Cellular IoT M2M RTU

BLIIOT®

MAKE IIOT EASIER

S275

User Manual

Version: V1.1

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Website: https://www.bliiot.com

Preface

Thanks for choosing BLIIoT Cellular IoT M2M RTU. These operating instructions contain all the information you need for operation of a device in the RTU S27 family.

Copyright

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

Revision Date	Version	Description	Owner
November 30th, 2021	V1.0	Initial Release	XJH
October 21st, 2022	V1.1		LKY

Content

1 Introduction

1.1 Overview

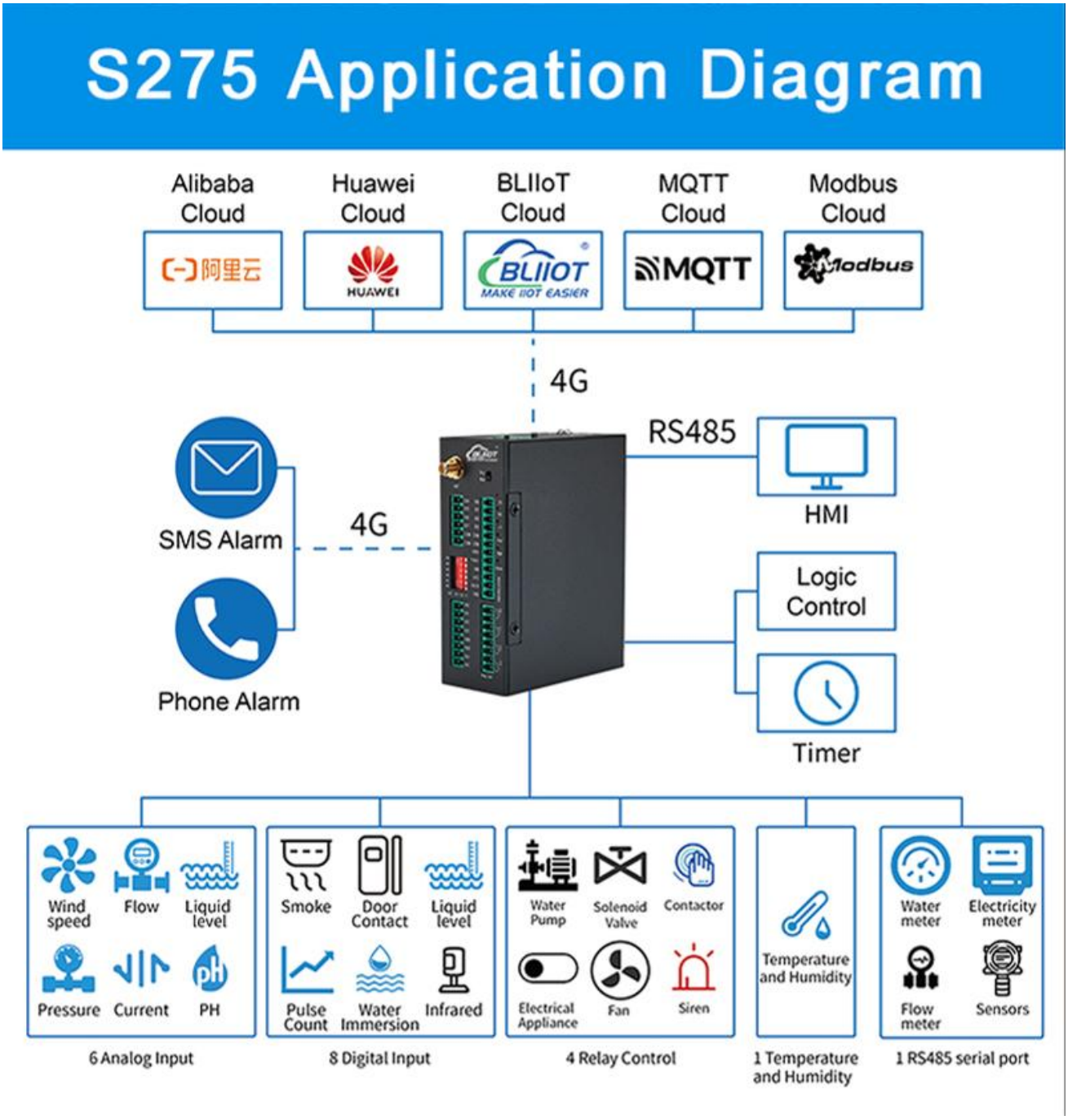
The Cellular IoT M2M RTU is an industrial class, high reliability, high stability, and programmable Remote Terminal Unit (RTU). It embedded 32-Bit High Performance Microprocessor MCU, inbuilt industrial Cellular module. The RTU features 8 digital inputs, 6 analog inputs, 4 relay outputs, 1 ambient sensor input for monitoring onsite temperature and humidity, and 1 RS485 serial port. And as Modbus master, the RTU can connect to expansion I/O module or read data from instruments, PLC and other devices.

Users can set high and low limit according to different application scenarios, when alarm occurs, the RTU will notify users by SMS, dialing, and also uploading data to cloud platform, monitoring center. The RTU also can be used as a remote switch, remote I/O, remote smart PLC, timer switches, which is able to open the gate or turn on the machine with a free charge call at specified time to save time for daily maintenance.

The RTU supports BLIIoT IoT RTU protocol, Modbus RTU over TCP protocol, Modbus TCP protocol, MQTT protocol, which can communicate directly with the server, cloud platform or SCADA. It is a cost effective IoT solution for industrial automation, security monitoring system, automatically measurement and control system, BTS monitoring, remote data acquisition, telemetry systems, automatically control system.

1.2 Typically Applications

BTS Monitoring, Security Alarm System applications, Supervision and monitoring alarm systems, Automatic monitoring system, Vending Machines security protection, Pumping Stations, Tanks, Oil or Water levels, Buildings and Real Estate, Weather Stations, River Monitoring and Flood Control, Oil and gas pipelines, Corrosion protection, Temperatures, Water leakage applications, Wellheads, boat, vehicle, Energy saving, street lights control system, Valve controls, Transformer stations, Unmanned machine rooms, Control room application, Automation System, M2M, Access Control System, etc.



1.3 Safety Directions

Safe Startup

Do not use the unit when using GSM/3G/4G equipment is prohibited or might bring disturbance or danger.

Interference

All wireless equipment might interfere network signals of the unit and influence its performance.

1.4 Packing List

Please make sure below items are included in the package:

(Pictures are for reference only)

- 1xRTU, Wiring terminal, 1xMini USB, 1xSMA cellular antenna, 1xPower adaptor, Wall-mounting clip kit, DIN-Rail mounting clip kit, Product qualification certificate, Warranty card

1.5 Features

- GSM/GPRS/3G/4G network communication, can be operated from anywhere, no distance limitation;
- Wide range power supply 9~36VDC with over voltage and phase-reversal protection;
- Embedded ARM Cortex-M4 32 Bit RISC Core, 168 MHz inside, RTOS system, reliable performance with in-built watchdog;
- 8 digital inputs, supports both dry contact and wet contact. Logic level: 10~30V or short circuit

treated as close, 0~3V or open circuits treated as open. DIN0 as a high-speed pulse counter, sampling frequency: 1MHz; DIN1~3 as low-speed pulse counter, anti-shake time can be set 1~2000ms, default 1ms; DIN1 with arm and disarm function;

