

BL207 BACnet/IP BA I/O System



BL207 User Manual

Version: V1.2

Date: 2023-10-24

Shenzhen Beilai Technology Co.,Ltd

Website: <https://www.bliiot.com>

Preface

Thanks for choosing BLIIOT Distributed I/O. These operating instructions contain all the information you need for operation of BL207.

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Disclaimer

This document is designed for assisting user to better understand the device. As the described device is under continuous improvement, this manual may be updated or revised from time to time without prior notice. Please follow the instructions in the manual. Any damages caused by wrong operation will be beyond warranty.

Revision History

Update Date	Version	Description	Owner
2021-10-13	V1.0	First Edition	ZLF
2022-07-01	V1.1	Add Profinet, EtherCAT protocol, add platform, logic control functions	HYQ
2023-07-27	V1.1	Change Model name	HYQ
2023-10-24	V1.2	Add BL203, BL206, BL207 description	HYQ
2023-10-24	V1.2	User manual split by model	HYQ

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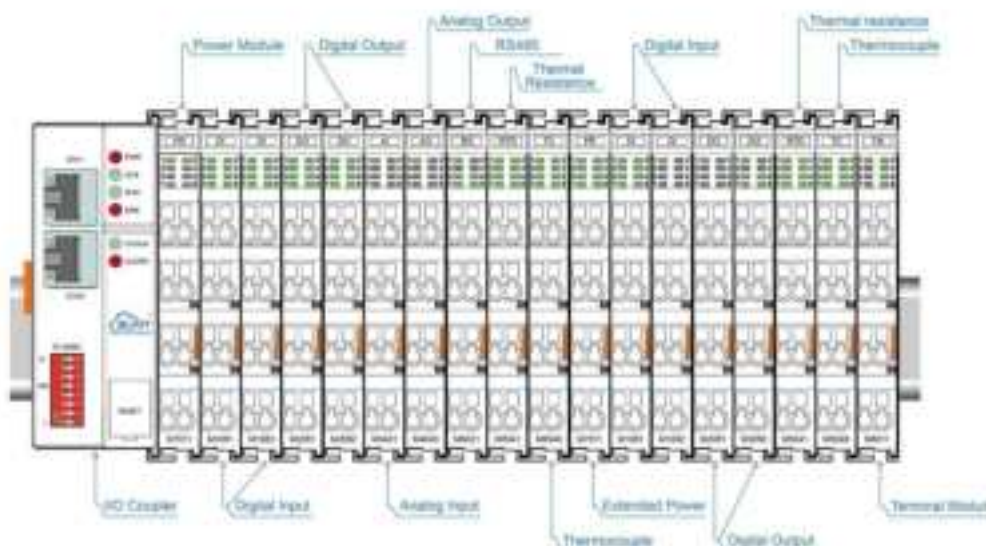
1 Product Introduction

1.1 Overview

BL207 series distributed I/O is a data acquisition and control system, based on a powerful 32-bit microprocessor design, using the Linux operating system, support BACnet/IP, MQTT, OPC UA protocols.

BL207 BACnet I/O system is used for data acquisition and controlling smart devices in buildings to manage energy use, HVAC, lighting, and detection. The BACnet I/O system is designed for building automation systems.

The BL207 distributed I/O system consists of 3 parts: Coupler, I/O modules and terminal modules.



The communication between the I/O and the field devices takes place via the Ethernet port of the fieldbus coupler, and the communication between the fieldbus coupler and the I/O modules takes place via the local bus. The two Ethernet ports are internally integrated with a switch function, which can establish a linear topology without the need for additional switches or hubs.

The system needs to use the power module to provide 24VDC system voltage and 24VDC field voltage. Since two independent power supplies are used, the field voltage input interface and system voltage input interface of BL207 coupler are electrically isolated from each other.

When assembling fieldbus node modules, each I/O module can be arranged in any combination, and it is not required to be grouped by module type.

A terminal module must be plugged into the end of a fieldbus node to ensure correct data transmission.

1.2 Typical Application

BL207 BACnet I/O system is used for data acquisition and controlling smart devices in buildings to manage energy use, HVAC, lighting, and detection. The BACnet I/O system is designed for building automation systems.

1.3 Features

- Each I/O system can have a maximum of I/O 32 modules.
- Support BACnet/IP, MQTT, OPC UA protocols.
- Support AWS Cloud, Thingsboard, Ignition, Alibaba Cloud, Huawei Cloud, etc.
- The field side, the system side and the bus side are electrically isolated from each other.
- Support 2 X RJ45 interface, integrated switch function, can establish line topology, without the need for additional switches or hubs.
- Convenient wiring connection technology, screw-free installation.

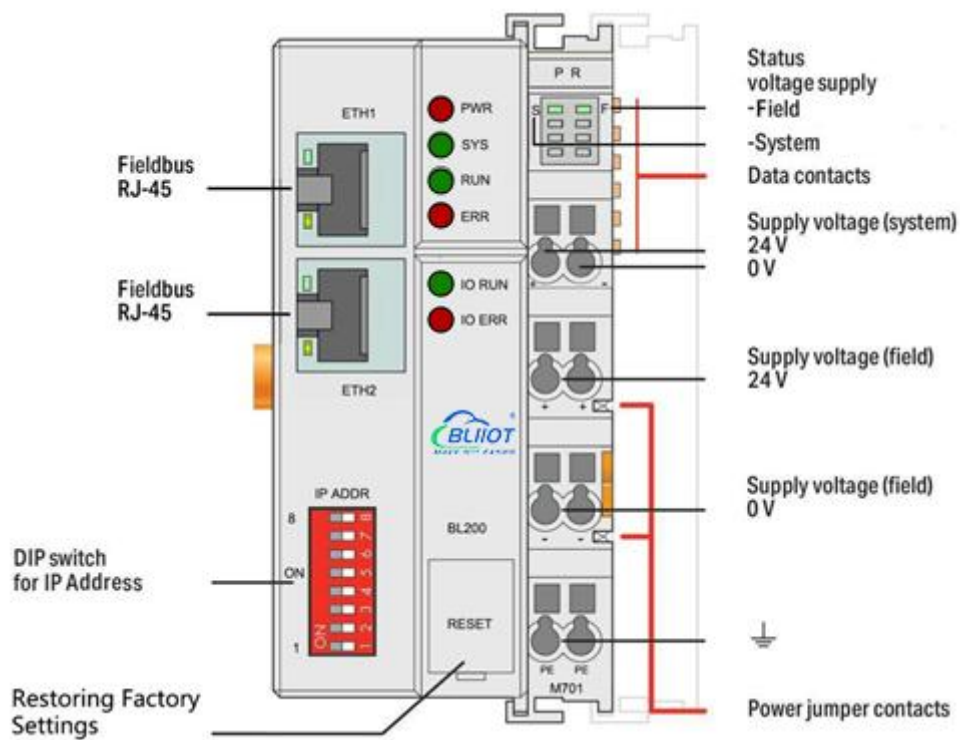
1.4 Model List

Description	Model	Channel	Type
Modbus-TCP I/O Coupler	BL200	/	/
Profinet I/O Coupler	BL201	/	/
EtherCAT I/O Coupler	BL202	/	/
Ethernet/IP I/O Coupler	BL203	/	/
OPC UA EdgeIO Controller	BL205	/	/
MQTT EdgeIO Controller	BL206	/	/
MQTT+OPC UA+Modbus TCP	BL206Pro	/	/
BACnet/IP I/O Coupler	BL207	/	BACnet/IP
BACnet/IP+MQTT+OPC UA	BL207Pro	/	/
8CH DI	M1081	8	NPN (low level trigger)
8CH DI	M1082	8	PNP (high level trigger)

16CH DI	M1161	16	NPN (low level trigger)
16CH DI	M1162	16	PNP (high level trigger)
4CH DO	M2044	4	Relay
8CH DO	M2081	8	PNP
8CH DO	M2082	8	NPN
16CH DO	M2161	16	PNP
16CH DO	M2162	16	NPN
4CH AI Single-Ended	M3041	4	0-20mA/4-20mA
4CH AI Single-Ended	M3043	4	0-5V/0-10V
4CH AI Differential	M3044	4	0-5V/0-10V
4CH AI Differential	M3046	4	±5V/±10V
4CH AO	M4041	4	0-20mA/4-20mA
4CH AO	M4043	4	0-5V/0-10V
4CH AO	M4046	4	±5V/±10V
2CH RTD	M5021	2	3Wire PT100
2CH RTD	M5022	2	3Wire PT1000
2CH RTD	M5023	2	4Wire PT100
2CH RTD	M5024	2	4Wire PT1000
4CH TC	M5048	4	TC(B/E/J/K/N/R/S/T)
2CH RS485	M6021	2	RS485
2CH RS232	M6022	2	RS232
1CH RS485, 1CH RS232	M6023	2	RS485+RS232
Power module	M7011	/	/
Terminal module	M8011	/	/

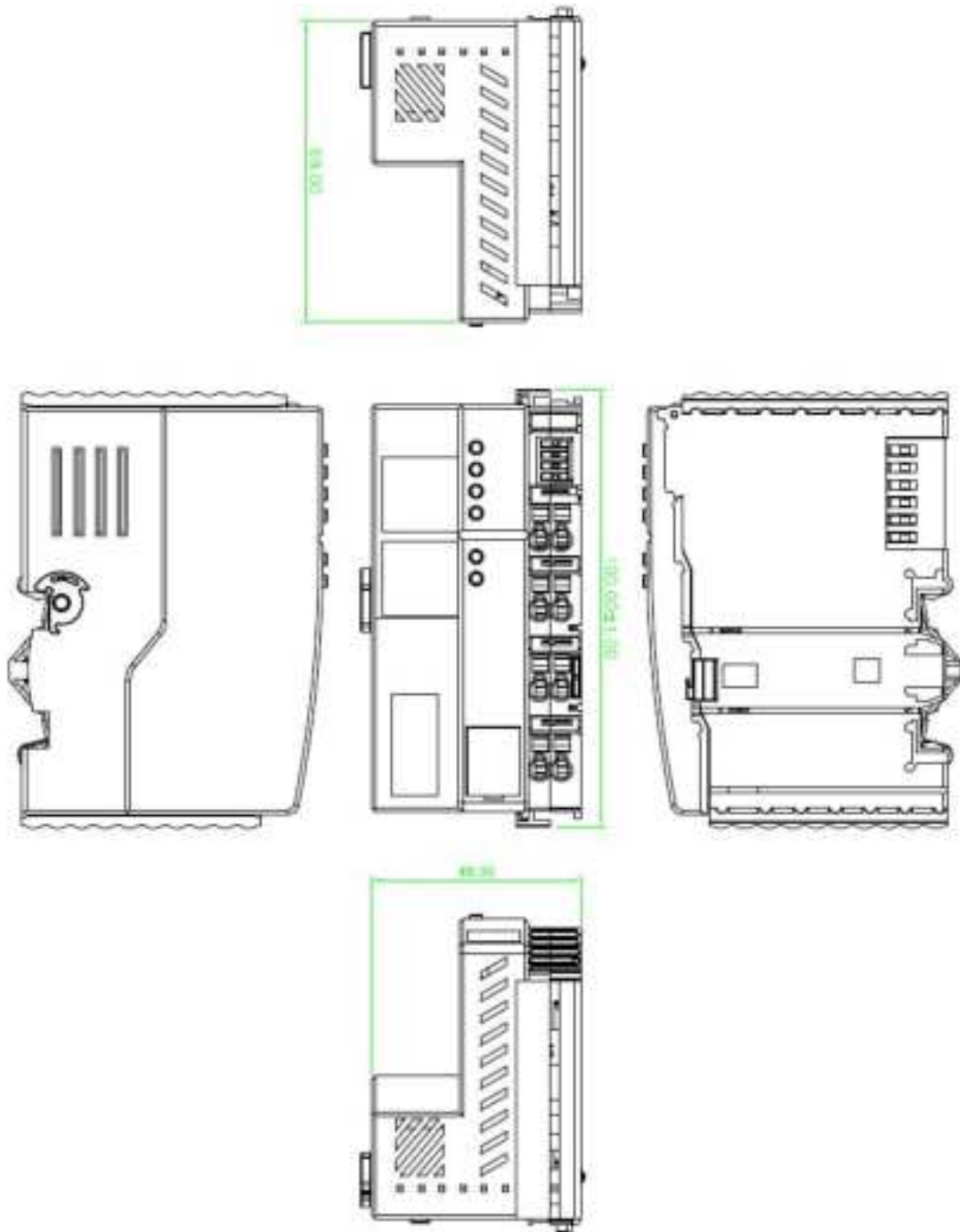
2 Hardware

2.1 I/O Coupler



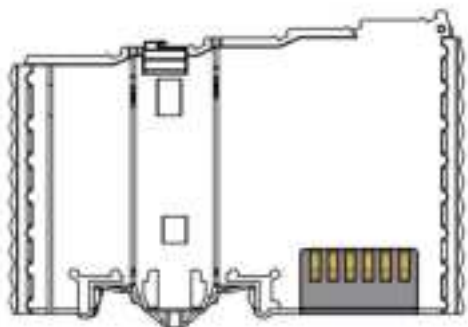
2.2 Dimension

Unit:mm



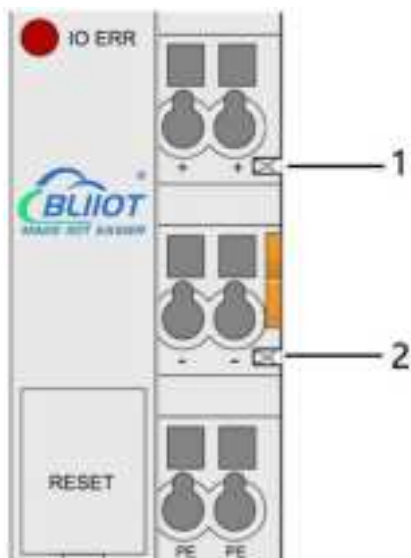
2.3 Data Contacts/Internal Bus

The communication between the fieldbus coupler and the I/O modules, as well as the system power supply of the I/O modules are realized via the internal bus. The internal bus is made up of 6 data contacts, these gold-plated contacts are self-cleaning when connected.



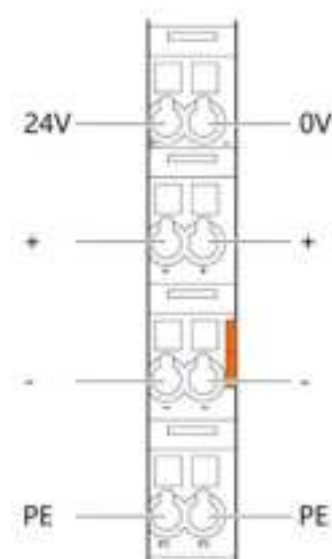
2.4 Power Jumper Contacts

The power module included with the coupler has two self-cleaning power jumper contacts for powering the field side. This power supply has a maximum current of 10A across the contacts, current exceeding the maximum will damage the contacts. When configuring the system, it must be ensured that the above-mentioned maximum current is not exceeded. If it exceeds, a power expansion module needs to be inserted.



No.	Type	Description
1	Spring contact	Supply 24V to the field side
2	Spring contact	Supply 0V to the field side

2.5 Terminal Point



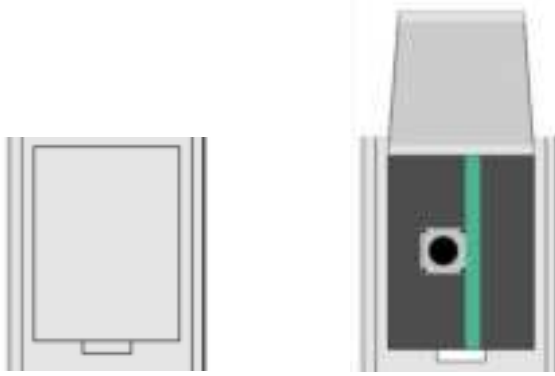
Name	Description
24V	System Power 24VDC
0V	System Power 0VDC
+	Connections Field Supply 24 VDC
+	Connections Field Supply 24 VDC
-	Connections Field Supply 0 VDC
-	Connections Field Supply 0VDC
PE	Grounding
PE	Grounding

2.6 Factory Reset

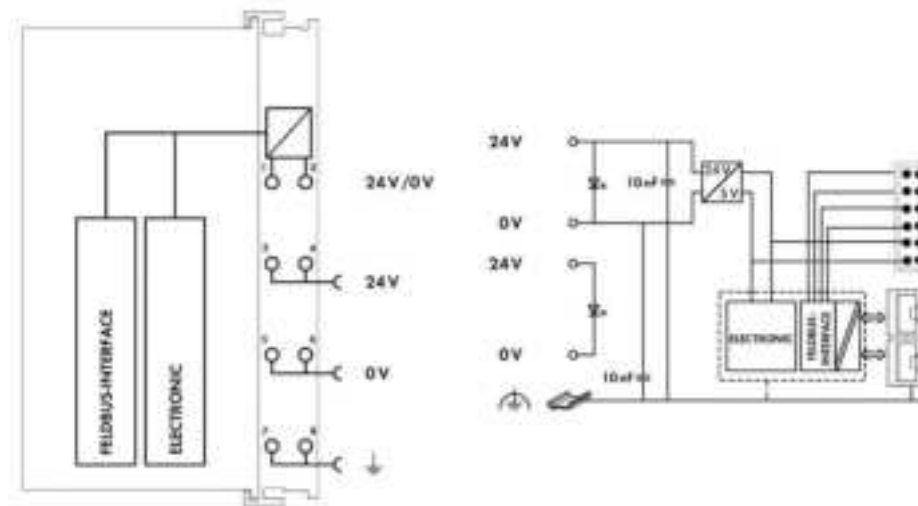
This reset button is used to restore the device configuration parameters to the factory state.

Operation steps:

1. When the device is running, open the flip cover;
2. Press and hold the button for more than 5 seconds, until all the LED lights go off, indicates reset successful, and then the device will automatically restart.



2.7 Electrical Schematic



3 Installation

3.1 Installation Sequence

All distributed couplers and I/O modules from Beilai Technology must be mounted on a standard DIN 35 rail.

Starting from the coupler, the I/O modules are assembled from left to right, and the modules are installed next to each other. All I/O modules have grooves and power jumper contacts on the right side, to avoid assembly errors, I/O modules must be inserted from the right and top to avoid damage to the modules.

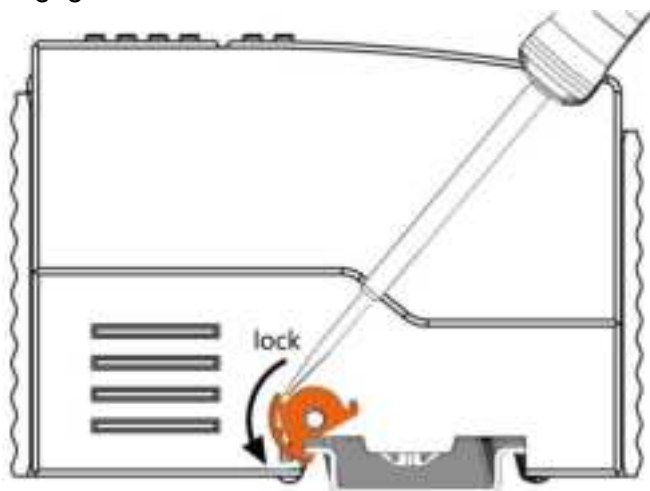
Utilizes a tongue and groove system to form a secure fit and connection. With the automatic locking function, the individual components are securely fixed on the rail

after installation.

Don't forget to install the terminal module! Always plug a terminal module (eg TERM) into the end of the I/O module to ensure correct data transmission.

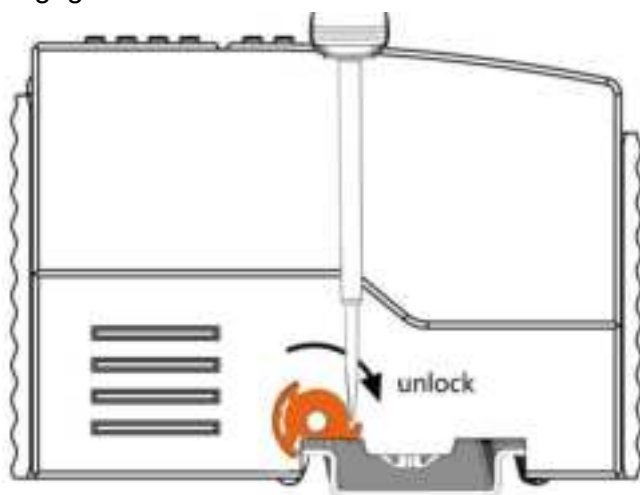
3.2 Install Coupler

- 1.Snap the coupler onto the DIN rail first;
- 2.Use a tool such as a screwdriver to turn the locking cam until the locking cam engages the DIN rail.

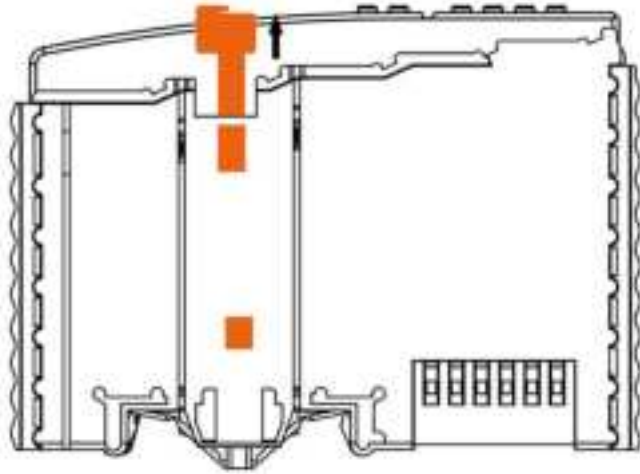


3.3 Remove Coupler

- 1.Use a screwdriver to turn the locking disc cam until the locking cam no longer engages the rail.



- 2.Pull the release tab to remove the coupler from the assembly



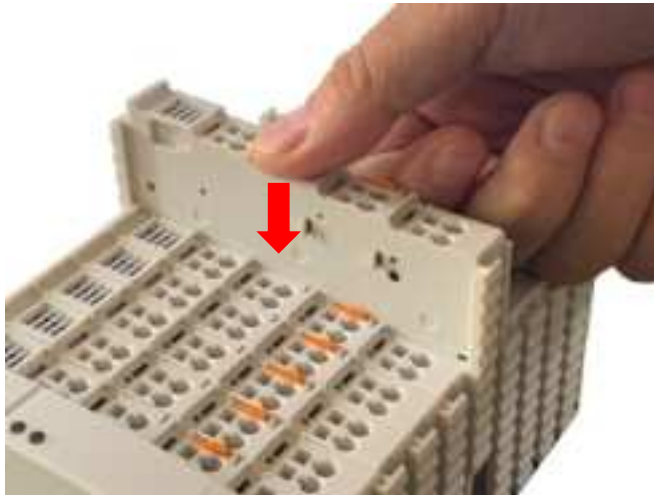
Data or power contacts are electrically disconnected from adjacent I/O modules when the coupler is removed.

3.4 Insert I/O Modules

1. When inserting the module, make sure the tabs on the module line up with the grooves of the coupler or other I/O module to which it is attached.



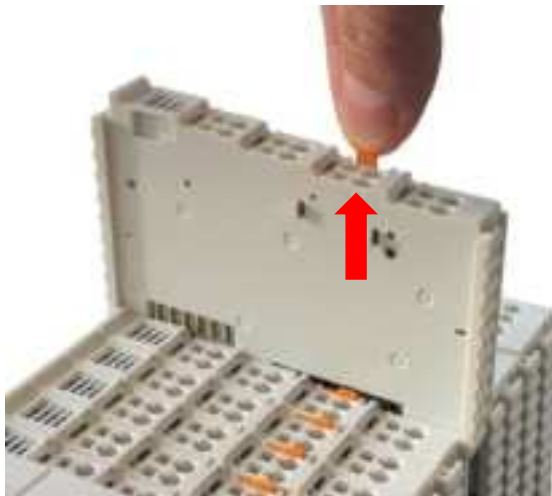
2. Press the I/O module into the assembly position until the I/O module snaps into the rail.



After the I/O module is installed, the electrical connection to the coupler (or the previous I/O module) and the following I/O module is established via the data contacts and the power jumper contacts.

3.5 Remove I/O Modules

Pull up on the latch to remove the I/O module from the assembly.



When the I/O module is removed, the electrical connection to the data or power jumper contacts is disconnection.

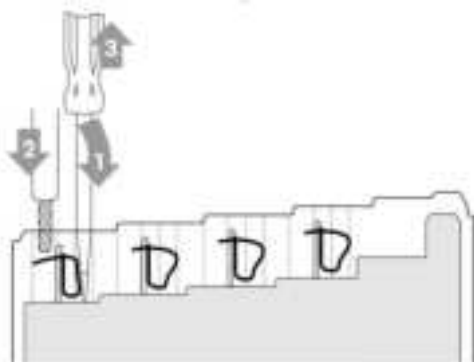
4 Device Connection

4.1 Wiring

CAGE CLAMP connection is suitable for solid, stranded and fine-stranded conductors. Only one wire can be connected to each CAGE CLAMP. If there is more than one wire,

it must be merged into a point before being connected.

1. Open the CAGE CLAMP by inserting the tool into the opening above the junction.
2. Insert the wire into the corresponding open connection terminal.
3. Once the tool is removed, the CAGE CLAMP closes and the wire is clamped firmly by the spring.



4.2 Power Supply

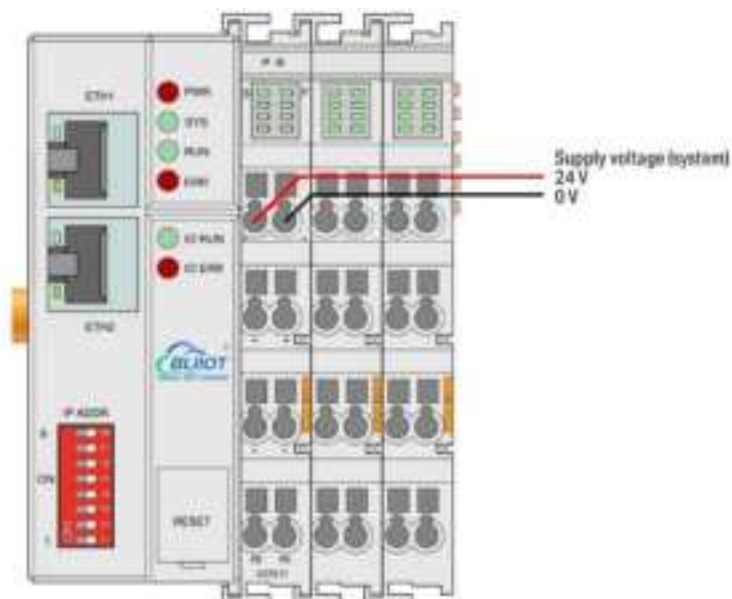
System and field voltages are supplied by power supply modules. The power supply module of the BL207 coupler supplies power for the internal electronics of the coupler and the I/O modules. If necessary (there are many I/O modules and the current is relatively high), it can also be provided through an independent power supply module. The fieldbus interface (Ethernet interface), system and field are galvanically isolated from each other.

