 0 to 255s. The default value is 3s.
5. Duration time for brightness: to set the working duration of staircase light, which ranges from 0 to 255min 59s. The default value is 5s.
6. Change staircase light time via bus: choose to change the working duration of staircase light via the bus.
7. Warning staircase light via bus: choose to send warning signal via the bus before the light is turned off.

#### 4.4 Scene Setting

After “Show the function page” is enabled in channel dimming setting, click “function” tab on the left and enable “scene” in the open page, and click “scene” tab on the left, as shown in Figure 4-4.



**Figure 4-4 Scene setting**

The setting items are explained below:

1. Fade time of scene dimming: to set the dimming time of scene, which ranges from 2 to 255s. The default value is 5s.
  - Output assigned to: choose to output corresponding scene number (up to 64 scene numbers available).
2. Output brightness value: to set the brightness value of scene light.
3. Fade time for brighter/darker: to set the time of getting lights brighter/darker, which ranges from 0 to 255s. The default value is 3s.

## 5 Curtain Setting

This chapter takes “Channel C (Curtain)” as an example to introduce the curtain and function setting.

### 5.1 General Setting

Click “Parameter” → “Channel C (Curtain)” to open the page, as shown in Figure 5-1.

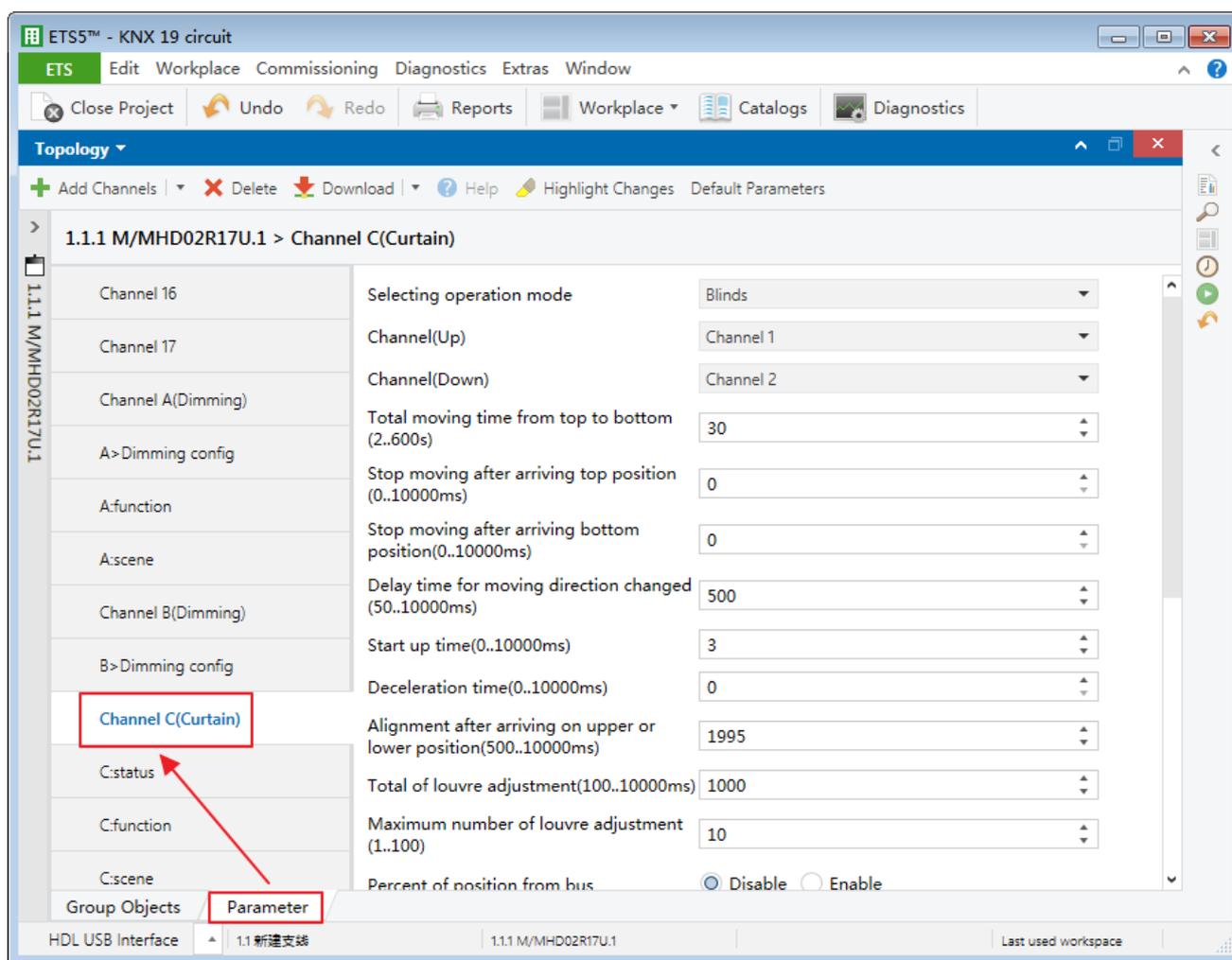


Figure 5-1 General setting

The setting items are explained below:

1. Selecting operation mode: to select the operation type of curtain, including “Curtain” and “Blinds”.
2. Channel (Up): to select the channel rolling up curtain. The default channel is Channel 1.

3. Channel (Down): to select the channel rolling down curtain. The default channel is Channel 2.
4. Total moving time from top to bottom: to set the time when curtain moves from the top to the bottom, which ranges from 2 to 600s. The default value is 30s.
5. Stop moving after arriving top position: to set the time when curtain continues moving after arriving at the top, which ranges from 0 to 10000ms. The time is used for correcting curtain top position.
6. Stop moving after arriving bottom position: to set the time when curtain continues moving after arriving at the bottom, which ranges from 0 to 10000ms. The time is used for correcting curtain bottom position.
7. Delay time for moving direction changed: to set the delay time of changing curtain direction, which ranges from 50 to 10000ms. The default value is 500ms.
8. Start up time: to set the time of starting up curtain, which ranges from 0 to 10000ms.
9. Deceleration time: to set the time when curtain decelerates before arriving at the preset position, which ranges from 0 to 10000ms.
10. Alignment after arriving on upper or lower position: to set the time when curtain corrects position after arriving at the top/bottom, which ranges from 500 to 10000ms. The default value is 2000ms.
11. Total of louvre adjustment: after “Blinds” is selected in “Selecting operation mode”, user can set the total time of adjusting blinds angle, which ranges from 100 to 10000ms. The default value is 1000ms.
12. Maximum number of louvre adjustment: after “Blinds” is selected in “Selecting operation mode”, user can set the maximum number of adjusting blinds angle, which ranges from 1 to 100. The default value is 10.
13. Percent of position from bus: choose to obtain curtain position via the bus.
14. Limit travelling range: to set the travelling range of curtain. After enabled, user can set the upper/lower limit of travelling range in “Upper limit” and “Lower limit” below.
15. Enable status page: to display/hide curtain status setting page in parameter list.
16. Reaction after bus voltage recovery: to set curtain status after the bus voltage recovery, including “no reaction”, “up”, “down”, “stop” and “set position”.
  - Output position value/Output louvre value: if “set position” is selected, curtain position and blinds angel can be set after the bus voltage recovery.
17. Show the function page: to display/hide function setting page in parameter list.

## 5.2 Curtain Status Setting

After “Enable status page” is enabled at the bottom of curtain general setting page, click “status” tab on the left, as shown in Figure 5-2.