- 4 relay output (5A@30VDC, 5A@250VAC), can auto control by timer, alarm-link and remote control by SMS, cloud. The first DO can set time to control by authorize number;
- 1 temperature & humidity sensor input for monitoring onsite environment, the sensor model is AM2301, temperatures range from -40°C to 80°C, with a 0.5°C accuracy, humidity range from 0 to 100RH%, with a 3% accuracy;
- 6 analog inputs, 12bits resolution, supports 0-5V, 0-20mA, 4-20mA output transducers;
- Inbuilt 32G SD card to save up to tens of thousands historical data and events;
- 1 RS485 port, support Modbus slave protocol, can link up to SCADA, HMI, DSC, PLC. Support Modbus Master protocol, can connect to 16 Modbus Salve, e.g.: Data Acquisition Module, meters, generator, PLC, VFD, etc., and 320 tags can set alarm value and content, also support data transparent transmission;
- Powerful SMS function: Threshold high SMS alert, SMS set, SMS inquiry, SMS command for Modbus PLC, and SMS monitoring communication with Slaves;
- Inbuilt 2 DC output for external transducers to save wiring cost;
- Automatically resend the data while communication interrupt or failure, and failure will alert by SMS;
- Supports remotely restart. configure and operate by SMS commands;
- 10 SMS Alert and auto dial numbers for receiving alarm message, can program to receive specified alarm message. The authorized numbers also can dial to open the door or turn on/off machine with a free charge call at the specified time;
- Inbuilt inter-lock logic programmer and powerful timer program function;
- Modular structure, replace a module to upgrade the network from 2G to 3G/4G or 3G to 4G;
- Support SMS, dial, GPRS, 3G , 4G network for alert, USB port for configuration and upgrade firmware;
- Inbuilt large capacity rechargeable backup battery, which is able to alert when external power failure;
- Support TCP/UDP, MQTT, Modbus TCP, Modbus RTU over TCP, BLIIoT IoT RTU protocol and data transparent transmission;

- Metal case with IP30 protection grade, safely isolated from inner system, especially suitable for industrial control application.
- Small size: 108mmx82mmx40mm, support wall-mounting and DIN Rail mounting.

1.6 Technical Specifications

Category	Parameter	Description
Power	Input Voltage	DC 9～36V
	Power Consumption	Normal: 50mA@12V, Max: 150mA@12V
	Output	2 Channel; Voltage: 9～36V DC; Current: 1500mA@12V(Max)
	Protection	Reverse wiring prevention; ESD Air: 15KV; Surge: 4KV
	Backup Battery	3.7V/900mA
USB	USB	1xMini USB
Serial Port	QTY	1xRS485
	Baud Rate	1200bps-115200bps
	Data Bit	8
	Parity Bit	None, Even, Odd
	Stop Bit	1, 2
	Protocol	Modbus RTU(slave), Modbus RTU(master)
	Protection	ESD Contact: 8KV; Surge: 4KV(8/20us)
Digital Input	QTY	8 Channel
	Type	Support both Wet contact and Dry contact
	Dry Contact	Close: Short circuit; Open: Open circuits
	Wet Contact	Close: 10~30V; Open: 0~3V
	Others	DIN0 as a high-speed pulse counter, sampling frequency: 1MHz; DIN1~3 as low-speed pulse counter, anti-shake time can be set 1~2000ms, default 1ms; DIN1 with arm and disarm function;
	Protection	2KVrms
Digital Output	QTY	4 Channel
	Type	Relay output (5A@30VDC, 5A@250VAC)
	Others	The first DO can set time to control by authorize number; Custom setting close and open times
	Protection	2KVrms
Analog Input	QTY	6 Channel
	Type	Differential input, 4-20mA/0-20mA/0-5V

	Resolution	12Bit
	Accuracy	±0.1% FSR @ 25°C ±0.3% FSR @ -10 and 60°C ±0.5% FSR @ -40 and 75°C
	Sampling Rate	200ms
	Input Impedance	>1M ohms
Temperature& Humidity (AM2301)	Resolution	16bit(0.1%RH, 0.1°C)
	Sampling Rate	200ms
	Temperature Range	-40 to +80°C
	Accuracy	0.5°C
	Humidity Range	0 to 99RH%
	Accuracy	3%RH
4G	SIM	Drawer type, Support 1.8V/3V SIM/UIM card, Built-in 15KV ESD protection
	SIM Slot	1
	L-E Version	GSM/EDGE:900,1800MHz WCDMA:B1,B5,B8 FDD-LTE:B1,B3,B5,B7,B8,B20 TDD-LTE:B38,B40,B41
	L-CE Version	GSM/EDGE:900,1800MHz WCDMA:B1,B8 TD-SCDMA:B34,B39 FDD-LTE:B1,B3,B8 TDD-LTE:B38,B39,B40,B41
	L-A Version	WCDMA:B2,B4,B5 FDD-LTE:B2,B4,B12
	L-AU Version	GSM/EDGE:850,900,1800MHz WCDMA:B1,B2,B5,B8 FDD-LTE:B1,B3,B4,B5,B7,B8,B28 TDD-LTE:B40
	L-AF Version	WCDMA:B2,B4,B5 FDD-LTE:B2,B4,B5,B12,B13,B14,B66,B71
	CAT-1 Version	GSM:900,1800 FDD-LTE:B1,B3,B5,B8 TDD-LTE:B34,B38,B39,B40,B41
Software	Internet Protocol	IPV4, TCP/UDP, Modbus RTU, Modbus TCP, MQTT, BLIIoT IoT RTU
	Indicator	4G signal, running, arming and disarming, 485 transmit-receive
	Configuration	PC software configuration, support WIN XP, WIN 7,

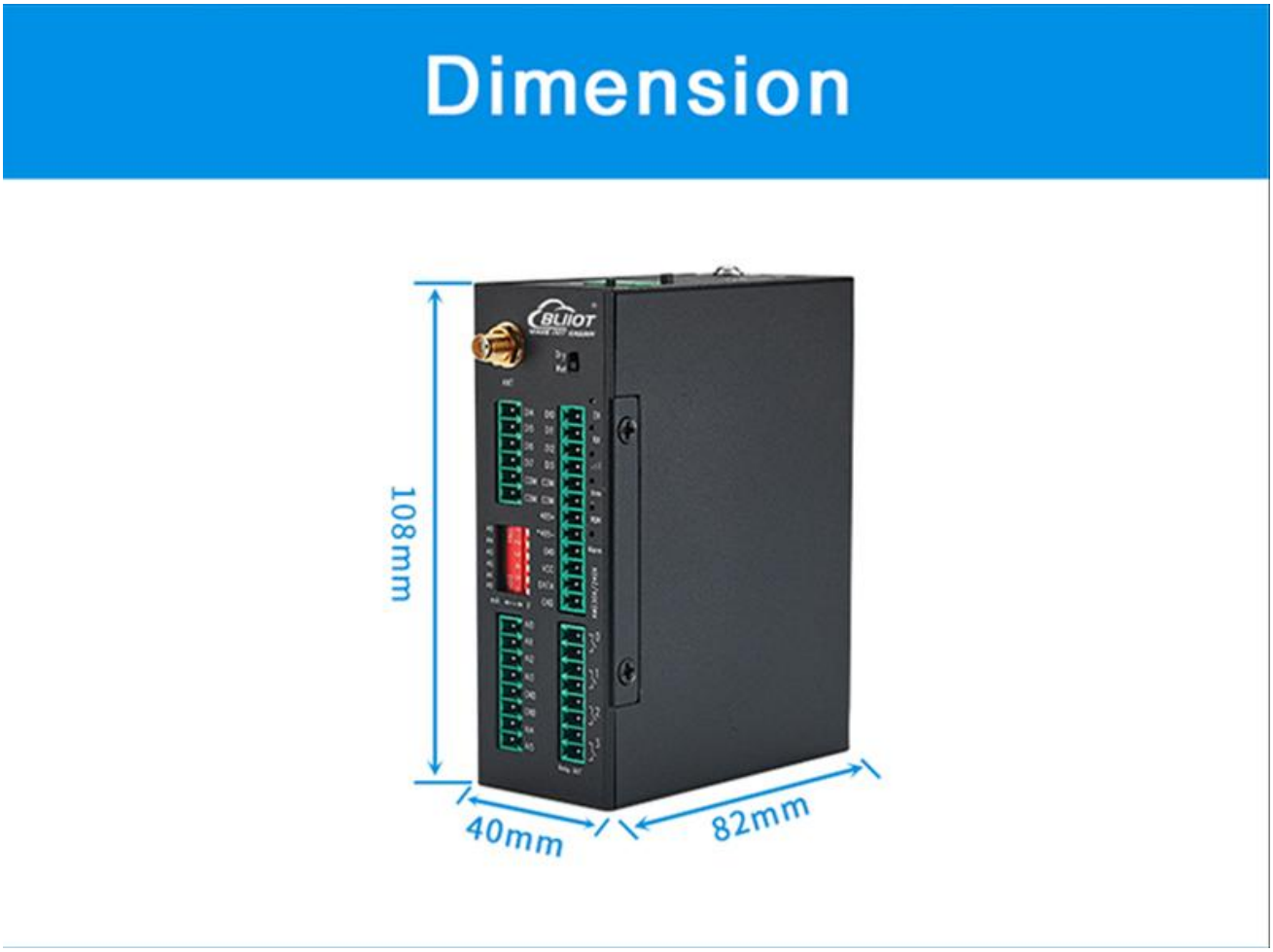
		WIN 8 and WIN 10
	Slave Connection	16 devices, Max 320 I/O data points(Bool, 16bit, 32bit, 64bit)
	Transparent Transmission	Support
	SMS Command	Support
	Login Package	Support custom login package
	Heartbeat Package	Support custom heartbeat package
	Storage	Built in 32G SD card, capable of storing up to 100,000 historical records
Safety	MTBF	≥100,000 hours
	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
	Others	CE, FCC, RoHS
Environment	Working	-45～85°C, 5～95% RH
	Storage	-45～105°C, 5～95% RH
Others	Shell	Metal
	Size	108x82x40mm
	Protection	IP30
	Installation	Wall-mounting or DIN Rail mounting.