4.2.1 System Power

BL207 couplers require 24V DC system power, which is connected from the terminal of the power supply module. The 5V bus voltage required inside the system is converted from the 24V system voltage.

The power supply module only has proper fuse protection, please provide proper overcurrent protection externally.

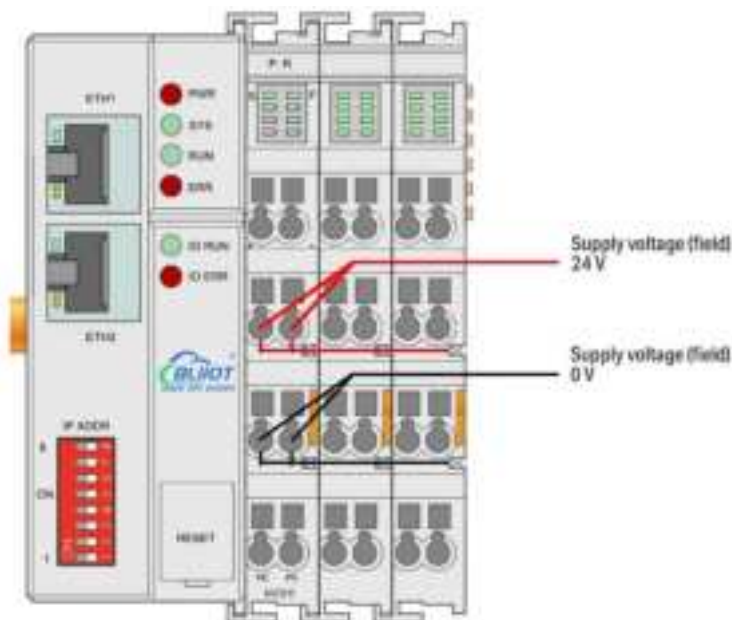
Please pay attention to matching the output power of the power supply module and the load power to avoid excessive load current.



4.2.2 On-site Power Supply

The power supply module supplies 24 VDC on the field side to power the sensors and actuators.

Field power supply only has proper fuse protection. Without overcurrent protection, electronic equipment can be damaged.



Field-side power is automatically output from the power jumper contact when the I/O module is connected. The continuous load current across the contacts of the power supply must not exceed 10 A.

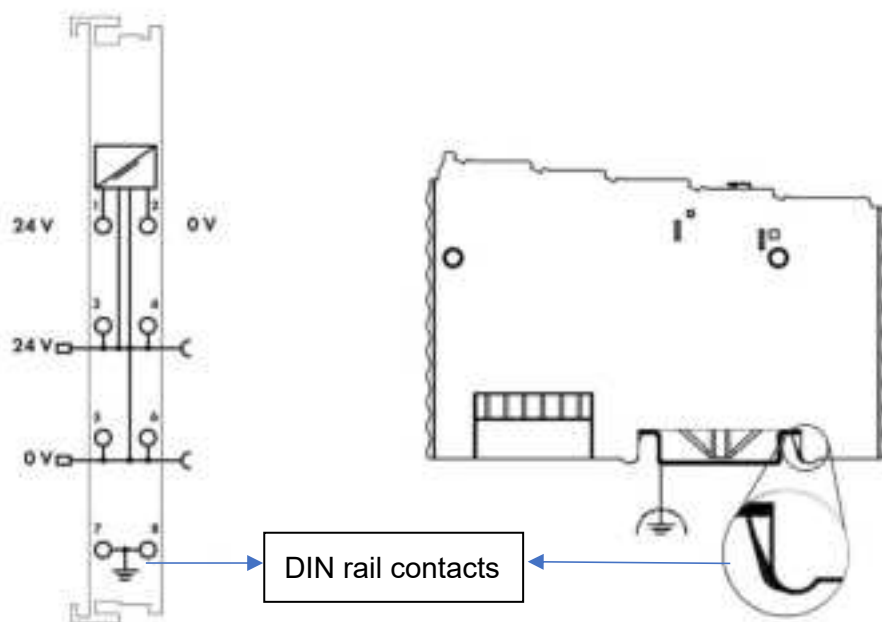
The problem of excessive load power on the system side or on the field side can be

solved by plugging in additional power supply modules. After plugging in an additional power supply module, a new voltage potential may appear on the field side.

In the case where electrical isolation is not required, the field power supply and the system power supply can use the same power supply.

4.2.3 Grounding

When installing the enclosure cabinet, the cabinet must be grounded, and the rail is electrically connected to the cabinet through screws to ensure that the rail is properly grounded. Grounding can increase resistance to electromagnetic interference. Some components in the I/O system have rail contacts that dissipate EMI onto the rail.



5 BACnet/IP Coupler

5.1 BL207 BACnet/IP Coupler

5.1.1 BL207 Coupler Overview

The BL207 coupler supports BACnet/IP protocol and provides BACnet/IP data as a server, such as HVAC systems, BMS systems, Siemens design cc, and other systems

that collect the I/O data of the BL207 coupler through BACnet/IP protocol. The DI, DO, AI, and AO of the BL207 coupler correspond to the BI, BO, AI, and AO of BACnet/IP, respectively. Object instance is the ordering of each way of the I/O module, such as Analog Input.10.present-value represents the 11th way of the AI type module, which is both the third way of the third AI module (There are four ways of each AI module, except for RTD).

5.1.2 Technical Parameters

Name	Parameter	Description
System power	Input voltage(system)	24 VDC
	Input current(system)	MAX 500 mA@24VDC
	Power Efficiency	84%
	Internal bus voltage	5VDC
	Coupler current consumption	MAX 300mA@5VDC
	I/O current consumption	MAX 1700mA@5VDC
	Isolation protection	500 V system/supply
Field power	Input voltage (field)	24 VDC
	Current carrying capacity (power jumper contacts)	MAX10 ADC
Ethernet	Number	2 X RJ45
	Transmission medium	Shielded twisted pair STP 100 Ω Cat 5
	MAX cable length	100m
	Baud rate	10/100 Mbit/s
	Isolation protection	ESD contact: 8KV, Surge: 4KV(10/1000us)
System	Operating system	Linux
	CPU	300MHz
	RAM	64MB
	Flash	128MB
	I/O Modules	MAX 32
	Protocol	BACnet/IP
Wiring method	Method	CAGE CLAMP
	Wire diameter	0.08 mm ² ... 2.5 mm ² , AWG 28 ... 14
	Strip length	8 mm ... 9 mm / 0.33 in

Environment	Working temperature	0 ... 55 ° C
	Storage temperature	-40 ... 70 ° C
	Relative humidity	5 ... 95% no condensation
	Working altitude	0 ... 2000 m
	Protection type	IP20
Dimension	Width	48mm
	Length	100mm
	Height	69mm
Material	Color	Light gray
	Housing material	Polycarbonate, Nylon 6.6
	Fire load	1.239 MJ
	Weight	180g
Installation	Method	DIN-35 rail
Certificates	EMC	EN 55022: 2006/A1: 2007 (CE &RE) Class B
		IEC 61000-4-2 (ESD) Level 4
		IEC 61000-4-3 (RS) Level 4
		IEC 61000-4-4 (EFT) Level 4
		IEC 61000-4-5 (Surge)Level 3
		IEC 61000-4-6 (CS)Level 4
		IEC 61000-4-8 (M/S) Level 4

5.1.3 Hardware Interface

5.1.3.1 LED Indicators



LED	Description	Color	Status	Meaning
PWR	Power indicator	Red	ON	Power connection

				successful
			OFF	No power
SYS	System indicator	Green	ON	System is abnormal
			OFF	System is running normally
RUN	Running indicator	Green	Flashing	System is running normally
			OFF	System is abnormal
ERR	Error indicator	Red	ON	BACnet/IP protocol connection error
			OFF	No errors
I/O RUN	I/O Running indicator	Green	Flashing	I/O module is working normally
			OFF	Module not inserted
I/O ERR	I/O Error indicator	Red	ON	I/O module communication error
			OFF	No errors



LED	Description	Color	Status	Meaning
S	System 24V power indicator	Green	ON	Power is OK
			OFF	No power
F	Field 24V power indicator	Green	ON	Power is OK
			OFF	No power

5.1.3.2 Ethernet Port

Connect to the Ethernet-based field bus through ETH 1 interface.

ETH2 is used to connect other nodes that need to access the Ethernet.



5.1.3.3 IP Address Selection Switch

The 8-bit DIP switches are used to set the IP address. The DIP switches are coded starting from DIP switch 1 with the lowest valid bit (2^0) to DIP switch 8 with the highest valid bit (2^7), which corresponds to decimal values: 0-255.

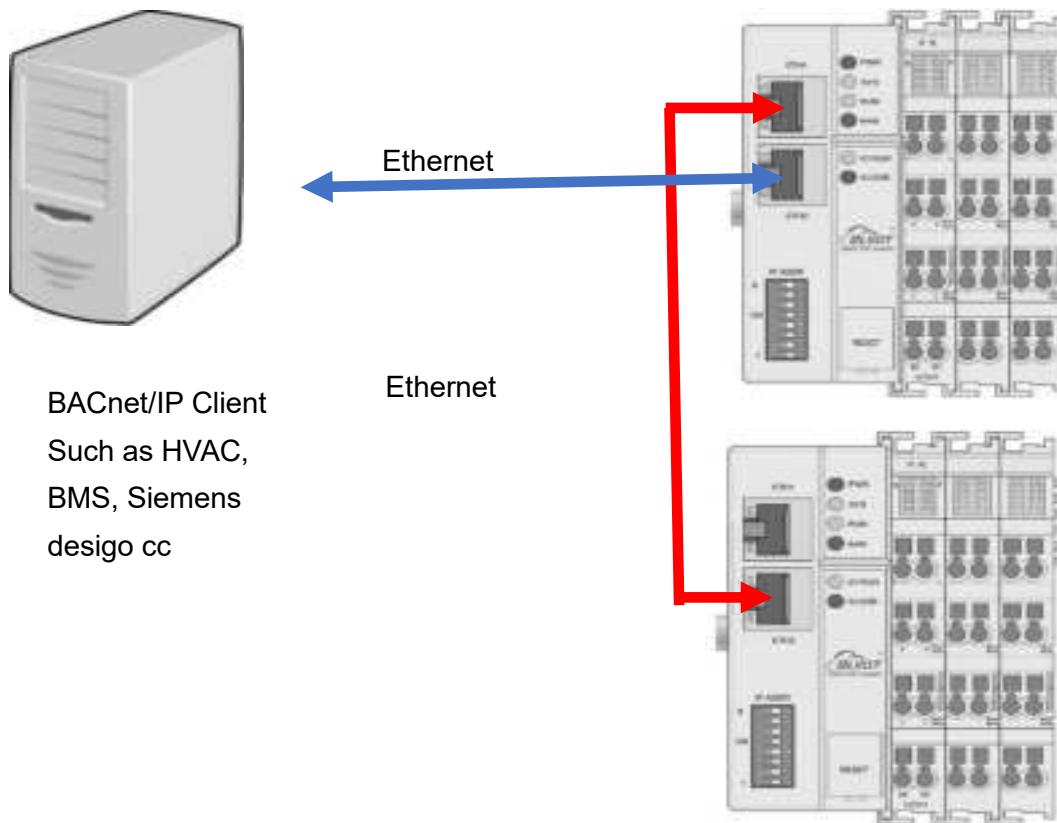


When the value of DIP switch is 1111 1111 (decimal 255), the IP address is set according to the web page, and the web page setting can specify the IP address or set up the automatic acquisition, and when the web page is not set up, the IP address is 192.168.1.10.

For DIP switch values of 0000 0000 - 1111 1110 (decimal 0-254), the 3rd byte of the IP address is determined, and the 1st, 2nd and 4th bytes are fixed bytes, i.e. 192.168.xxx.253.

5.1.4 Coupler Connection

The BL207 coupler acts as a BACnet/IP server and connects to the BACnet/IP client via the ETH2, and ETH1 is used to connect to other BL207 coupler.



5.1.5 Web Configuration

The web configuration allows you to configure the BL207 BACnet/IP Coupler device ID, port number, device name, device description, and location. Web configuration also supports IP modification and web upgrade programs.

5.1.5.1 Preparation Before Configuration

To successfully access the BL207, it must be properly installed and connected to the computer. In addition, configure them with correct IP addresses to keep them in the same network segment.

5.1.5.1.1 Connect Computer and Coupler

1. Mount the fieldbus node on a DIN35 rail. Follow the installation instructions in the "Installation" chapter.
2. Connect the 24 V power supply to the system power terminals.
3. The computer and the bus node can be connected in two ways, one is that the two

are connected to the switch device of the local area network through the Ethernet port; the other is that the two are directly connected point-to-point. For detailed steps, follow the instructions in the "Coupler Connection" chapter.

4. Turn on the power supply and start supplying power.

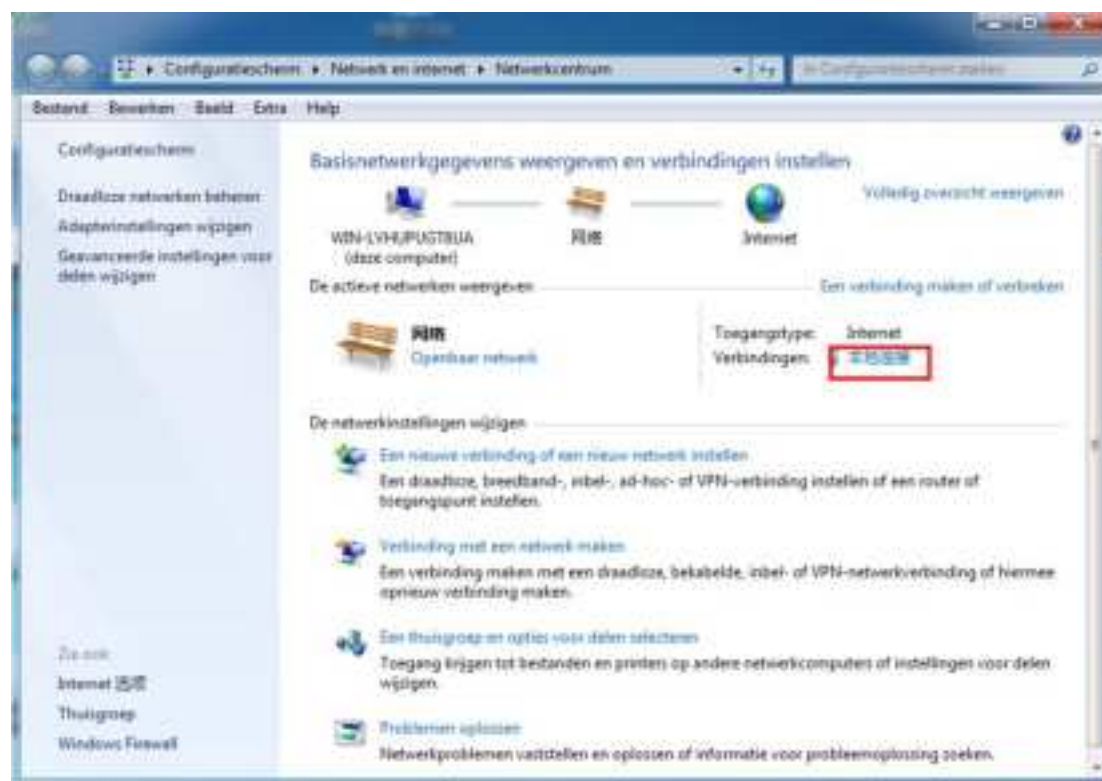
The controller is initialized after power-up, creates process image according to the I/O modules configuration of the node.

5.1.5.1.2 Configure Computer IP Address

There are two ways to configure PC IP address. One is to turn on the automatic IP address option on the PC's local connection to dynamically assign DHCP in the network. The other is to configure a static IP address with the coupler node on the same network segment on the local connection of the PC.

Takes Windows 7 system as an example for configuration. Windows systems are all configured similarly.

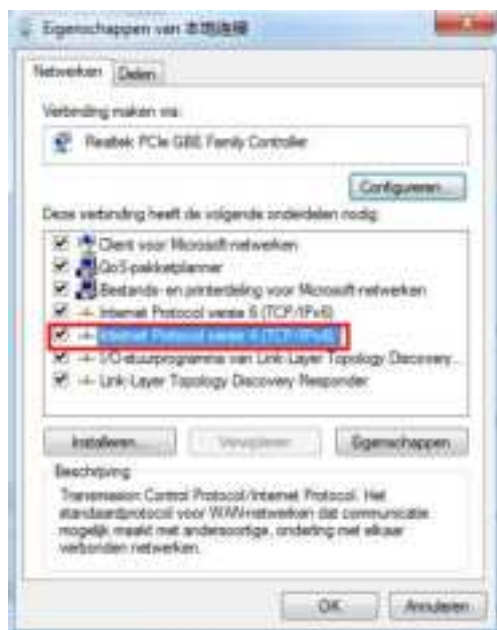
1. Click Start > Control Panel > Network and Sharing Center, and click local connection in the window that opens.



2. In the local connection status window, click Properties.



3. Double-click "Internet Protocol Version 4 (TCP/IPv4)" on the local connection properties page.



4. There are two ways to configure the IP address of the PC

- Obtain IP address automatically (system default mode)
To obtain an IP address automatically from a DHCP server, select "Obtain an IP address automatically";



■ Set a static IP address

Select "Use the following IP address" and set the correct values for the IP address, subnet mask and default gateway.



5.1.5.1.3 Configure Coupler IP address

There are 2 ways to assign an IP address

- Assignment via built-in web page (static IP or automatic IP assignment)
- Assign via DIP switch (static IP)

DIP address selector switch definition

Switch position (ON = 1)	Value	Definition
-----------------------------	-------	------------

0000 0000 --- 1111 1110	0-254	Enable the DIP selector switch assignment function and determine the value of the 3rd byte. Example: 0010 0110 (22 decimal), the IP address is "192.168.22.253".
1111 1111	255	Enable the function of specifying IP on the web page, or select the function of DHCP automatic allocation. When the IP is not allocated through the web, the IP is 192.168.1.10.

5.1.5.1.3.1 Configuration via Web Page

The coupler can be set to an IP address via the "Settings > Local Settings" page after entering the page, or it can be set to be assigned automatically. Select static address, if not set IP address, the IP is 192.168.1.10



5.1.5.1.3.2 Assign IP via DIP Switch

Set the value of the DIP address selector switch to 0000 0000 - 1111 1110 (decimal 0 - 254), and the IP address will be assigned by the DIP switch.

The IP address consists of fixed bytes and variable bytes. The 1st, 2nd and 4th bytes are fixed bytes, the DIP selector switch determines the 3rd byte, namely:

192.168.xxx.253

The controller assigns an IP address via a DIP switch, and the IP address set in this way is static.



5.1.5.1.4 Factory Default Settings

Before logging into the web configuration page, it is necessary for you to understand the following default parameters,

IP: Determined according to the DIP switch, if the DIP switch is 1111 1111, the default IP is 192.168.1.10

If factory default DIP switch is 0000 0000 status, then the IP is 192.168.0.253

Item	Description
Username	admin
Password	Empty

5.1.5.2 Login Configuration Page

1. Open a browser on your computer, such as IE, Chrome, etc.
2. Enter the IP address of the controller node (192.168.1.10) in the address bar of the browser to enter the user login interface.



3. Enter "Username" and "Password" in the login interface, and then click Login.

Authorization Required

Please enter your username(the default is admin) and password(the password by default)

Username

Password

[Login](#) [Reset](#)

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4.After successfully logging in to the web interface, the display is as follows

BL200BN

[Status](#)
[System](#)
[Settings](#)
[I/O Module](#)
[BACnet](#)
[Logout](#)

Status

System

Hostname	BL200BN
Model	BL207-BACnet I/O Module
Firmware Version	Shenzhen Beilai Technology Co., Ltd V1.1.12
Kernel Version	4.4.194
Local Time	2023-11-04 13:29:53
Uptime	0h 3m 54s
Load Average	1.48, 0.77, 0.32

Memory

Total Available	36.73 MB / 56.55 MB (47%)
Used	25.55 MB / 56.55 MB (45%)
Buffered	3.34 MB / 56.55 MB (6%)
Cached	9.46 MB / 56.55 MB (16%)

Network

Active Connections	52 / 16384 (5%)
--------------------	-----------------

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5.After configuring the parameters, you need to click the "Save and Apply" button on the page to take effect.

[Save & Apply](#)
[Save](#)
[Reset](#)

5.1.6 Web Configuration Page Description

5.1.6.1 Status

Users can check overview, system log and kernel log, as well as device parameters and device operating status.

Status > Overview



Status > System Log

[Status](#) - [System](#) - [Settings](#) - [HW Module](#) - [Serial Module](#) - [OPIC UA](#) - [Operation&Control](#) - [Logout](#)

[illegible]

Status > Kernel Log

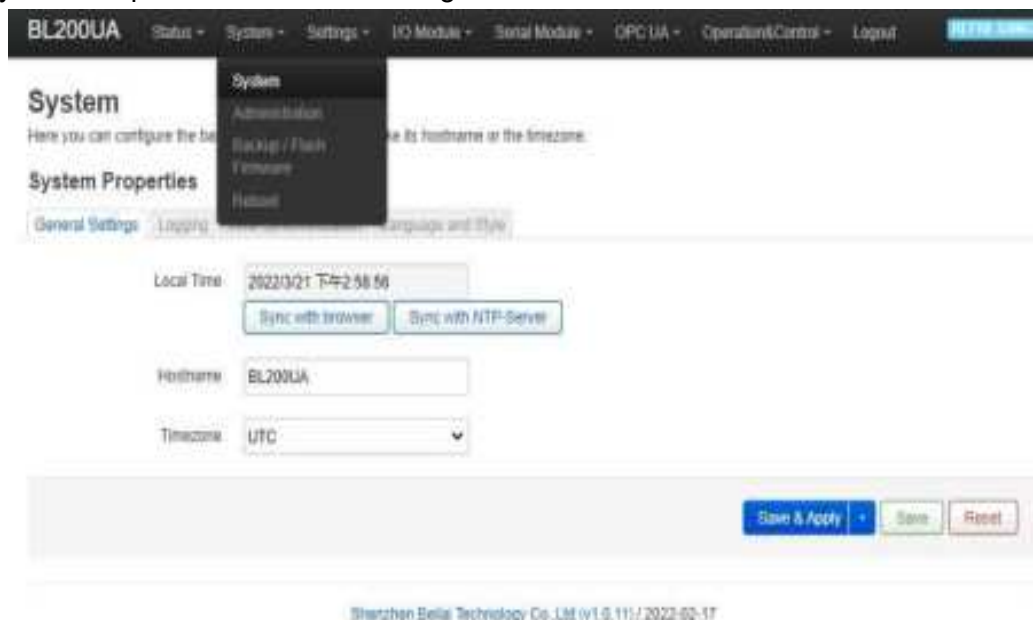
[Status](#) - [Features](#) - [Screenshots](#) - [API Module](#) - [Social Module](#) - [FAQs](#) - [Download/Feedback](#) - [Home](#)

```
0.000000 Booting Linux on physical CPU 0x000
0.000000 Linux version 4.1794 (gcc@arm) gcc version 5.4.0 (Linaro GCC 5-4.0 releases) ; #6 PREEMPT Sat May 9 15:23:54 2020
0.000000 CPU: ARMv8SVE+SVE2 [16384C] revision 5 (ARMA7TEJ), t=00003171
0.000000 CPU: VIVT data cache, VIVT instruction cache
0.000000 Machine model: Nuvoton NU2860 IOT-GateWay Version: 8.9
0.000000 Memory policy: Data cache writeback
0.000000 On node 0 totalpages: 16384
0.000000 free_area_init_node: node 0, pgdat 09d37764, node_mem_map_start 0x77600
0.000000 Normal zone: 128 pages used for memmap.
0.000000 Normal zone: 0 pages reserved
0.000000 Normal zone: 16354 pages, LIFO batch:5
0.000000 pcpu-alloc: at 0x032768-0x32768 alloc=1x32768
0.000000 pcpu-alloc: [0,0]
0.000000 Built 1 zonelists in Zone order; mobility grouping on. Total pages: 16295
0.000000 Kernel command line: sdc:=nvmeblk2 console=ttyS0 115200n8 nvme=atactrl start=64M ip=14444;
0.000000 PID hash table entries: 256 (order: -2, 1024 bytes)
0.000000 Dentry cache hash table entries: 6144 (order: 3, 32768 bytes)
0.000000 Inode cache hash table entries: 4096 (order: 2, 16384 bytes)
0.000000 Memory: 5775K/16384K available (4558K kernel code, 305K rdsblt, 172K init, 252K bss, 775K reserved, 96 kbytes reserved)
0.000000 Virtual kernel memory layout:
0.000000   vector: 0x000000-0x0ff1000   ( 4 MB)
0.000000   kernel: 0x0c0000-0x0f00000   (3072 KB)
0.000000   vmalloc: 0xc400000-0xf000000   ( 944 MB)
0.000000   lowmem: 0xc000000-0xc400000   ( 94 MB)
0.000000   modules: 0xf000000-0xf000000   ( 0 MB)
0.000000   text: 0xc000000-0xc062000   (6244 KB)
0.000000   .init: 0xc062000-0xc065000   (188 KB)
0.000000   .data: 0xc065000-0xc06c704   (388 KB)
0.000000   .bss: 0xc06c704-0xc06d000   (253 KB)
0.000000 SLUB: HWalign=32, Order=0-3, MinObject=0, CPUs=1, Nodes=1
0.000000 Preemptible hierarchical RCU implementation
0.000000 Bump time adjustment of last failed to 32
0.000000 NR_IRQS=544
0.000000 clocksource: mcs860-timer: mask: 0xffff max_cycles: 0xffff, max_qlen: 62215585615
0.000033 sched_clock: 24 bits of 120Hz resolution (323ns), wraps every 6880960430ns
0.000741 Console: virtual device ttyS0
0.000916 console (ttyS0) enabled
0.000917 Caching device map (trigger) present value: 142.00 Bytes/MHz (ip=14444);
0.001714 pci_msi_mask: 32768 resources, 20
0.201123 Mount-cache hash table entries: 1024 (order: 0, 4096 bytes)
0.206790 Mountpoint-cache hash table entries: 1824 (order: 0, 4096 bytes)
0.216914 CPU: Testing write buffer coherency: ok
0.224803 Setting up MMR identity map for 0x0000-0x0000
0.227150 clocksource: jiffies: mask: 0xffff max_cycles: 0xffff, max_idle_ns: 1819199446275000 ns
0.252310 futex hash table entries: 256 (order: -1, 3672 bytes)
0.256274 posix-timers: initializers pinned subsystem
0.264431 NET: Registered protocol family 46
0.301496 DMA: preallocated 216 Kbytes pool for kernel coherent allocations
0.316703 cdtv: mcs860_irq_device, irq =
```


5.1.6.2 System

5.1.6.2.1 System

System Properties > General Settings



Item	Description	Default
Local time	Displays the current time of the device. You can click the "Sync browser time" or "Sync with NTP server" button to update the device time.	--
Hostname	The device name can be customized to easily distinguish between multiple devices.	BL200BN
Timezone	The time zone can be selected via the drop down menu	UTC

System Properties > Logging

BL200UA
Status
System
Settings
IO Module
Serial Module
OPC UA
OperationalControl
Logout

System

Here you can configure the basic aspects of your device like its hostname or the timezone.