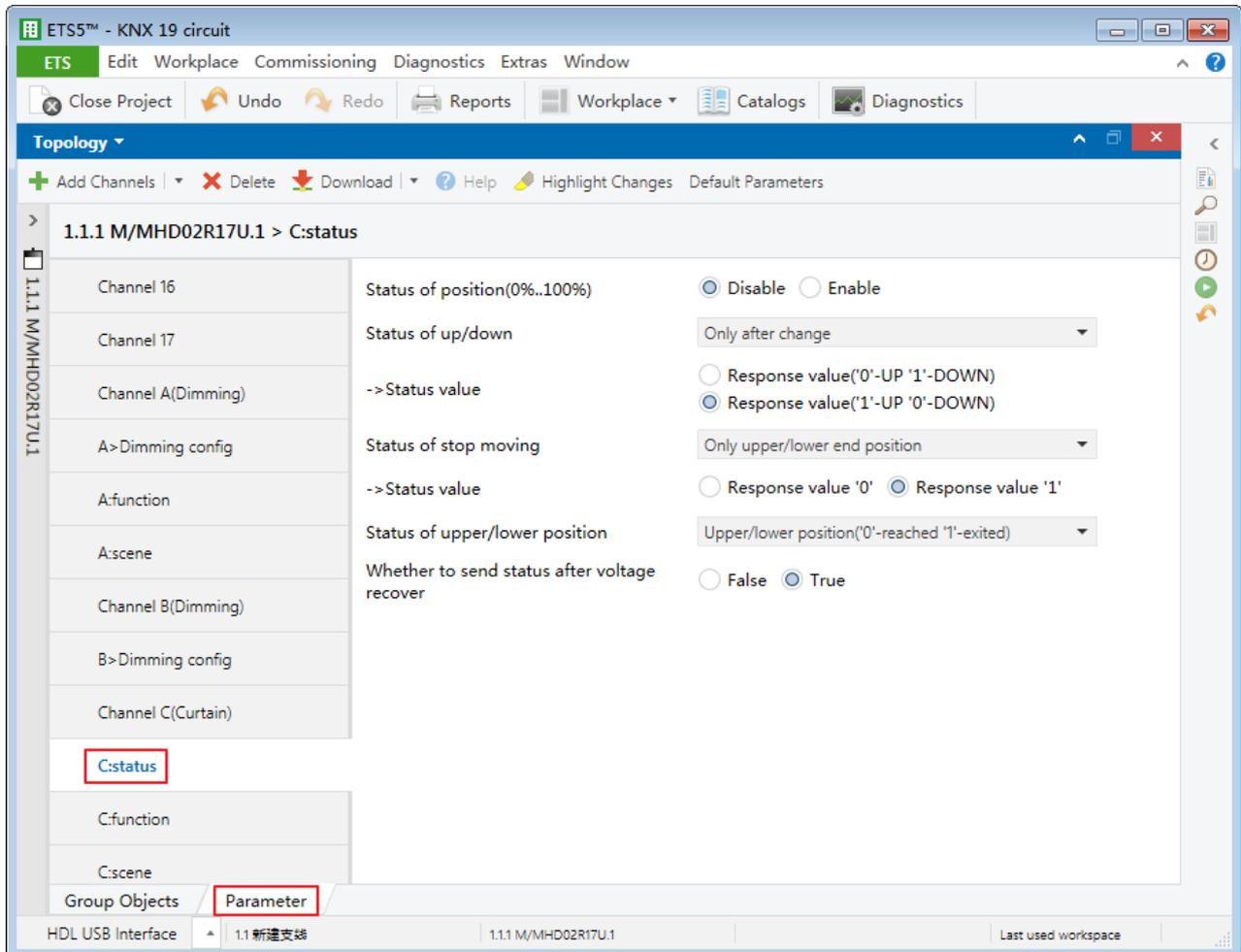


Figure 5-2 Curtain status setting

The setting items are explained below:

1. Status of position: to enable curtain position feedback.
2. Status of up/down: to select curtain rolling up/down feedback type, including “No response”, “Always response” and “Only after change”.
  - Status value: if “Always response” or “Only after change” is selected, feedback type can be selected, including “0-UP, 1-DOWN” and “1-UP, 0-DOWN”.
3. Status of stop moving: to select curtain stopping feedback type, including “No response”, “Always response” and “Only upper/lower end position”.

- Status value: if “Always response” or “Only upper/lower end position” is selected, feedback type can be selected, including “Response value 0” and “Response value 1”.
4. Status of upper/lower position: to select curtain at the top/bottom feedback type, including “No response”, “Upper/lower position, ‘0’-reached, ‘1’-exited” and “Upper/lower position, ‘1’-reached, ‘0’-exited”.
  5. Whether to send status after voltage recover: choose to enable curtain status feedback after the bus voltage recovery.

### 5.3 Curtain Scene Setting

After “Show the function page” is enabled at the bottom of curtain general setting page, click “function” tab and enable “scene” in the open page, and click “scene” tab on the left, as shown in Figure 5-3.

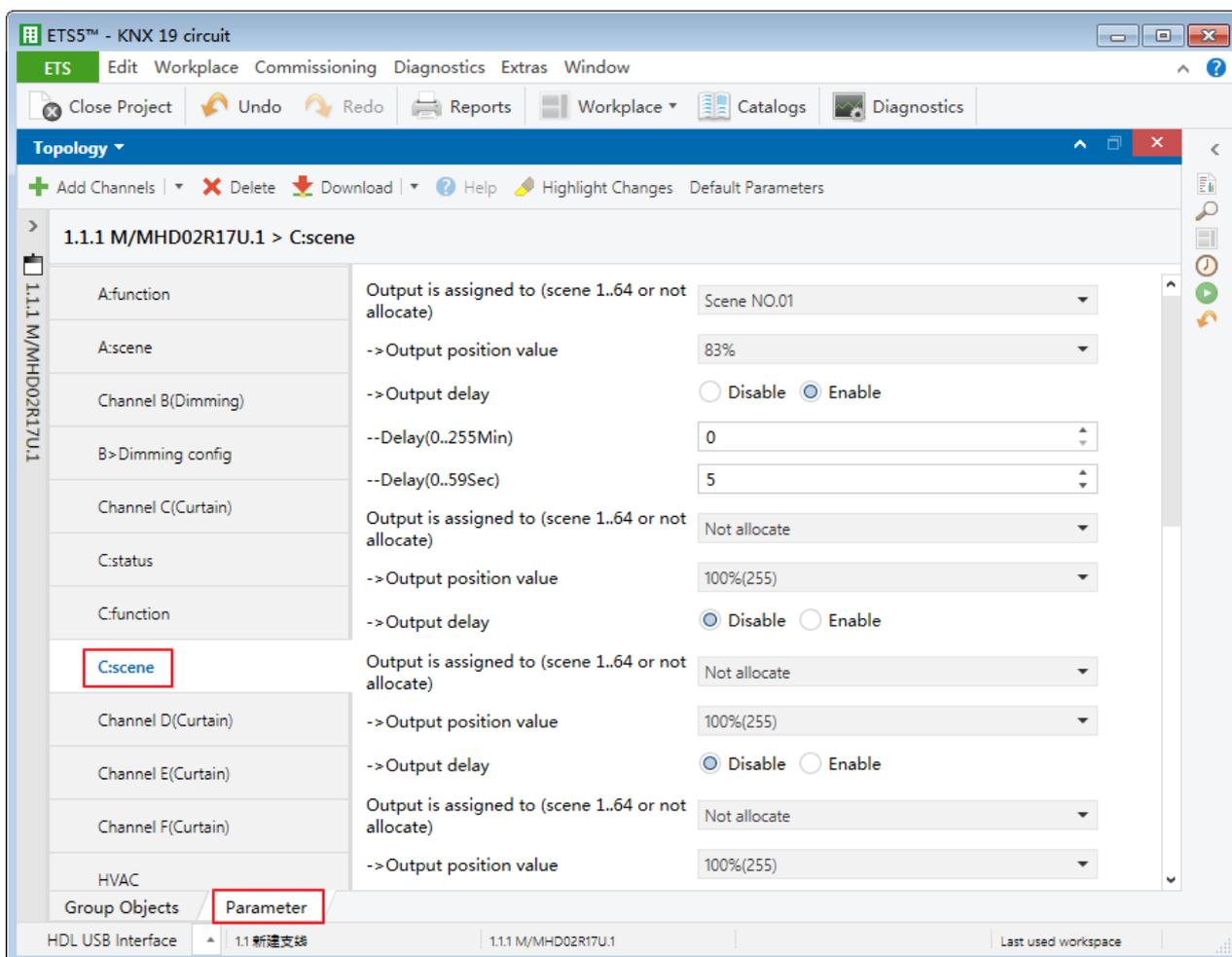


Figure 5-3 Curtain scene setting

The setting items are explained below:

Output assigned to: choose to output corresponding scene number (up to 64 scene numbers available).

- Output position value: to set the position value of scene output.
- Output Delay: after enabled, the delay time of scene output can be set, which ranges from 0 to 255min 59s. The default value is 5s.

## 6 HVAC Setting

### 6.1 HVAC Setting

Click “Parameter” → “HVAC” and enable “HVAC function” in the open page, as shown in Figure 6-1.