1.7 Model Selection

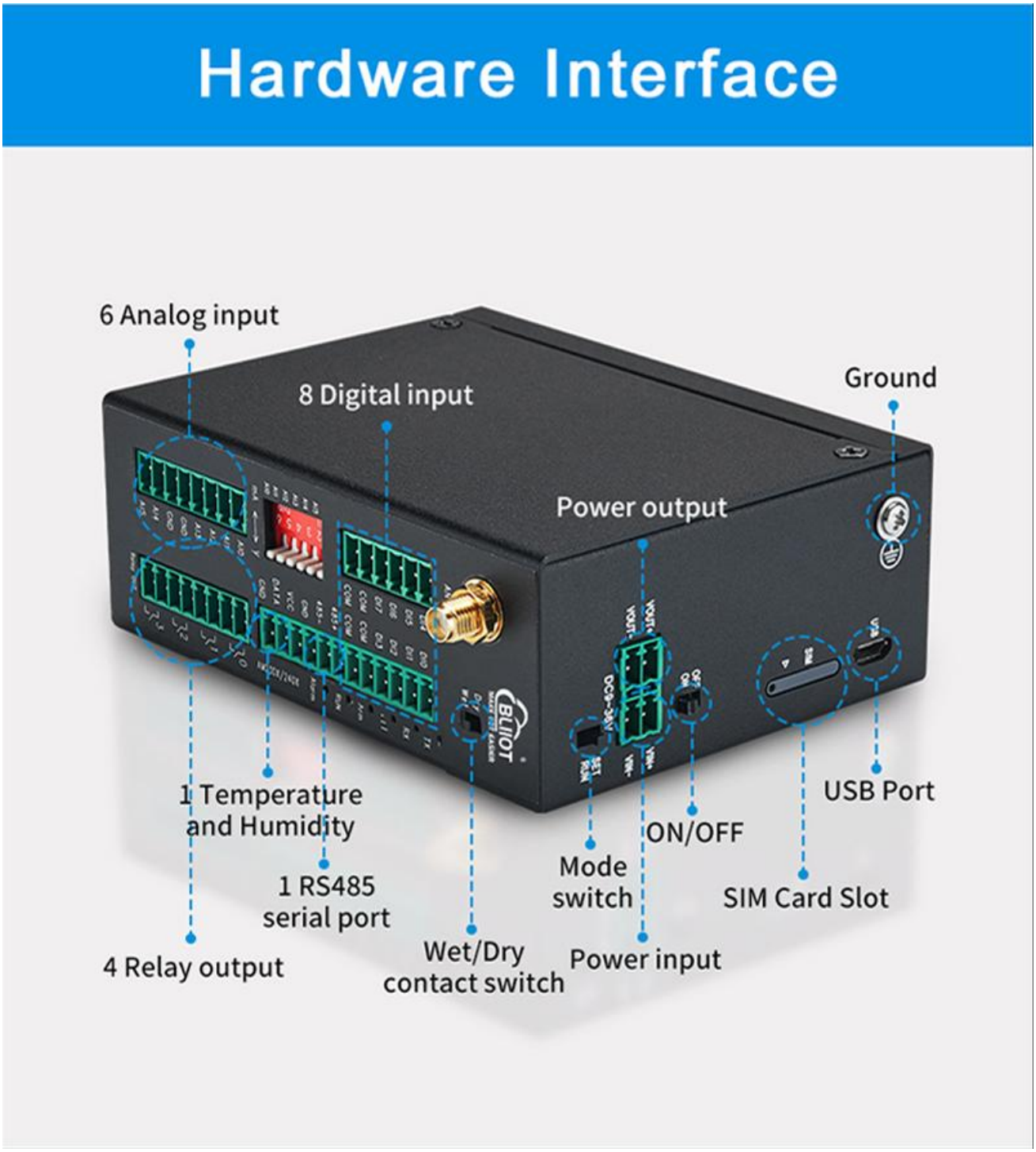
Model	DI	AI	DO	Tem& Hum	Storage	USB	RS485	I/O data points			
								bool	16Bit	32Bit	64Bit
S270	2	2	2	1	2M	1	x	x	x	x	x
S271	4	4	4	1	2M	1	x	x	x	x	x
S272	8	6	4	1	32G	1	1	64	64	x	x
S274	4	x	4	1	32G	1	1	64	128	64	64
S275	8	6	4	1	32G	1	1	64	128	64	64

2 Hardware Specifications

2.1 Size



2.2 Interface



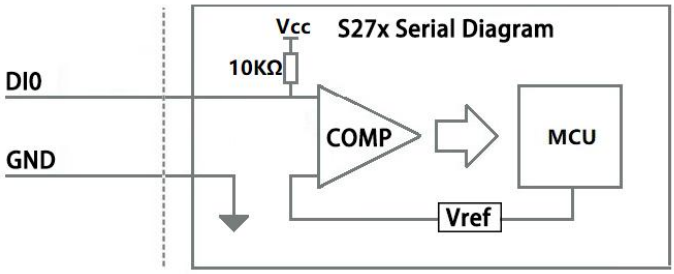
2.2.1 Digital Input

Digital Input	
Function	**Description**
DI0	First channel of Digital input, support high speed pulse counting, sampling

	frequency: 1MHz
DI1	Second channel of Digital input, support low speed pulse counting, support used as arming and disarming input
DI2	Third channel of Digital input, support low speed pulse counting
DI3	Fourth channel of Digital input, support low speed pulse counting
COM	Common grounding
COM	Common grounding
DI4	Fifth channel of Digital input
DI5	Sixth channel of Digital input
DI6	Seventh channel of Digital input
DI7	Eighth channel of Digital input
COM	Common grounding
COM	Common grounding
Dry	DI switch to Dry contact
Wet	DI switch to Wet contact

Note: DIN0 as a high-speed pulse counter, sampling frequency: 1MHz; DIN1~3 as low-speed pulse counter, anti-shake time can be set 1~2000ms, default 1ms;
When using the counter function, please swtich the DIP switch on device to Wet.