System Properties

General Settings
Logging
Time Synchronization
Language and Style

System log buffer size: 64
External system log server:
External system log server port: 514
External system log server protocol: UDP
Write system log to file:
Log output level: Debug
Cron Log Level: Debug

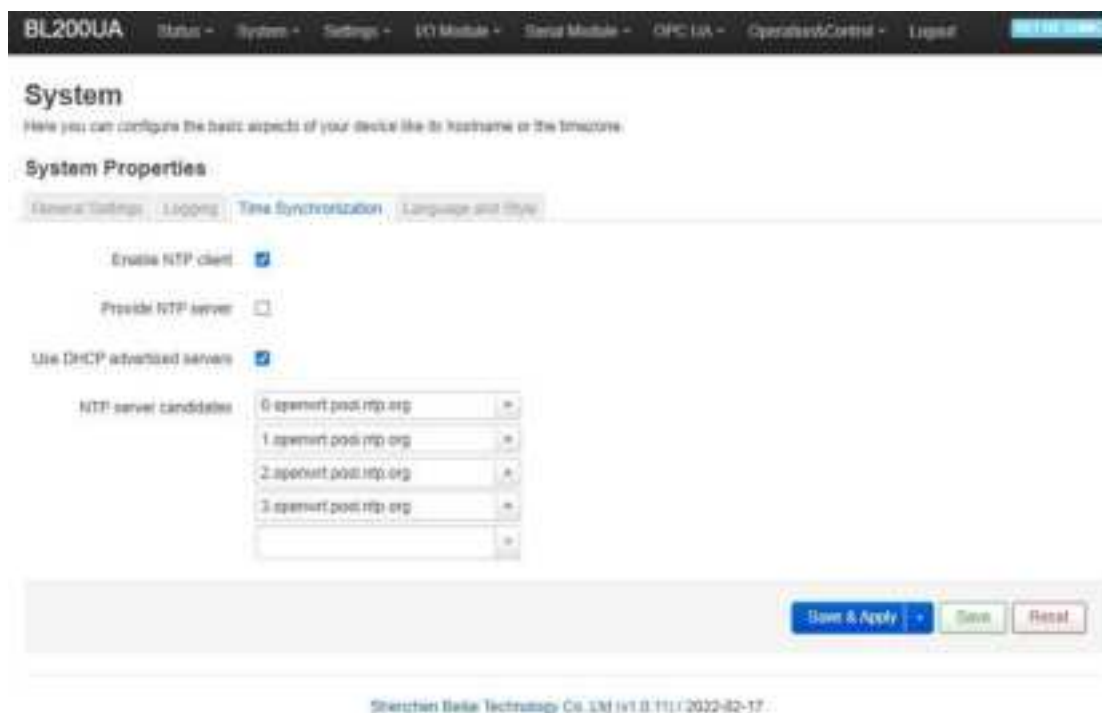
Save & Apply
Save
Reset

Shenzhen Beilai Technology Co., Ltd. (v1.0.11) | 2022-02-17

Item	Description	Default
System log buffer size		64
External system log server		
External system log server port		
External system log server protocol		
Write system log to file		
Log output level		
Cron log level		

System Properties > Time Synchronization

A NTP server can be set to synchronize time



System Properties > Language and Style



Item	Description	Default
Language	Available in auto, English, Chinese	auto
Design	Currently only Bootstrap is supported.	Bootstrap

5.1.6.2.2 Administration

Administration > Router Password

Change the administrator password for accessing the device.

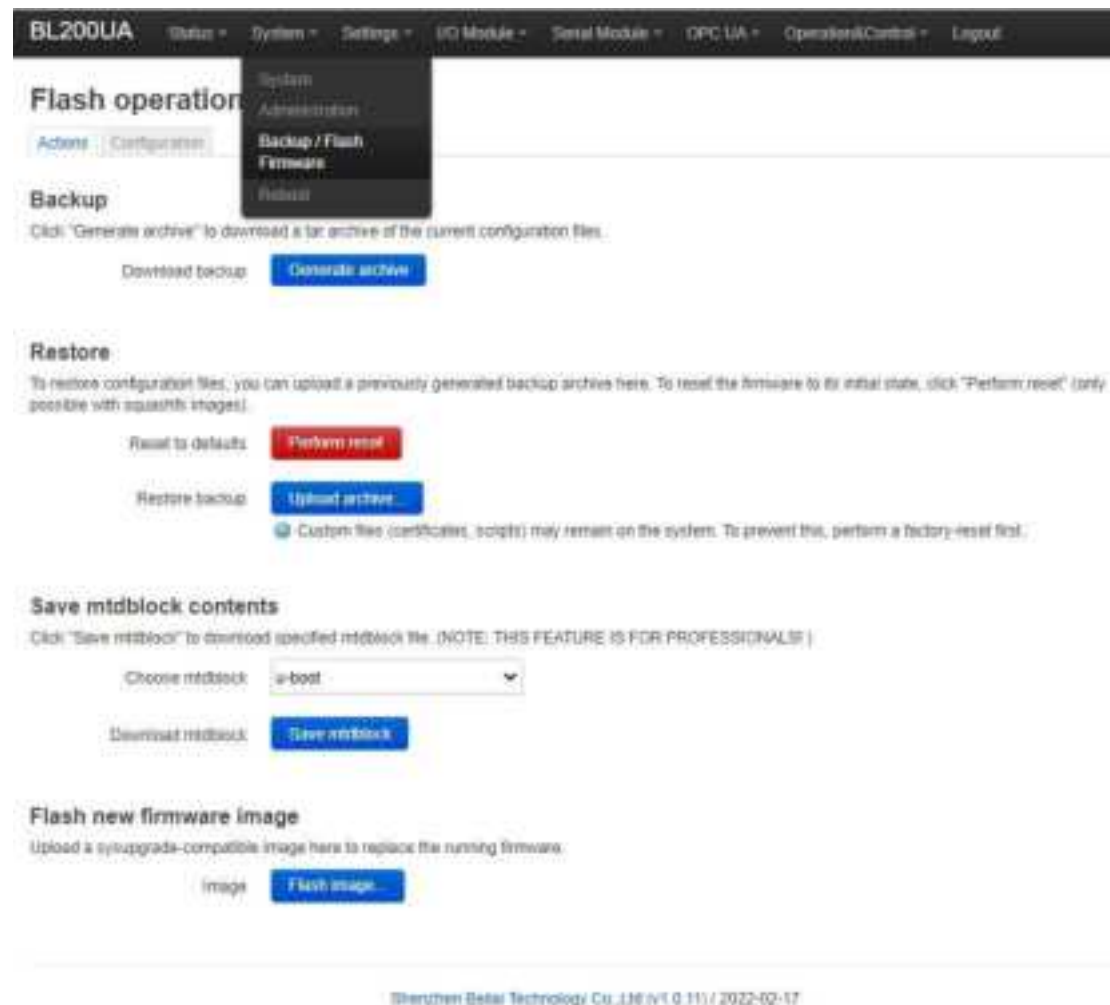


Administration > SSH Keys

Public keys allow for the passwordless SSH logins with a higher security compared to the use of regular passwords. In order to upload a new key to the device, paste an OpenSSH compatible public key line or drag a .pub file into the input field.



5.1.6.2.3 Backup/Flash Firmware



Item	Description	Default
Backup	Click "Generate archive" to download a tar archive of the current configuration files.	--
Restore	To restore configuration files, you can upload a previously generated backup archive here. To reset the firmware to its initial state, click "Perform reset" (only possible with squashfs images).	--
Save mtddblock	Click "Save mtddblock" to download specified mtddblock file. (NOTE: THIS FEATURE IS FOR PROFESSIONALS)	--
Flash image	Upload a sysupgrade-compatible image here to replace the running firmware.	--

5.1.6.2.4 Reboot

Click "Perform reboot" will reboot your device



5.1.6.3 Settings



Item	Description	Default
Modbus Device ID	Modbus device ID range is 1~247.	1
Modbus TCP port	Modbus TCP protocol port number, which can be customized.	502
DIP switch address	Displays the IP address set by the DIP switch.	
IP address type	Select from "Static Address", "Dynamic Address(DHCP)".	
Set device IP address	The IP address of the device can be set by yourself, and it needs to be restarted to take effect after setting.	--

Subnet mask	Set IP subnet mask	
Gateway address	Set IP gateway address	

5.1.6.4 I/O Modules

After power on, the coupler automatically recognizes all I/O modules connected to it and creates an internal local process image based on the module type, data width and the module's position in the node.

If I/O modules are added, changed or removed, a new process image is created and the process data addresses change. When adding an I/O module, the process data of all previous I/O modules must be considered.

The coupler can connect up to 32 I/O modules, including digital input and output, analog input and output and special function modules.

BL200UA Status System Settings I/O Module Serial Module OPC UA Operation&Control Login									
IO status									
IO Slot	Module Name	Module Type	Channel Number	Modbus Address	24V Address State	Soft Version	IO Status	Channel Status	
1	M1061	DI	8	2000-2007	8001-Power On	5	Normal	Channel Status 1	
2	M2082	DO	8	1000-1007	8002-Power On	5	Normal	Channel Status 2	
3	M3041	AI	4	3000-3008	8003-Power On	5	Normal	Channel Status 3	
4	M4044	AO	4	4000-4008	8004-Power On	5	Normal	Channel Status 4	
5	M6021	COM	2	0-0	8005-Power On	5	Normal	Channel Status 5	

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Item	Description
IO slot	The order of IO modules in the slot, the first module card position close to the controller is 1, and the following ones are 2 3 4...
Module name	I/O module model
Module type	I/O module function type
Channel Number	Data width of I/O module
Modbus Address	Process map address of the I/O module inside the controller
24V Address State	Power supply status on the field side of the I/O module, digital, 1 bit
Software version	I/O module internal firmware version

IO status	I/O module and controller communication status
Channel status	Click to view and set the parameters of different types of I/O modules

5.1.6.4.1 Digital Input Module

The digital input module can provide two types of data, one is the current input state value, Boolean type; the other is the counter value, 32-bit numerical type, which supports the clear function.

IO status

IO Slot:1,Module Type:DI,Module Name:M1081

Channels	Modbus Address	Value
1	2000	Open
2	2001	Open
3	2002	Open
4	2003	Open
5	2004	Open
6	2005	Open
7	2006	Open
8	2007	Open

Filter Time

Filter Time(ms) 1.0

DI Count

Channels	Modbus Address	Value	Count Mode	Clear
1	5000	0	Rising Edge	Clear
2	5002	0	Rising Edge	Clear
3	5004	0	Rising Edge	Clear
4	5006	0	Rising Edge	Clear
5	5008	0	Rising Edge	Clear
6	5010	0	Rising Edge	Clear
7	5012	0	Rising Edge	Clear
8	5014	0	Rising Edge	Clear

Item	Description
Channels	Channel number of the digital input module

Modbus Address	Process map address of Boolean status data inside the controller
Value	Display the current input state, open: logic 0, close: logic 1
Filter Time	Selecting the time for DI filtering

Item	Description
Channels	Channel number of the digital input module
Modbus Address	Process map address of the count value inside the controller
Value	Display the current input count value, 32-bit unsigned integer
Count Mode	Selection of "Rising Edge", "Falling Edge", "Rising Edge and Falling Edge" Trigger Counting Methods
Clear	Clear the current channel counter value

5.1.6.4.2 Digital Output Module

BL200UA
Status - System - Settings - IO Module - Serial Module - OPC UA - Operational Control - Logout

IO status
ID Slot:2,Module Type:DO,Module Name:M2082

Channels	Modbus Address	Value	PowerOn Status	Open/Close
1	1000	Open	Open	Open/Close
2	1001	Open	Open	Open/Close
3	1002	Open	Open	Open/Close
4	1003	Open	Open	Open/Close
5	1004	Open	Open	Open/Close
6	1005	Open	Open	Open/Close
7	1006	Open	Open	Open/Close
8	1007	Open	Open	Open/Close

Back to Overview
Save & Apply
Save
Reset

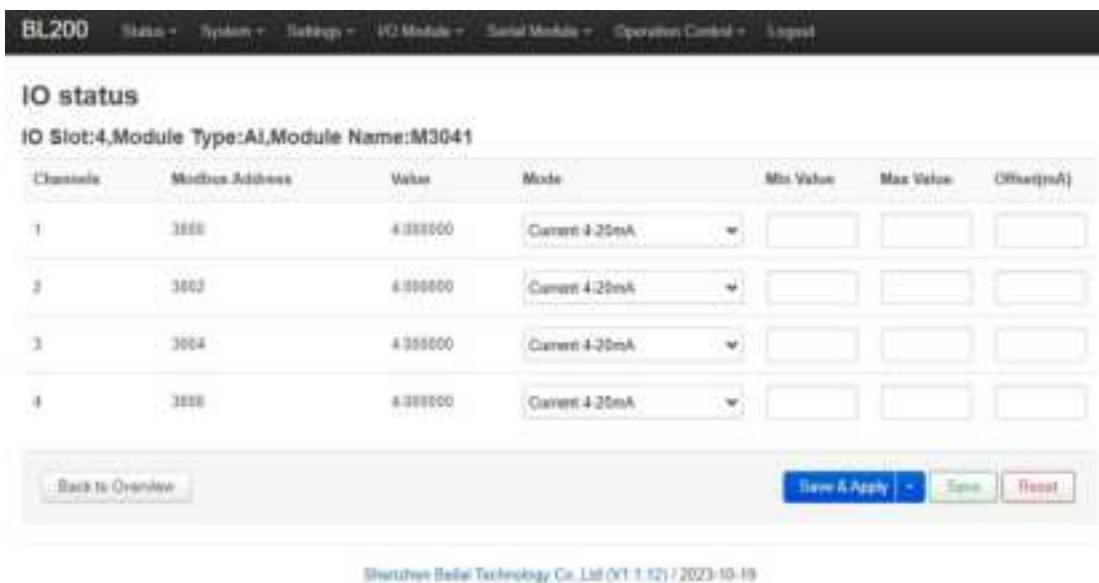
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Item	Description
Channels	Channel number of the digital output module
Modbus Address	Process map address of the digital output boolean data inside the controller
Value	Display the current output state, open: 0, close: 1

Power-on status	Set the state of DO after power-on, select from "open", "close", "last"
Open/Close	Can control the current channel output state

5.1.6.4.3 Analog Input Module

The analog input (AI) type module supports setting parameters through the controller web page, so that the data conversion is automatically realized inside the module, and the actual engineering value corresponding to the sensor can be directly output.



IO status
IO Slot:4,Module Type:AI,Module Name:M3041

Channels	Modbus Address	Value	Mode	Min Value	Max Value	Offset(mA)
1	3000	4.388800	Current 4-20mA			
2	3002	4.388800	Current 4-20mA			
3	3004	4.388800	Current 4-20mA			
4	3006	4.388800	Current 4-20mA			

Back to Overview Save & Apply Save Reset

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Item	Description
Channels	Channel number of the analog input module
Modbus Address	Process map address of the analog input module inside the controller
Value	Display the actual engineering value input by the current channel, 32-bit single-precision floating-point type
Mode	Different models of analog input modules have different options, please refer to the specific analog input I/O module manual for details.
Min Value	Sensor range minimum
Max Value	Sensor range maximum
Offset(mA)	The offset allows you to adjust the error between acquisition and actual.

There is a linear relationship between the electrical signal value of the analog input module (usually a sensor) and the actual engineering value. Their formulas are as follows (take 4-20mA as an example):

Actual engineering value = (current value - 4) * ((maximum - minimum) / (20 - 4)) + minimum

Take the 4-20mA type water level sensor to measure the depth of the water tower as an example:

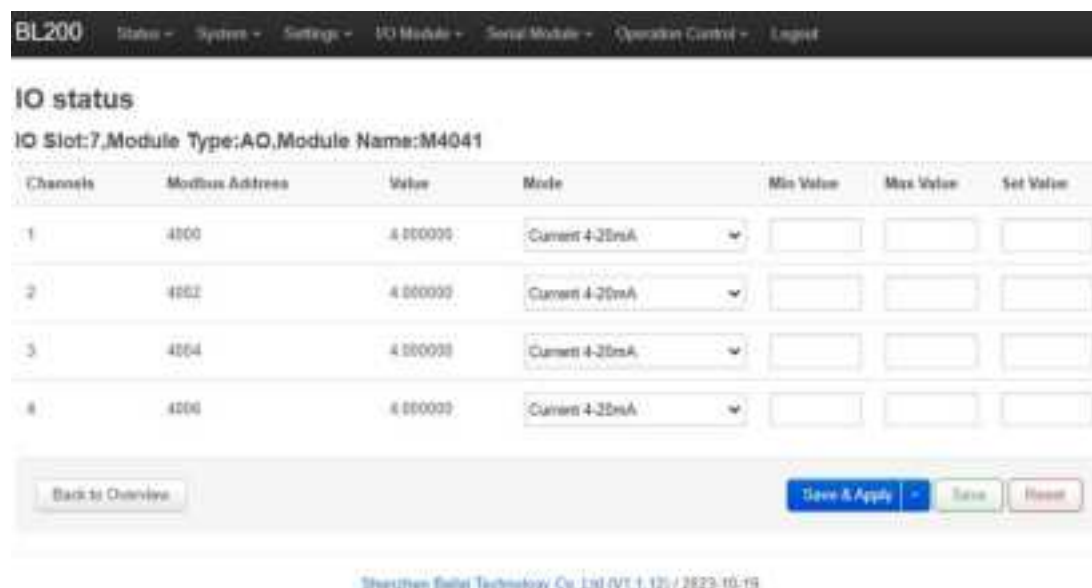
The known water level sensor range is 0-100m, the current data is 5.6mA, and the depth of the water tower is calculated:

Into the formula:

$$(5.6 - 4) * ((100 - 0) / (20 - 4)) + 0 = 10$$

The depth of the water tower is 10m

5.1.6.4.4 Analog Output Module



Item	Description
Channels	Channel number of the analog output module
Modbus Address	Process map address of the analog output module inside the controller
Value	Display the actual engineering value output by the current channel, 32-bit single-precision floating-point type
Mode	Different models of analog output modules have different options, please refer to the specific analog output I/O module

	manual for details.
Min value	Actual engineering value minimum value
Max value	Actual engineering value maximum value
Set value	You can set the actual project value required for the output

5.1.6.5 BACnet

Web configuration allows you to configure the BL207 Coupler BACnet/IP device ID, port number, device name, device description, and location.



5.2 BL207Pro BA I/O Coupler

5.2.1 BL207Pro Overview

The BL207Pro coupler is based on the BL207 coupler to add MQTT and OPC UA functions.

5.2.2 OPC UA Data Point Node Id

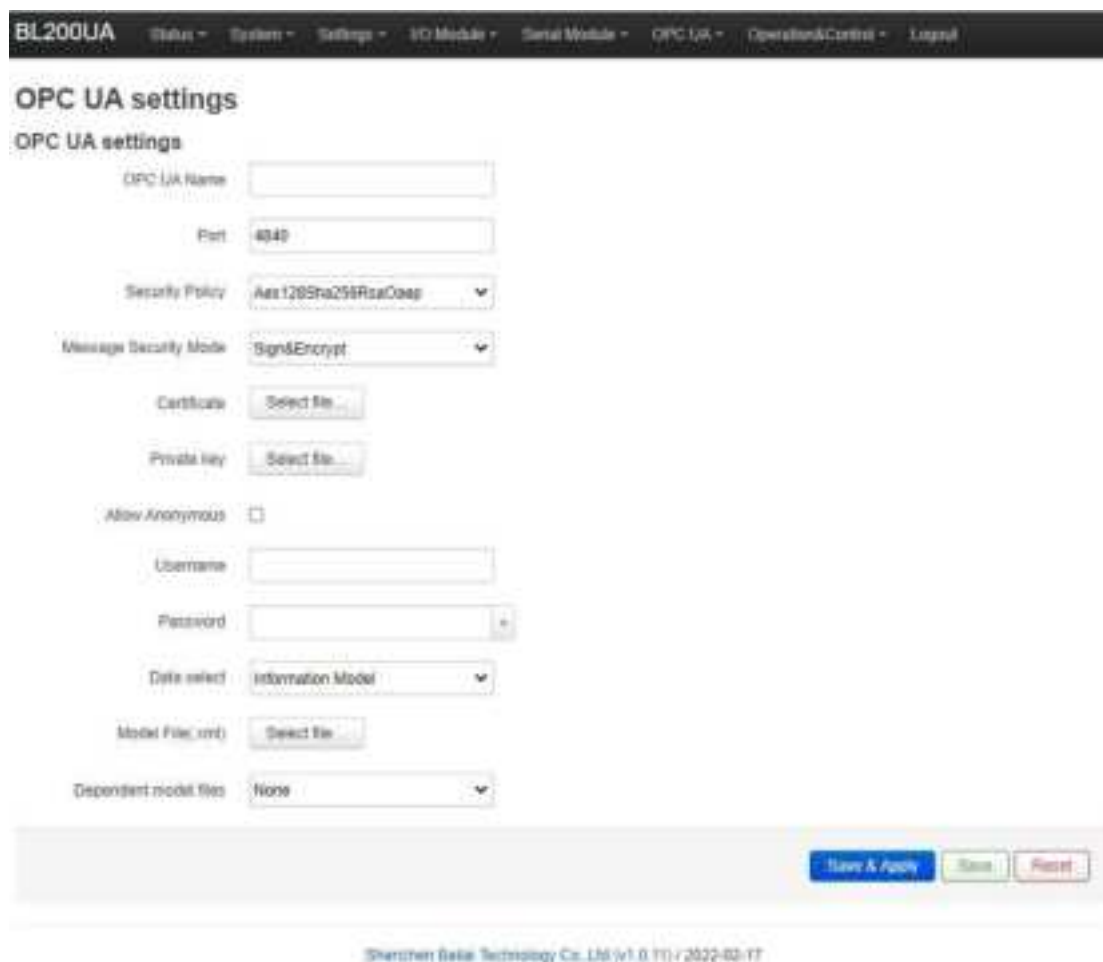
The Node Id for OPC UA defaults to NS=1; S=Modbus mapping address of the I/O data point (for example, the first DO module of the first DO module: NS=1; S=1000), Modbus mapping address range DI: 2000-2999, DO: 1000-1999, AI: 3000-3999, AO: 4000-4999. Custom OPC UA model Node Id can be customized.

5.2.3 MQTT Identifiers

The MQTT identifier is REG+Modbus mapping address (such as the first DO module first DO: REG1000). Modbus mapping address range DI: 2000-2999, DO: 1000-1999, AI: 3000-3999, AO: 4000-4999.

5.2.4 OPC UA Web Configuration Page Description

After configuring the OPC UA parameters, click "Save and Apply" to send it to BL207Pro coupler to take effect.



Item	Description	Default
OPC UA name	OPC UA server name	
Port	OPC UA server port number	4840
Security policy	None basic128rsa15	None

	basic256 basic256sha256 aes128sha256rsaoaep All security policies	
Message security mode	Sign Sign and encrypt	
Certificate	OPC UA certificate, click the uploaded certificate to load the configuration page.	
Private key	OPC UA private key, click on the uploaded certificate to load it into the configuration page.	
Allow anonymous	Whether to enable user name and password login	
Username	Fill in the username	
Password	Fill in password	
Data select	All data Select data point Information model	All data
Select data point	You can select the data points you want to read. "Data selection" option to select "select data point" to have this option	
Model file (.xml)	Upload the information model (.xml) file, select "Information Model" in the "Data Selection" item to have this option	
Dependent model files	Select the number of information models to reference, up to 5 can be selected.	
Dependent Models 1-5	Upload the information model (.xml) file to be referenced	

Note: For a customized information model, the data point description item must be in the format of REG + Modbus address during modeling. For example, DO1 point description item fills in REG1000, and other items are customized.

5.2.5 MQTT Web Configuration Page Description

Once the platforms to be connected have been configured, they need to be sent to the BL207Pro coupler by clicking on "Save and Apply" in order to take effect.

5.2.5.1 Cloud Connection Settings



Click "Add", select "Beilai IIoT V2", and the BLIIoT Cloud MQTT configuration will pop up.



BLIIoT Cloud Connection	
Item	Description
Cloud platform	Beilai IIoT V2
MQTT Client ID	Contact sales person to get it
Publish Period	MQTT data upload interval period
Data Retransmission Enable	Whether to enable data retransmission
Publish Module Status	Whether to publish I/O module status information
Dismiss	Cancel Beilai Cloud Configuration
Save	Save Beilai Cloud Configuration

Note: 1, Configure BLIIoT cloud, click "Save", and also click "Edit" to open the configuration interface, click "Save" again, as shown below.

2, Publish I/O module status information has a separate topic "io_status", the contents

of the I/O slot normal or abnormal status such as: {"slot1": "Normal"}, on behalf of the slot 1 module normal status.



Click "Add", select "Custom Cloud", MQTT data format has a default data format and custom data format.