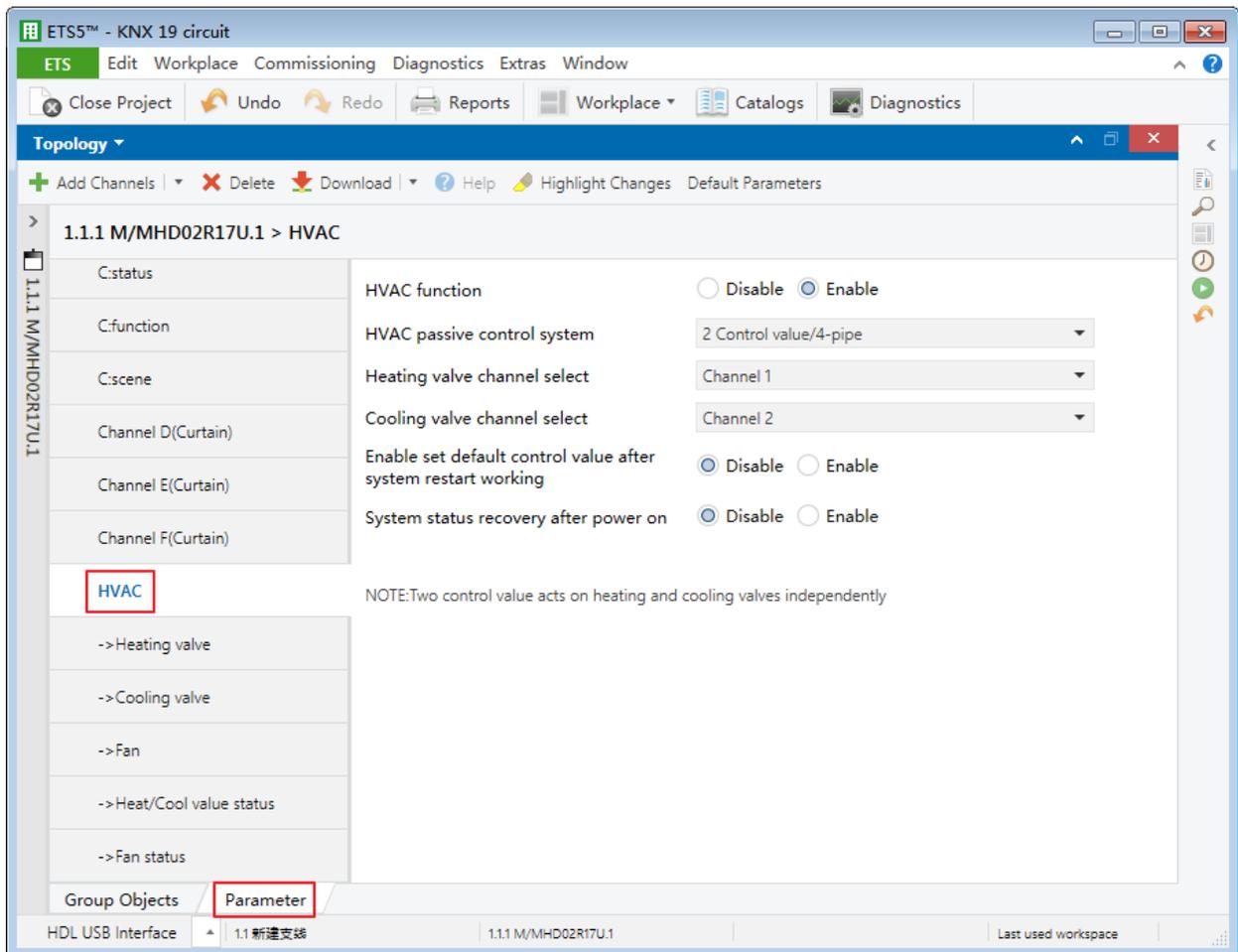


Figure 6-1 HVAC general setting

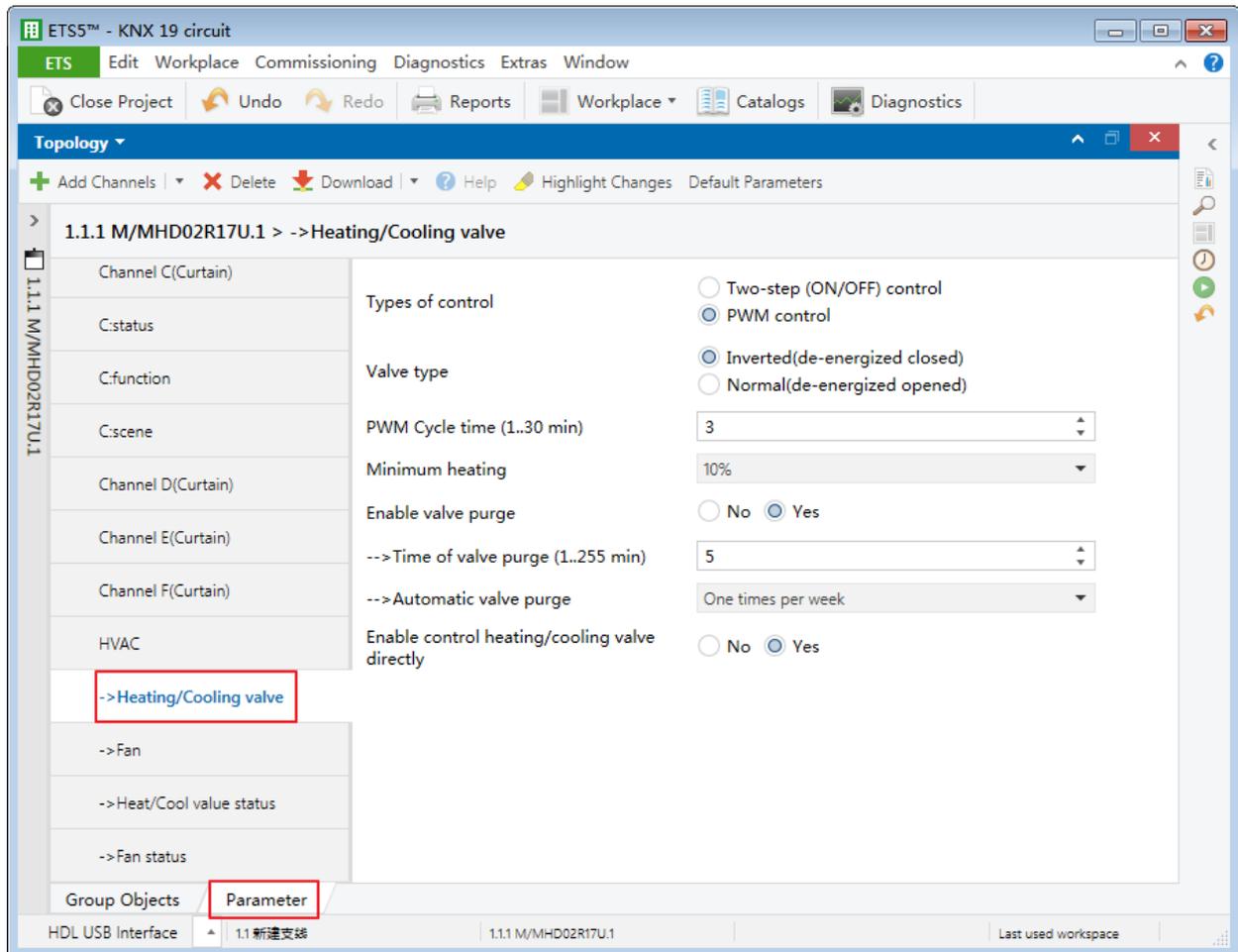
The setting items are explained below:

1. HVAC passive control system: include “1 Control value/2-pipe”, “1 Control value/4-pipe, with switch object”, “2 Control value/2-pipe”, “2 Control value/2-pipe, with switch object” and “2 Control value/4-pipe”.
  - Heating/Cooling valve channel select: to select the channel controlling heating/cooling valve.

- Switch object configuration:
  - ① If “1 Control value/4-pipe, with switch object” is selected in “HVAC passive control system”, switch object type can be selected, including “writing 1 to object to control heating valve, writing 0 to control cooling valve”, and “writing 0 to object to control heating valve, writing 1 to control cooling valve”.
  - ② If “2 Control value/2-pipe, with switch object” is selected in “HVAC passive control system”, switch object type can be selected, including “writing 1 to object to choose the control value A, writing 0 to choose the control value B” and “writing 0 to object to choose the control value A, writing 1 to choose the control value B”.
- 2. Enable set default control value after system restart working: to enable setting the default control value after the system restarts.
- 3. System status recovery after power on: choose to recover system status after the bus voltage recovery.

