KONG DDC M0 Network Engine
Installation and Operation Instructions

MKG41-BTW23

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Safety Warning

The product itself and the Installation and Operation Instructions contain operation, personal injury and property loss prevention, and correct and safe operation of the product. Fully understand the following markings or signs, read this document, and observe the following precautions.

⚠CAUTION

Read this safety warning carefully before installation.
The following contents are important for safety. Do observe them.
The meaning of each part is as follows:

⚠ **Warning**   It indicates that incorrect handling will result in personal injury or property loss.

⚠ **CAUTION**   It is highly likely that the best operation result will not be obtained due to ignoring the contents of precautions.

After installation, have a trial run to confirm that the device runs normally, and hand over the Installation and Operation Instructions to the customer.

Marking description

Marking	Name	
⊘	Prohibition. The specific content to be prohibited will be represented with graphics or words in or near the marking.	
①	Compulsory requirement. The specific compulsory content will be represented with graphics or words in or near the marking.	
⚠ Warning	Installation entrustment	Please entrust a dealer or professionals with installation. The installation personnel must have relevant professional knowledge. Incorrect operation by yourself will lead to fire, electric shock or injury.
⊘ Warning in Operation	Prohibition	Do not spray flammable spray directly to the data converter. Otherwise, a fire may be caused.
	Prohibition	Do not operate the product with wet hands, or let water enter the product. Otherwise, you may get electric shock.

⚠Warning

● This device must be installed by professional technicians, rather than by the customers. Otherwise, you and others may be injured and the controller may be damaged.
● The device must be wired by professional technicians according to the circuit diagram and in compliance with electrical safety specifications.
● Do not change the use and function of the device without permission.
● Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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- Do not install the device in places with potential flammable gas leakage. Once flammable gas leaks and stays around the device, a fire may be caused.
- Wire the device based on the current of controller.
- Check the wiring before powering the device on. Do not install the device lively.
- In case of fault, contact professional technicians, but do not remove and repair the device by yourself.
- Do not install the device at the position where children may gather.

- This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.
- However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
    * Reorient or relocate the receiving antenna.
    * Increase the separation between the equipment and receiver.
    * Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
    * Consult the dealer or an experienced radio/TV technician for help.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Installation Instructions

Product Introduction

M0 network engine is a network-based programmable controller, oriented for the building automation market. It is mainly applied to distributed monitoring of building HVAC system and water supply & drainage system, realizing automatic operation and monitoring of building HVAC and electromechanical equipment. The controller is available for online graphical programming and debugging, and its firmware can be upgraded by whole-chain OTA, to realize ring network redundancy. It supports a variety of communication protocols and adapts to different application scenarios.
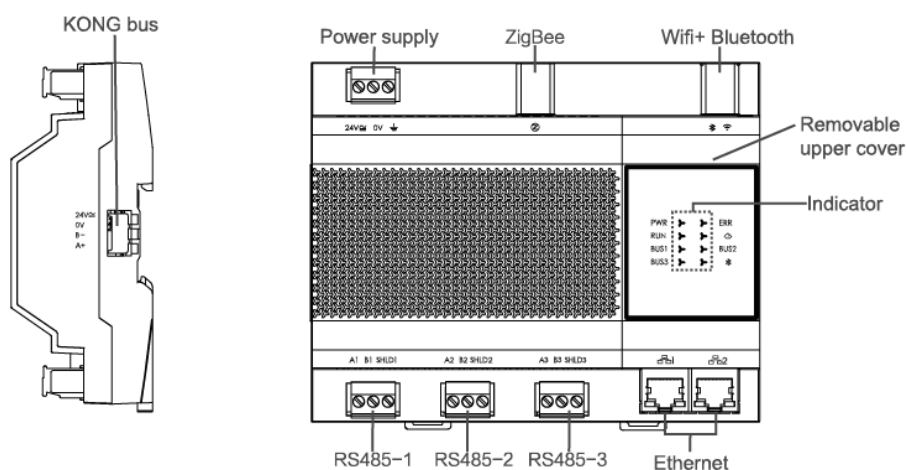
Product dimensions
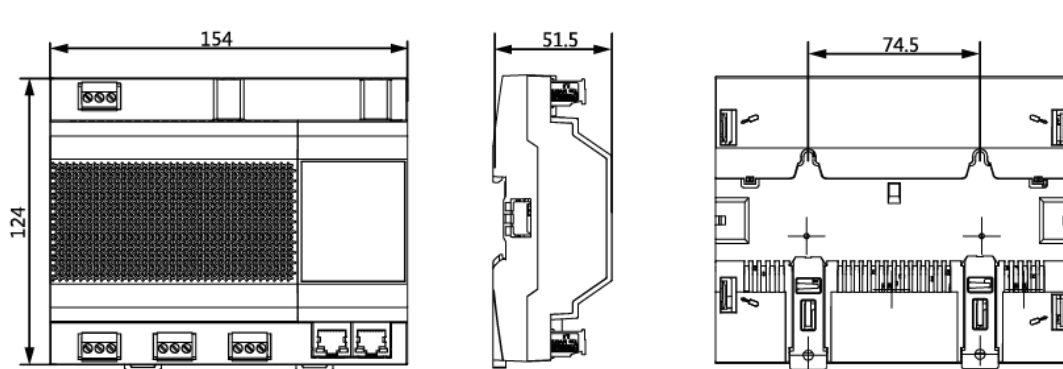

Unit: mm

Installation of accessories

Please confirm whether the following components are complete:

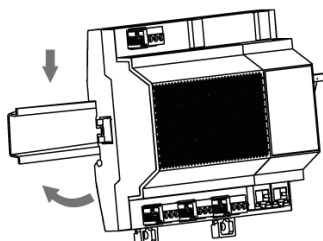| S/N	Name	Quantity	Notes
1	Self-tapping screw	4	ST4*20
2	Plastic expansion pipe	4	For installation of controller on wall
3	3 PIN black terminal	3	For communication
4	3 PIN gray terminal	1	For connection to power supply
5	Sucker antenna	2	Signal enhancement

▌Operation Instructions
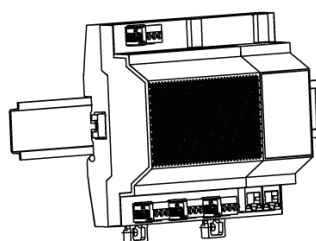
Installation method

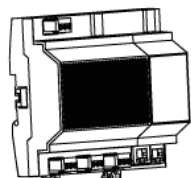### 1. Installation on guide rail
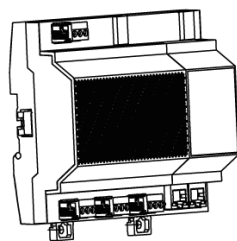
Pull open the
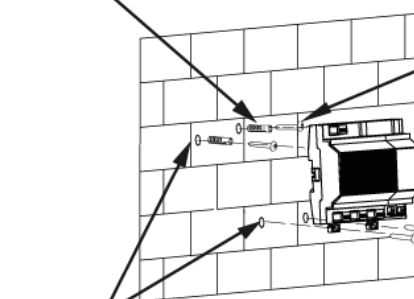handle buckle.

Clamp the product
on the guide rail.

Close the
handle buckle.
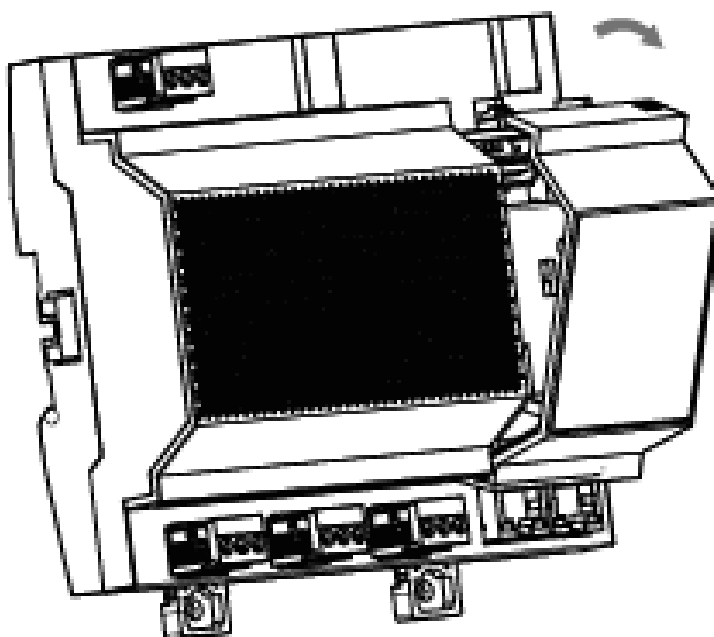
2. Installation on wall

Plastic expansion pipe

Cross round head screw ST4*20
(This fixing screw is driven into the
wall in advance, with a distance of
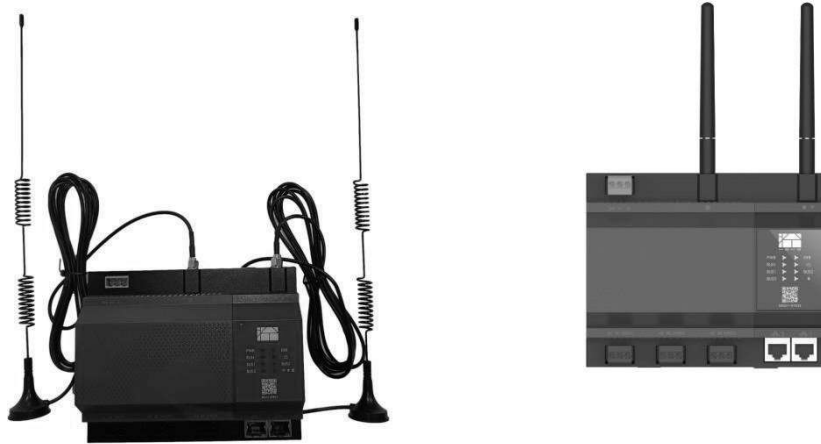5.5 mm from the highest position
of the nut to the wall)

Pull open the
handle buckle.