Cloud connection settings

Cloud platform: Custom Cloud

Cloud name:

Host IP or Domain:

Port:

MQTT Client ID:

User Name:

Password:

Encryption: No encryption

Publish data format: Default data format

Publish Topic:

Subscribe Topic:

Publish Period(s):

Publisher QOS: Q-At most once

Data Retransmission Enable: ☐

Publish Module Status: ☐

Data packing: ☒ Send multiple data in one message

Number of data: 20

Publish only changed data: ☐

Cancel Save

Custom Cloud Connection	
Item	Description
Cloud platform	Custom cloud
Cloud name	Custom cloud platform name
Host IP or Domain	MQTT server IP or domain name
Port	MQTT server port number
MQTT Client ID	The client identifier used by the MQTT connection message, which is used by the server to identify the client.
User name	The username used for MQTT connection messages, which the server can use for authentication and authorization.

Password	The password used for MQTT connection messages, which the server can use for authentication and authorization.
Encryption	"No encryption", "Encryption (root certificate)", "Encryption (self-signed)"
Publish data format	"Default Data Format", "Custom Data Format"
Publish topic	The subject name used for MQTT publish messages, the subject name is used to identify the information channel to which the payload data should be published.
Subscribe topic	The subject name used for MQTT subscribe messages. After subscribing, the server can send a publish message to the client.
Publish period	MQTT data publish interval
Publisher QOS	Publish quality of service "0 - at most once", "1 - at least once", "2 - only once"
Data Retransmission Enable	Whether to enable data retransmission
Publish Module Status	Whether to publish I/O module status information
Data packing	Whether to enable data packaging. Disable means one message sent one data point
Number of data	Number of data points published in one message
Publish only changed data	Whether to enable publishing only data that has changed during the cycle
Dismiss	Cancel MQTT platform configuration
Save	Save MQTT platform configuration

"Publish Data Format" item select "Custom Data Format", pop-up custom data format editing interface, click "Data Format Example" to view the editing example, edit the content to comply with the JSON data format, Subscribe topic is Publish topic /, Click on the blank space outside the edit box when you are done editing.

Publish data format: Custom data format

Publish Period(s): 10

Publisher QOS: 0-At most once

Data Retransmission Enable: ☒

Publish Module Status: ☒

Custom data format:

Data format example: ☒

Custom data format:

```

使用$引用本机或MODBUS寄存器地址, 服务器使用主题+7(例如'主题1/7'为发布主题中设置值)
Use '$' to reference local or MODBUS mapping register address, use 'topic'+7 (such as 'topic1/7') as topic to set value

{
  "topic1": {
    "property1": {
      "data1": "$REG1000",
      "data2": "$REG2000"
    },
    "property2": {
      "data1": "$REG3000",
      "data2": "$REG4000",
      "time": "$TIME"
    }
  }
}

```

5.2.5.2 Ali Cloud

BL200M
Status
System
Settings
I/O Module
Serial Module
Operation Control
Cloud platform
Logout

Ali cloud settings

Ali cloud settings

Enable ☐

Authentication method: Device Secret

Product Key(ProductKey):

Device Name(DeviceName):

Device Secret(DeviceSecret):

Region ID: East China 2

Publish Period(s):

Publish only changed data ☐

Data parsing ☒ Send multiple data in one message

Number of data: 20

Connect State: Not connected

Save & Apply Save Reset

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Ali Cloud Connection	
Item	Description
Enable	Check to enable
Authentication Method	"Device Secret" and "X.509"
Product Key	ProductKey on Ali Cloud
Device Name	DeviceName on Ali Cloud
Device Secret	DeviceSecret on Ali Cloud
Region ID	Ali cloud region, If you need to fill in the IP address, you can do so at Customize.
Publish Period(s)	More than 60s
Certification Authority (root certificate)	Select File Upload, displayed when X509 certificate is selected as the authentication method.
Device Certificate	Select File Upload, displayed when X509 certificate is selected as the

	authentication method.
Device Private Key	Select File Upload, displayed when X509 certificate is selected as the authentication method.
Publish only changed data	Whether to enable publishing only data that has changed during the cycle
Data packing	Whether to enable data packaging. Disable means one message sent one data point
Number of data	Number of data points published in one message
Connect state	After clicking "Save and Apply", you can see whether the connection to Ali cloud is successful or not.

5.2.5.3 AWS

BL200M

[Status](#)
[System](#)
[Settings](#)
[I/O Module](#)
[Serial Module](#)
[Operation Control](#)
[Cloud platform](#)
[Logout](#)

Aws cloud settings

Aws cloud settings

Enable ☐

Host(EndPoint)

Client ID

Thing Name

Certificate authority

[awsroot/awsiot.crt](#)

Device certificate

[awsroot/awsiotlocal.crt](#)

Device private key

[awsroot/awsiotprivate.key](#)

Publish Topic

Publish Period(s)

Publish only changed data ☐

Shadow Data select:

Data packing ☒

[Send multiple data in one message](#)

Number of data

Connect State: Not connected

AWS Connection	
Item	Description
Enable	Check to enable
Host(EndPoint)	Set the endpoint
Client ID	The client identifier used in the MQTT connection message, the server uses the client identifier to identify the client, and each client connected to the server has a unique client identifier.
Thing Name	Set thing name
Certification Authority (root certificate)	Select File Upload

Device Certificate	Select File Upload
Device Private Key	Select File Upload
Publish Topic	The subject name used by MQTT to publish messages. The subject name is used to identify which information channel the payload data should be published to. The subject name in the published message cannot contain wildcards.
Publish Period(s)	More than 60s
Publish only changed data	Whether to enable publishing only data that has changed during the cycle
Shadow data select	Shadow control data point selection from None, All Data, Select Data Points
Data packing	Whether to enable data packaging. Disable means one message sent one data point
Number of data	Number of data points published in one message
Connect state	After clicking "Save and Apply", you can see whether the connection to AWS is successful or not.

5.2.5.4 HUAWEI Cloud

BL200M
Status
System
Settings
UI Module
Serial Module
Operation Control
Cloud platform
Logout

Huawei cloud settings

Huawei cloud settings

Enable ☐

Authentication method: Device Secret

Device ID

Secret Key

Service ID

Region ID: CN North-Shanghai

Publish Period(s)

Publish only changed data ☐

Data packing ☒ Send multiple data in one message

Number of data: 20

Connect State: Not connected

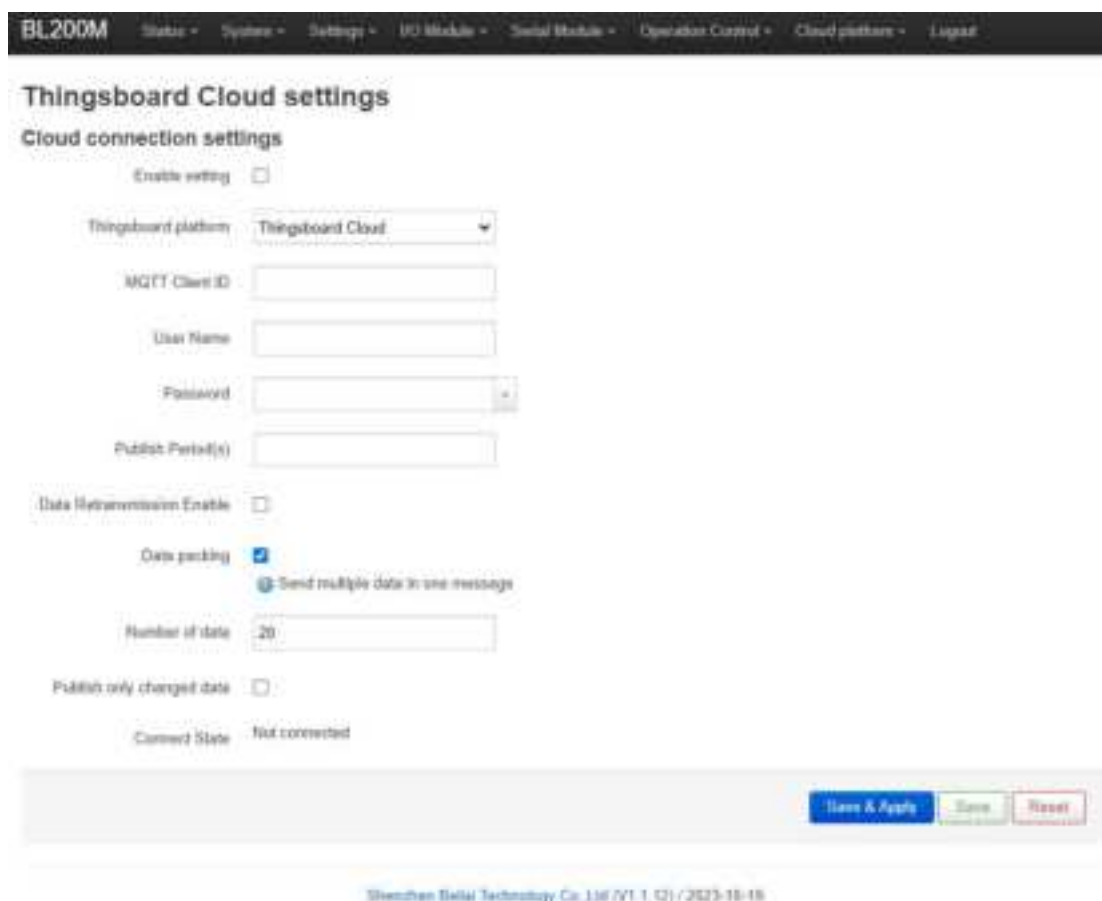
Save & Apply Save Reset

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HUAWEI Cloud Connection	
Item	Description
Enable	Check to enable
Authentication Method	"Device Secret" and "X.509"
Device ID	Huawei Cloud Device ID
Secret key	Password entered when creating the device certificate, you can refer to the HUAWEI CLOUD help document to create a test certificate
Service ID	Products need to create services to report data
Region ID	Device region, select Other to fill in the IP address
Publish Period(s)	More than 60s
Certification authority (root certificate)	Root certificate provided by Huawei cloud, displayed when X509 certificate is selected as the authentication method.
Device certificate	Device certificate deviceCert.pem, upload to /etc/conf directory and select the file, displayed when X509 certificate is selected as the authentication method.

Device key	Device key/deviceCert.key, upload to/etc/conf directory and select the file, displayed when X509 certificate is selected as the authentication method.
Only publish changed data	Whether to enable publishing only data that has changed during the cycle
Data packing	Whether to enable data packaging. Disable means one message sent one data point
Number of data	Number of data points published in one message
Connect state	After clicking "Save and Apply", you can see whether the connection to HUAWEI cloud is successful or not.

5.2.5.5 ThingsBoard



Thingsboard Connection	
Item	Description
Enable Setting	Check to enable
Thingsboard platform	Choose from "ThingsBoard Cloud",

	"Other ThingsBoard Servers".
MQTT Client ID	The client identifier used in the MQTT connection message, the server uses the client identifier to identify the client, and each client connected to the server has a unique client identifier.
User Name	The username used for MQTT connection messages, which the server can use for authentication and authorization.
Password	The password used for MQTT connection messages, which the server can use for authentication and authorization.
Publish Period(s)	More than 60s
Data Retransmission Enable	Check to enable data retransmission
Data Packing	Whether to enable data packaging. Disable means one message sent one data point
Number of data	Number of data points published in one message
Only publish changed data	Whether to enable publishing only data that has changed during the cycle
Connect State	After clicking "Save and Apply", you can see whether the connection to Thingsboard is successful or not.

6 Fieldbus Communication Example

6.1 BL207 Coupler Communication Example

6.1.1 Yabe Acquiring Data From BL207

1. Prepare I/O modules: BL207 coupler, digital output module, digital input module, analog input module, analog output module.

2. BL207 coupler and PC in the same LAN, BL207 coupler IP for 192.168.1.253 as an example, IP address selection switch selection reference 5.1.3.3 IP address selection switch. The dip switch dialing code is shown below:



3. The web configuration can keep the defaults or modify the device ID, port number, device name, device description, and location parameters.



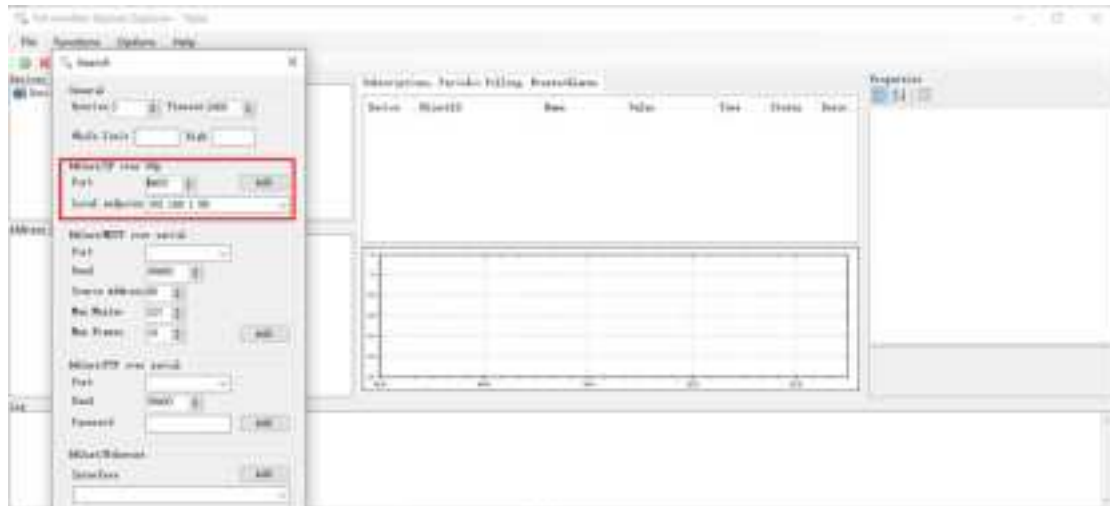
The screenshot shows the BL2008N web configuration interface. The top navigation bar includes links for Status, System, Settings, IO Module, BACnet, and Logout. The main content area is titled "BACnet settings" and contains a form with the following fields:

- Port: 47888
- Device name: BL207
- Device ID: 688
- Device Description: BACnet IO Module
- Location: CN

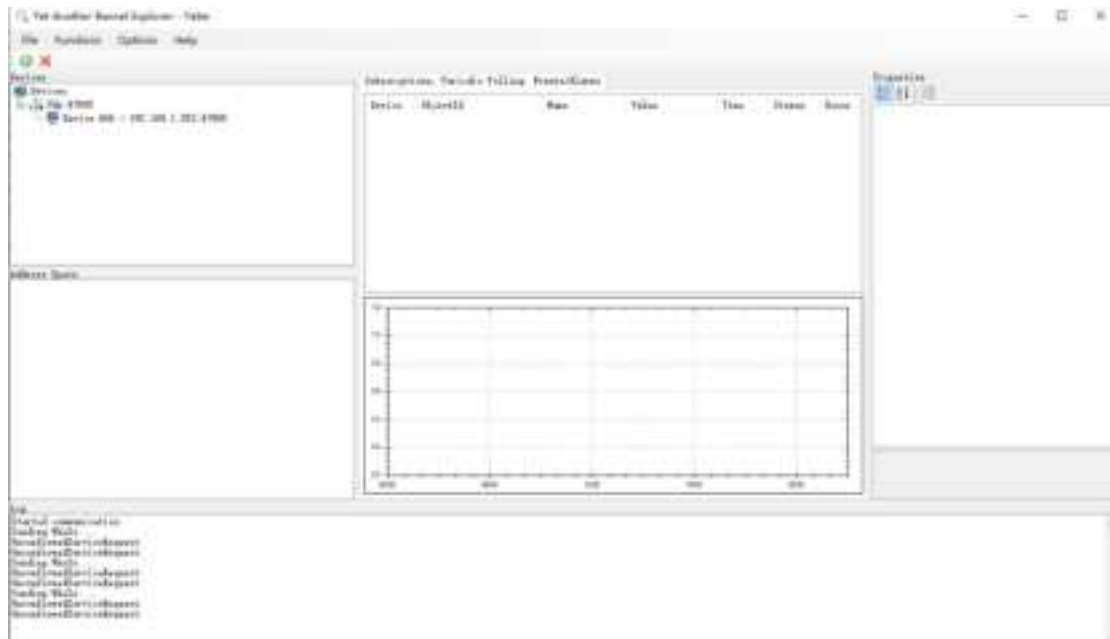
At the bottom right of the form are three buttons: "Save & Apply", "Save", and "Reset". Below the form, the footer text reads "Shenzhen Beilai Technology Co., Ltd (V1.1.12) / 2023-10-18".

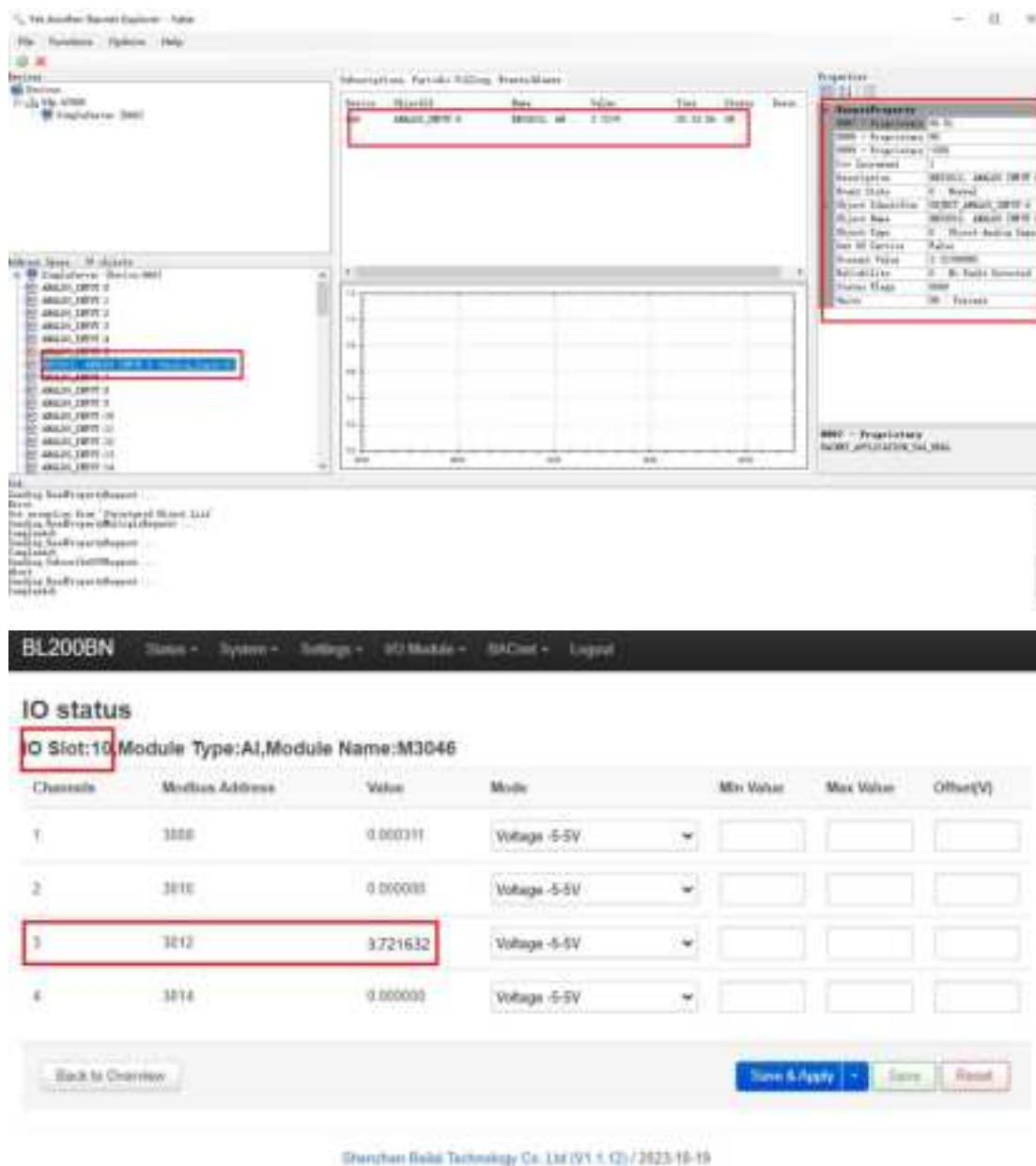
4. Open Yabe, click "Devices", right mouse button, select "Add device", a configuration box will pop up, configure the BACnet/IP parameters, the port number is the same as the port number of BL207 BACnet IP settings, select the IP of the computer where the host computer is located, click "Add".





5. Automatically search for BACnet/IP devices on LAN, click on the searched device, read all the data points of the device, click on the read data point, drag it to the middle box to show the value of the data point, and the right box displays the attributes of the data point. For example, click "Analog Input 6" (corresponding to the third channel of the second AI) to see the current value of "3.72823".





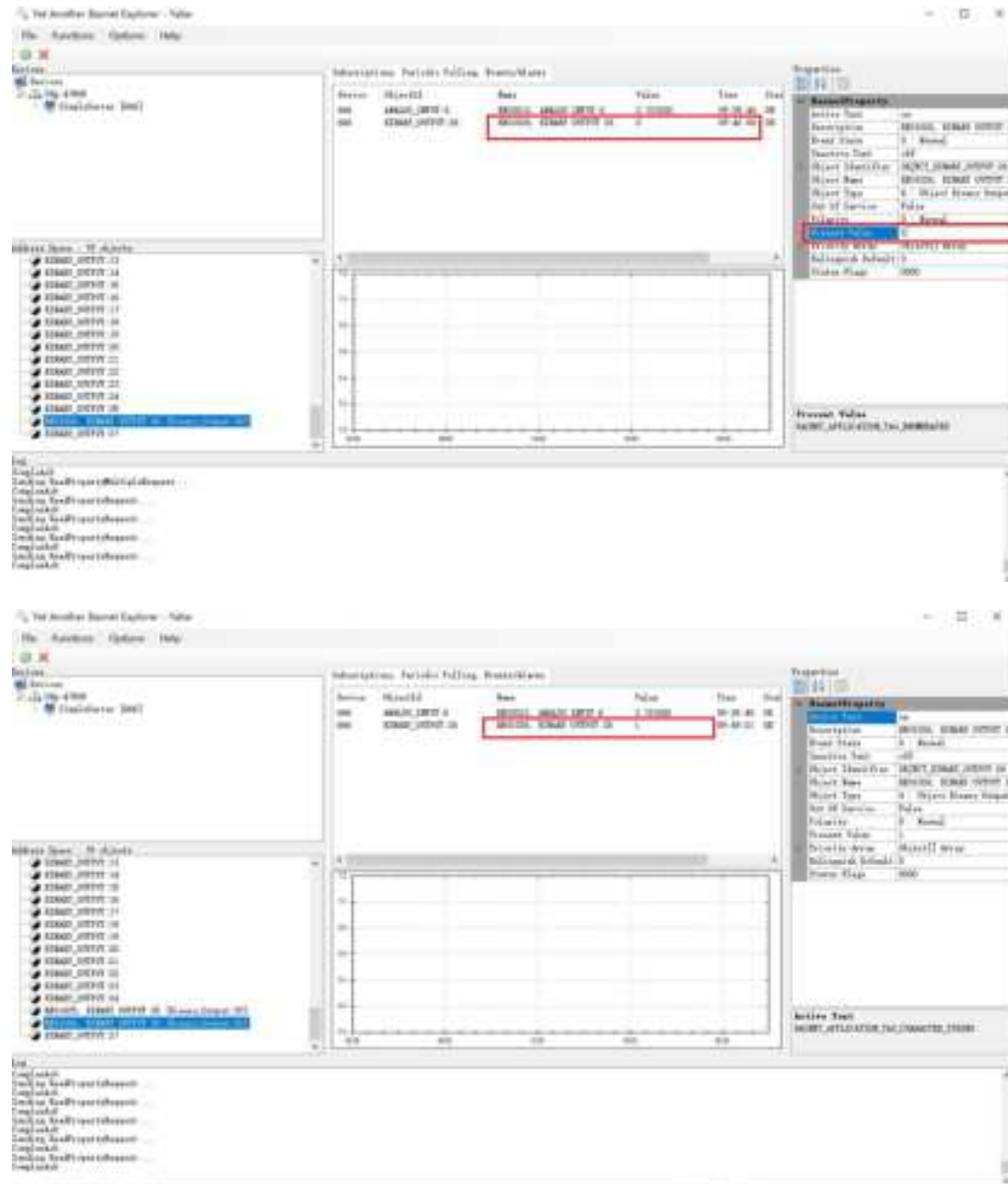
6. The BI, BO, AI, and AO instance objects are the corresponding DI, DO, AI, and AO sorted relative to each other, respectively. As shown in the figure below, the 3rd channel of M2044 in slot 8 is Binary Output, 26 (data point attribute description is REG1026), and there are three 8-channel DOs in front of it, then $3 \times 8 = 24$, $24 + 3 = 27$, and the DOs are sorted as the 27th channel, and the instance object of BO in BACnet/IP starts from "0", and then the instance object of the 27th channel is "26". For example, the M1082 in slot 7 has a sequencing of 31 for channel 7 (the front slot has three 8-way DIs, so $3 \times 8 = 24$, $24 + 7 = 31$), which corresponds to a Binary Input, 30 (described as REG2030). Such as card slot 15 of the M5023 first sort of 13-way (in front of two 4-way AI and two 2-way RTD, then $2 \times 4 = 8$, $2 \times 2 = 4$, $8 + 4 + 1 = 13$), corresponding to the Analog Input, 12 (the description of the REG3024, one way AI

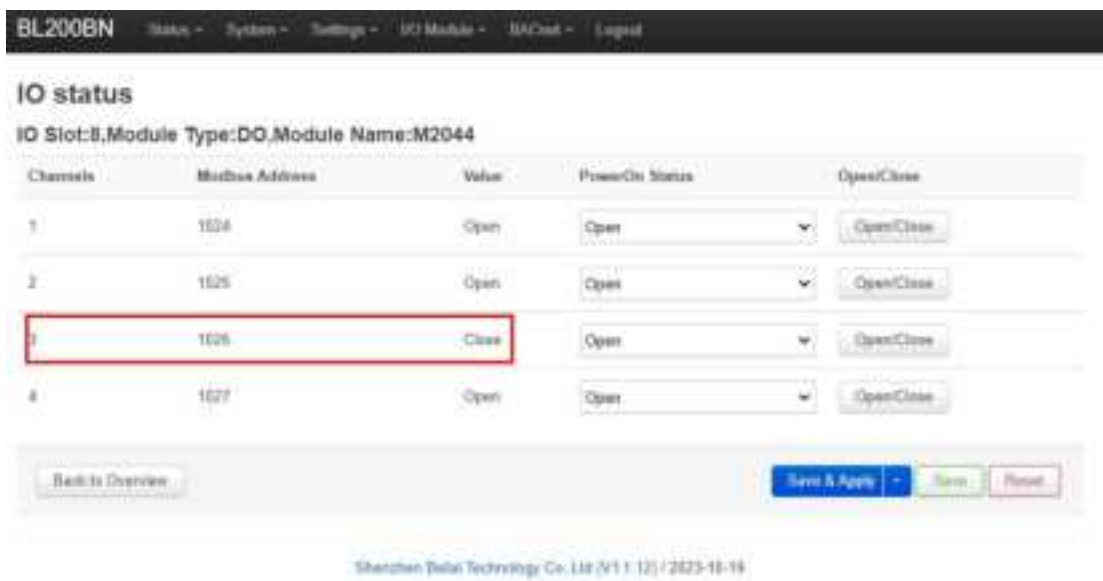
accounted for 2 registers).