## 6.2 Heating/Cooling Valve Setting

After “HVAC function” is enabled in HVAC setting, click “Heating/Cooling valve” tab on the left, as shown in Figure 6-2.



**Figure 6-2 Heating/Cooling valve setting**

The setting items are explained below:

1. Types of control: to select heating/cooling valve control type, including “Two-step control” and “PWM control”. If “PWM control” is selected, PWM control period can be set in “PWM Cycle time” below. The period ranges from 1 to 30min and the default value is 3min. The minimum heating value can be set in “Minimum heating”.
2. Valve type: to select valve type, including “Inverted” and “Normal”.
3. Enable valve purge: to enable the self-cleaning function of heating/cooling valve.
  - Time of valve purge: to set the duration of self-cleaning, which ranges from 1 to 255min. The default value is 5min.
  - Automatic valve purge: to set the period of self-cleaning automatically, including “No”, “One times per day”, “One times per week” and “One times per month”.
4. Enable control heating/cooling valve directly: choose to control heating/cooling valve directly.

## 6.3 Fan Setting

After “HVAC function” is enabled in HVAC setting, click “Fan” tab on the left, as shown in Figure 6-3.

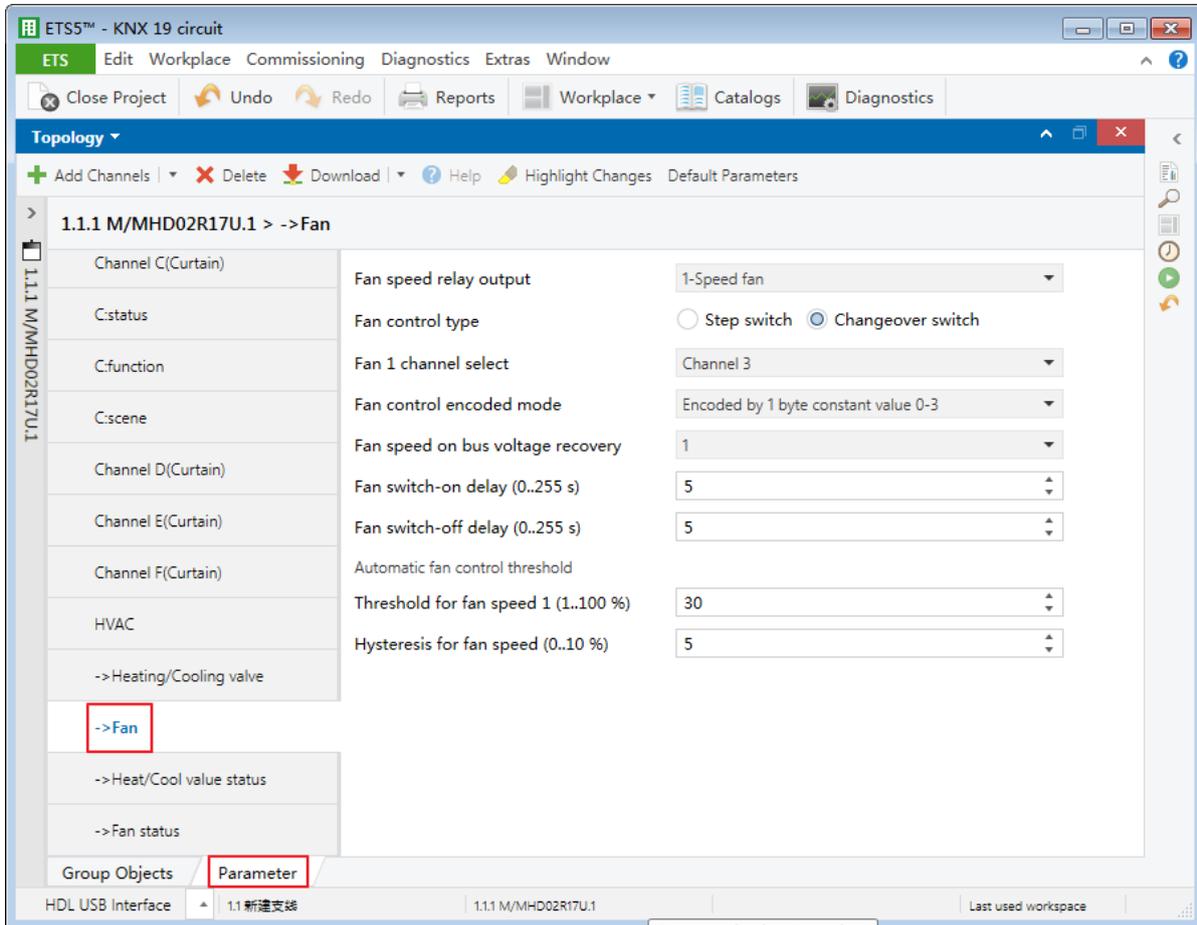


Figure 6-3 Fan setting

The setting items are explained below:

1. Fan speed relay output: to select fan speed relay output type, including “1-Speed fan”, “2-Speed fan” and “3-Speed fan”.
2. Fan control type: to select fan control type, including “Step switch” and “Changeover switch”.
3. Fan \* channel select: to select the channel controlling fan speed levels.
4. Fan control encoded mode: to select the encoding mode of fan control, including “Encoded by 1 byte percent value 0-100%”, “Encoded by 1 byte constant value” and “1 bit values”.

➤ Fan speed-\* value: if “Encoded by 1 byte percent value 0-100%” is selected in “Fan

control encoded mode”, the control value of fan speed level can be set, which ranges from 0 to 255. The control value of fan speed 1 is 85, that of fan speed 2 is 170, and that of fan speed 3 is 255.

5. Fan speed on bus voltage recovery: to select fan speed status after the bus voltage recovery, including “Recovery”, “OFF”, “1/2/3” and “Auto”.
6. Fan switch-on/switch-off delay: to set the delay time of turning on/off fan, which ranges from 0 to 255s.
7. Enable start-up behavior: if “2-speed fan” or “3-speed fan” is selected in “Fan speed relay output”, the start-up status of fan speed can be set.
  - Starting characteristic of fan: to select the initial fan speed level after starting up fan.
  - Minimum delay at starting speed: to set the minimum delay time of starting up fan, which ranges from 0 to 255s.
8. Changeover delay between fan speeds: if “2-speed fan” or “3-speed fan” is selected in “Fan speed relay output”, the delay time of switching fan speeds can be set. The default value is 0.5s.
9. Minimum duration time on fan speed: to set the minimum working duration of fan, which ranges from 0 to 255s.
10. Fan automatic control is active by object: to trigger automatic fan control via object “0” or “1”.
11. Enable limitations: if “2-speed fan” or “3-speed fan” is selected in “Fan speed relay output”, the object of limiting fan speed level can be set in “Speed with limitation” below. If “unchanged” is selected, fan speed will not be limited.
12. Automatic fan control threshold
  - Threshold for fan speed: to set the threshold controlling fan speed, which ranges from 1 to 100. The default value is 30.
  - Hysteresis for fan speed: to set the hysteresis controlling fan speed, which ranges from 0 to 10. The default value is 5.

## 6.4 Heating/Cooling Valve Status Setting

After “HVAC function” is enabled in HVAC setting, click “Heat/Cool value status” tab on the left, as shown in Figure 6-4.