6 mm drill bit drilling in a depth
not less than 30 mm

Cross round head
screw ST4*20

3. Removal and installation of removable upper cover

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4. Antenna installation chart

Note: This page shows the status of two commonly used antennas. If the appearance and color of the product are changed, the actual product shall prevail.

Operation Instructions

1. Hardware Introduction

1.1.1 Main parameters

Product model	MKG41-BTW23
Material code	17211200002981
Rated voltage	AC 24V±20%, 50/60Hz, 12VA DC 24V±10%, 8W
Operating environment	-20℃ ~ 60℃
Operating humidity	≤93% (no condensation)
Pollution degree	3
Overvoltage category	III

1.1.2 Performance parameters

Name	Performance
CPU	Quad-core Cortex-A35 64-bit CPU, 1.5 GHz
Memory	DDR3 1600 MHz 1 GB
Flash	eMMC 8 GB
Ethernet	10/100 Mbps Daisy-chain topology supported (ring network to be supported only with anti-loopback switch)
WIFI	2.4 GHz WIFI supported 802.11 b/g/n protocol supported
Bluetooth	Bluetooth Low Energy (BLE) supported
Zigbee	2.4GHz IEEE 802.15.4 standard supported 250kbps wireless network connection supported

⚠ CAUTION

- 1. Requirements for power supply selection: The linear transformer must be a safety isolating transformer conforming to IEC61558-2-6; The switching power supply should be of reinforced insulation conforming to IEC 61558-2-16; SELV adapter shall be selected and conform to LVD Directive and EMC Directive;
- 2. The power of recommended power supply is 1.2~2 times that of rated load. When power supply is selected, the sum of the controller power and IO module power fed by the controller expansion port should be calculated;

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1.2 Communication interface

Interface	Sign	Application	Technical parameters
Ethernet interface	⊟1 ⊟2	Web page device parameter configuration Web page device firmware upgrade Web page programming Communication support Modbus TCP BACnet IP	● Port: RJ45, shielded ● Rate: 10/100 Mbps ● Daisy-chain topology supported (ring network to be supported only with anti-loop-back switch)
RS485-1	A1 B1 SHLD1	Communication support ●BACnet MS/TP ●Modbus RTU	● Interface type: RS-485 (EIA-485) interface ● With isolation ● Rate: 4800, 9600, 38400, 57600, 76800 (bps) ● BUS 1 flashes during data transmission ● Software configuration terminal matching resistor ● One bus only supports to turn on terminal matching resistor at both ends.
RS485-2	A2 B2 SHLD2	Communication support ● Modbus RTU	● Interface type: RS-485 (EIA-485) interface ● With isolation ● Rate: 4800, 9600, 38400, 57600, 76800 (bps) ● BUS 2 flashes during data transmission ● Software configuration terminal matching resistor ● One bus only supports to turn on terminal matching resistor at both ends.
RS485-3	A3 B3 SHLD3	Communication support ● Modbus RTU	● Interface type: RS-485 (EIA-485) interface ● With isolation ● Rate: 4800, 9600, 38400, 57600, 76800 (bps) ● BUS 3 flashes during data transmission ● Software configuration terminal matching resistor ● One bus only supports to turn on terminal matching resistor at both ends.
KONG bus interface	24V ⏦ 0V B- A+	Expansion module access ● KONG bus, used for connecting MK series IO expansion modules	● 24V and 0V interfaces, supporting 24V AC/DC power supply ● Bus interfaces A+, B- (not isolated) ● Maximum allowable output current of power supply: 2A
Bluetooth	✳	Quick network configuration service	Bluetooth Low Energy (BLE) technology

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1.3 Indicator

Type	Sign	Status/color	Function description
Power supply	PWR	OFF	Device powered off
		Normally ON in red	Device powered on
Running	RUN	OFF	Abnormal running of main flow
		Normally ON in green	Abnormal running of main flow
		Flashing in green	Device in normal operation
Cloud	☁	OFF	WiFi not connected
		Normally ON in white	WiFi connected
		Quick flashing in white	ZigBee gets into the open network configuration state
Fault	ERR	OFF	Normal, no fault
		Normally ON in red	Fault
RS485-1 communication	BUS1	OFF	No data transmission
		Flashing in green	Normal communication, with data transmission
RS485-2 communication	BUS2	OFF	No data transmission
		Flashing in green	Normal communication, with data transmission
RS485-3 communication	BUS3	OFF	No data transmission
		Flashing in green	Normal communication, with data transmission
Bluetooth	✳	OFF	Abnormal function
		Normally ON in white	Broadcast status
		Flashing in white	Connection status
	品1 品2	Yellow indicator normally on	Connection activated
		Yellow indicator off	No connection
		Green indicator flashing	In network communication
		Green indicator off	No connection

1.4 Other characteristics

IP reset function

If you cannot access the gateway page due to forgetting IP settings, you can reset the Ethernet IP address as per the following steps:

- After powering off the gateway, short-circuit A1B1 port and A2B2 port together (A to A ends short-circuited, and B to B ends short-circuited).

- Power on the gateway, and wait for the system running indicator to flash normally. Then the gateway Ethernet IP address will be reset to the initial address

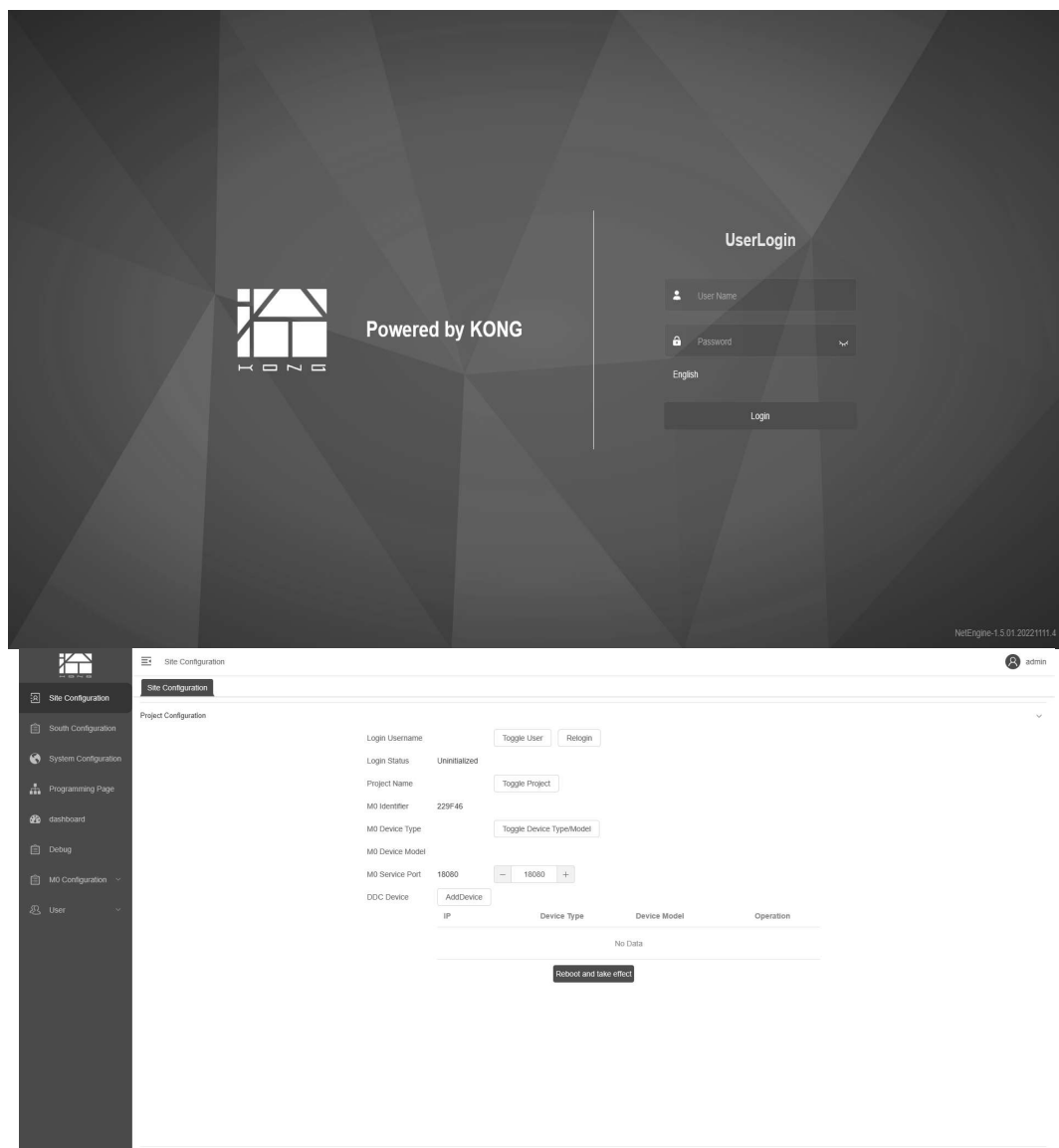# 2. Operation Instructions

Website:https://192.168.100.185

This document describes how to configure and use the M0 website. The M0 platform allows users to view such information as project configuration, southbound configuration, programming page, system configuration and user management in real time.