BL200BN Status System Settings IO Module BACnet Logout								
IO status								
IO Slot	Module Name	Module Type	Channel Number	Module Address	24V Address State	Sci Version	IO Status	Channel Status
1	M2002	DO	8	1000-1007	9001-Power On	29	Normal	<button>Channel Status</button>
2	M2002	DO	8	1008-1015	9002-Power On	29	Normal	<button>Channel Status</button>
3	M2001	DO	8	1016-1023	9003-Power On	29	Normal	<button>Channel Status</button>
4	M1001	DI	8	2000-2007	9004-Power On	29	Normal	<button>Channel Status</button>
5	M1001	DI	8	2008-2015	9005-Power On	29	Normal	<button>Channel Status</button>
6	M1002	DI	8	2016-2023	9006-Power On	29	Normal	<button>Channel Status</button>
7	M1002	DI	8	2024-2031	9007-Power On	29	Normal	<button>Channel Status</button>
8	M2044	DO	4	1024-1027	9008-Power On	29	Normal	<button>Channel Status</button>
9	M2045	AI	4	3000-3006	9009-Power On	29	Normal	<button>Channel Status</button>
10	M2046	AI	4	3006-3014	9010-Power On	29	Normal	<button>Channel Status</button>
11	M4031	AO	4	4000-4006	9011-Power On	29	Normal	<button>Channel Status</button>
12	M4033	AO	4	4008-4014	9012-Power On	29	Normal	<button>Channel Status</button>
13	M5021	RTD	2	3016-3018	9013-Power On	29	Normal	<button>Channel Status</button>
14	M5022	RTD	2	3020-3022	9014-Power On	29	Normal	<button>Channel Status</button>
15	M5023	RTD	2	3024-3026	9015-Power On	29	Normal	<button>Channel Status</button>
16	M5049	RTD	4	3028-3034	9016-Power On	29	Normal	<button>Channel Status</button>

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7. Control DO, such as control Binary Output, 26 closed (card slot 8 of the M2044 3rd), click on "Binary Output, 26", in the right side of the "BacnetProperty" - "Present Value" to fill in the value of "1", press the keyboard "Enter" key to determine or in the blank space left mouse button.





6.2 BL207Pro Coupler Communication Example

BL207Pro Communication Example BACnet/IP communication can be referred to 6.1 BL207 Coupler Communication Example, OPC UA connection can be referred to BL205 Coupler Communication Example, and MQTT connection can be referred to BL206 Coupler Communication Example.

6.2.2 OPC UA Communication Example

6.2.2.1 UaExpert and BL205 Communication

BL205 coupler to collect DI, DO, AI module, security policy select basic128rsa15, select the signature and encryption method, data format according to the customized information model way, refer to an information model as an example. Data can also be directly uploaded in the format of BLIIoT.

6.2.1.1.1 OPC UA Web Page Configuration



The screenshot displays the 'OPC UA settings' web page for the BL200UA device. The page includes the following fields and options:

- OPC UA name:** BL200 OPC UA Server
- Port:** 4840
- Security Policy:** Basic128Rsa15
- Message Security Mode:** Signing and Encryption
- Certificate:** [Select File] (shows: select_certificate.pem (10 KB))
- Private key:** [Select File] (shows: select_private_key.pem (10 KB))
- Allow Anonymity:** ☐
- Username:** BL200
- Password:** [Masked]
- Color select:** Informational Model
- Model file url:** [Select File] (shows: select_model_file.xml (10 KB))
- Dependent model file:** One Model File
- Dependent model url:** [Select File] (shows: select_model_url.xml (10 KB))

At the bottom right, there are buttons for 'Save & Apply', 'Cancel', and 'Reset'. The footer indicates 'Shenzhen Beilai Technology Co., Ltd (V1.0.11) | 2022-09-17'.

Steps:

- (1) Fill in the OPC UA name, which can be customized to facilitate the OPC UA client to search and distinguish different OPC UA servers. For example: fill in "BL205 OPC UA Server".
- (2) The port number of the OPC UA server, default: 4840.
- (3) Security policy selection. For example, choose basic128rsa15.
- (4) Message security mode selection. For example, choose Signing and Encryption.
- (5) Upload the certificate and key, click "Select File" > click "Upload File" > select your certificate or key file, click Open > After it is displayed in the file name box, click Upload file > After uploading the file successfully The file you uploaded will be displayed in the box, click the certificate or key file you uploaded > then your certificate or key file will be displayed in the certificate or key item.
- (6) Whether to allow anonymity, because of the use of signature and encryption methods, allow anonymity is not checked.
- (7) Fill in the username and password. The client needs to fill in the username and password when connecting.

(8) Select the data, because the user-defined information model is used, so choose the "information model".

(9) Upload the information model file. The upload method is the same as uploading the certificate or key file. The uploaded file is an xml file.

(10) Depends on the model file, whether there is a reference model, and how many references are there.

(11) Dependent model: Upload the model you refer to. The upload method is the same as uploading the certificate or key file. The upload is an xml file.

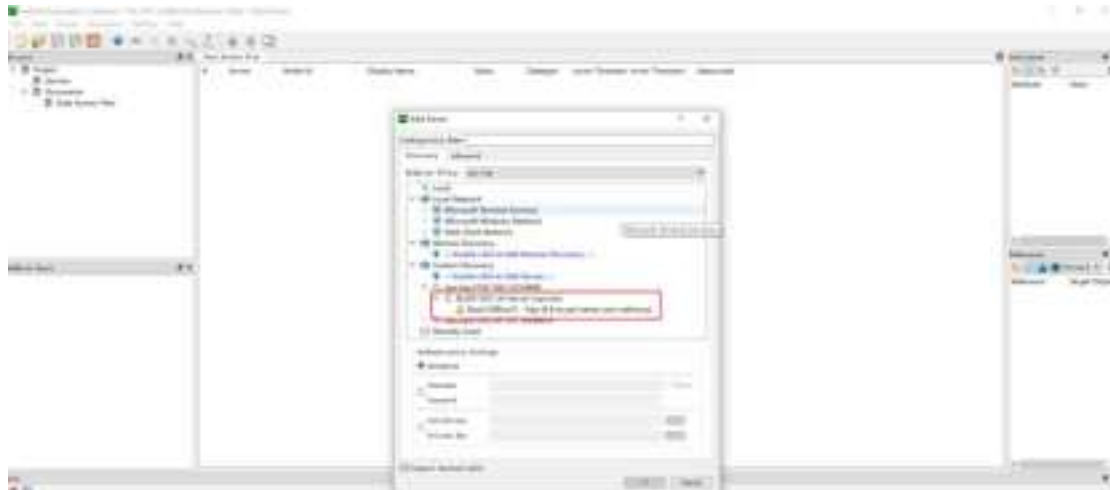
(12) Click "Save and Apply".

6.2.1.1.2 Send and Receive Data Using UaExpert Client

Open UaExpert (OPC UA client) and enter the OPC UA server IP and port.



Click Search, click the searched OPC UA server, and click basic128rsa15 for Signature and Encryption.

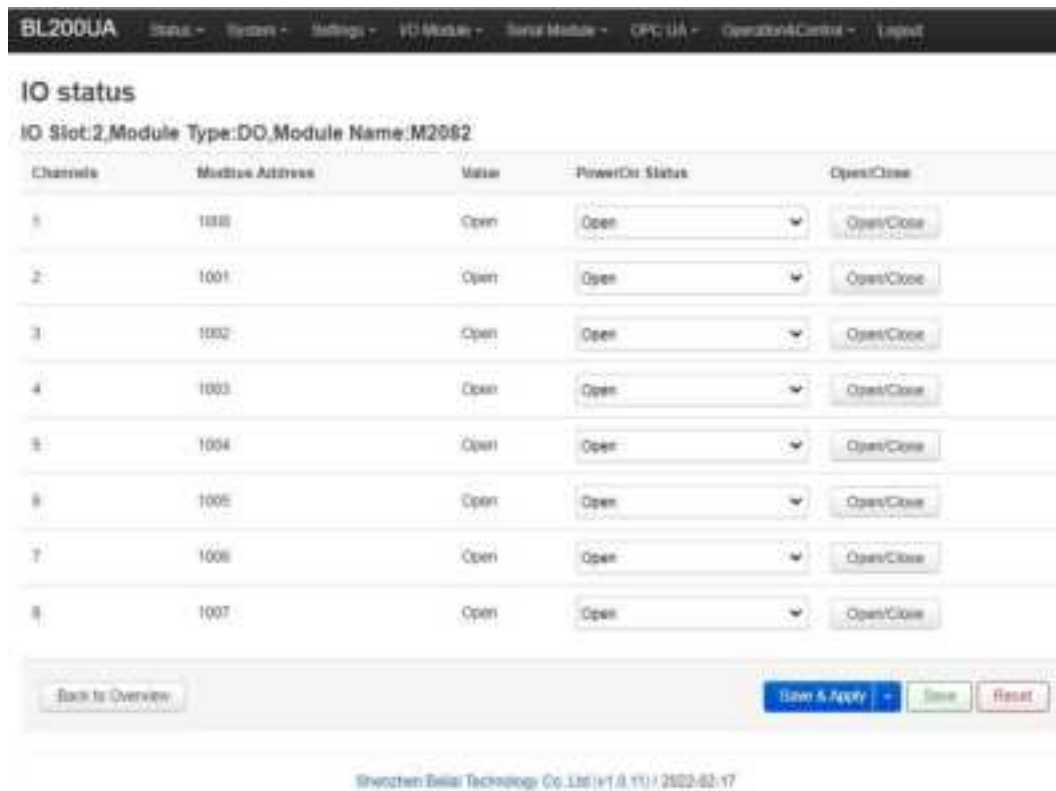




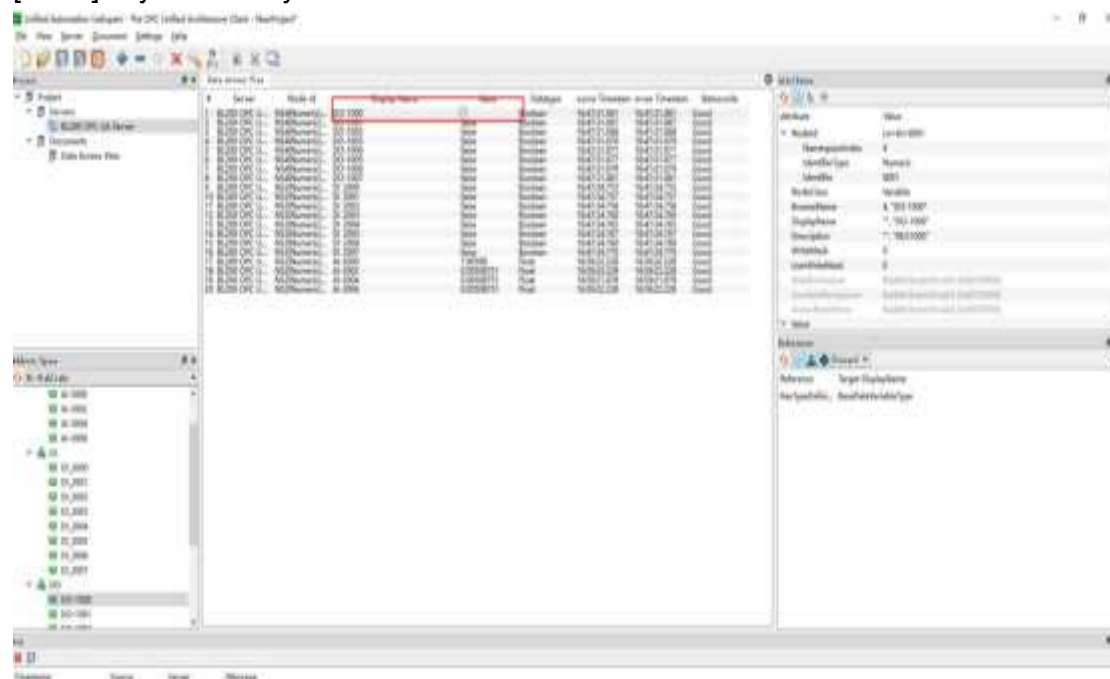
The screenshot shows the Autodesk Revit MEP software interface. The main window displays a table of data for various equipment types, including Air Handling Units (AHU), Fan Coil Units (FCU), and Radiators. The table columns include Equipment Type, Equipment Name, Equipment Size, Equipment Location, Equipment Status, and Equipment Notes. The left sidebar shows the Project Browser with the Data Access View selected. The right sidebar shows the Properties palette for the selected equipment type.

Equipment Type	Equipment Name	Equipment Size	Equipment Location	Equipment Status	Equipment Notes
AHU	AHU-001	1000	Room 101	Active	
AHU	AHU-002	1000	Room 102	Active	
AHU	AHU-003	1000	Room 103	Active	
AHU	AHU-004	1000	Room 104	Active	
AHU	AHU-005	1000	Room 105	Active	
AHU	AHU-006	1000	Room 106	Active	
AHU	AHU-007	1000	Room 107	Active	
AHU	AHU-008	1000	Room 108	Active	
AHU	AHU-009	1000	Room 109	Active	
AHU	AHU-010	1000	Room 110	Active	
AHU	AHU-011	1000	Room 111	Active	
AHU	AHU-012	1000	Room 112	Active	
AHU	AHU-013	1000	Room 113	Active	
AHU	AHU-014	1000	Room 114	Active	
AHU	AHU-015	1000	Room 115	Active	
AHU	AHU-016	1000	Room 116	Active	
AHU	AHU-017	1000	Room 117	Active	
AHU	AHU-018	1000	Room 118	Active	
AHU	AHU-019	1000	Room 119	Active	
AHU	AHU-020	1000	Room 120	Active	
AHU	AHU-021	1000	Room 121	Active	
AHU	AHU-022	1000	Room 122	Active	
AHU	AHU-023	1000	Room 123	Active	
AHU	AHU-024	1000	Room 124	Active	
AHU	AHU-025	1000	Room 125	Active	
AHU	AHU-026	1000	Room 126	Active	
AHU	AHU-027	1000	Room 127	Active	
AHU	AHU-028	1000	Room 128	Active	
AHU	AHU-029	1000	Room 129	Active	
AHU	AHU-030	1000	Room 130	Active	
AHU	AHU-031	1000	Room 131	Active	
AHU	AHU-032	1000	Room 132	Active	
AHU	AHU-033	1000	Room 133	Active	
AHU	AHU-034	1000	Room 134	Active	
AHU	AHU-035	1000	Room 135	Active	
AHU	AHU-036	1000	Room 136	Active	
AHU	AHU-037	1000	Room 137	Active	
AHU	AHU-038	1000	Room 138	Active	
AHU	AHU-039	1000	Room 139	Active	
AHU	AHU-040	1000	Room 140	Active	
AHU	AHU-041	1000	Room 141	Active	
AHU	AHU-042	1000	Room 142	Active	
AHU	AHU-043	1000	Room 143	Active	
AHU	AHU-044	1000	Room 144	Active	
AHU	AHU-045	1000	Room 145	Active	
AHU	AHU-046	1000	Room 146	Active	
AHU	AHU-047	1000	Room 147	Active	
AHU	AHU-048	1000	Room 148	Active	
AHU	AHU-049	1000	Room 149	Active	
AHU	AHU-050	1000	Room 150	Active	
AHU	AHU-051	1000	Room 151	Active	
AHU	AHU-052	1000	Room 152	Active	
AHU	AHU-053	1000	Room 153	Active	
AHU	AHU-054	1000	Room 154	Active	
AHU	AHU-055	1000	Room 155	Active	
AHU	AHU-056	1000	Room 156	Active	
AHU	AHU-057	1000	Room 157	Active	
AHU	AHU-058	1000	Room 158	Active	
AHU	AHU-059	1000	Room 159	Active	
AHU	AHU-060	1000	Room 160	Active	
AHU	AHU-061	1000	Room 161	Active	
AHU	AHU-062	1000	Room 162	Active	
AHU	AHU-063	1000	Room 163	Active	
AHU	AHU-064	1000	Room 164	Active	
AHU	AHU-065	1000	Room 165	Active	
AHU	AHU-066	1000	Room 166	Active	

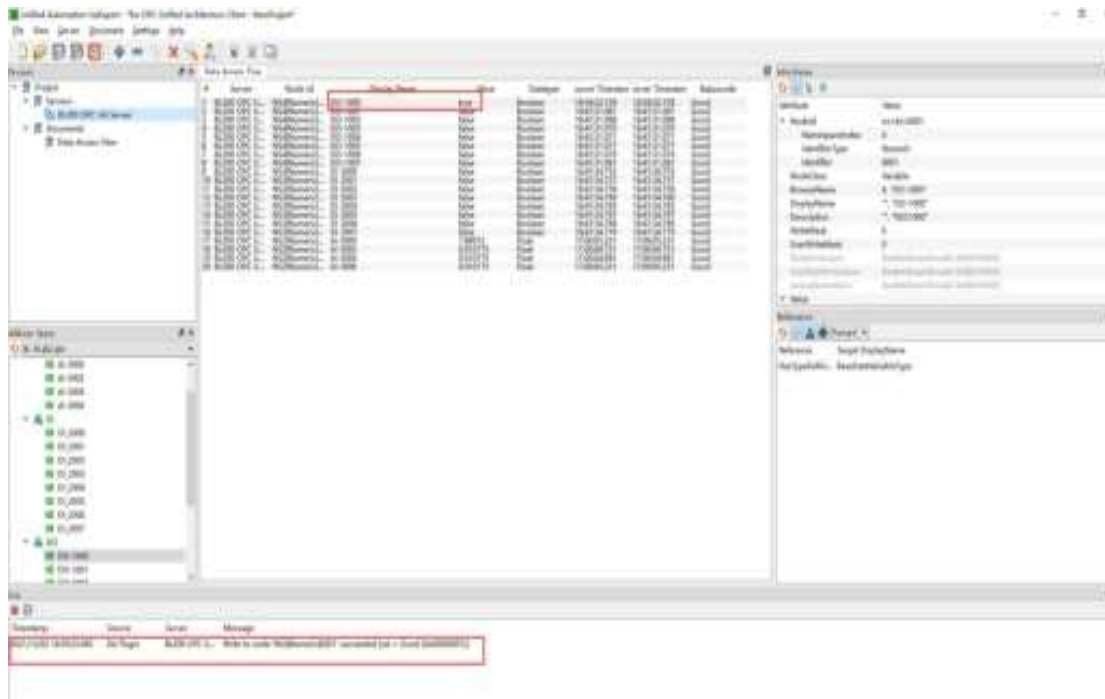
Take the following data point DO-1000 as an example



Click the value of the DO-1000 data point, it turned out to be false, there is no √ in the square, click once to put √, click the left mouse button in the blank space or press the [Enter] key on the keyboard.



The OPC UA client will send a message successfully. Because the server responds quickly, you can see that the value has changed to "true".



Check the DO status in the web configuration of BL205. DO1 is also changed from the original open to close.

BL200UA									
IO status									
IO Slot	Module Name	Module Type	Channel Number	Modbus Address	24V Address	State	Soft Version	IO Status	Channel Status
1	M1001	DI	8	2000-2007	9001	Power Off	5	Normal	Channel Status
2	M1002	DO	8	1000-1007	9002	Power Off	5	Normal	Channel Status
3	M1003	AI	4	3000-3003	9003	Power Off	5	Normal	Channel Status
4	M1004	AO	4	4000-4003	9004	Power Off	5	Normal	Channel Status
5	M1005	COM	2	0-5	9005	Power Off	5	Normal	Channel Status

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BL200UA
Status
System
Settings
IO Module
Serial Module
OPC UA
Operation&Control
Logout

IO status

IO Slot:2,Module Type:DO,Module Name:M2082

Channels	Modbus Address	Value	PowerOn Status	Open/Close
1	1000	Close	Open	Open/Close
2	1001	Open	Open	Open/Close
3	1002	Open	Open	Open/Close
4	1003	Open	Open	Open/Close
5	1004	Open	Open	Open/Close
6	1005	Open	Open	Open/Close
7	1006	Open	Open	Open/Close
8	1007	Open	Open	Open/Close

Back to Overview
Save & Apply
Save
Reset

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6.2.2 MQTT Communication Example

6.2.1.1 Connecting BL206 to a Custom MQTT

Cloud connection settings

Cloud platform
Custom Cloud

Cloud Name
custom MQTT cloud

Host IP or Domain
192.168.1.1

Port
1883

MQTT Client ID

User Name

Password

Encryption
No encryption

Publish data format
Default data format

Publish Topic
/BeLai/BL206/Data/

Subscribe Topic
/BeLai/BL206/Down

Publish Period(s)
60

Publisher QOS
0-At most once

Data Retransmission Enable
☒

Publish Module Status
☒

Data packing
☒

Send multiple data in one message

Number of data
100

Publish only changed data
☐

Dismiss

Save

BL200M

Status

System

Settings

I/O Module

Serial Module

Operation Control

Cloud platform

Login

Cloud connection settings

Cloud connection settings

Cloud Name	Host IP or Domain	Port	Publish Period(s)	Connect State	Enable	
custom MQTT cloud	192.168.1.1	1883	60	Connected	☒	Edit Delete

Add

Save & Apply

Save

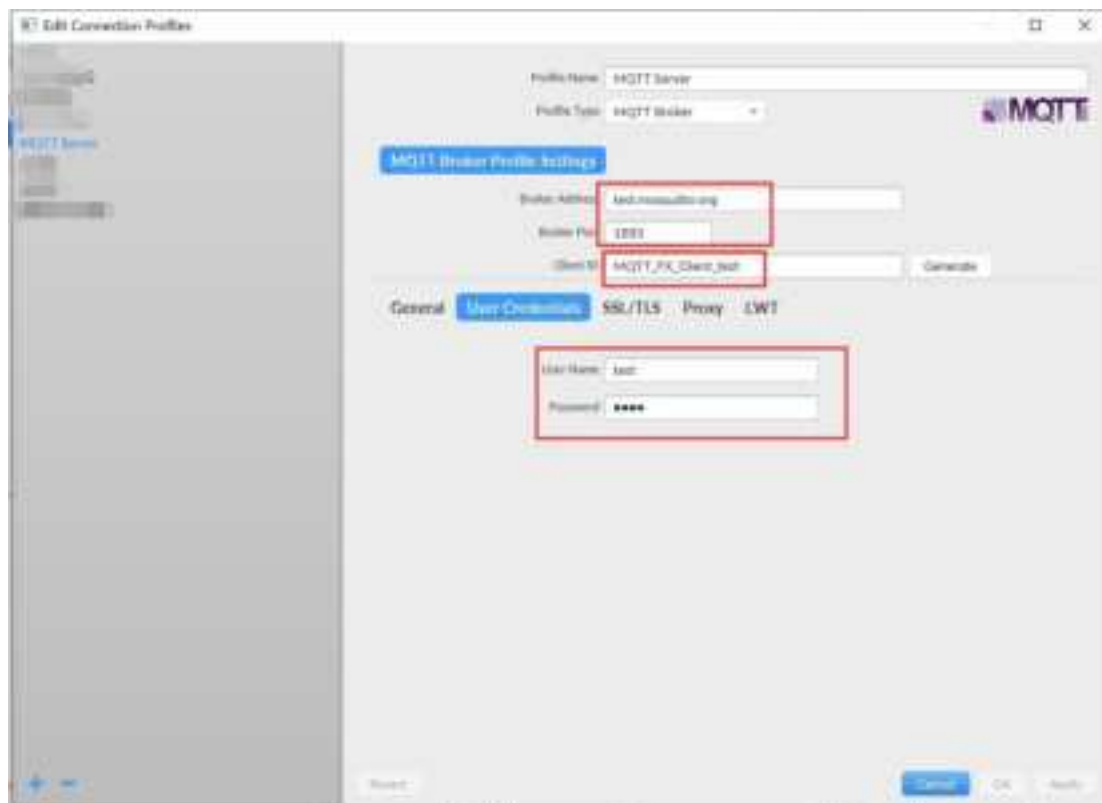
Reset

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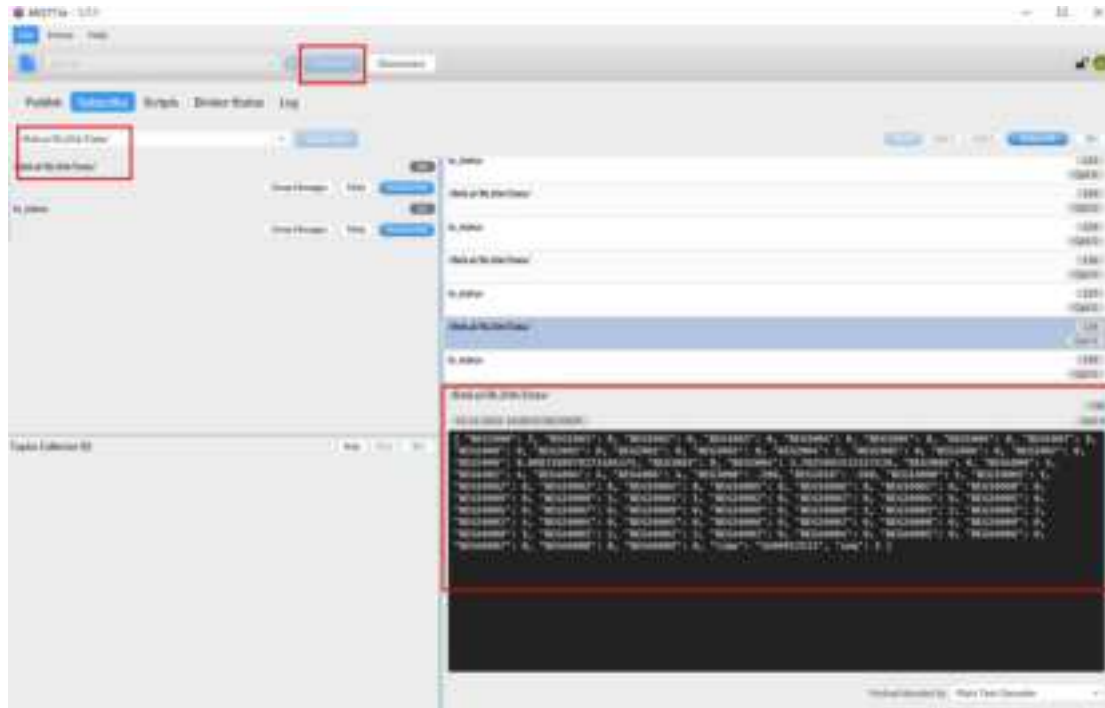
Instructions: 1. Click "Cloud Platform" - "Custom Cloud" 2. Click "Add" button to bring up the cloud platform configuration box. 3. Configure various configurations, refer to 5.2.5.1 Cloud Connection Settings for the description of each item. 4. Click "Save" to

save the configuration. 5. Click "Save and Apply" to send the configuration to the BL206 coupler and check the connection status. Check the connection status, you can check whether the connection is successful or not.