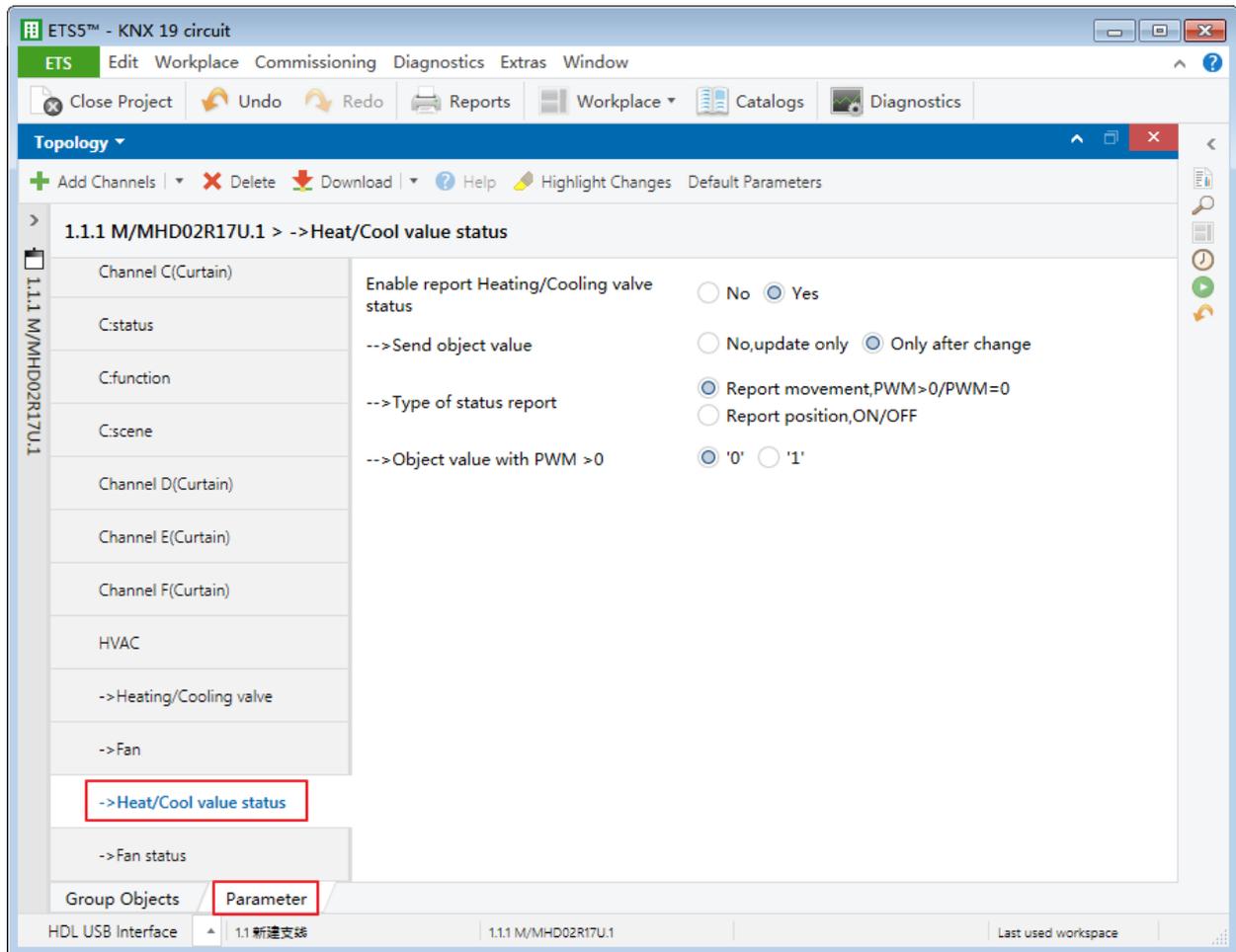


Figure 6-4 Heating/Cooling valve status setting

The setting items are explained below:

Enable report Heating/Cooling valve status: after enabled, the following items can be set:

1. Send object value: to set object sending type, including “No, update only” and “Only after change”.
2. Types of status report: to select status report type.
  - Report movement: if “0” is set in “Object value with PWM > 0”, “0” will be sent when PWM > 0, while “1” will be sent when PWM = 0. If “1” is set in “Object value with PWM > 0”, “1” will be sent when PWM > 0, while “0” will be sent when PWM = 0.
  - Report position: if “1-ON, 0-OFF” is set in “State value”, “1” will be sent when the relay is switched on, while “0” will be sent when the relay is switched off. If “0-ON, 1-OFF” is set in “State value”, “0” will be sent when the relay is switched on, while “1” will be sent when the relay is switched off.

## 6.5 Fan Status Setting

After “HVAC function” is enabled in HVAC setting, click “Fan status” tab on the left, as shown in Figure 6-5.

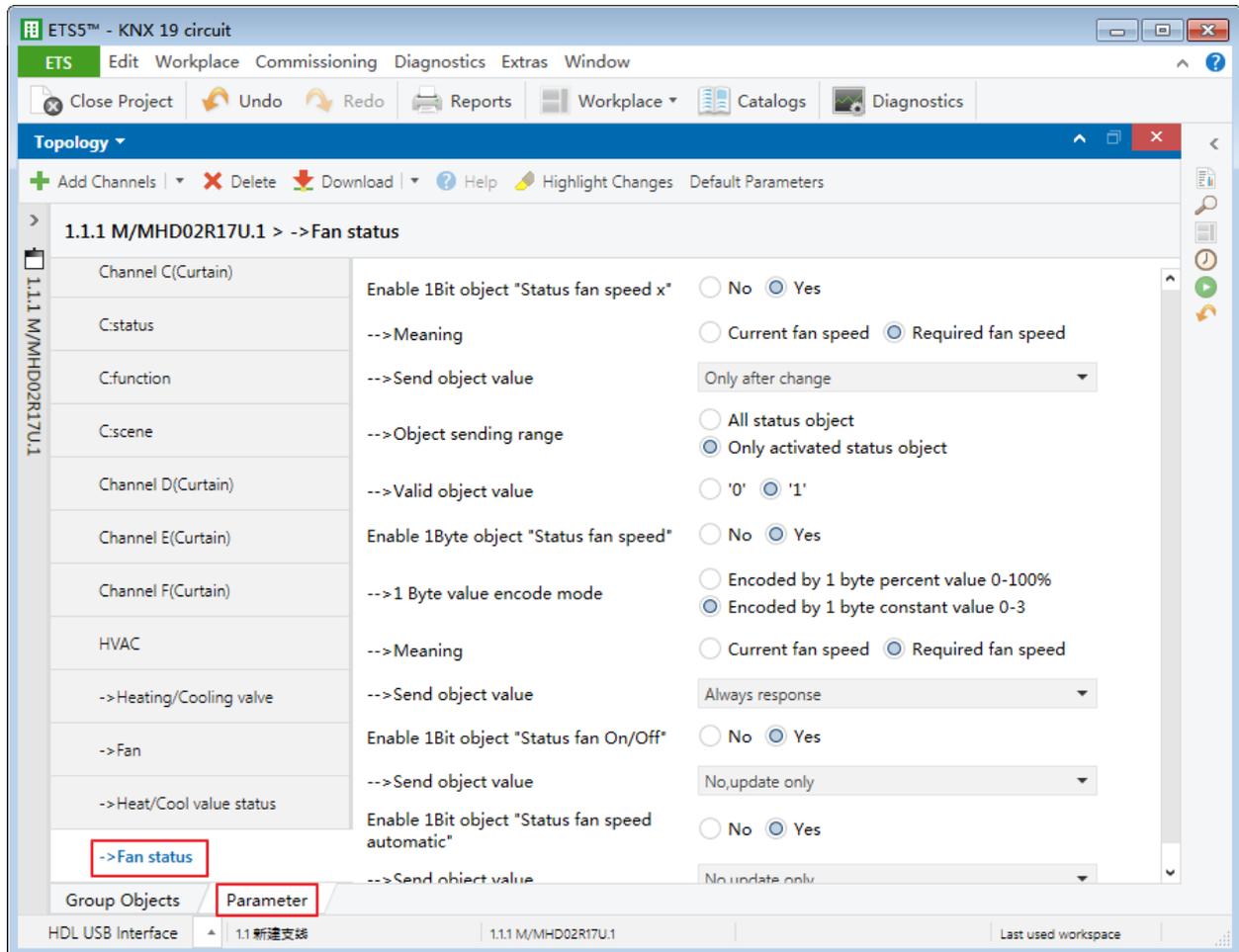


Figure 6-5 Fan status setting

The setting items are explained below:

1. Enable 1 bit object “Status fan speed x”: to enable fan speed feedback in 1-bit object.
  - Meaning: to select feedback items, including “Current fan speed” or “Required fan speed”.
  - Send object value: to select object sending type, including “Always response”, “No, update only” and “Only after change”.
  - Object sending range: to select object sending range, including “All status object” and “Only activated status object”.
  - Valid object value: to select “1” or “0” as valid object value.

2. Enable 1 byte object “Status fan speed”: to enable fan speed feedback in 1-byte object.
  - 1 Byte value encode mode: to select the type of 1-byte value encoding mode, including “Encoded by 1 byte percent value 0-100%” and “Encoded by 1 byte constant value 0-3”.
3. Enable 1 Bit object “Status fan On/Off”: to enable fan on/off feedback in 1-bit object.
4. Enable 1 Bit object “Status fan speed automatic”: to enable automatic fan speed feedback in 1-bit object.

## 7 Download Data

### 7.1 Interface Setting

If users need to download data to KNX 17/19CH Actuator, KNX interface is necessary.