2.1 User login/logout

Login: Account/password login

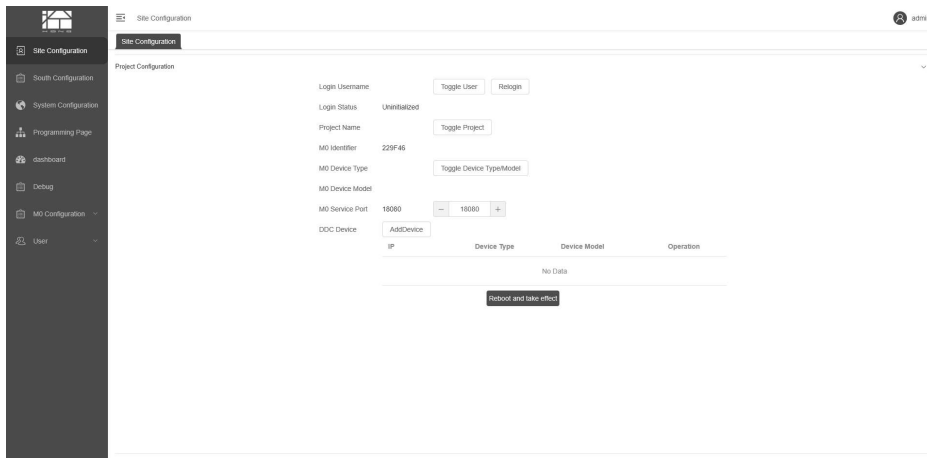Note: login account by default: admin; password: 123AB@ab

(2) In the main interface, click "Logout" in the upper right corner

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2.2 Station configuration

It displays the current project, M0 device, DDC device and other information. Click the corresponding button for corresponding operations.


(1) User switch/re-login: Click Switch User button, and enter the user name and password in the pop-up window to log in; click re-login to re-log in the current user account. The login status will be displayed in the corresponding bar;
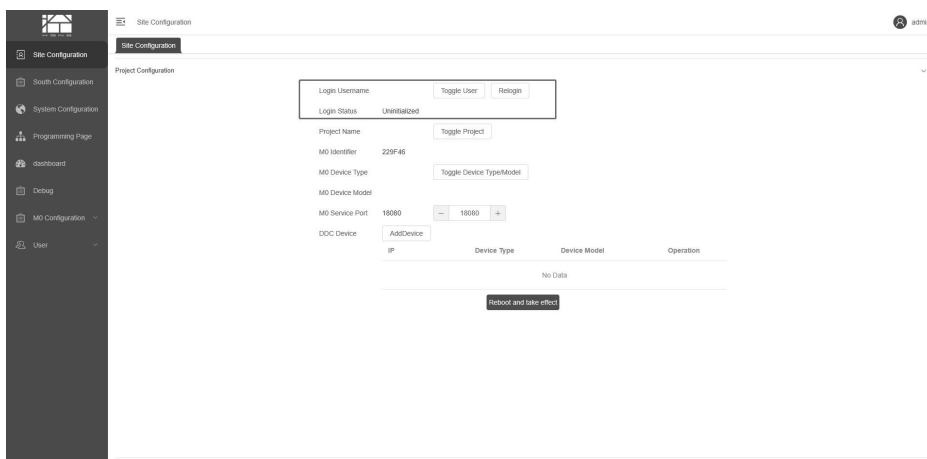

(2) Project information: Click Switch Project button to switch projects in the pop-up window. Click OK, and the selected project name will be displayed on the left side of the button.