Diagram of DI internal interface:



2.2.2 LED Indicators

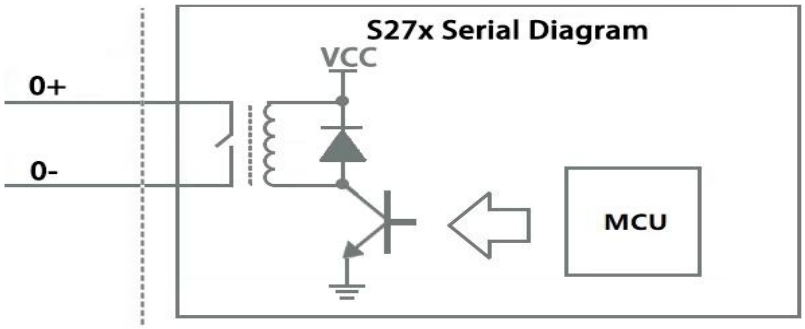
LED Indicators				
Symbol	**Name**	**Color**	**State**	**Description**
	4G signal	RED	Always ON	Normal
			OFF	4G module abnormal
Alarm	Alarm	RED	Always ON	Triggered alarm
			OFF	No alarm
Run	Run	RED	Flickering	System is running
			OFF	System stop running
Arm	Arm	RED	Always ON	Armed

			OFF	Disarmed
TX	Transmit via serial port	RED	Flickering	Data communication via RS485 serial port
			OFF	No data
RX	Receive via serial port	RED	Flickering	Data communication via RS485 serial port
			OFF	No data

2.2.3 Digital Output

Digital Output	
Functions	**Description**
DO0+	First channel of Digital output
DO0-	First channel of Digital output
DO1+	Second channel of Digital output
DO1-	Second channel of Digital output
DO2+	Third channel of Digital output
DO2-	Third channel of Digital output
DO3+	Fourth channel of Digital output
DO3-	Fourth channel of Digital output

Diagram of DO internal interface:



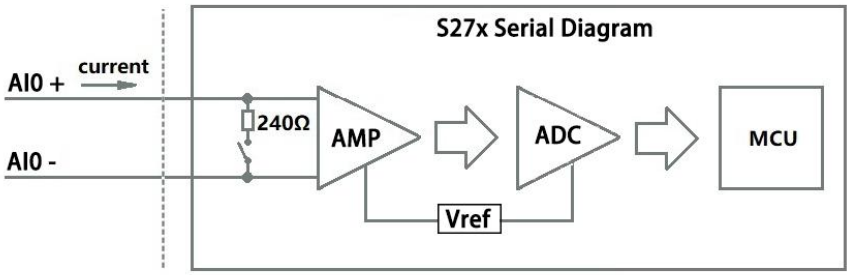
2.2.4 Analog Input

Mode selection(DIP Switch)	
Functions	**Description**
V	Switch to "V" indicate that the analog input type is "0-5V"
mA	Switch to "mA" indicate that the analog input type is "0-20mA" or "4-20mA"
A0-A5	Corresponding to the analog input of each channel

Note: According to the output type of the transmitter(mA or V), switch the DIP switch of the corresponding channel to the corresponding position on the device.

Analog Input	
Functions	**Description**
AI0	First channel of Analog input positive interface
AI1	Second channel of Analog input positive interface
AI2	Third channel of Analog input positive interface
AI3	Fourth channel of Analog input positive interface
GND	Common grounding
GND	Common grounding
AI4	Fifth channel of Analog input positive interface
AI5	Sixth channel of Analog input positive interface

Diagram of AI internal interface:



2.2.5 RS485 and Temperature&Humidity

RS485 and Temperature&Humidity	
Functions	**Description**
485+	RS485 A +
485-	RS485 B -
GND	485 Grounding
VCC	Power supply interface of Tem &Hum sensor(AM230x/AM240x)
DATA	Data interface of Tem &Hum sensor(AM230x/AM240x)
GND	Grounding of Tem &Hum sensor(AM230x/AM240x)

2.2.6 Power&Switch&Mode Settings

Power&Switch&Mode Settings

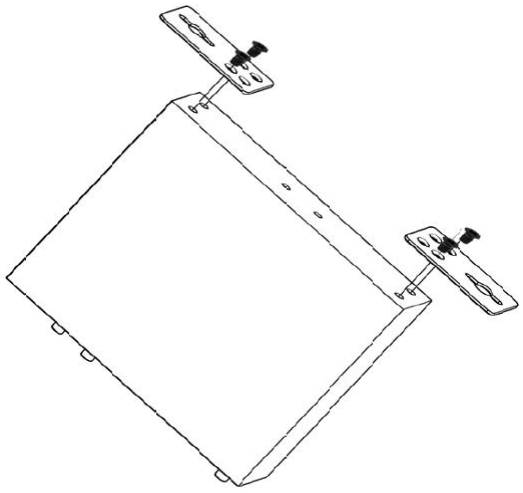
Functions	Description
VIN+	9-36V Power input positive
VIN-	9-36V Power input negative
VOUT+	9-36V Output positive
VOUT-	9-36V Output negative
OFF	Device shutdown
ON	Device startup
SET	Switch to SET to enter configuration mode when configuring
RUN	When configuring is complete, switch to RUN to enter the running mode.
USB	Used to connect configuration software, set parameters, and upgrade

2.2.7 SIM Card Slot

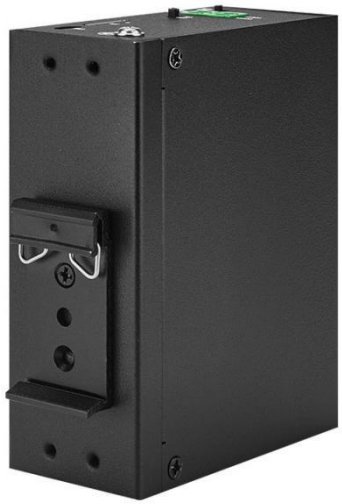
When inserting/removing the SIM card, please turn off the device.
Note: Please place the device flat when inserting/removing the SIM card.

3 Installation

3.1 Wall mounted



3.2 DIN Rail mounting



4 Configuration

4.1 Preparation before configuration

Please follow the steps

1) Insert the SIM Card;
2) The device must be configured in [SET] mode, switch to [SET] before configuration;

3) Connect the device to an external power and power on, switch the power switch to ON. Please switch to SET mode first, then power on the device.

4) Connect the RTU to PC by USB cable, and install the USB Driver to the computer;
5) Open configuration software, choose the correct COM port and fill in the password(Default: 1234), select Normal SIM card mode to enter configuration software;
6) Open parameter setting page---->Click "Read" button to get device current value--->After modifying or setting the parameters---->Click the "Save" button to saving parameters in device;
7) If you need to program bulks of RTU with similar parameters, you can [Export Configuration File], and then [Import Configuration File] to the next device to complete the settings quickly;
8) Power off the device when configuration is complete, switch the power switch to OFF;
9) Switch to [RUN] mode after power off the device;
10) Reboot the device, then the device will enter into normal running mode.