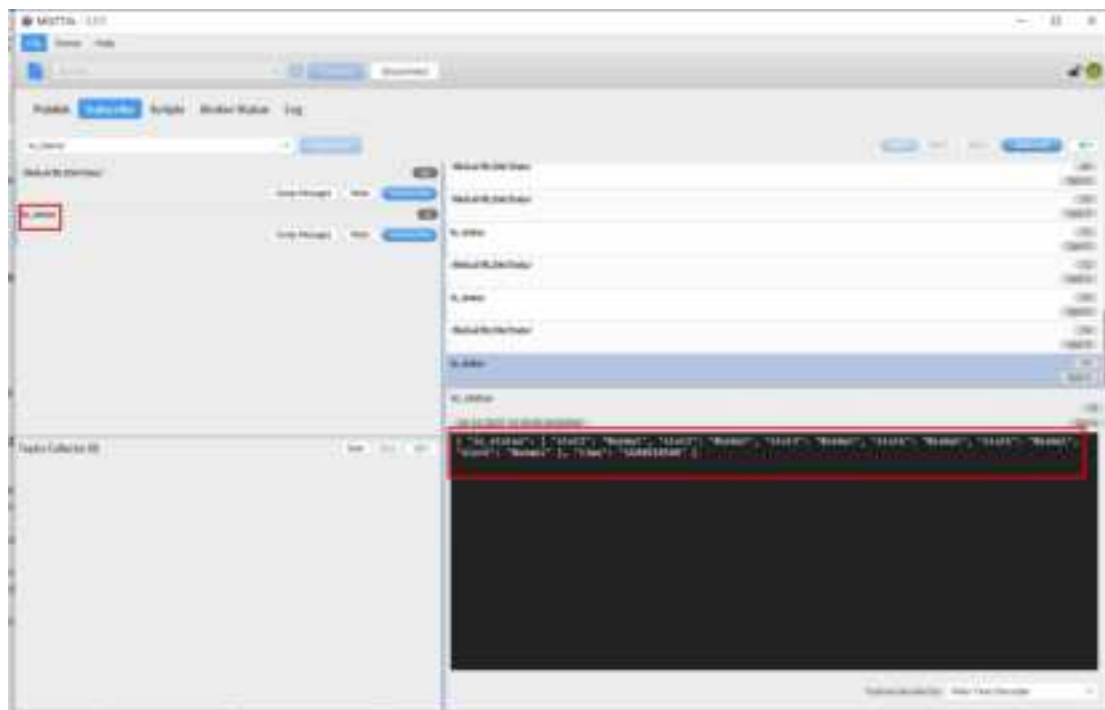
6.2.2.2 View and Send Data with MQTT.fx



The Client ID cannot be the same as the Client ID filled in on the BL206. Click "connect" to subscribe to the publish topic "/BeiLai/BL206/Data/" of the customized MQTT cloud configuration on BL206, and all the data is shown in the figure below. For identifier description and data format, refer to Note 7.1 Data Publish Format.

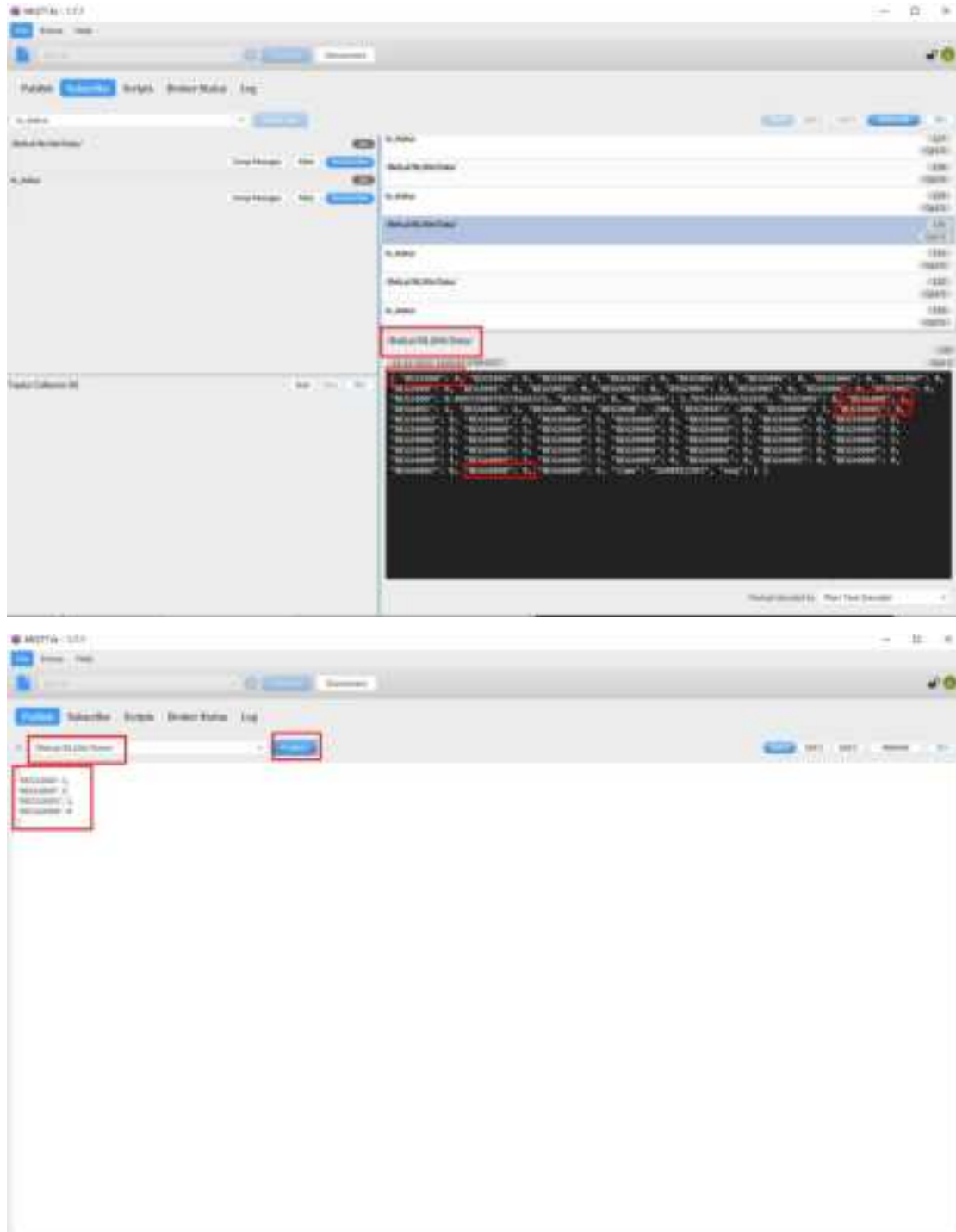


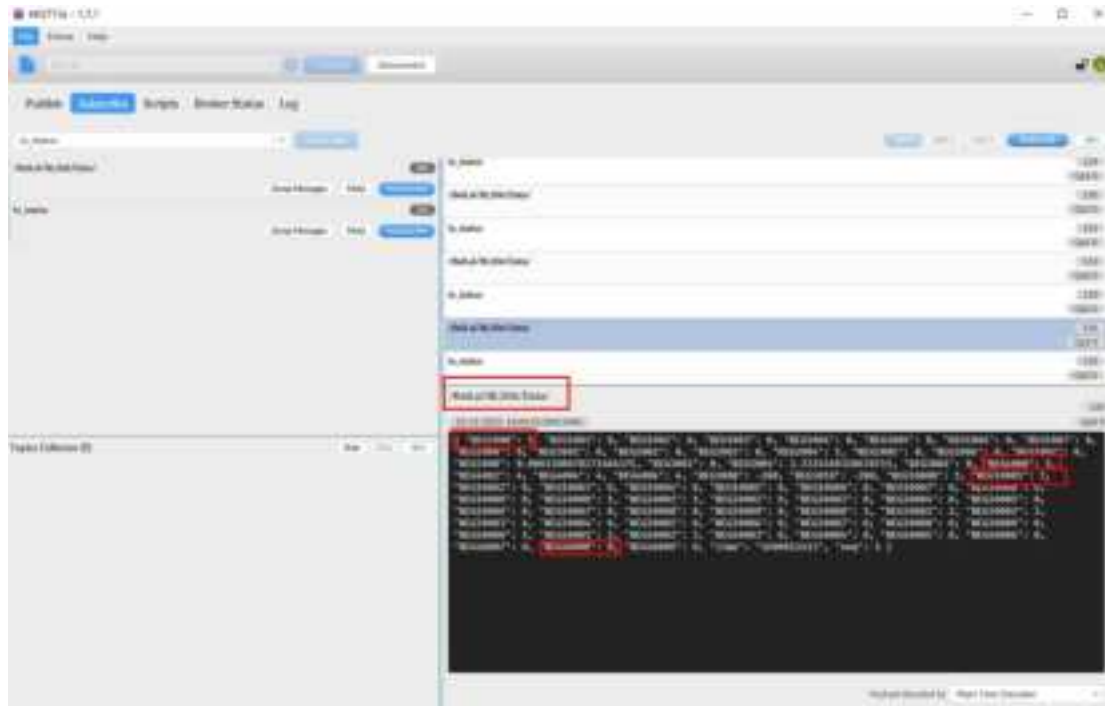
The IO module status message is a separate fixed topic "io_status" that allows you to see if the slot is abnormal.



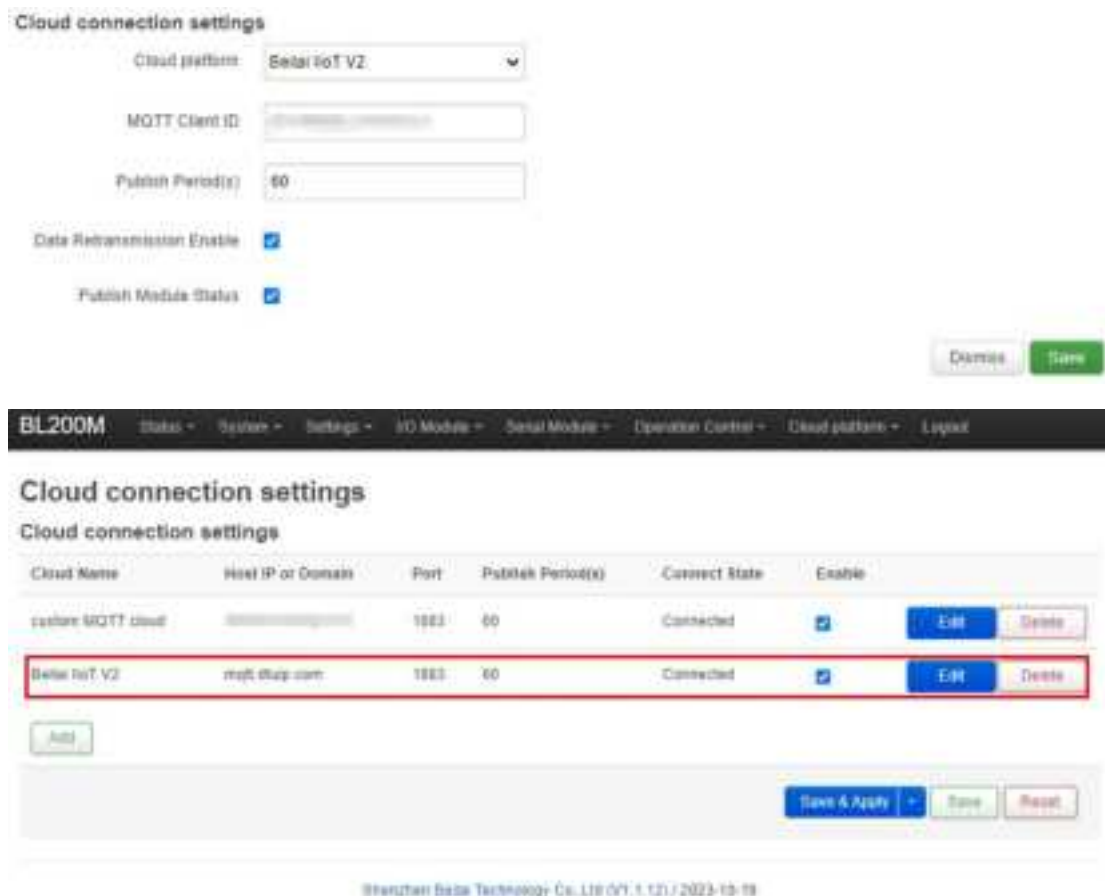
MQTT.fx publish control BL206, the publish topic is BL206 custom MQTT cloud configuration subscribe topic "/BeiLai/BL206/Down" data format reference 7.2 Subscribe Data Format.

Control DO1 closed, REG1000 is "1", AO1 output 5, "REG4000" is "5", the data collected by the serial port, REG10001 is "1", REG40008 is "8".





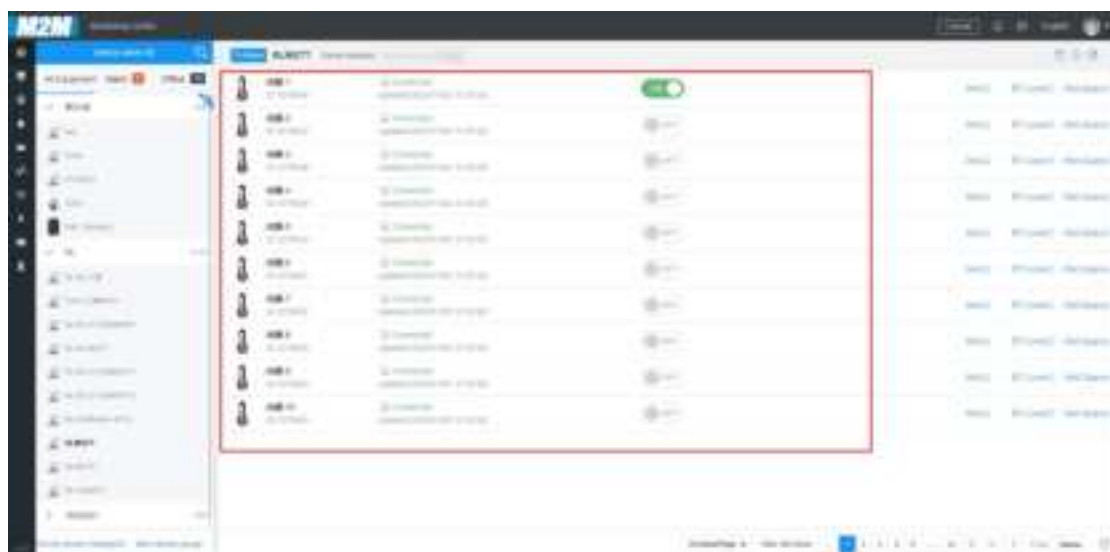
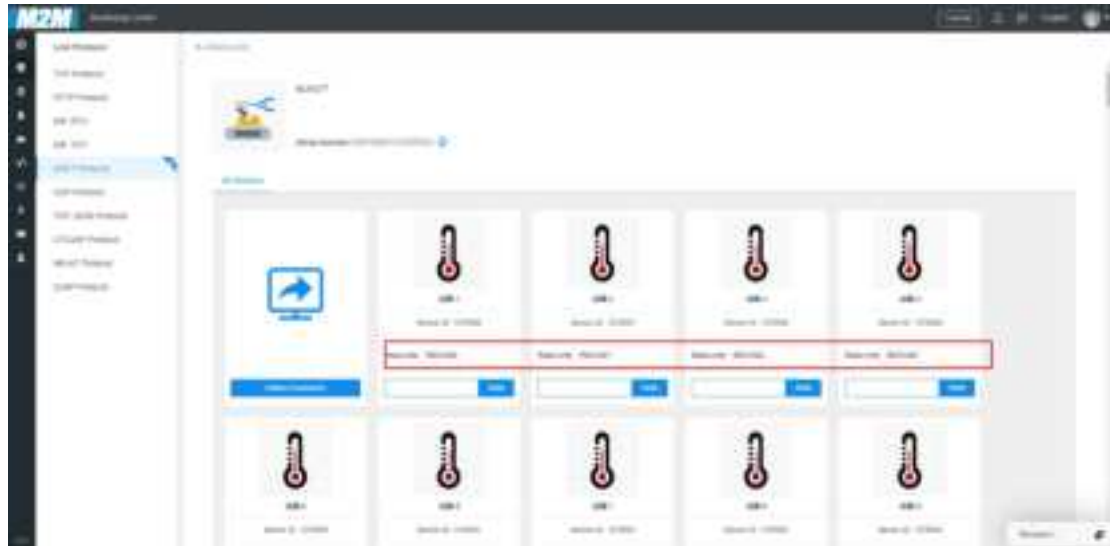
6.2.2.3 Connecting BL206 to BLIIoT Cloud

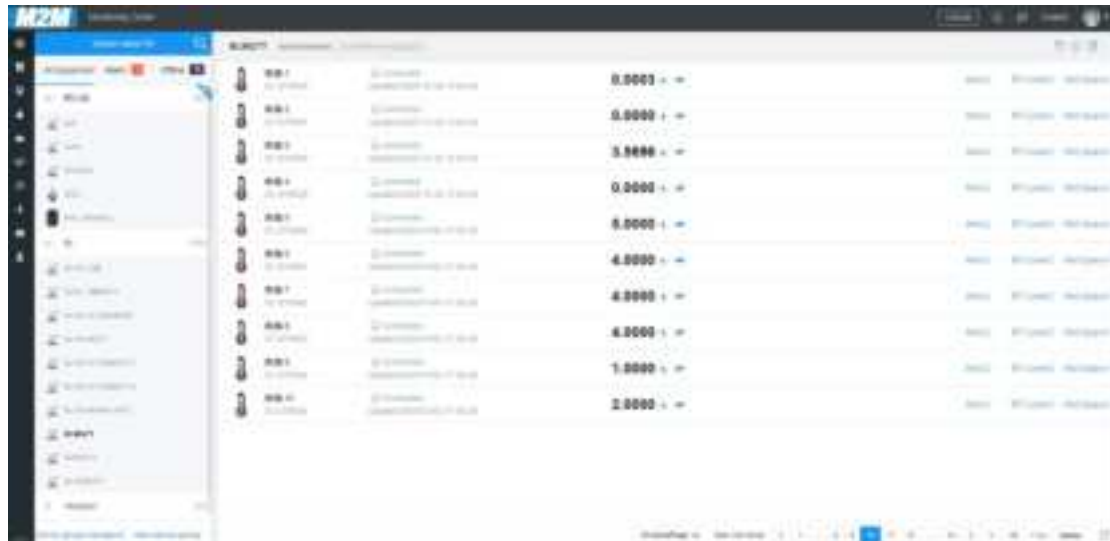


Instructions: 1, Click "cloud platform" - "custom cloud" 2, click on the "Add" button, the pop-up cloud platform configuration box. 3, Select "Beilai IIoT V2", the client ID is BLIIoT cloud platform serial number, fill in the upload period of 60s. 4, Click "Save" to save the configuration. 5, Click "Edit", click "Save" again. 6, Click "Save and Apply", send the configuration to BL206, check the connection status, you can check whether the connection is successful.

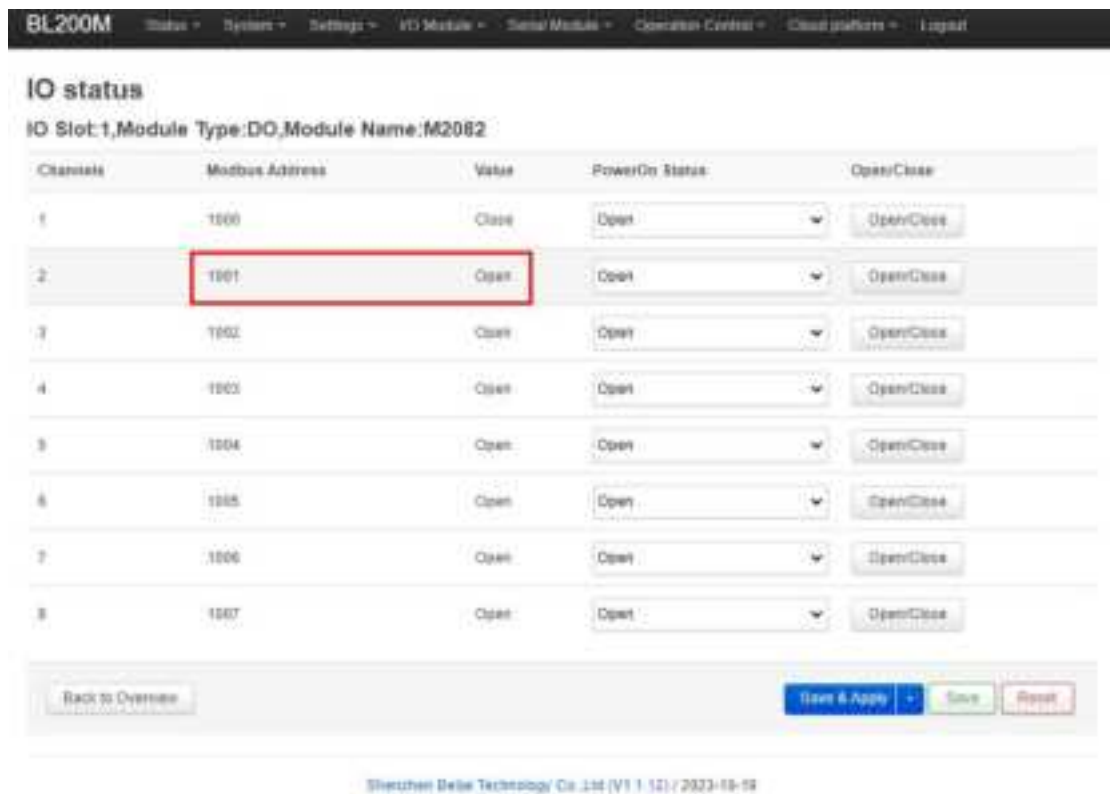
6.2.2.4 BLIIoT Cloud View and Send Data

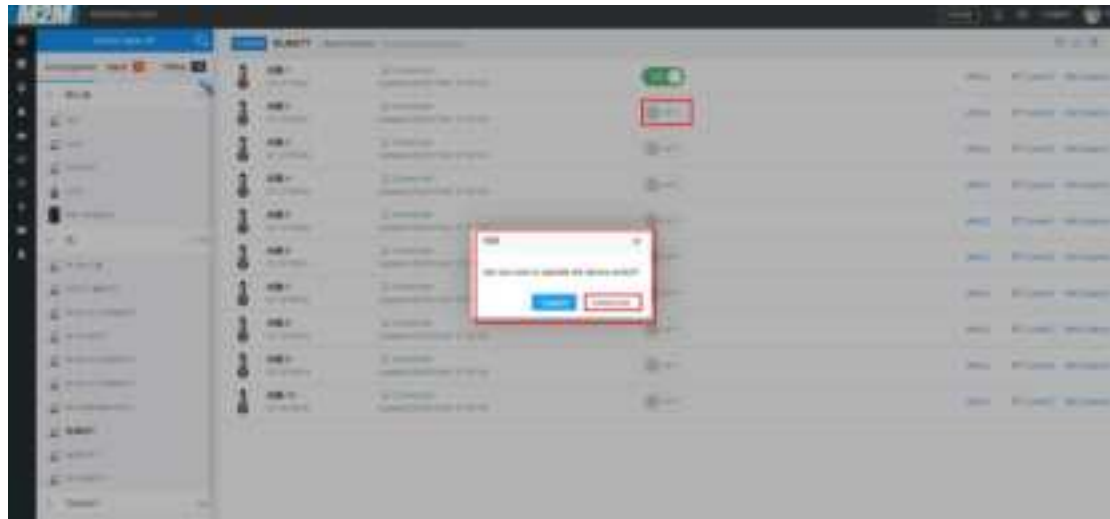
Log in BLIIoT cloud, domain name: www.my-m2m.com. After creating the device, configure the link protocol data point read and write identification can refer to 7.1 Data Publish Format.





Send data: Control DO2 closed, the data collected by the serial port mapping address 40005 corresponding to the data point send "10".