After connecting KNX interface to a computer via USB, click “Bus” tab in ETS’ main page, “HDL USB Interface” will show up in “Discovered Interface”. Double click to add and the interface will show up in “Current Interface”, as shown in Figure 7-1.

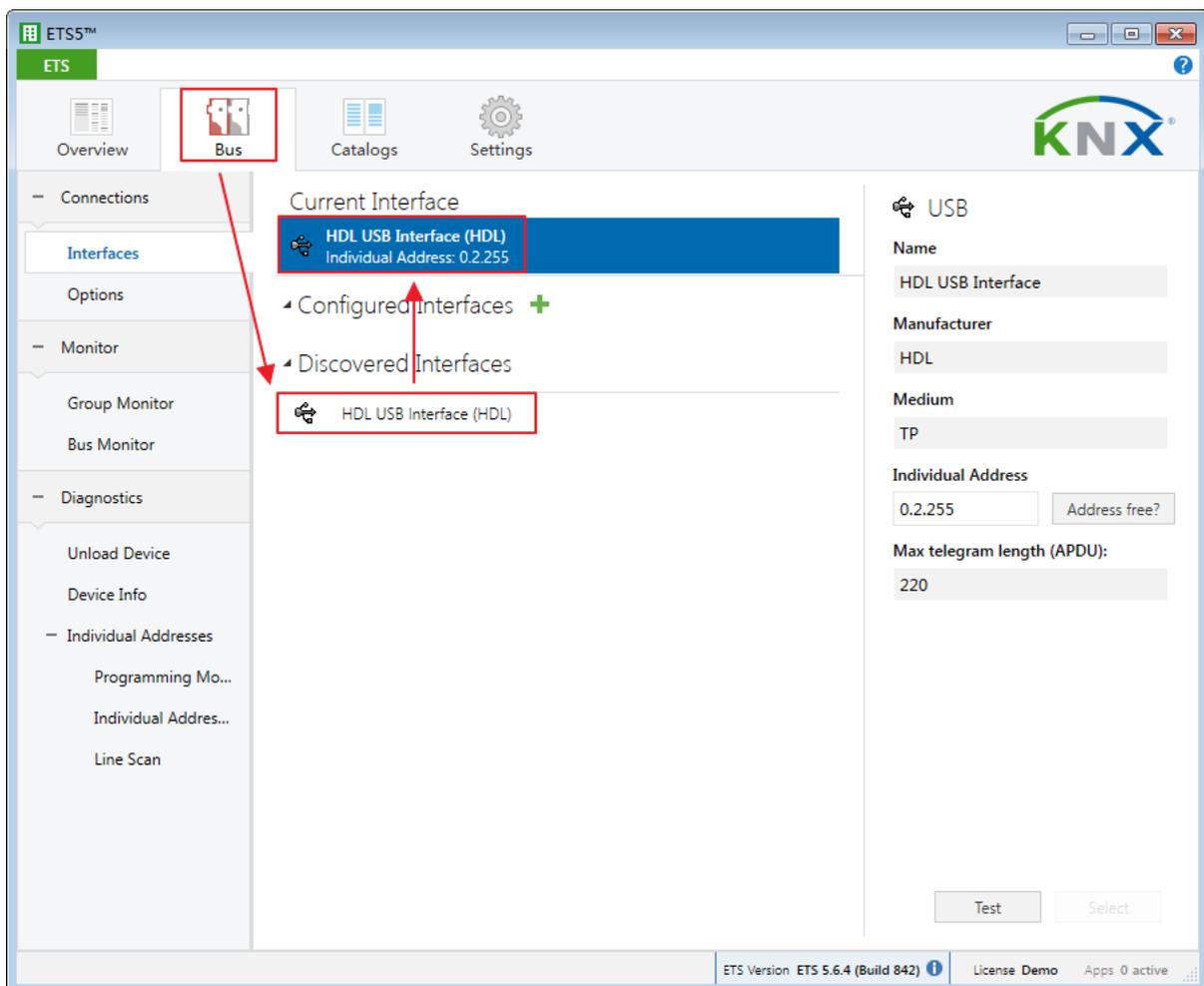


Figure 7-1 Interface setting

## 7.2 Download Data

Press the programming button of KNX 17/19CH Actuator, and the red indicator keeps on. Right click the database to be downloaded to KNX 17/19CH Actuator and select “download”. The information indicates the end of the process on the right side of ETS, as shown in Figure 7-2.

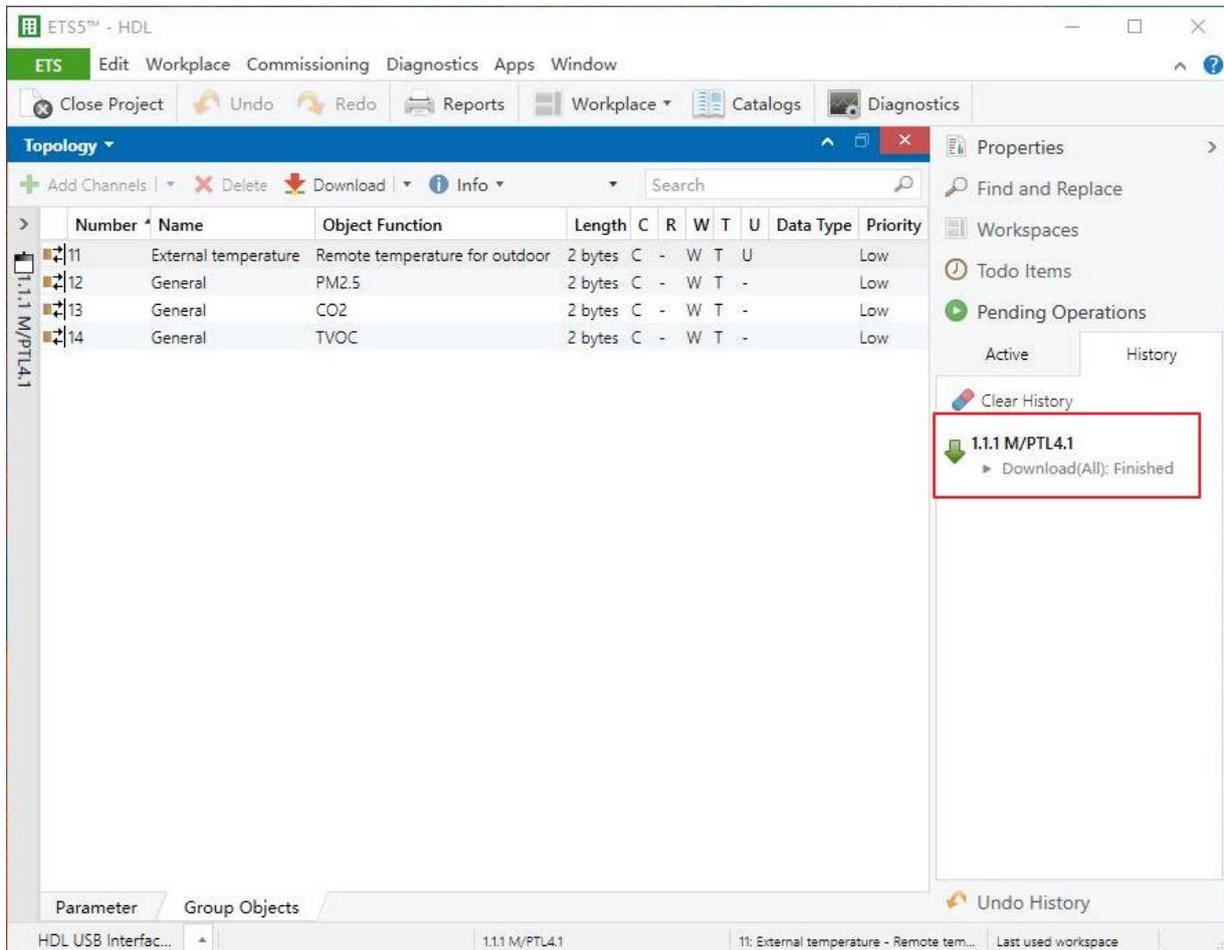


Figure 7-2 Download data

## 8 Object Instruction

KNX communication objects are used for receiving and sending data. The length of these objects is from 1 to 14 bits according to different function settings. Each object has a flag with communication property.