▍Operation Instructions
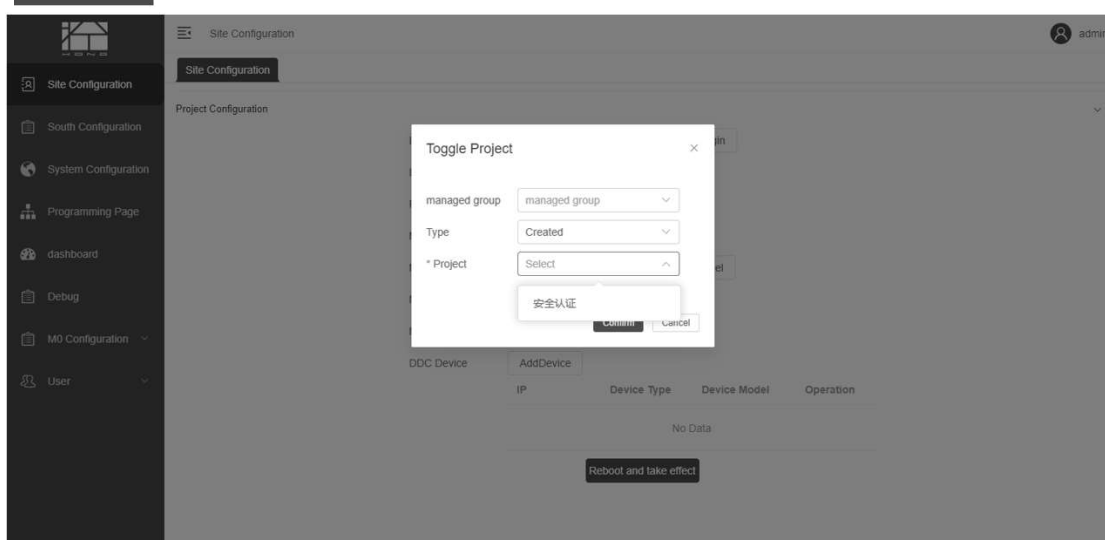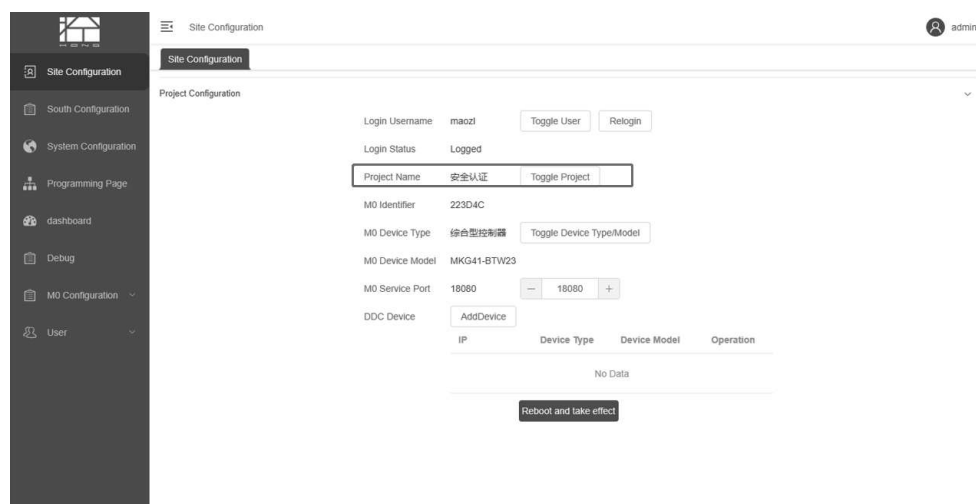
(3) M0 information: M0 identifier is automatically generated and cannot be changed; click Switch Device Type/Model button, and then OK to select M0 device type/model; click "+" / "-" or directly enter a number to change the M0 port (Do not change the M0 port without authorization. Please change it under the guidance of a technical support engineer);
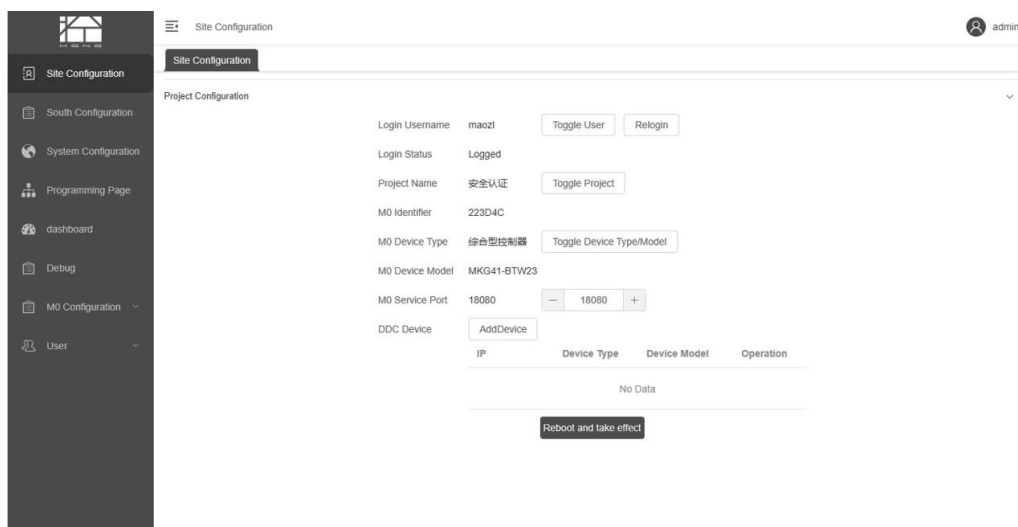
(4) DDC device: Click Add Device, enter the device information in the pop-up window, and click OK to add device; use the table bar to edit or delete a device
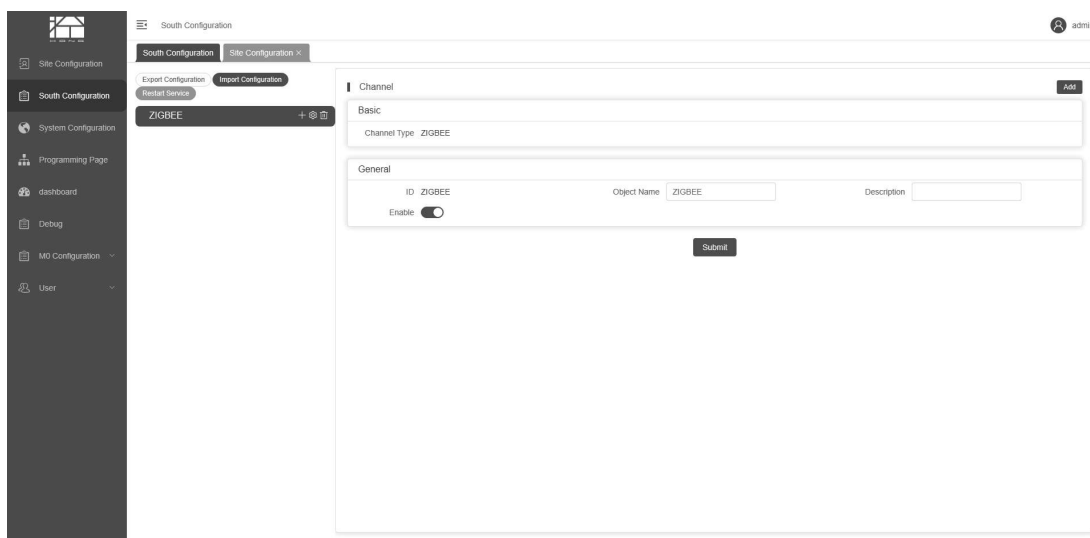
▌ Operation Instructions
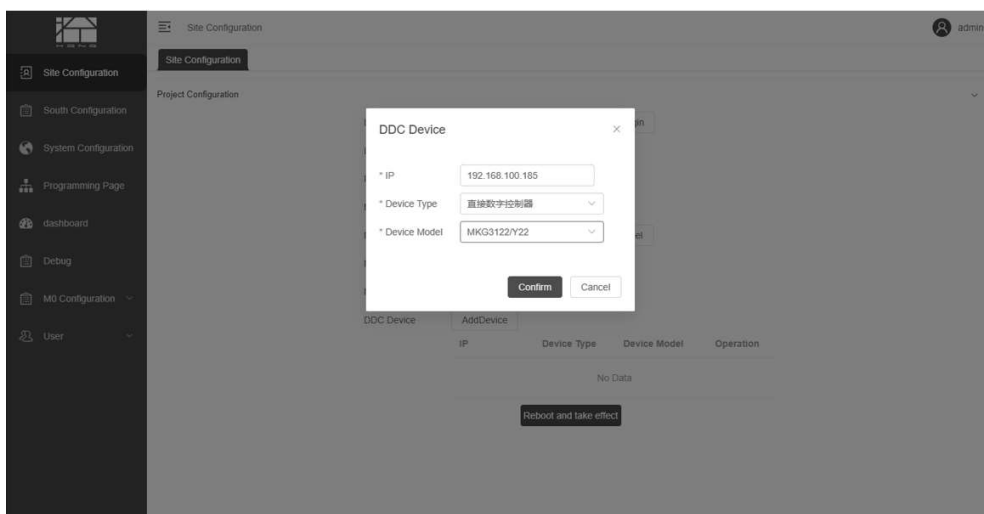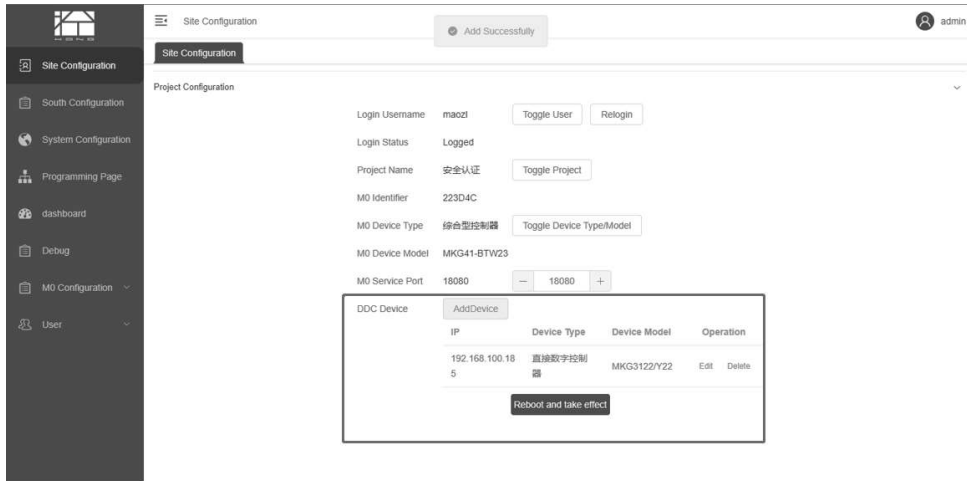
(5) Restart and enable: Click Restart and Enable button to restart.

2.3 Southbound configuration

(1) Page layout: The tree node is on the left side and the corresponding configuration is on the right side; the first layer of the tree node is the channel, the second layer is the controller, and the third layer is the variable.

(2) Modify the configuration: In case of any change in the data, click Submit button below to submit.

(3) Add a channel: Click Add button at the upper right corner, enter/select the corresponding information in the pop-up window, and Click Submit.
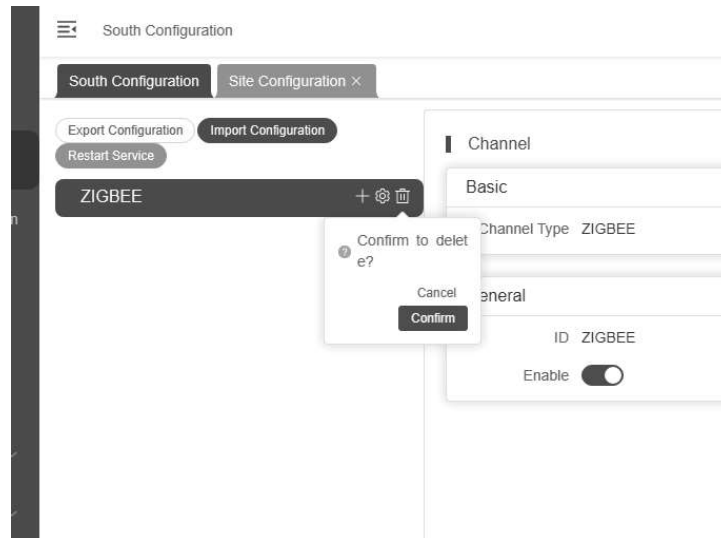

(4) Add the controller/variable: Click tree node +, and enter/select corresponding information in the pop-up window to add child nodes.

(5) Delete a node: Click the delete icon on the right side of the tree node to delete it.