BL200M Status - System - Settings - **IO Module** - Serial Module - Operation Control - Cloud platform - Logout

IO status

IO Slot:1,Module Type:DO,Module Name:M2082

Channels	Modbus Address	Value	PowerOn Status	Open/Close
1	1000	Close	Open	Open/Close
2	1001	Close	Open	Open/Close
3	1002	Open	Open	Open/Close
4	1003	Open	Open	Open/Close
5	1004	Open	Open	Open/Close
6	1005	Open	Open	Open/Close
7	1006	Open	Open	Open/Close
8	1007	Open	Open	Open/Close

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Save & Apply Save Reset

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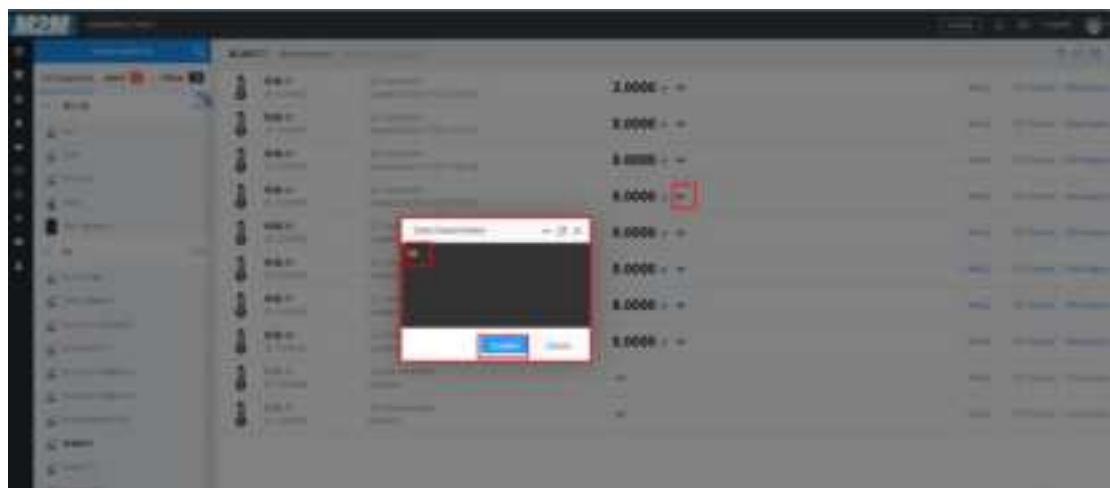
BL200M Install System Settings IO Module Serial Module Operation Control Cloud platform Logout

Modbus Query

Configure Name	Slave Address	Function Code	Mapping Address	Register Address	Data Type	Data Value	COM Port
03	1	3	40000	0	INT16-AB	1	COM1
03	1	3	40001	1	INT16-AB	2	COM1
03	1	3	40002	2	INT16-AB	3	COM1
03	1	3	40003	3	INT16-AB	0	COM1
03	1	3	40004	4	INT16-AB	0	COM1
03	1	3	40005	5	INT16-AB	0	COM1
03	1	3	40006	6	INT16-AB	0	COM1
03	1	3	40007	7	INT16-AB	0	COM1
03	1	3	40008	8	INT16-AB	0	COM1
03	1	3	40009	9	INT16-AB	0	COM1

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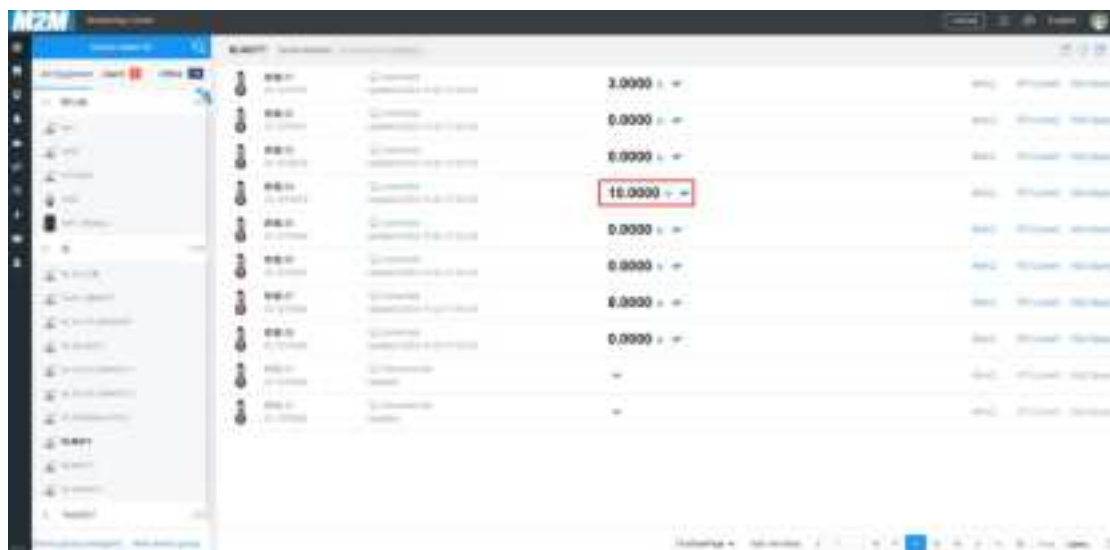
EL200M

Modbus Query

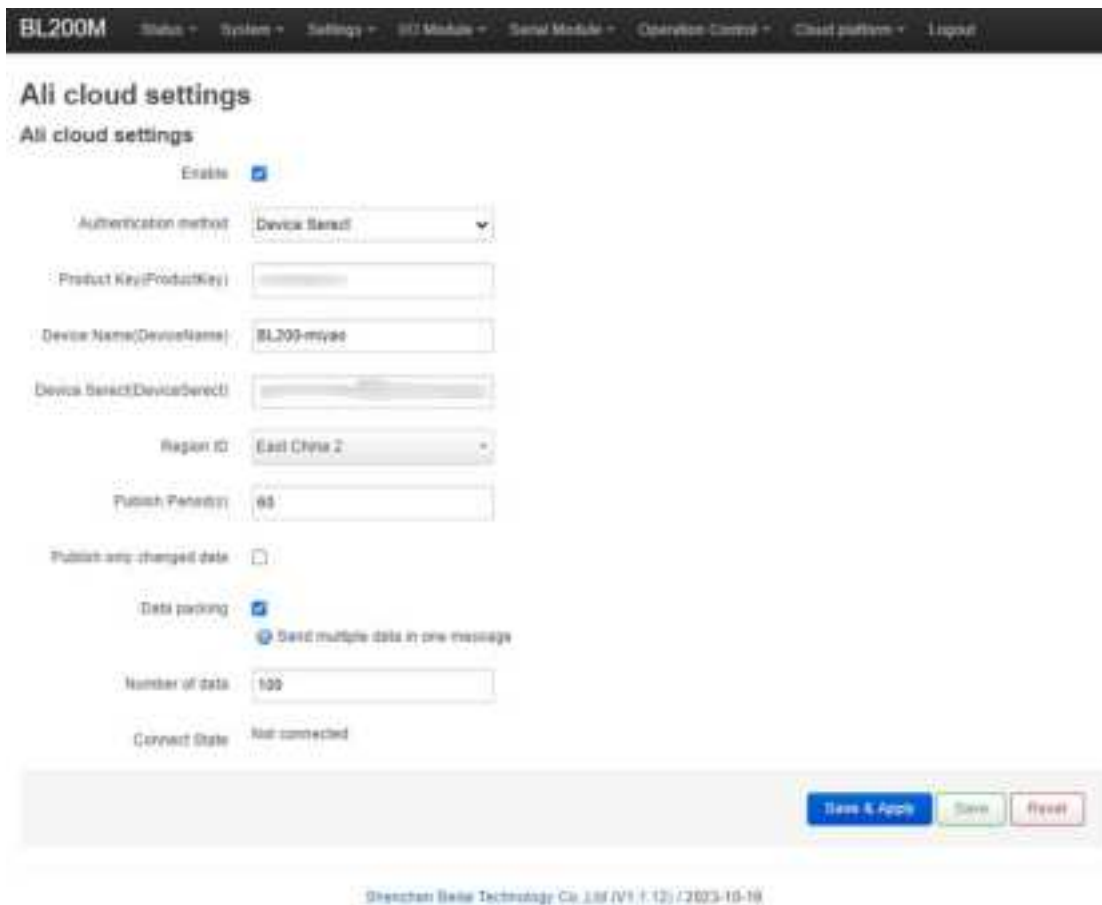
Configure Name	Slave Address	Function Code	Mapping Address	Register Address	Data Type	Data Value	COM Port
E3	1	3	40000	0	INT16 AE	1	COM1
E3	1	3	40001	1	INT16 AE	2	COM1
E3	1	3	40002	2	INT16 AE	3	COM1
E3	1	3	40003	3	INT16 AE	0	COM1
E3	1	3	40004	4	INT16 AE	0	COM1
E3	1	3	40005	5	INT16 AE	18	COM1
E3	1	3	40006	6	INT16 AE	0	COM1
E3	1	3	40007	7	INT16 AE	0	COM1
E3	1	3	40008	8	INT16 AE	0	COM1
E3	1	3	40009	9	INT16 AE	0	COM1

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6.2.2.5 Connecting BL206 to AliCloud



BL200M Status System Settings IOT Module Serial Module Operation Control Cloud platform Logout

Ali cloud settings

Ali cloud settings

Enable ☒

Authentication method: Device Secret

Product Key(ProductKey):

Device Name(DeviceName): BL209-miyad

Device Secret(DeviceSecret):

Region ID: East China 2

Publish Period: 60

Publish any changed data: ☐

Data packing: ☒ Send multiple data in one message

Number of data: 100

Connect State: Not connected

Save & Apply Save Reset

Shenzhen Beilai Technology Co., Ltd (V1.1.2) / 2023-10-10

1. Click "Cloud Platform"->"Alicloud". 2. Click "Enable" and select "Device Secret Key" as the authentication method. 3. "Product Secret Key", "Device Name", "Device Secret" and the content of the device certificate of Aliyun platform are the same. 4, Select East China 2 for the region, fill in 60s for the release period, and customize the data packages by packing 100 packages each. 5, Click "Save and Apply", and send the configuration to BL206, and you can check the connection status to see whether the connection is successful.

Device Certificate



Device Certificate [Copy](#)

ProductKey [Copy](#)

DeviceName BL200-miyao [Copy](#)

DeviceSecret [Copy](#)

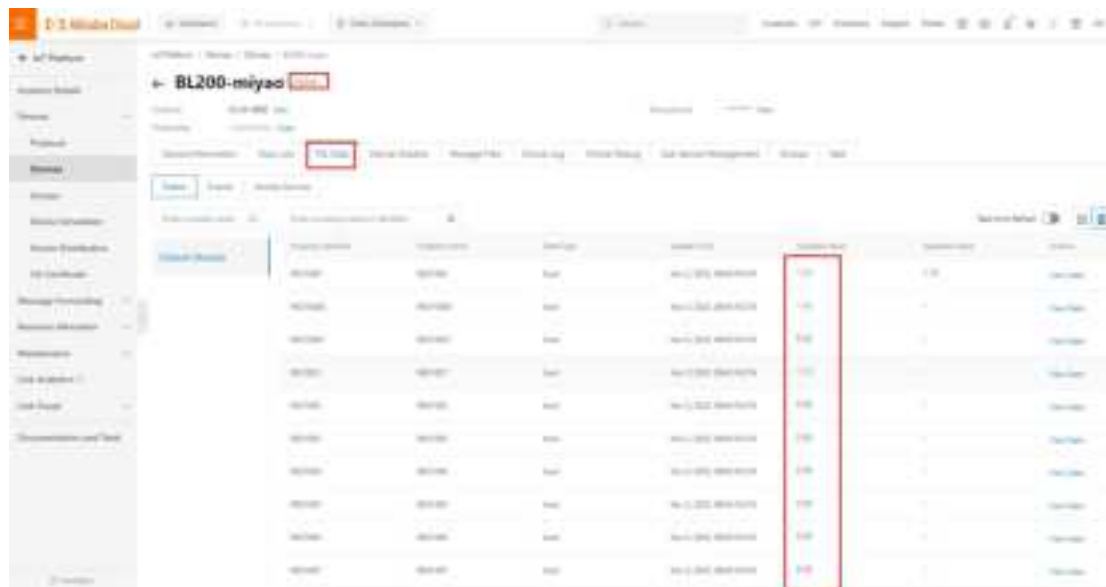
Certificate Installation Modes

✓ [Introduction to the unique-certificate-per-device and unique-certificate-per-product modes](#)

Close

6.2.2.6 View and Send data on AliCloud

Login to Aliyun, click "TSL Data" to view the data, and refer to 7.1 Data Publish Format for data point read/write identification. The data of local I/O and serial port slave are as follows:

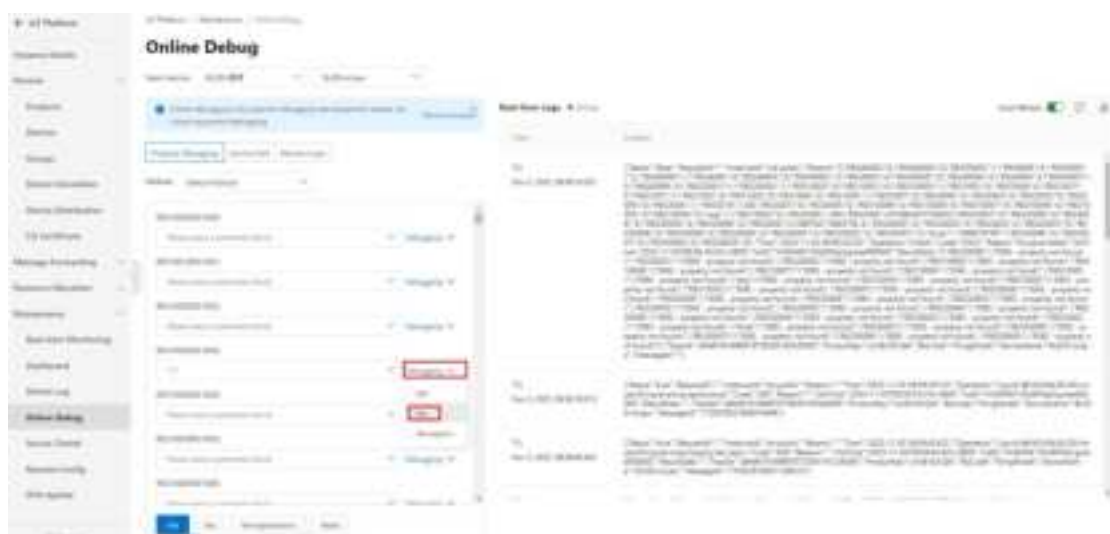
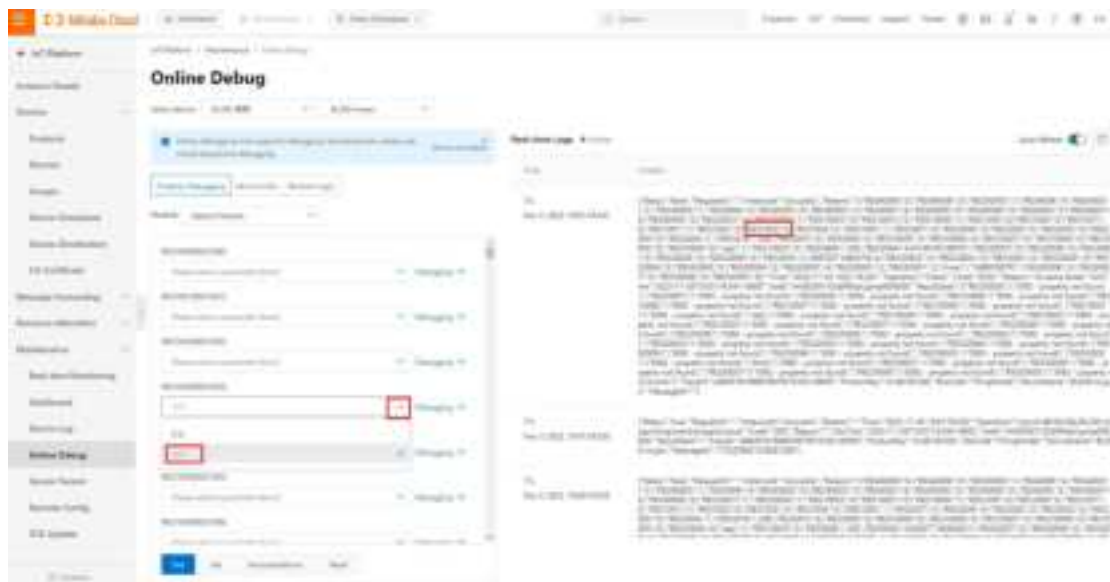


Property Name	Property Value	Data Type	Device ID	Timestamp	Operation	Value
BL200-001	BL200-001	Bool	BL200-001	1611111111111111	Write	1
BL200-002	BL200-002	Bool	BL200-002	1611111111111111	Write	1
BL200-003	BL200-003	Bool	BL200-003	1611111111111111	Write	1
BL200-004	BL200-004	Bool	BL200-004	1611111111111111	Write	1
BL200-005	BL200-005	Bool	BL200-005	1611111111111111	Write	1
BL200-006	BL200-006	Bool	BL200-006	1611111111111111	Write	1
BL200-007	BL200-007	Bool	BL200-007	1611111111111111	Write	1
BL200-008	BL200-008	Bool	BL200-008	1611111111111111	Write	1
BL200-009	BL200-009	Bool	BL200-009	1611111111111111	Write	1
BL200-010	BL200-010	Bool	BL200-010	1611111111111111	Write	1



Address	Value	Description
REG1003	1	...
REG4000	20	...

Send data: I/O REG1003 closed, serial slave REG4000 changed from "1" to "20".



BL200M [Status](#) [System](#) [Settings](#) [IO Module](#) [Serial IO-Link](#) [Operation Control](#) [Cloud profile](#) [Logout](#)

IO status

IO Slot:1,Module Type:DO,Module Name:M2082

Channels	Modbus Address	Value	PowerOn Status	Open/Close
1	1000	Close	Open	<button>Open/Close</button>
2	1001	Close	Open	<button>Open/Close</button>
3	1002	Open	Open	<button>Open/Close</button>
4	1003	Close	Open	<button>Open/Close</button>
5	1004	Open	Open	<button>Open/Close</button>
6	1005	Open	Open	<button>Open/Close</button>
7	1006	Open	Open	<button>Open/Close</button>
8	1007	Open	Open	<button>Open/Close</button>

[Back to Overview](#) [Save & Apply](#) [Save](#) [Reset](#)

Shenzhen Hase Technology Co., Ltd. (V1.1.12) / 2023-10-19

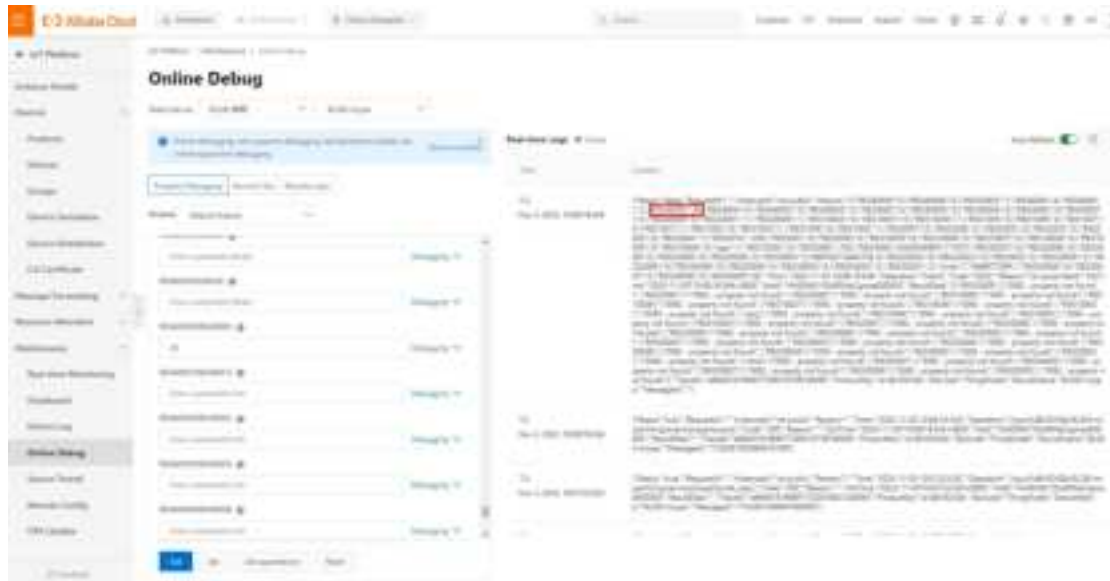
[illegible]

Online Debug

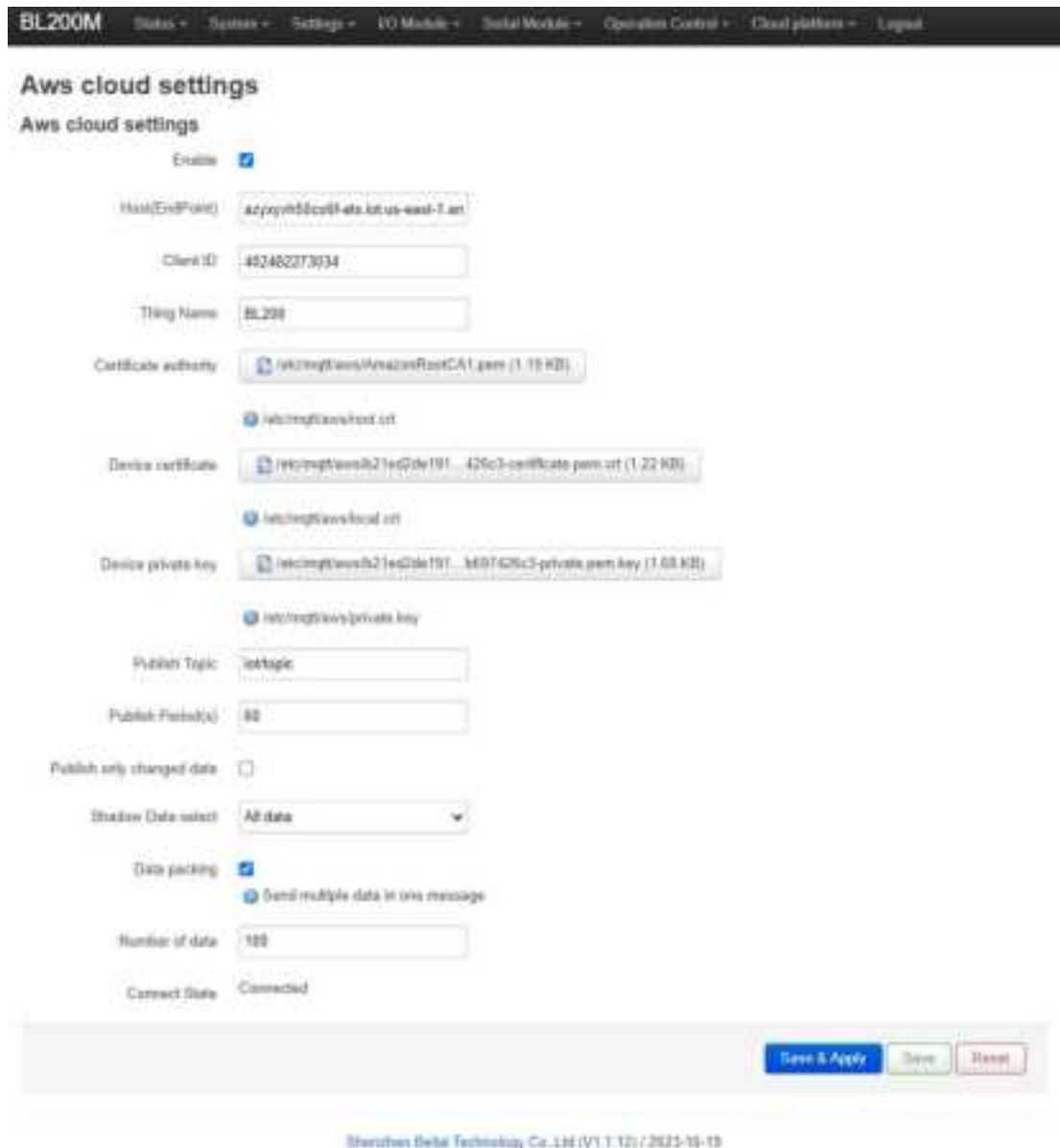
Modbus Query

Configure Name	Slave Address	Function Code	Mapping Address	Register Address	Data Type	Data Value	COM Port
03	1	3	40000	0	INT16 AB	23	COM1
03	1	3	40001	1	INT16 AB	2	COM1
03	1	3	40002	2	INT16 AB	3	COM1
03	1	3	40003	3	INT16 AB	0	COM1
03	1	3	40004	4	INT16 AB	0	COM1
03	1	3	40005	5	INT16 AB	0	COM1
03	1	3	40006	6	INT16 AB	0	COM1
03	1	3	40007	7	INT16 AB	0	COM1
03	1	3	40008	8	INT16 AB	0	COM1
03	1	3	40009	9	INT16 AB	0	COM1

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6.2.2.7 Connecting BL206 to the AWS



Instructions: 1. Click "Cloud Platform"->"AWS Cloud" 2. Click "Enable". 3. End point: Fill in the same node as the end point in "Settings"->"Device Data End Point" of Amazon Cloud Platform.

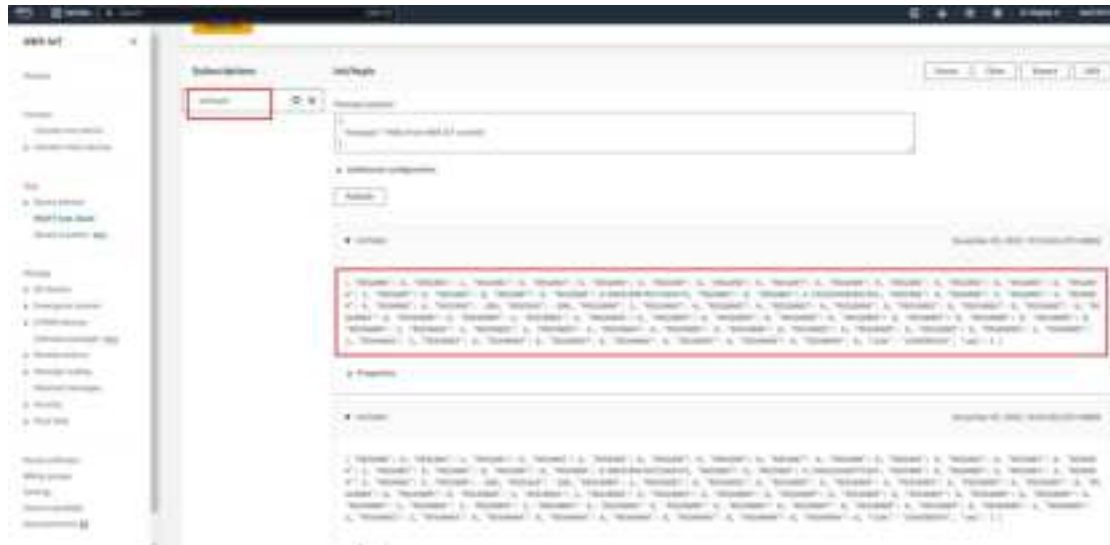


4. Client ID: Fill in the user ID, Thing name: Fill in the thing name created by Amazon.com. 5. Certificate authority, device certificate and device private key are the certificates generated when you upload the thing created by Amazon.com. Download them from Amazon.com. How to upload: Click "Select File"->"Upload File", click the certificate, click the open button in the pop-up window, click "Upload File" in the configuration interface, and upload it to the configuration box. Click "Upload File" in the configuration interface to upload it, select the certificate you need in the box and click it. 6. Publishing topic: Fill in the Amazon platform topic, such as `iot/topic`. 7. Publishing cycle: 60s. 8. Shadow data selection: Amazon platform shadow send to control BL206, do not need to send control, select "no", send control data can choose to support all data or individual data can be controlled. 9. Data packing 100 per package, customized. 10. Click "Save and Apply", send the configuration to BL206, the connection status can be queried whether the connection is successful.