1. "C"-Communication, representing that communication objects are connected normally via the bus.
2. "R"-Read, representing that communication object value can be read via the bus.
3. "W"-Write, representing that communication object value can be rewritten via the bus.
4. "T"-Transmit, representing that communication objects have transmit function. When this object value is modified, send the message.
5. "U"-Update, representing that communication object value can be updated via the bus response message.

### 8.1 Objects "General"

| Objects "General" |         |                          |       |   |   |   |   |   |        |     |
|-------------------|---------|--------------------------|-------|---|---|---|---|---|--------|-----|
| 序号 ^              | 名称      | 对象功能                     | 长度    | C | R | W | T | U | 数据类型   | 优先级 |
| 1                 | General | Heartbeat telegram       | 1 bit | C | - | - | T | - | enable | 低   |
| 2                 | General | Channel switching on/off | 1 bit | C | - | W | - | - | switch | 低   |
| 3                 | General | Channel status           | 1 bit | C | R | - | T | - | switch | 低   |

| No.   | Name    | Function                 | Flag  | Data Type         |
|---|---------|--------------------------|-------|-------------------|
| 1   | General | Heartbeat telegram       | C T   | DPT1.003<br>1 bit |
| This object can be activated by selecting "Send value "0" cyclically, Send value "1" cyclically or Send value "1/0" inverted cyclically" in the parameter "Heartbeat Telegram", which is used for checking if the device is connected to the system normally. |         |                          |       |                   |
| 2   | General | Channel switching on/off | C W   | DPT1.001<br>1 bit |
| This object is used for switching on/off channels.  |         |                          |       |                   |
| 3   | General | Channel status           | C R T | DPT1.001<br>1 bit |
| This object is used for indicating channel status.  |         |                          |       |                   |

## 8.2 Objects “Channel”

| Objects “Channel”   |                               |                                       |         |                          |
|---|-------------------------------|---------------------------------------|---------|--------------------------|
| (Take “Channel 1” as an example)  |                               |                                       |         |                          |
| 11  | Channel 1                     | Switching                             | 1 bit   | C - W - - switch 低       |
| 12  | Channel 1                     | Status after changed                  | 1 bit   | C R - T - switch 低       |
| 13  | Channel 1                     | Staircase light                       | 1 bit   | C - W - - switch 低       |
| 14  | Channel 1                     | Change staircase lighting time        | 2 bytes | C - W - - time (s) 低     |
| 15  | Channel 1                     | Alarm staircase lighting              | 1 bit   | C R - T - alarm 低        |
| 12  | Channel 1                     | Status always                         | 1 bit   | C R - T - switch 低       |
| 13  | Channel 1                     | Scene(8bit)                           | 1 byte  | C - W - - scene cont...低 |
| No.   | Name                          | Function                              | Flag    | Data Type                |
| 11,20,<br>29,38,<br>47,56,<br>65,74,<br>83,92,<br>101,110,<br>119,128,<br>137,146,<br>155 | Channel n<br>(n=1, 2, ...,17) | Switching                             | C W     | DPT1.001<br>1 bit        |
| These objects are used for turning on/off channels.                                       |                               |                                       |         |                          |
| 12,21,<br>30,39,<br>48,57,<br>66,75,<br>84,93,<br>102,111,<br>120,129,<br>138,147,<br>156 | Channel n<br>(n=1, 2, ...,17) | Status after changed<br>Status always | C R T   | DPT1.001<br>1 bit        |
| These objects are used for indicating channel switch status.                              |                               |                                       |         |                          |
| 13,22,<br>31,40,<br>49,58,<br>67,76,<br>85,94,<br>103,112,<br>121,130,<br>139,148,<br>157 | Channel n<br>(n=1, 2, ...,17) | Staircase light<br>Scene (8 bit)      | C W     | DPT1.001<br>1 bit        |

|   |                               |                                |       |                     |
|---|-------------------------------|--------------------------------|-------|---------------------|
| These objects are used for enabling staircase light and scene.                            |                               |                                |       |                     |
| 14,23,<br>32,41,<br>50,59,<br>68,77,<br>86,95,<br>104,113,<br>122,131,<br>140,149,<br>158 | Channel n<br>(n=1, 2, ...,17) | Change staircase lighting time | C W   | DPT7.005<br>2 bytes |
| These objects are used for controlling the working duration of staircase light.           |                               |                                |       |                     |
| 15,24,<br>33,42,<br>51,60,<br>69,78,<br>87,96,<br>105,114,<br>123,132,<br>141,150,<br>159 | Channel n<br>(n=1, 2, ...,17) | Alarm staircase lighting       | C R T | DPT1.005<br>1 bit   |
| These objects are used for controlling the alarm function of staircase light.             |                               |                                |       |                     |

### 8.3 Objects “Dim Output”

**! Note:** Objects “Dim Output” are only applicable for KNX 19CH Actuator.

|                                      |              |                             |         |           |               |   |
|--------------------------------------|--------------|-----------------------------|---------|-----------|---------------|---|
| Objects “Dim Output”                 |              |                             |         |           |               |   |
| (Take “Dim Output A” as an example.) |              |                             |         |           |               |   |
| 164                                  | Dim Output A | Channel output              | 1 bit   | C - W - U | switch        | 低 |
| 165                                  | Dim Output A | Relative dimming(4bit)      | 4 bit   | C - W - U | dimming c...  | 低 |
| 166                                  | Dim Output A | Absolute dimming(8bit)      | 1 byte  | C - W - U | percentag...  | 低 |
| 167                                  | Dim Output A | Response state(1bit)        | 1 bit   | C R - T - | switch        | 低 |
| 168                                  | Dim Output A | Response state(1byte)       | 1 byte  | C R - T - | percentag...  | 低 |
| 169                                  | Dim Output A | Temperature alarm           | 1 bit   | C R - T - | alarm         | 低 |
| 170                                  | Dim Output A | Read temperature            | 2 bytes | C R - T - | temperatu...  | 低 |
| 171                                  | Dim Output A | Staircase light             | 1 bit   | C - W - U | switch        | 低 |
| 172                                  | Dim Output A | Change staircase light time | 2 bytes | C - W - U | time (s)      | 低 |
| 173                                  | Dim Output A | Warning staircase light     | 1 bit   | C R - T - | alarm         | 低 |
| 174                                  | Dim Output A | Scene(8bit)                 | 1 byte  | C - W - U | scene cont... | 低 |
| 175                                  | Dim Output A | Scene dimming(4bit)         | 4 bit   | C - W - U | dimming c...  | 低 |

| No.  | Name           | Function   | Flag  | Data Type                                 |
|--|----------------|--|-------|---|
| 164,180  | Dim Output A/B | Channel output                                       | C W U | DPT1.001<br>1 bit                         |
| These objects are used for outputting channels.  |                |  |       |   |
| 165,166,<br>181,182  | Dim Output A/B | Relative dimming (4 bit)<br>Absolute dimming (8 bit) | C W U | DPT3.007<br>4 bits<br>DPT5.001<br>1 byte  |
| These objects are used for controlling relative/absolute dimming.  |                |  |       |   |
| 167,168,<br>183,184  | Dim Output A/B | Response state (1 bit)<br>Response state (1 byte)    | C R T | DPT1.001<br>1 bit<br>DPT5.001<br>1 byte   |
| These objects are used for indicating channels status, including "1-bit object feedback" and "1-byte object feedback".           |                |  |       |   |
| 169,185  | Dim Output A/B | Temperature alarm                                    | C R T | DPT1.005<br>1 bit                         |
| These objects are used for controlling temperature alarm.  |                |  |       |   |
| 170,186  | Dim Output A/B | Read temperature                                     | C R T | DPT9.001<br>2 bytes                       |
| These objects are used for controlling reading temperature.  |                |  |       |   |
| 171,187  | Dim Output A/B | Staircase light                                      | C W U | DPT1.001<br>1 bit                         |
| These objects are used for enabling staircase light.   |                |  |       |   |
| 172,188  | Dim Output A/B | Change staircase light time                          | C W U | DPT7.005<br>2 bytes                       |
| These objects are used for changing the working duration of staircase light.   |                |  |       |   |
| 173,189  | Dim Output A/B | Warning staircase light time                         | C R T | DPT1.005<br>1 bit                         |
| These objects are used for controlling warning function which is designed for informing staircase light will be turned off soon. |                |  |       |   |
| 174,175<br>190,191   | Dim Output A/B | Scene (8 bit)<br>Scene dimming (4 bit)               | C W U | DPT18.001<br>1 byte<br>DPT3.007<br>4 bits |
| These objects are used for controlling scene.  |                |  |       |   |