(6) View the information of all child nodes: Click the setting icon on the right side of the tree node; import the configuration, select the child node excel to import, and export the excel file as the child node exported by the configuration.
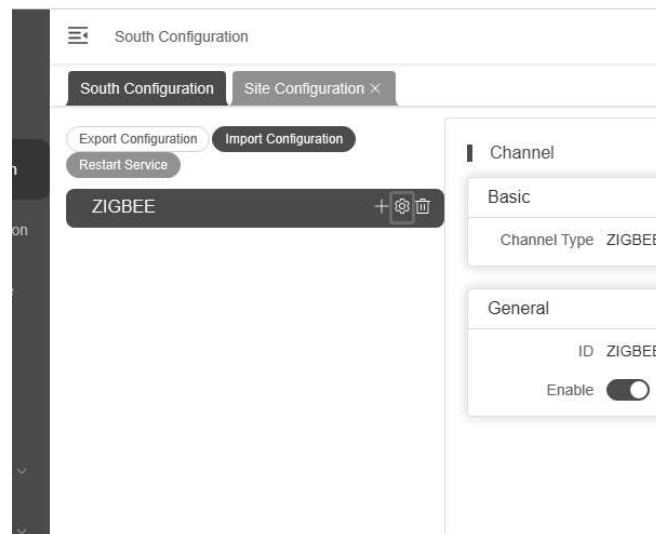
▌Operation Instructions
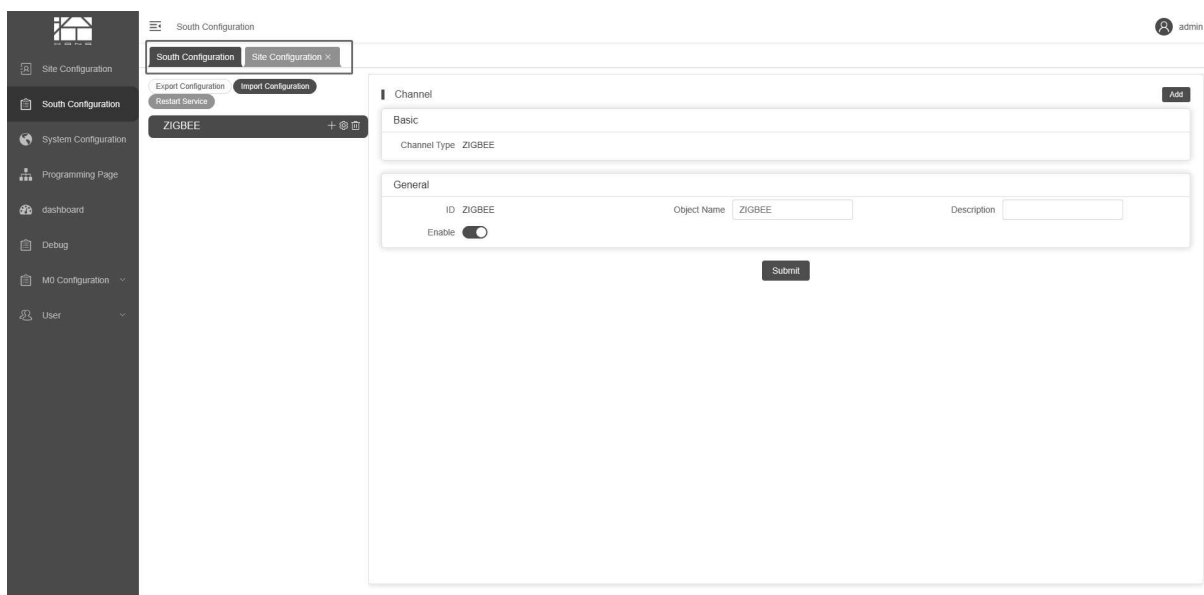
2.4 System configuration

(1)　Display: Real-time display of system configuration data
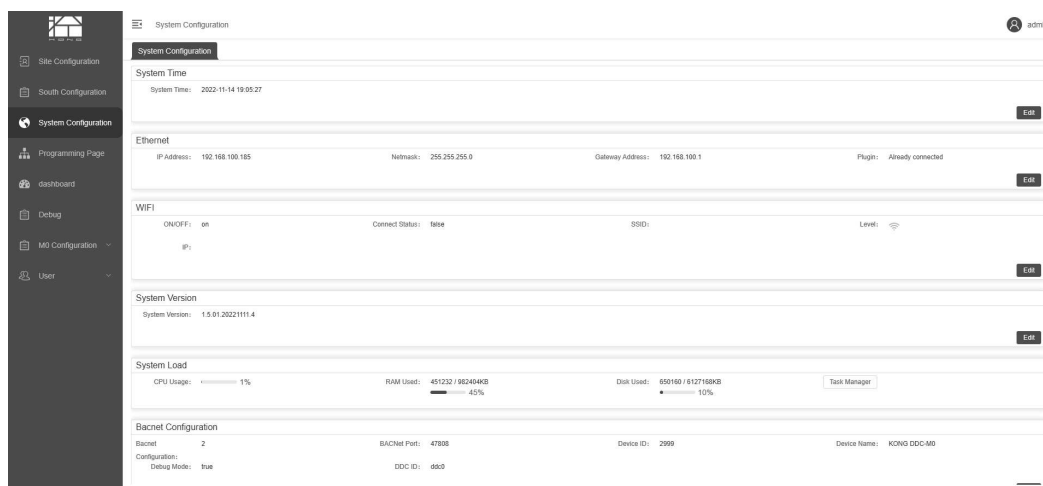
(2)　System configuration information: Click the corresponding edit button, change the setting in the pop-up window, and then click Submit. The contents that can be modified are system time, Ethernet configuration and WIFI connection. The changed setting will take effect immediately after Submit is clicked.

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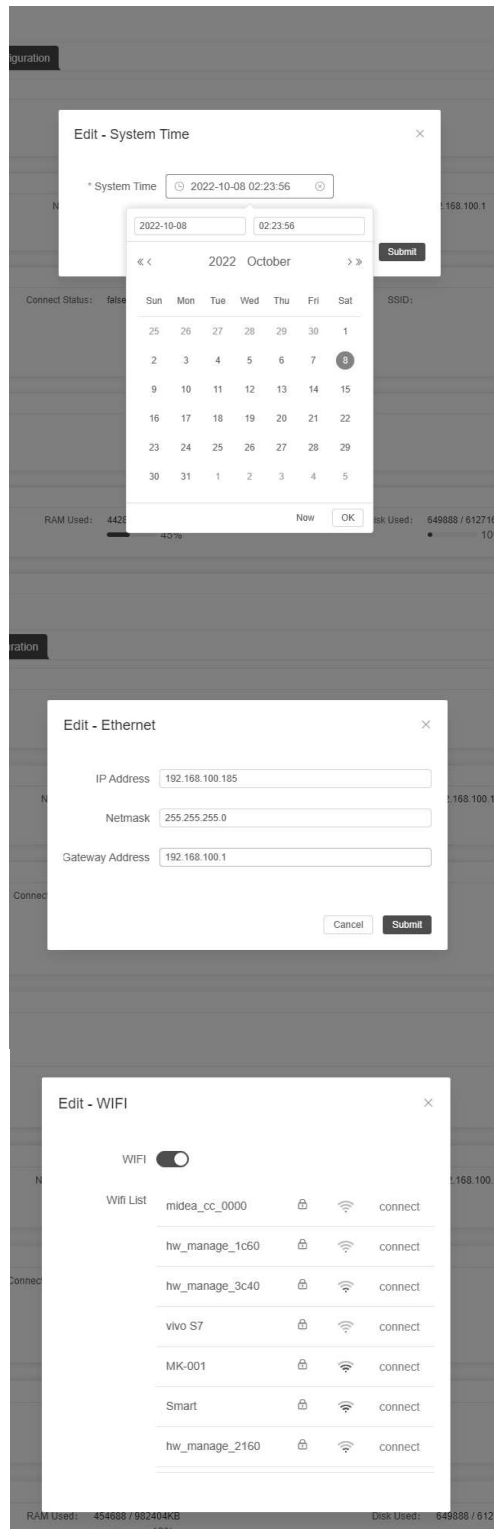
(3)　System upgrade

Click Edit in the system version module to upload the firmware. The system will verify the up-loaded firmware and return the version information of the upgrade package.

▌Operation Instructions
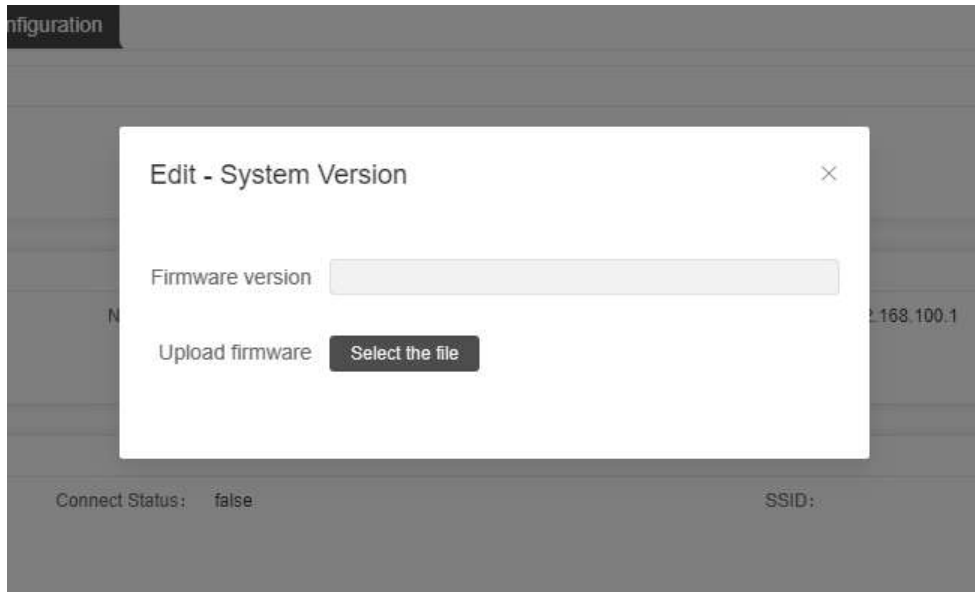
After successful uploading, you can choose to upgrade and restart, or upgrade. If you choose to upgrade, the system will keep the firmware data and be upgraded after the next restart.
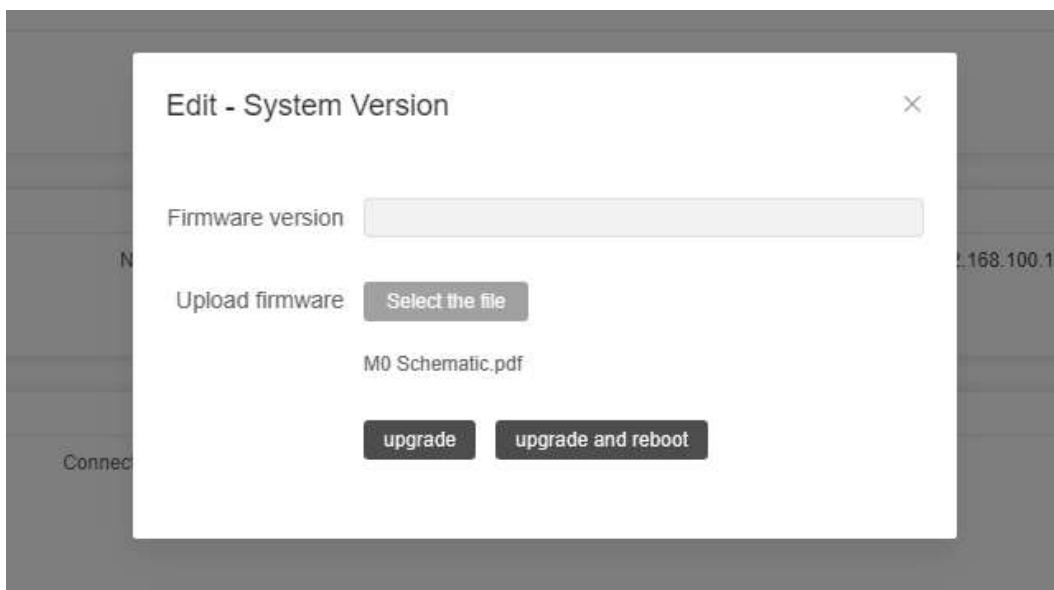
(4) Task management