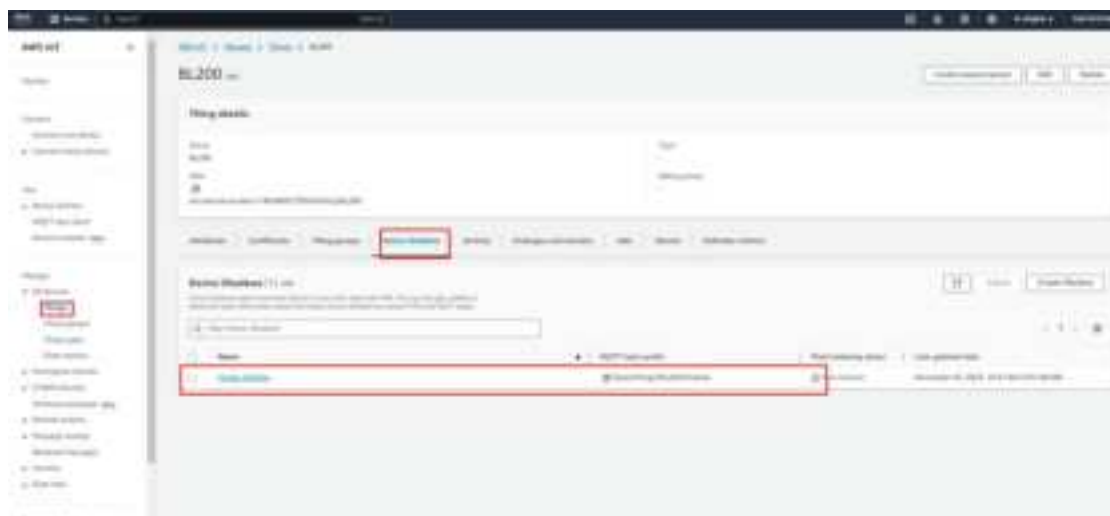
6.2.2.8 AWS View and Send Data

Click "MQTT Test Client" to subscribe to the BL206 Amazon Cloud Configuration publish topic "`iot/topic`".





Shadow control REG1000 closed and slave REG40000 is changed from "1" to "20".





6.2.2.9 Connecting BL206 to Huawei Cloud

BL200M

Status • System • Settings • ID Module • Serial Module • Operation Control • Cloud platform • Logout

Huawei cloud settings

Huawei cloud settings

Enable ☒

Authentication method Device Select ▼

Device ID 070d0e0f0c0e0d0c0b0a09080706050403020100_BL200M

Secret key *****

Service ID BL200

Region ID CN North-Bj4g4 ▼

Publish Period(s) 60

Publish only changed data ☐

Data packing ☒
☒ Send multiple data in one message

Number of data 100

Connect State Connected

Save & Apply

Save

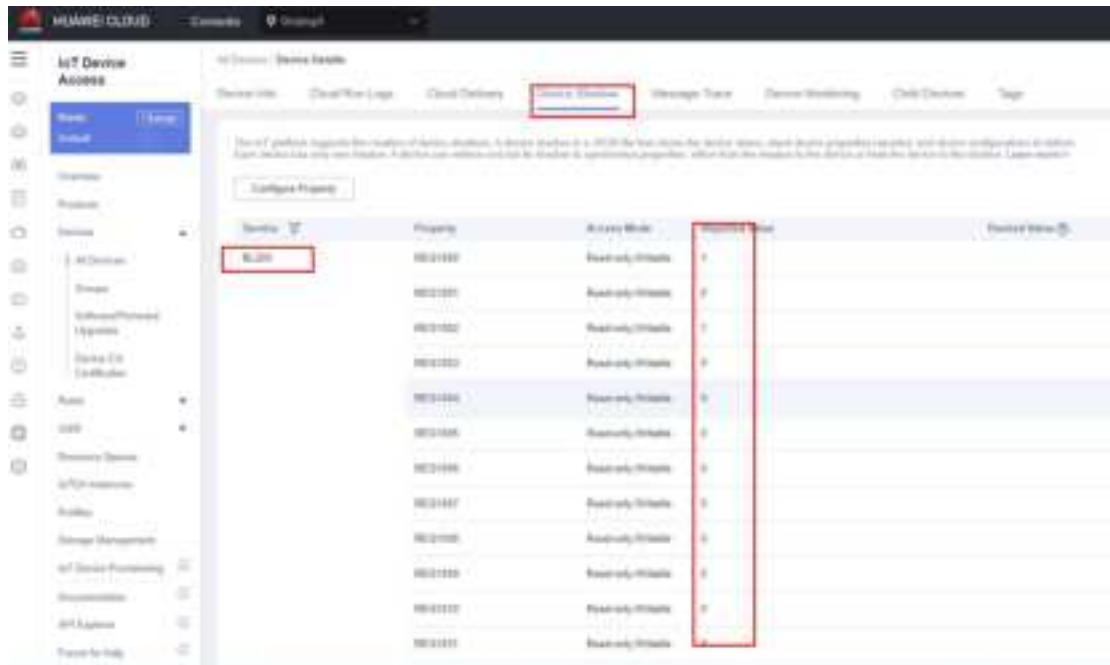
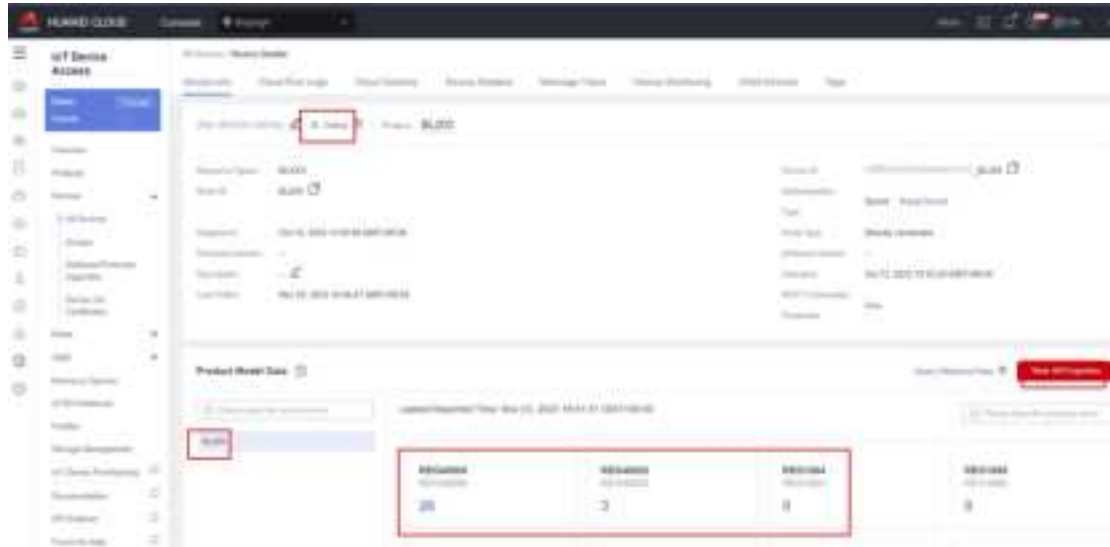
Reset

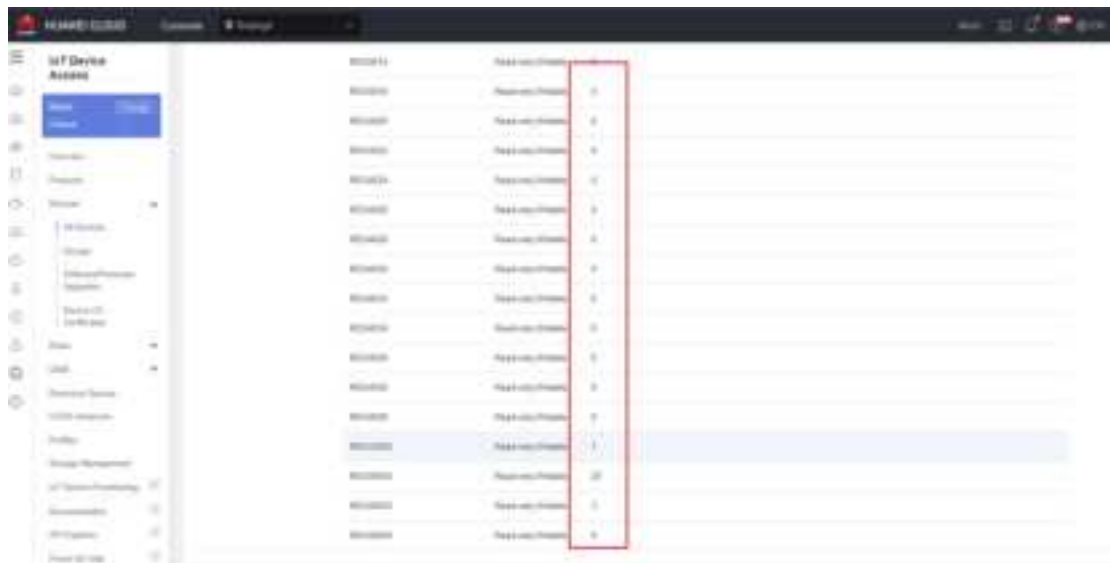
Shenzhen Bial Technology Co., Ltd (V1.1.02) © 2023-10-19

Instructions: 1. Click "Cloud Platform"->"Huawei Cloud". 2. Click "Enable" and select "Device Secret" as the authentication method. 3. Device ID is the same as the device ID of Huawei Cloud Platform, and the key is the password entered by Huawei Cloud Platform to create the device. 4. Service ID is the same as the service ID of Huawei Cloud Platform to create the product. 5. Region ID: Select North China-Beijing4, and you can fill in the IP address if you select others. 6. Publish period: 60s 7. Data packing 100 per package, customized. 8. Click "Save and Apply", the Huawei Cloud configuration is sent to BL206, and the connection status can be queried whether the connection is successful or not.

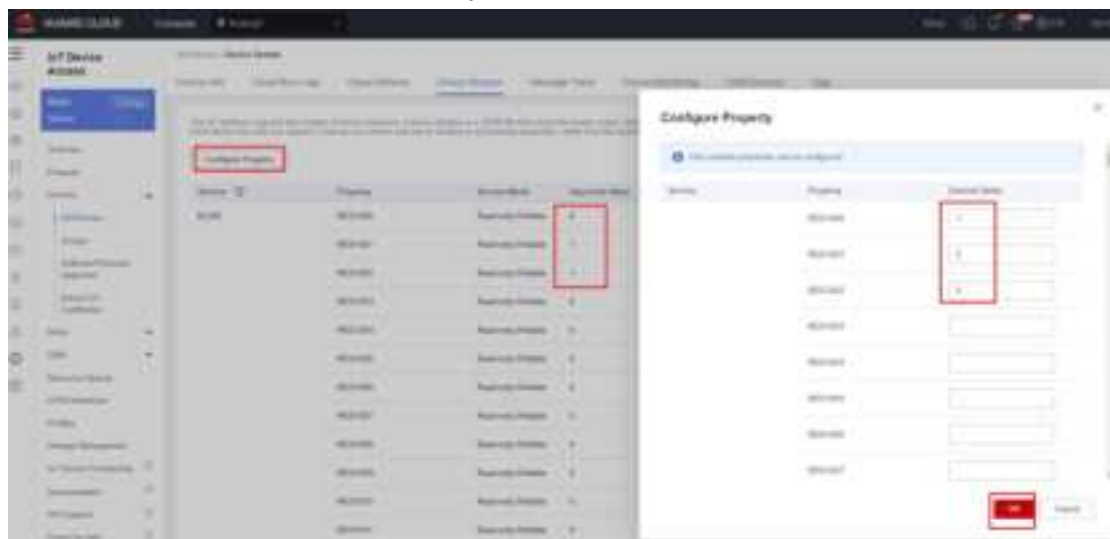
6.2.2.10 Huawei Cloud View and Send Data

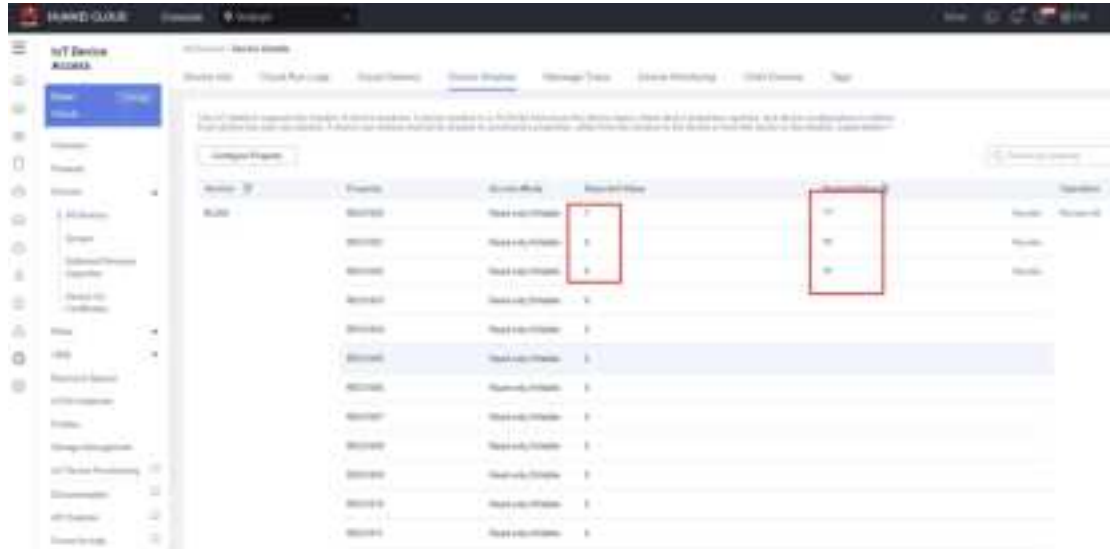
Log in to Huawei Cloud, click Device - Device Info to view the data, and click View All Attributes or Device Shadow to view the data. Click "View All Properties" or "Device Shadow" to view the data, and refer to 7.1 Data Publish Format for data point read/write identifiers. The data of local I/O and serial port slave are as follows:





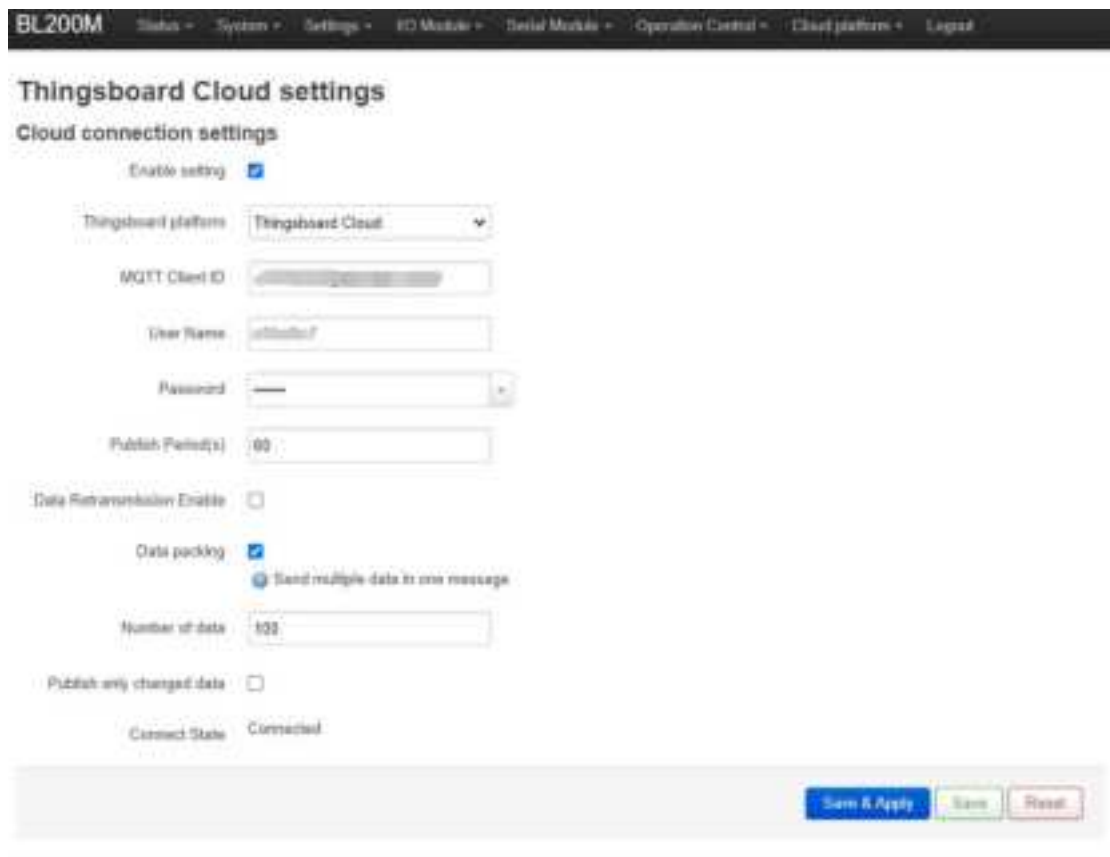
Shadow send: Control REG1000 to close, REG1001 to disconnect, REG1002 to disconnect. Shadow send control AO and control DO with the same principle, need to output how much value, fill in the value can be, AO send control does not do the demonstration. BL206 Huawei Cloud temporarily does not support the message send down and command send down way control.





6.2.2.11 Connecting Thingsboard

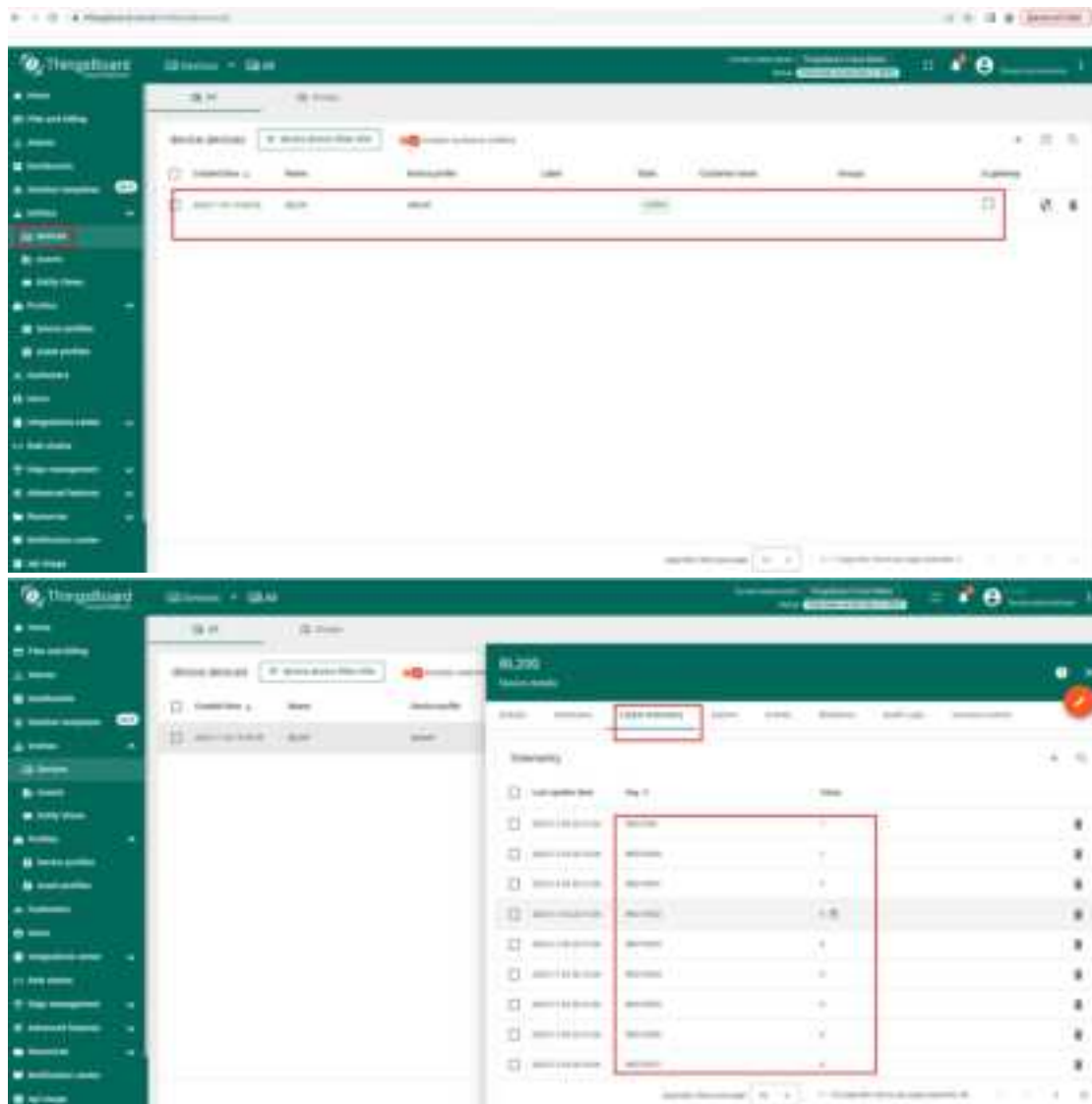
Thingsboard cloud connects to the Pro version of the cloud service with the domain name: thingsboard.cloud. To connect to other thingsboard-formatted cloud platforms, select "Other thingsboard servers". For the time being, only the topic: v1/devices/me/telemetry is supported.



Instructions: 1. Click "Cloud Platform"->"Thingsboard Cloud". 2. Click "Enable" and select "ThingBoard Cloud". 3. Fill in the MQTT client ID, user name and password in the same way as you fill in MQTT Basic when you create a device for thingsboard platform. 4. Publish period: 60s. 5. Data Packaging 6. Click "Save and Apply" to send the thingsboard cloud configuration to BL206, and you can check whether the connection status is successful or not.

6.2.2.12 Thingsboard View Data

Thingsboard sends down control data that is not supported at this time.



BL200
Device details

Details Attributes Latest Telemetry Alarms Events Relations Audit Logs Version control

Telemetry

☐	Last update time	Key ↑	Value	
☐	2023-11-03 20:18:26	RES40001	-0.00	
☐	2023-11-03 20:18:26	RES40002	0	
☐	2023-11-03 20:18:26	RES40003	0.0	
☐	2023-11-03 20:18:26	RES40004	0	
☐	2023-11-03 20:18:26	RES40005	0	
☐	2023-11-03 20:18:26	RES40006	0	
☐	2023-11-03 20:18:26	RES40007	0	
☐	2023-11-03 20:18:26	RES40008	0	
☐	2023-11-03 20:18:26	RES40009	0	
☐	2023-11-03 20:18:26	RES40010	0	

pagination items per page 20 31 - 40 pagination items per page separator 10

BL200
Device details

Details Attributes Latest Telemetry Alarms Events Relations Audit Logs Version control

Telemetry

☐	Last update time	Key ↑	Value	
☐	2023-11-03 20:19:26	RES40007	0	
☐	2023-11-03 20:19:26	RES40008	0	
☐	2023-11-03 20:19:26	RES40009	0	
☐	2023-11-03 20:19:26	RES40010	4	
☐	2023-11-03 20:19:26	RES40011	4	
☐	2023-11-03 20:19:26	RES40012	4	
☐	2023-11-03 20:19:26	RES40013	1	
☐	2023-11-03 20:19:26	time	2023-11-03	

pagination items per page 20 31 - 40 pagination items per page separator 10

7 Custom MQTT Protocol

7.1 Data Publish Format

If data packaging is checked during configuration, multiple I/O data points will be sent in one message (multiple messages will be sent separately when there are many data points, and each message contains multiple data points), if not checked, the message only corresponds to one I/O data point, and there are some differences between the two publishing formats.

1) The payload data format in the device publish message

Publish subject: Corresponding to the configured publish subject setting item
<pre> { "REG1000": 1, //Device DO read/write identifier and value "REG2000": 1, //Device DI reads and writes identifiers and values "REG3000": 2, //Device AI read/write identification and value "REG4000": 3, //Device AO read and write identifiers and values "REG10000": 1, //Serial Port Collect Slave 01 Function Code Read/Write Identification and Value "REG20000": 1, //Serial Port Collect Slave 02 Function Code Read/Write Identification and Value "REG30000": 8, //Serial Port Collect Slave 04 Function Code Read/Write Identification and Value "REG40000": 10, //Serial Port Collect Slave 03 Function Code Read/Write Identification and Value "time": "1698910380", //Time stamp, data publish timestamp in UTC format "seq": 1 //Number of packets, packet number "retransmit": "enable" //Retransmission identifier, indicating historical data (retransmission of historical data has this identifier, real-time data does not have this identifier) } </pre>

Note:

1. Device I/O data point read and write identification:

Data name	Read and write identification	Data type	Description
DO	REG1000~1999	Switcher	0 is open, 1 is close

DI	REG2000~2999	Switcher	0 is open, 1 is close
AI	REG3000~3999	Value	true value = original value
AO	REG4000~4999	Value	true value = original value

2. Serial port module slave I/O data point read and write identification:

Data name	Read and write identification	Data type	Description
Coil state	REG10000~19999	Switcher	According to slave data definition
Input coil	REG20000~29999	Switcher	According to slave data definition
Holding register	REG40000~49999	Value	According to slave data definition
Input register	REG30000~39999	Value	According to slave data definition

7.2 Subscribe Data Format

Payload data format in device subscribe message

Subscribe topic: serial number/+ (corresponding to the configured subscribe topic setting item)

(The topic used by BLIIoT V2.0 for downlink publishing messages is named "Serial Number/Sensor ID", so the device subscribe topic needs to add a wildcard "/+", so that the data sent by the platform can be received for control)

```
{
"REG1000":1, //Device DO downstream control
"REG4000":5, //Device AO downstream control
"REG10001": 1, //Serial Port Slave DO downstream Control
"REG40008":8 //Serial Port Slave AO downstream Control
}
```

8 Warranty

- 1) This equipment will be repaired free of charge for any material or quality problems within one year from the date of purchase.
- 2) This one-year warranty does not cover any product failure caused by man-made damage, improper operation, etc.

9 Technical Support

Shenzhen Beilai Technology Co., Ltd

Website: <https://www.bliiot.com>