## 8.4 Objects “Curtain Output” (Shutter/Blinds)

| Objects “Curtain Output”   |                         |   |        |  |
|--|-------------------------|---|--------|--|
| (Take “Blind Output C” as an example)  |                         |   |        |  |
| 196  | Blind Output C          | Move blinds up/down   | 1 bit  | C - W - U up/down 低  |
| 197  | Blind Output C          | Adjust louvre/Stop moving   | 1 bit  | C - W - U step 低   |
| 198  | Blind Output C          | Percent of position(0%..100%)   | 1 byte | C - W - U percentag... 低                                     |
| 199  | Blind Output C          | Percent of louvre(0%..100%)   | 1 byte | C - W - U percentag... 低                                     |
| 200  | Blind Output C          | Limit travelling  | 1 bit  | C - W - U up/down 低  |
| 201  | Blind Output C          | Status of position(0%..100%)  | 1 byte | C R - T - percentag... 低                                     |
| 202  | Blind Output C          | Status of louvre(0%..100%)  | 1 byte | C R - T - percentag... 低                                     |
| 203  | Blind Output C          | Status 1bit(0-UP 1-DOWN)  | 1 bit  | C R - T - up/down 低  |
| 204  | Blind Output C          | Status 1bit('0'-stop)   | 1 bit  | C R - T - step 低   |
| 205  | Blind Output C          | Status of upper pos   | 1 bit  | C R - T - up/down 低  |
| 206  | Blind Output C          | Status of lower pos   | 1 bit  | C R - T - up/down 低  |
| 207  | Blind Output C scene    | Call scene number   | 1 byte | C - W - U scene cont...低                                     |
| No.  | Name                    | Function  | Flag   | Data Type  |
| 196,197<br>216,217<br>236,237<br>256,257   | Blind Output<br>C/D/E/F | Move blinds up/down<br>Adjust louvre/Stop moving  | C W U  | DPT1.008<br>1 bit<br>DPT1.007<br>1 bit                       |
| These objects are used for rolling up/down curtain, adjusting blinds angle and stopping curtain. |                         |   |        |  |
| 198,199,<br>218,219,<br>238,239<br>258,259   | Blind Output<br>C/D/E/F | Percent of position<br>Percent of louvre  | C W U  | DPT5.001<br>1 byte   |
| These objects are used for percentage controlling curtain/blinds.                                |                         |   |        |  |
| 200,220,<br>240,260  | Blind Output<br>C/D/E/F | Limit travelling  | C W U  | DPT1.008<br>1 bit  |
| These objects are used for controlling the travel range of curtain.                              |                         |   |        |  |
| 201-206,<br>221-226,<br>241-246,<br>261-266  | Blind Output<br>C/D/E/F | Status of position<br>Status of louvre<br>Status 1 bit (0-UP, 1-DOWN)<br>Status 1 bit ('0'-stop)<br>Status of upper/lower pos | C R T  | DPT5.001<br>1 byte<br>DPT1.008<br>1 bit<br>DPT1.007<br>1 bit |
| These objects are used for indicating curtain position/rolling up/rolling down/stopping status.  |                         |   |        |  |
| 207,227,<br>247,267  | Blind Output<br>C/D/E/F | Call scene number   | C W U  | DPT18.001<br>1 byte  |
| These objects are used for outputting scene.   |                         |   |        |  |

## 8.5 Object “HVAC”

| Objects “HAVC”  |                                 |   |         |   |                |
|---|---------------------------------|---|---------|---|----------------|
| 276   | Control value A                 | Heating value                                 | 1 byte  | C - W T U                               | percentag... 低 |
| 277   | Control value B                 | Cooling value                                 | 1 byte  | C - W T U                               | percentag... 低 |
| 278   | Switch A/B                      | 0'-A,'1'-B                                    | 1 bit   | C - W T U                               | switch 低       |
| 279   | Valve Heating                   | Valve status                                  | 1 bit   | C R - T -                               | switch 低       |
| 280   | Valve Cooling                   | Valve status                                  | 1 bit   | C R - T -                               | switch 低       |
| 281   | HVAC                            | System ON/OFF(1-ON,0-OFF)                     | 1 bit   | C - W - -                               | switch 低       |
| 282   | Fan                             | Fan speed automatic                           | 1 bit   | C - W - -                               | enable 低       |
| 283   | Fan                             | Fan speed with % value                        | 1 byte  | C - W - -                               | percentag... 低 |
| 284   | Fan                             | Fan speed 1                                   | 1 bit   | C - W - -                               | switch 低       |
| 285   | Fan                             | Fan speed 2                                   | 1 bit   | C - W - -                               | switch 低       |
| 286   | Fan                             | Fan speed 3                                   | 1 bit   | C - W - -                               | switch 低       |
| 287   | Fan                             | Status fan speed 1                            | 1 bit   | C R - T -                               | switch 低       |
| 288   | Fan                             | Status fan speed 2                            | 1 bit   | C R - T -                               | switch 低       |
| 289   | Fan                             | Status fan speed 3                            | 1 bit   | C R - T -                               | switch 低       |
| 290   | Fan                             | Status fan speed                              | 1 byte  | C R - T -                               | counter pu...低 |
| 291   | Fan                             | Status fan On/Off                             | 1 bit   | C R - T -                               | switch 低       |
| 292   | Fan                             | Status fan speed automatic                    | 1 bit   | C R - T -                               | enable 低       |
| 293   | Fan                             | Limitation 1                                  | 1 bit   | C R W T -                               | enable 低       |
| 294   | Fan                             | Limitation 2                                  | 1 bit   | C R W T -                               | enable 低       |
| 295   | Fan                             | Limitation 3                                  | 1 bit   | C R W T -                               | enable 低       |
| 296   | Fan                             | Limitation 4                                  | 1 bit   | C R W T -                               | enable 低       |
| 297   | Valve Heating                   | Trigger valve purge                           | 1 bit   | C - W - -                               | trigger 低      |
| 298   | Valve Heating                   | Status valve purge                            | 1 bit   | C R - T -                               | enable 低       |
| 299   | Valve Heating                   | Valve open/close                              | 1 bit   | C - W - -                               | open/close 低   |
| No.   | Name                            | Function                                      | Flag    | Data Type                               |                |
| 276-278   | Control value A/B<br>Switch A/B | Heating/Cooling value<br>'0'-A, '1'-B         | C W T U | DPT5.001<br>1 byte<br>DPT1.001<br>1 bit |                |
| These objects are used for controlling heating/cooling valve.       |                                 |   |         |   |                |
| 279,280   | Valve<br>Heating/Cooling        | Valve status                                  | C R T   | DPT1.001<br>1 bit                       |                |
| These objects are used for indicating heating/cooling valve status. |                                 |   |         |   |                |
| 281   | HVAC                            | System ON/OFF                                 | C W     | DPT1.001<br>1 bit                       |                |
| This object is used for switching on/off HVAC.                      |                                 |   |         |   |                |
| 282-286   | Fan                             | Fan speed automatic<br>Fan speed with % value | C W     | DPT1.003<br>1 bit                       |                |

|  |               |   |         |   |
|--|---------------|---|---------|---|
|  |               | Fan speed with 0-3 value<br>Fan speed 1/2/3   |         | DPT5.001<br>1 byte<br>DPT5.010<br>1 byte<br>DPT1.001<br>1 bit |
| These objects are used for controlling fan speed.                                  |               |   |         |   |
| 287-292  | Fan           | Status fan speed 1/2/3<br>Status fan speed<br>Status fan On/Off<br>Status fan speed automatic | C R T   | DPT1.001<br>1 bit<br>DPT5.001<br>1 byte<br>DPT1.003<br>1 bit  |
| These objects are used for indicating HVAC switch and fan speed status.            |               |   |         |   |
| 293-296  | Fan           | Limitation 1/2/3/4  | C R W T | DPT1.003<br>1 bit   |
| These objects are used for limiting fan speed levels.                              |               |   |         |   |
| 297,300  | Valve heating | Trigger valve purge   | C W     | DPT1.017<br>1 bit   |
| These objects are used for triggering the self-cleaning function of heating valve. |               |   |         |   |
| 298,301  | Valve heating | Status valve purge  | C R T   | DPT1.003<br>1 bit   |
| These objects are used for indicating heating valve self-cleaning status.          |               |   |         |   |
| 299,302  | Valve heating | Valve open/close  | C W     | DPT1.009<br>1 bit   |
| These objects are used for turning on/off heating valve.                           |               |   |         |   |