In Task Management, you can view the system resources occupied by each flow, and the corresponding flow can be restarted with the Restart button on the right.
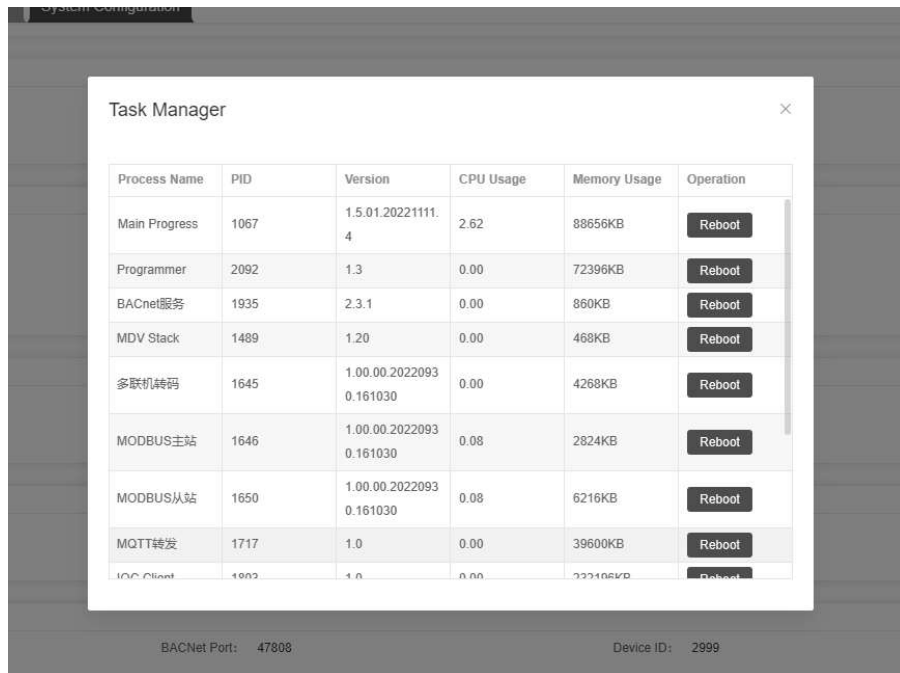
(5)   BACNet configuration editing

There are three configuration items in the BACNet configuration:

1. M0 Bacnet virtual address configuration, as shown below, with the address of 2. This configuration will affect the default device addresses of non-native Bacnet devices (such as Modbus device). If multiple M0s are connected to the same network, it is recommended to modify this configuration to keep each M0 different.

2. BACNet port, as shown below, with port 47808. This configuration will affect the BACNet IP monitoring port of M0. The default port is 47808.

3. Debugging mode, which is enabled by default. When the debugging mode is enabled, the third-party Bacnet device edited through the southbound page will be registered in the online programming page in an offline form.
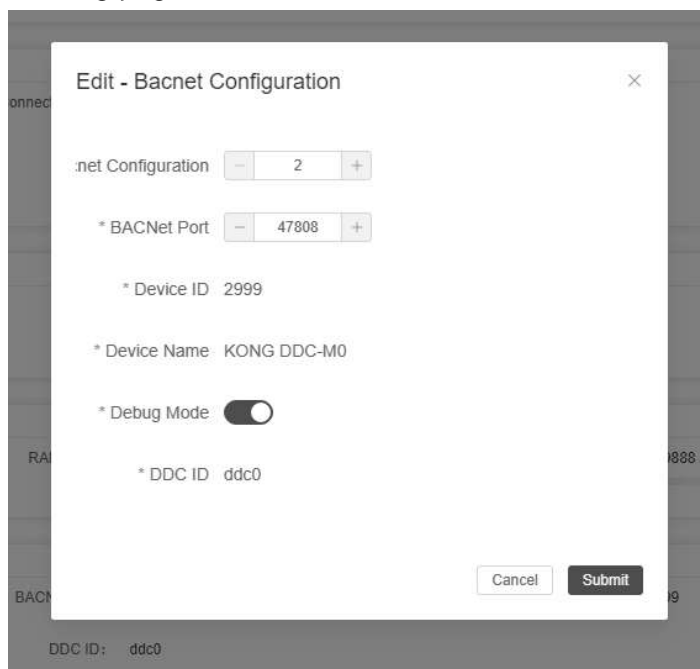
(6)Matching resistor configuration

▎Operation Instructions
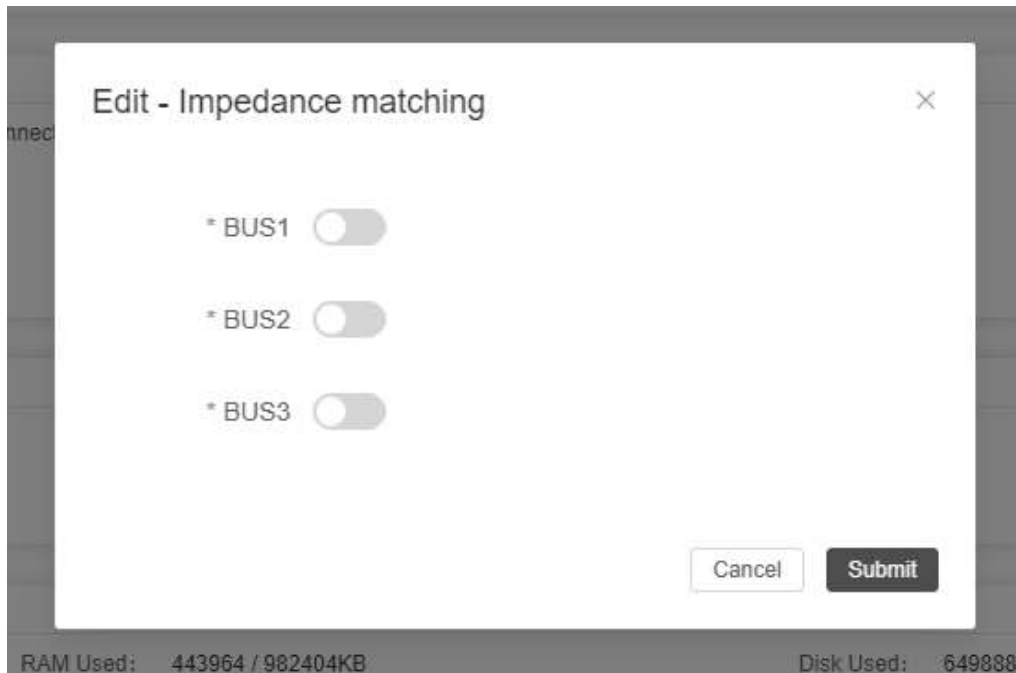
After the matching resistor is enabled, the terminal resistor will be turned on for the corresponding bus, which is not turned on by default.

2.5 Programming page

The device is accessed through Web, and the logic programming function is realized through Web page.

After the computer is connected to the device, enter the IP address of the device in the browser (Chrome recommended), and the login page will appear. After the user enters the correct account and password (automatic logout without operation for 30min), it will jump to the home page.

Enter the programming page through the "Programming Page" module in the main page, or enter the default address https://192.168.100.185:1880 of the device in the browser. After successful connection, enter the system account and password to enter the programming page of the device. After entering the main page, it is shown as below.