Notice:

1, The device must be configured in [SET] mode, switch to [SET] before power ON the device;

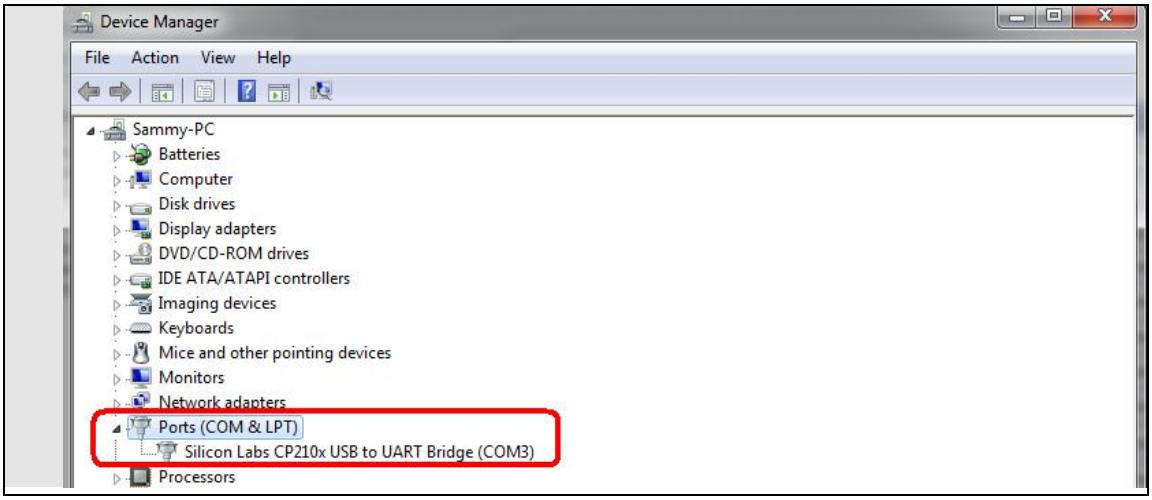
2, Click the "Save" button to saving parameters in device;

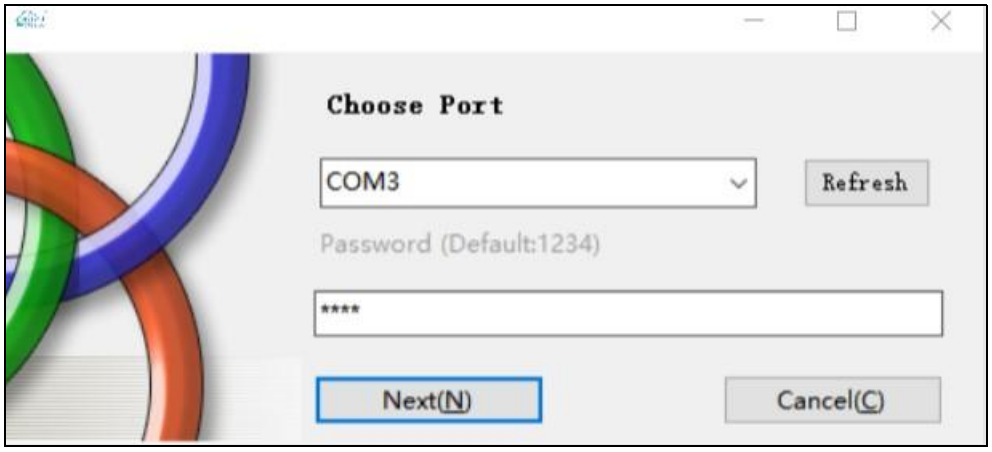
3, When configuration is complete, power OFF the device, then switch to [RUN] mode;

4.1.1 Install USB Driver

Install the USB Driver to the computer firstly. When successful, it can be found out at the device manager of the XP or Windows 7 or Win8/Win10. Also, the driver for different OS can be downloaded from Silicon Laboratories, Inc. http://www.silabs.com , the model is CP210x.

4.1.2 Check COM Port





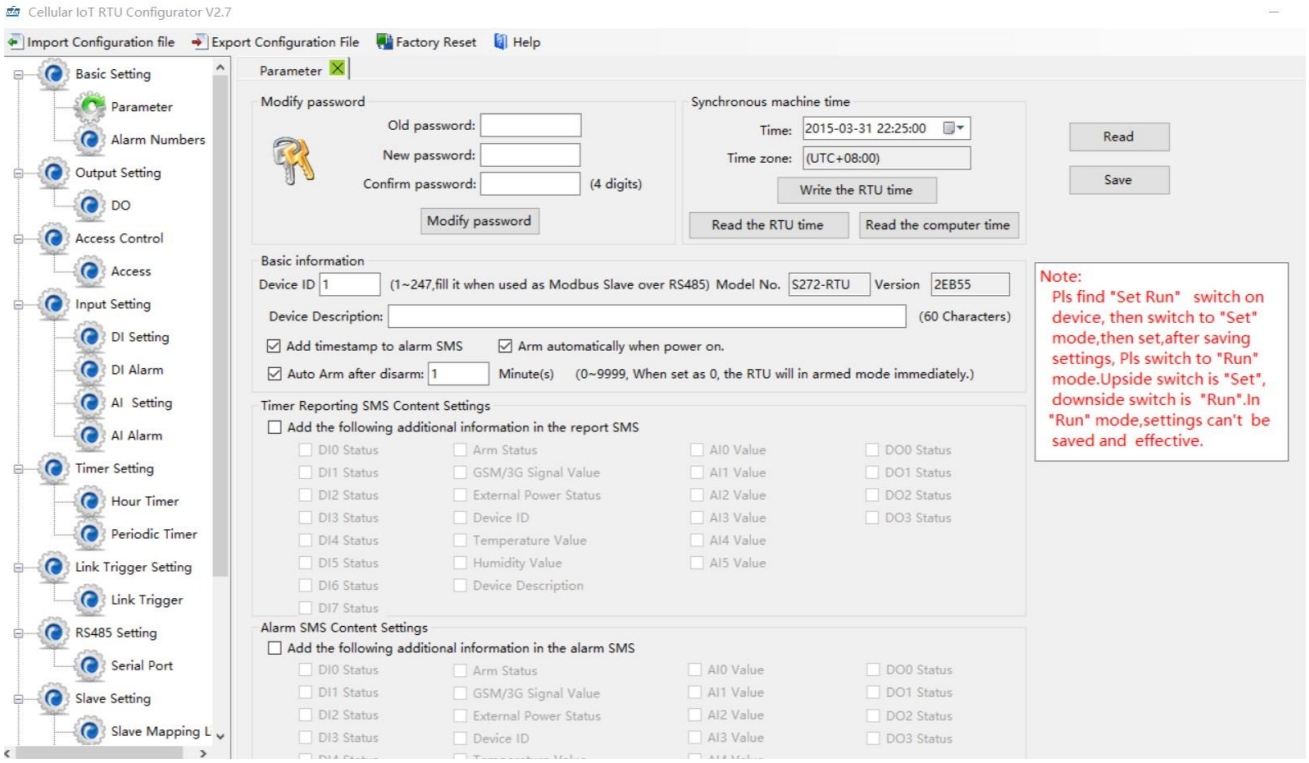
Choose the correct "COM port" when entering configuration software.