1) Toolbar: subflow, function module.

2) Tab bar: to switch the workspace flow.

3) Workspace: the area for program editing, where the program can be edited and modified.

4) Status bar: to display editing status.

5) Navigation bar: to display the main flow in the program and the module/subflow instances under the main process, and realize the functions of positioning and enabling/disabling.

6) Information attribute bar: to display the attributes and instructions of the instances.

7) Deploy and compile button: to temporarily store or deploy the program to the controller to verify whether the program has been compiled.

8) N/A: Not available.

9) Menu options:to display menu options after unfolding to import and export the flow and set relevant parameter options.

10) Parameter configuration window: Double click the flow in the tab bar or the instance in the workspace to open the parameter configuration window to configure the parameters of the flow, subflow and instance.

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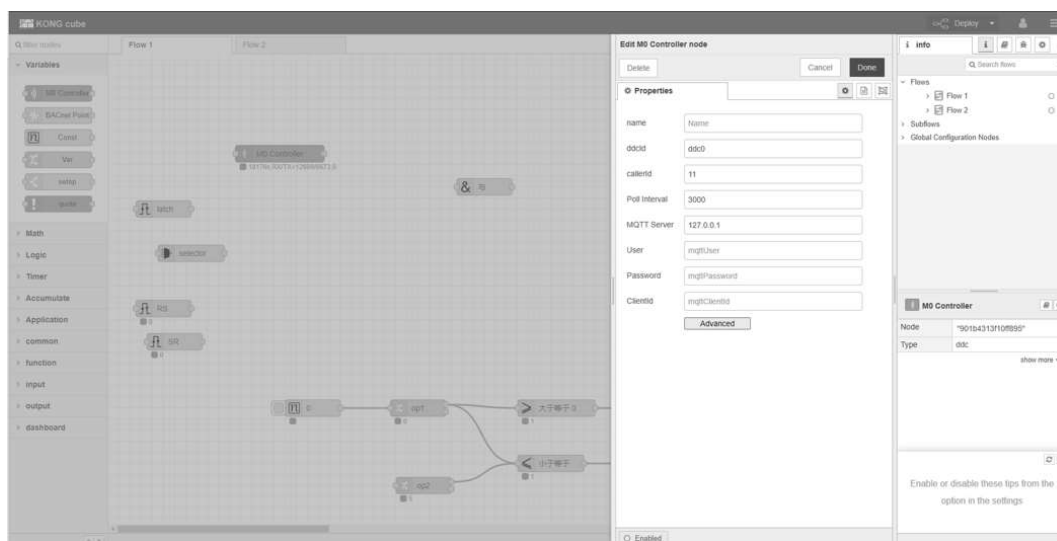
▎ Operation Instructions

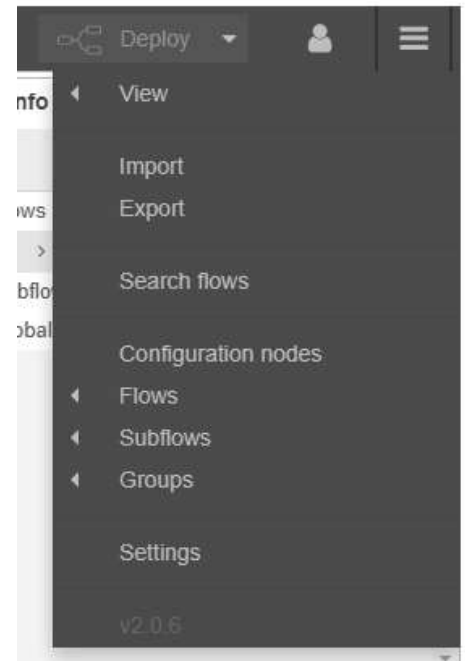## 2.5.1 Menu options

Click the menu option in the upper right corner to unfold the relevant menu information. The following options for configuration are as follows:
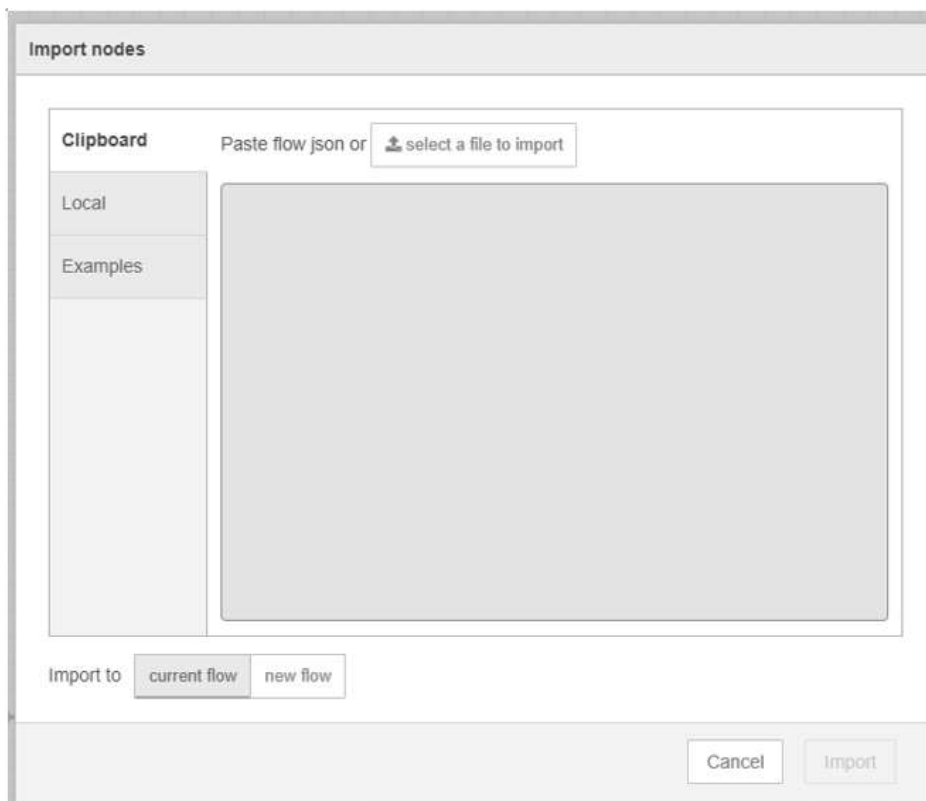
- Display:
- Import: Flow import
- Export: flow export.
- Search flow
- Modify node configuration
- Flow:
- Subflow:
- Group:
- Node management:
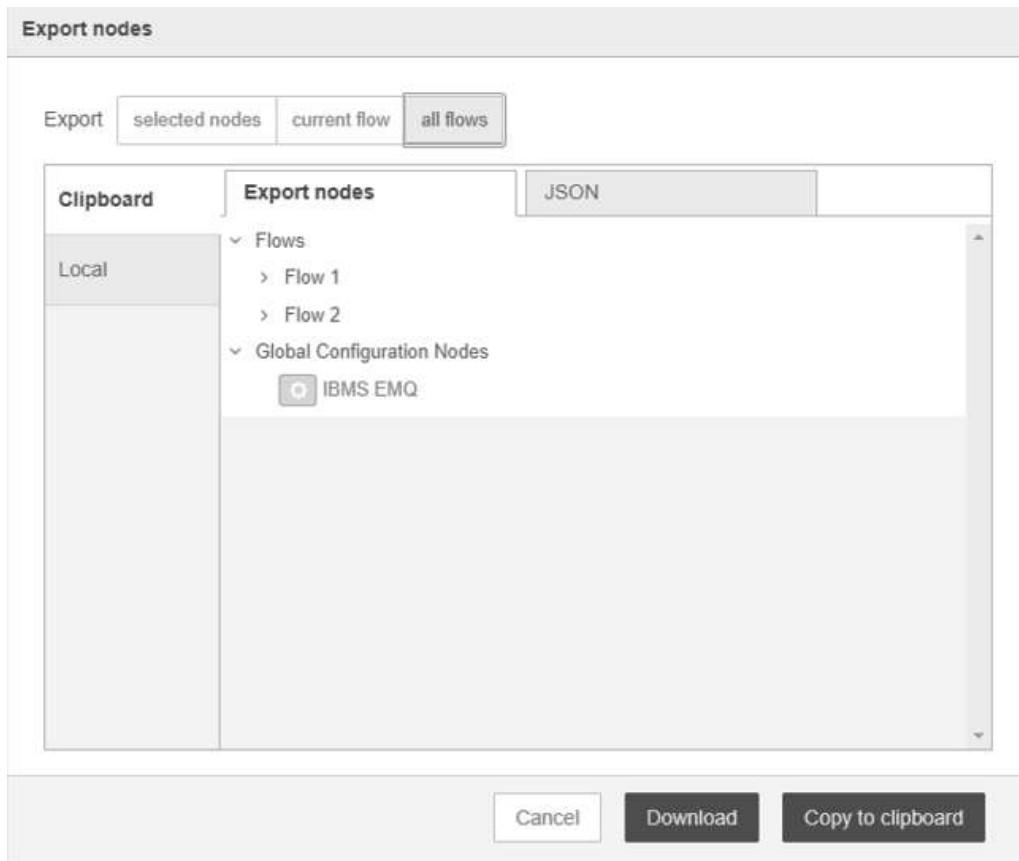- Setting:
- Version No.:

Refer to the right figure

2.5.1.1. Flow

2.5.1.1.1 Import

2.5.1.1.2 Export

2.5.1.1.3 Create

Create new main flow in the tab bar, which is automatically named "flow n" (n is 1, 2, ...) and is currently activated.

2.5.1.1.4 Rename

When a main flow is activated, the "Rename" option is highlighted and available. Click it to pop up the configuration window of the current main flow to rename and modify the "Detailed Description".

2.5.1.1.5 Delete

When a main flow is activated and is not the only one, the "Delete" option is highlighted and available. Click it to delete the current main flow.

2.5.1.2 Subflow

There are two sub-options in the subflow: "Create" and "Change the selected part to subflow".

2.5.1.2.1 Create

Create a new flow in the tab bar, named after "Subflow n" (n is 1, 2, ...), and activate the flow in the workspace.

2.5.1.2.2 Change the selected part to subflow

This function is activated when one or more modules are selected in the workspace. After clicking, the selected module will be moved into a new subflow and replaced with an instance of the subflow in the original flow.

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## 2.5.2 Program deployment and compilation
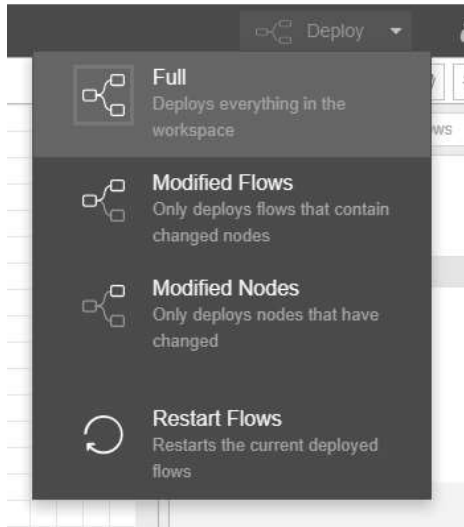
2.5.3 Status bar

It displays the editor status.

2.5.4 Navigation bar

The navigation bar displays the main flow, subflow and module instances in the form of a directory tree.

In the navigation bar, you can search, quickly locate, disable or enable flows and instances. After one of the node instances is clicked, the attribute information of the node instance is displayed in the information attribute bar. As shown in the figure below, click on the left to quickly locate the corresponding flow or module instance.
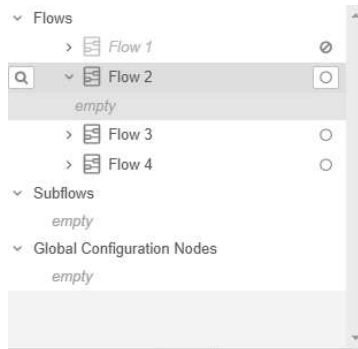
2.5.5 Information attribute bar

The information attribute bar displays the relevant content information of the instance. The content information is as follows:

- Module instance name: module icon and name.

- Instance (node) address.

- Type: Function block type of the instance.

2.5.6 Tab bar

The tab bar is used to switch the flow displayed in the workspace. The flow is divided into main flow and subflow, and is an integral part of the controller program. All (physical, virtual, communication) points and logic are created in the main flow. As a user-defined function, the subflow is a supplement to the function module.
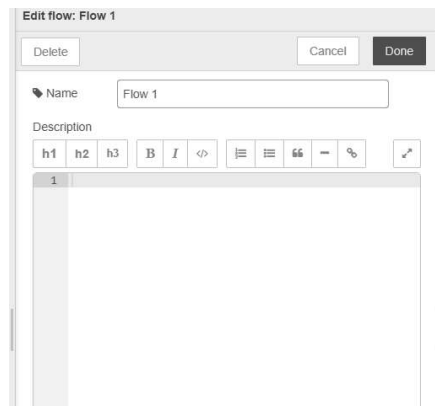
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2.5.6.1 Main flow

Function blocks and subflow function blocks create instances in the main flow. Double-clicking the flow tab in the tab bar opens the configuration window.

Main flow configuration items:

- Name.
- Detailed description.

As shown in the figure.

The function buttons of the configuration window are set as follows:

- Delete: Click to delete the flow.
- Cancel: The modification of configuration item is not enabled.
- OK: The modification of configuration item is enabled.

2.5.6.2 Subflow

The subflow is a user-defined function that can add input and output ports of subflow function blocks, as shown below.
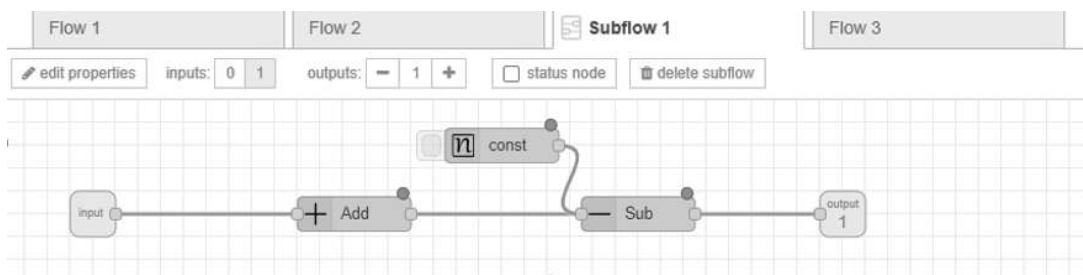
After the subflow is created, the corresponding subflow module appears in the toolbar "Subflow". Drag it to the flow workspace to generate the corresponding subflow instance.

Configuration parameters of input and output ports

- Name: It is displayed in the corresponding module of subflow; in the instance, the corresponding name is displayed when the mouse hovers over the port.
- Note: Fill in the description of the port.

Subflow configuration parameters include:

- Name: The toolbar module is named in this way.
- Note: This part appears in the information bar of the instance.

The function buttons of the subflow parameter configuration window are set as follows:

- Delete: Click to delete the subflow.
- Cancel: The attribute modification is not enabled.
- OK: The attribute modification is enabled.

Operation Instructions

2.6 User management

In the user module, you can view, add, delete or edit users in the current device.
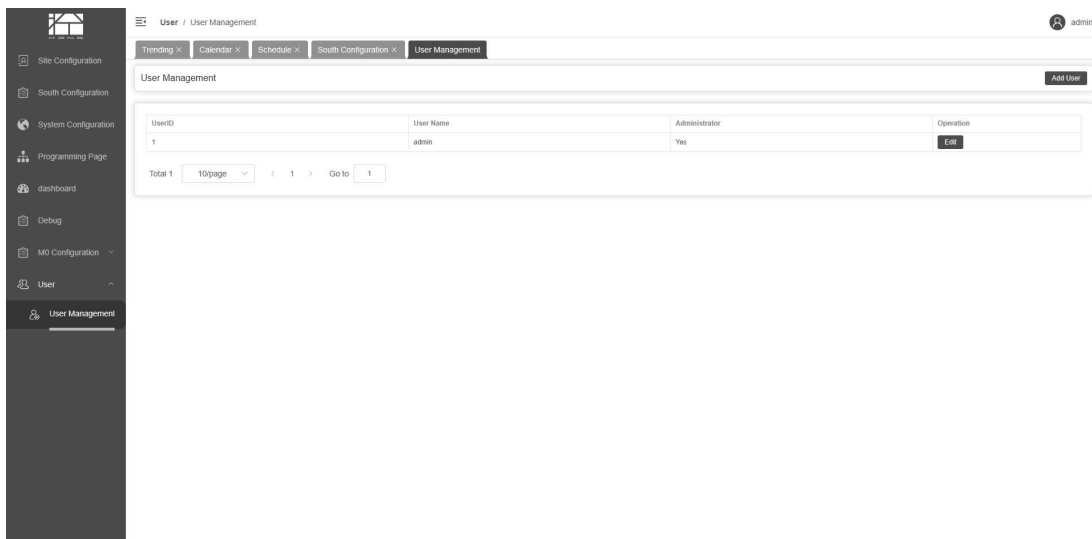
5. Environmental Protection List

Hazardous substances / Component name	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chrome (Cr (VI))	Poly-brominated Biphenyl (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PCBA module	×	○	×	○	○	○
Connecting wire	×	○	○	○	○	○
Fasteners such as screws and washers	×	○	○	○	○	○
Rubber parts	○	○	○	○	○	○
Other metal parts	○	○	○	○	○	○
Other plastic parts	○	○	○	○	○	○
Printed parts	○	○	○	○	○	○

○: It indicates that the content of the hazardous substance in all homogeneous materials of this part is lower than the limit specified in GB/T 26572.

×: It indicates that the content of the hazardous substance in at least one homogeneous material of the component is higher than the limit specified in GB/T 26572. However, under the existing technical conditions, it is extremely difficult to make the product parts completely free from the harmful substances mentioned above. The design will be gradually improved with the technical progress.

The model approval code is marked on the nameplate.

KONG

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Version: KONG-EM21IU-004A V.B

All the contents in this document have been carefully checked. If there is any misprint or misunderstanding, please consult the Company. Note: In case of any technical improvement of the product, such improvement will be compiled into the new manual without prior notice. If the appearance and color of the product are changed, the actual product shall prevail.