4.1.3 Login Configuration Software

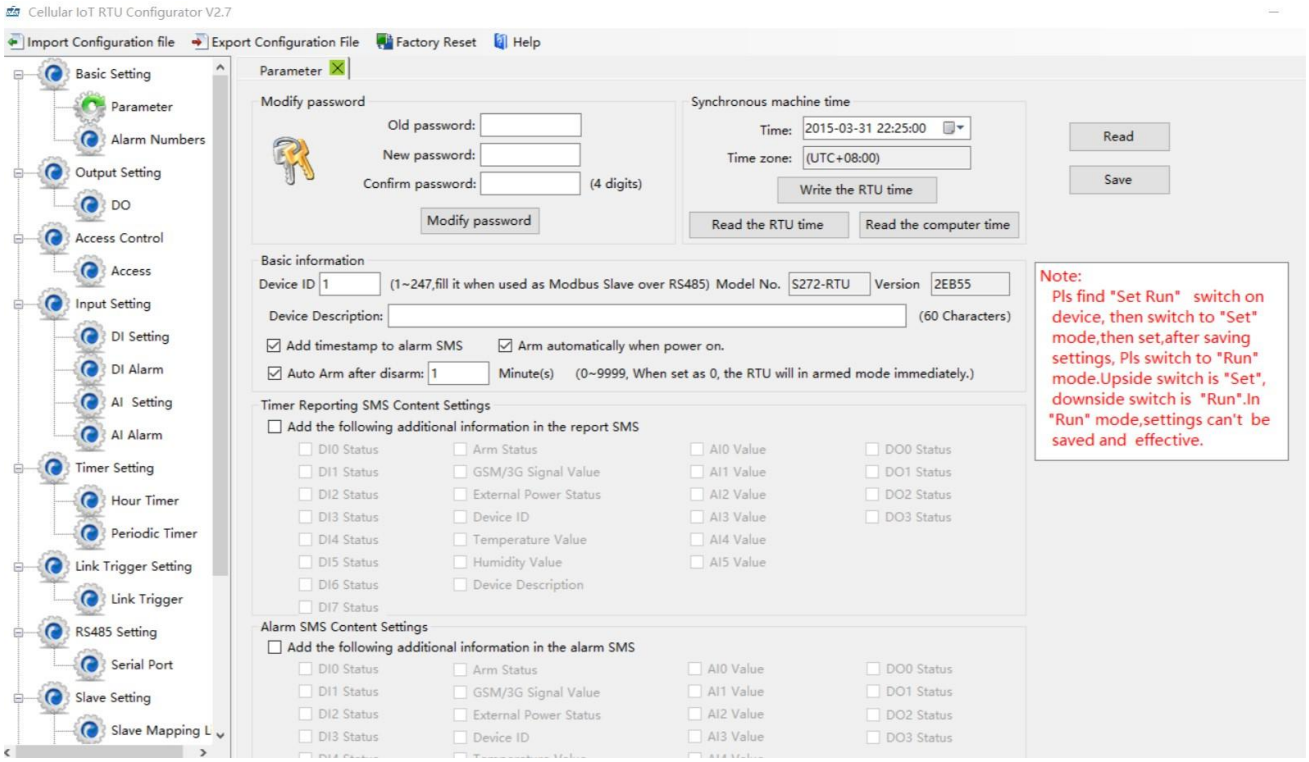
Choose the correct port, then fill in the password to login configuration software

The login password is 1234

Click "Read" button to get device current parameters first



4.2 Basic Settings



Modify password		
Item	Description	**Default**
Old password	Enter the old password	Empty
New password	Enter the new password	Empty

Confirm password	Confirm the password	Empty
Modify password	Password modification takes effect	--
Synchronous machine time		
Item	Description	**Default**
Time	Current time on device	--
Time zone	Current time zone on computer	--
Write the RTU time	Time on computer is synchronized with RTU	--
Read the computer time	Read the current time on computer	--

Basic information		
Item	Description	**Default**
Device ID	As device ID address only when device is Modbus slave via RS485, range: 1-247 It is invalid in other situations.	1
Model No.	Device model number	--
Version	Device version	--
IMEI	Device serial number	--
Device description	The alarm message will include device description information.	Empty
Add timestamp to alarm SMS	Alarm message will include the time	Check
Arm automatically when power on	RTU will enter into Arm mode automatically once the RTU powered on	Check
Auto arm after disarm	RTU will change to arm mode automatically after a certain period after disarm	Uncheck

No need to set the "Timer reporting SMS content" and "Alarm SMS Content"

if the RTU connect to cloud platform

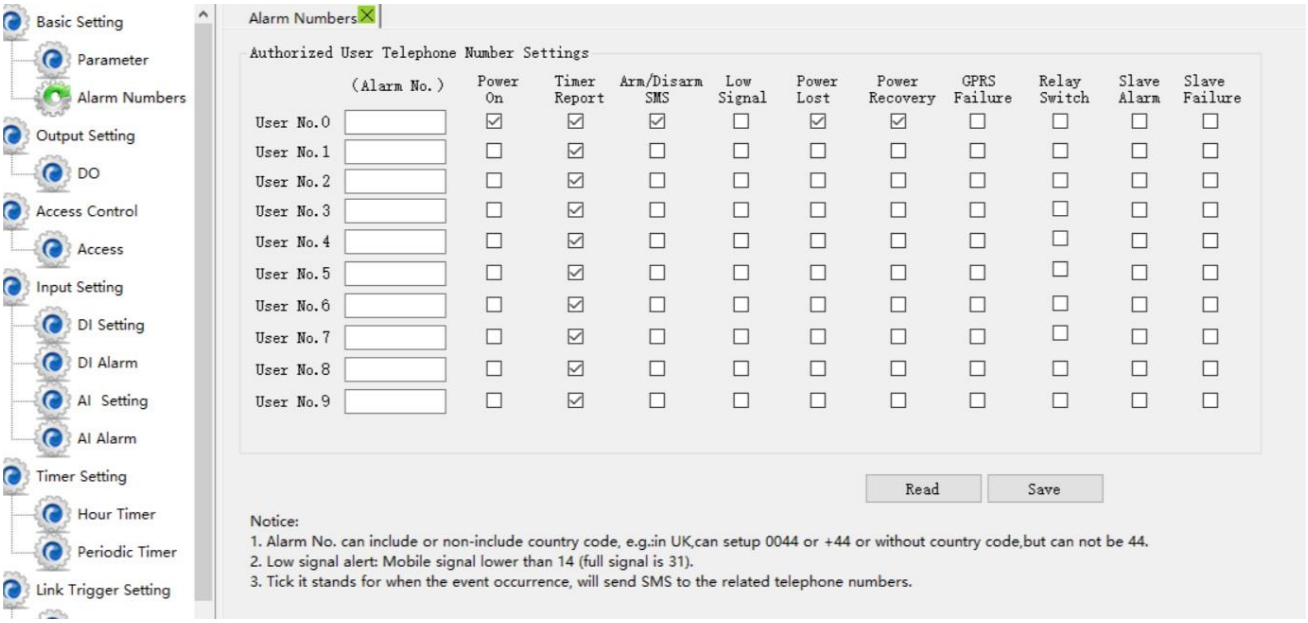
Timer reporting SMS content settings		
Item	Description	**Default**
Add the following additional information in the report SMS	Check the related item to add its value/status to the Timer report text message.	Uncheck

Alarm SMS content settings		
Item	Description	**Default**
Add the following additional	Check the related item to add its	Uncheck

information in the alarm SMS	value/status to the alarm text message.	

4.3 Alarm Numbers Settings

When device connect to cloud platform, it may be frequently offline due to sending text message, receiving text message and dialing. We don't suggest you use SMS alarm if RTU need to be connected to cloud platform.



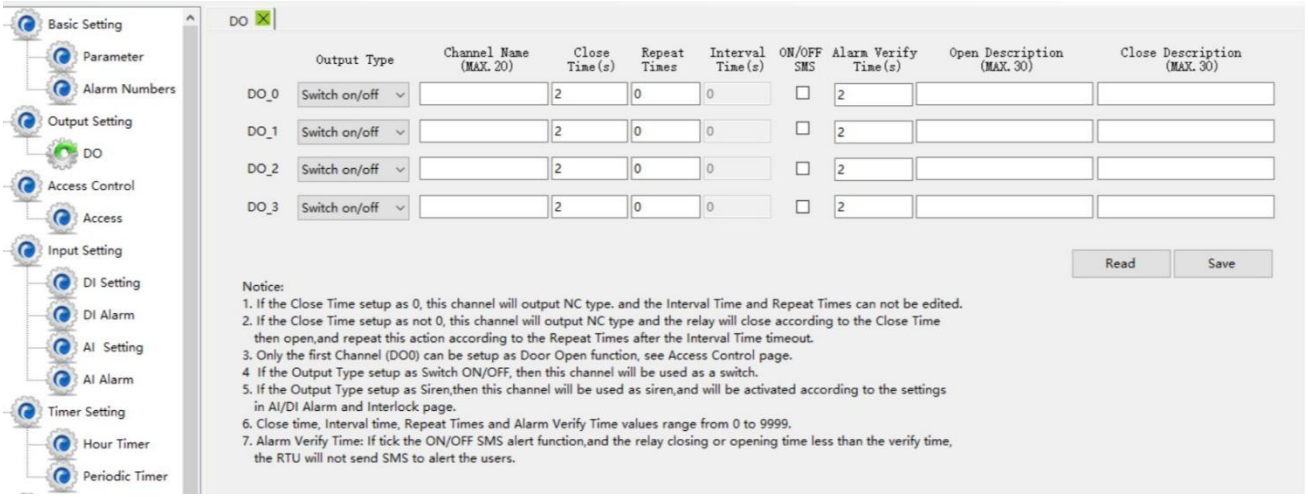
Authorized user telephone number settings		
Item	Description	**Default**
Alarm No.	Authorized mobile numbers to receive the alarm text message or dial	Empty
Power on	Text message will be sent when RTU powered on, the message includes device model, version, description, IMEI, status, signal value etc....	Check
Timer report	Timer report text message will be sent	Check
Arm/Disarm SMS	Text message will be sent when the state(Arm or Disarm) of RTU changed.	Check
Low signal	Text message will be sent when 4G signal strength lower than 14	Uncheck
Power lost	Text message will be sent when external DC power loss	Check
Power recovery	Text message will be sent when external DC power restored	Check
GPRS failure	Text message will be sent when re-connection	Uncheck

	failed three times.	
Relay switch	Text message will be sent when relay state changes	Uncheck
Slave alarm	Text message will be sent when Modbus slave alarm occurs	Uncheck
Slave failure	Text message will be sent when Modbus slave communication timeout	Uncheck

4.4 Digital Output Settings

No need to set Channel name, ON/OFF SMS, Open description, Close description when device connect to cloud platform.

This device features 4 relay outputs, rated range: 5A/30VDC, 5A/250VAC. It can be set as an authorized number to call in for control, or it can be controlled remotely by SMS, or timer, event correlation automatic control, or remote control via the monitoring center and cloud platform.



Relay Output settings		
Item	Description	**Default**
Output type	Support 3 output types ● **Open door**: Only the first Channel(DO0) can be set as Open Door, DO0 will close and the device will be automatically set to disarm status when the authorization number calls in. When DO0 used as Open door, then it cannot be used as regular ON/OFF switch ● **Siren:** Only DO1 can be set as Siren, DO1 will close when the siren function(DI setting) is executed	Switch on/off

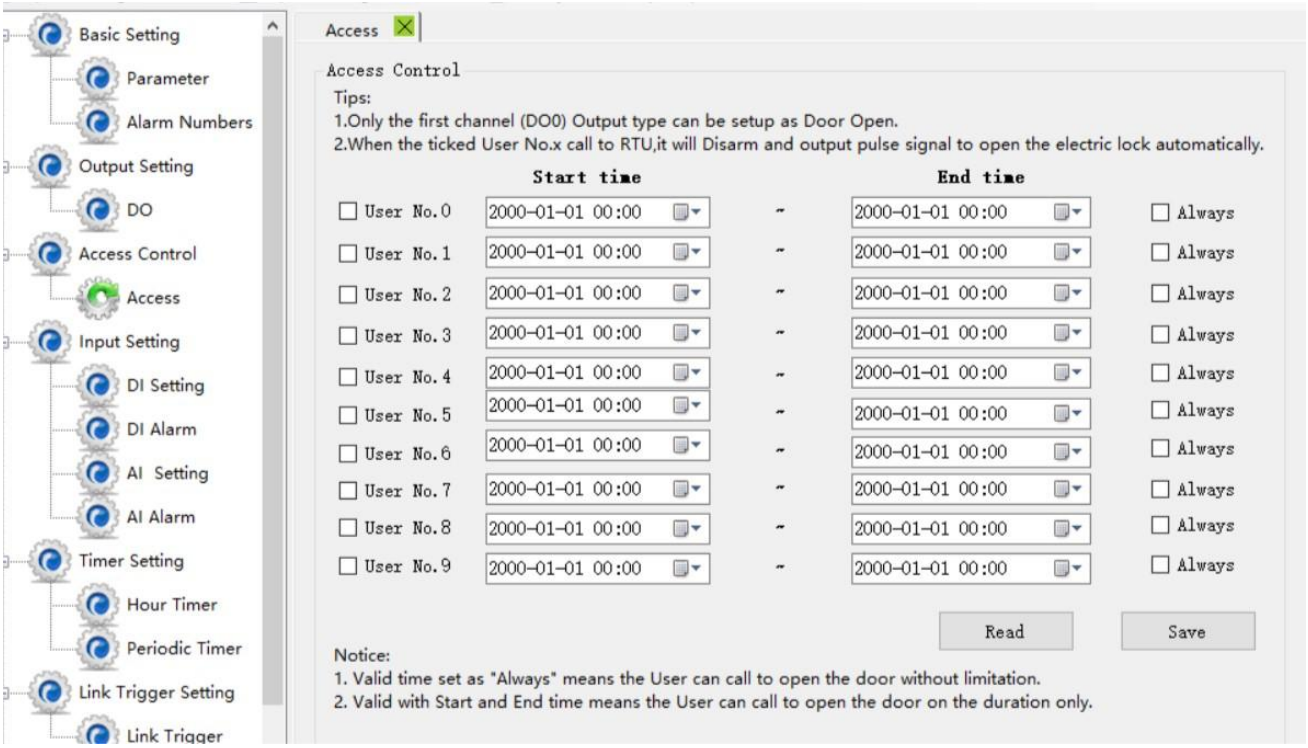
	● **Switch ON/OFF:** The relay is used as a switch, it can be used as a normal timing event, linkage event, and SMS control.	
Channel name	Custom setting channel name, in order to identify it in text message.	Empty
Close time	Relay close and last time, 0 second means always close.	0
Repeat times	Times to repeat closure when the relay action is performed.	0
Interval times	The interval time of relay repeating the close and open action. Use it with "repeat times", you can consider it as pulse output. The unit is second.	0
ON/OFF SMS	Text message will be sent when relay state changes	Uncheck
Alarm verify times	Alarm after a period when the relay state changed	0
Open description	Description of "OPEN" state in the text message	Empty
Close description	Description of "CLOSE" state in the text message.	Empty

4.5 Access Control Settings

No need to set this when device connect to cloud platform

This function is valid only when the DO0 is set as open door.

Users can quickly set the number and time period for call-in control. It is really convenient for remote control of electric locks in unattended computer rooms. It is possible to remotely authorize a certain maintenance personnel to open the door by calling in with his mobile phone within a limited period of time, which solves the traditional cumbersome approval process that takes a lot of time to pick up and deliver keys. And you can also set various parameters on this page through SMS, cloud platform, and monitoring center..



Access Control		
Item	Description	**Default**
User No.0-No.9	Authorized mobile number	Uncheck
Start time	Mobile number call-in permission start time	--
End time	Mobile number call-in permission end time	--
Always	You can call in to open the door at any time	Uncheck

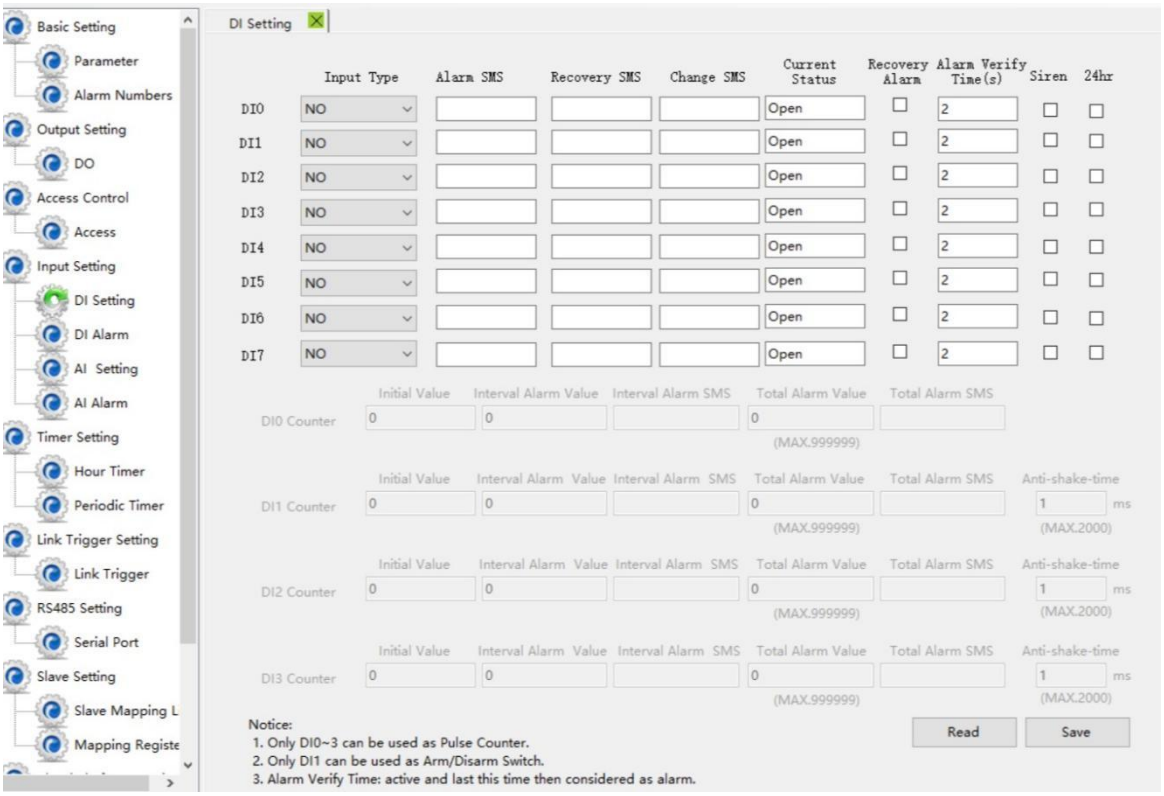
4.6 Input Settings

This device features 8 digital input, 6 analog input, and 1 temperature and humidity input, of which DI0 supports counter function. For their addresses in the registers and the supported Modbus function code, please refer to 8.1 Device Register Address

4.6.1 DI Setting

When device connect to cloud platform, it may be frequently offline due to sending text message, receiving text message and dialing.

No need to set [Alarm SMS], [Recovery SMS], [Change SMS], [Interval alarm SMS] and [Total value alarm] when device connect to cloud platform.



Select the corresponding input type according to the detector.

DI setting		
Item	Description	**Default**
Input type	● **Disable:** Digital input of this channel unable to use ● **NO:** The normal state of the digital input is normally open, and the normally closed state is an abnormal event. ● **NC:** The normal state of the digital input is normally closed, and the normally open state is an abnormal event. ● **Change:** Each time the state of the digital input changes, it will be treated as an abnormal event ● **Counter:** DIN0 as a high-speed pulse counter, sampling frequency: 1MHz; DIN1~3 as low-speed pulse counter, anti-shake time can be set 1~2000ms, default 1ms; ● **Arm/Disarm:** Only DIN1 can be set as Arm/Disarm. The arm and disarm state will switch when DI changes from NO to NC	
Alarm SMS	The text message sent to authorized numbers when alarm occurs	Empty
Recovery SMS	The text message sent to authorized numbers when	Empty

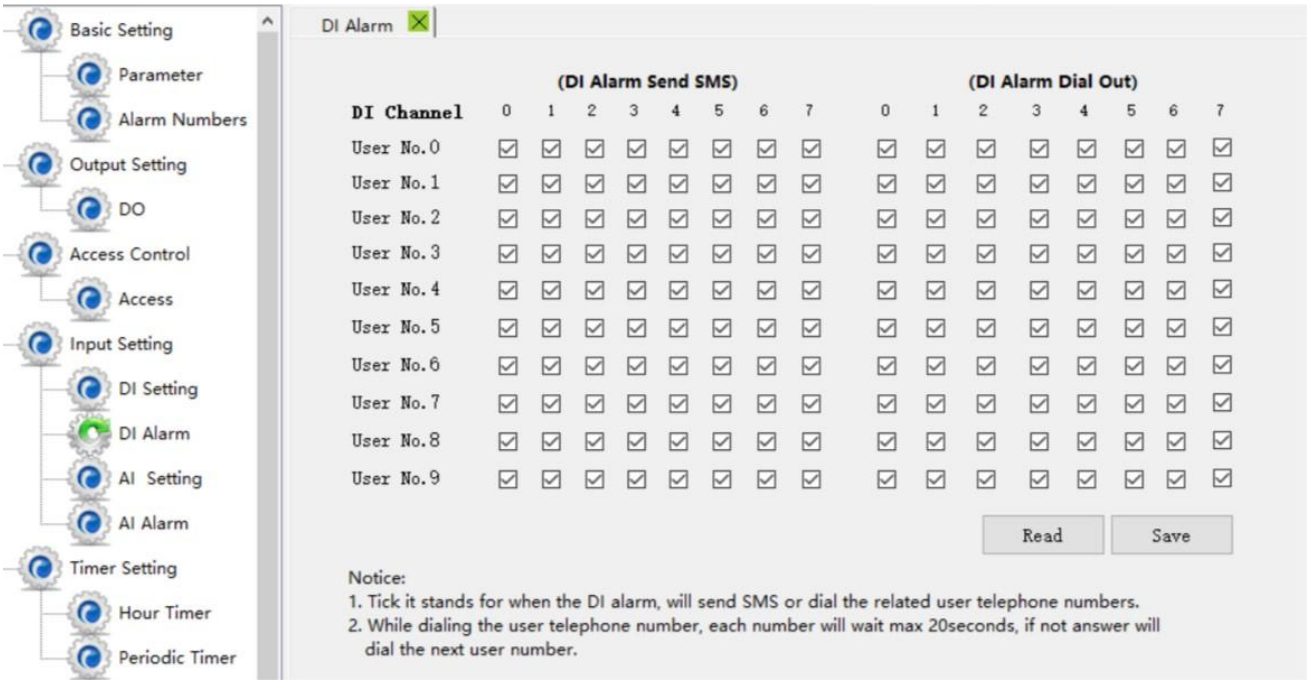
	alarm restored	
Change SMS	When DI input type set as "Change", the text message you entered here will be sent once the alarm occurs	Empty
Current status	Current state of digital input	--
Recovery alarm	Under the arm or 24-hour state, when alarm restored, the text message will be sent to authorized numbers	Uncheck
Alarm verify time	When the abnormal event last more than this period, it will be treated as a true alarm. The unit is second	1
Siren	Enable the Siren function, when DO1 set as Siren, DO1 will close when the alarm occurs	Uncheck
24hr	Alarm will be triggered no matter RTU is in Arm or Disarm mode	Uncheck

Counter		
Item	Description	**Default**
Counter	Pulse counter	Uncheck
Initial value	Initial value to start counting	Empty
Interval alarm value	Alarm occurs when counting to the interval value	Empty
Interval alarm SMS	The text message sent to authorized numbers when interval alarm happens	Empty
Total alarm value	When counts to the total value, it will automatically clear the count value to the initial value	Empty
Total alarm SMS	The text message sent to authorized numbers when counts to the total value	Empty
Anti-shake time	Unit: ms, default 1, indicates that the maximum pulse sampling frequency is 1KHz; when the pulse frequency is low, appropriately increasing the anti-shake time can improve the accuracy. (Pulse sampling frequency = 1000/anti-shake time, for example, 1ms corresponds to 1000Hz, 10ms corresponds to 100Hz, 100ms corresponds to 10Hz, 1000ms corresponds to 1Hz)	1
When using counter function, please switch the DIP switch on device to Wet.		

4.6.2 DI Alarm Settings

When device connect to cloud platform, it may be frequently offline due to sending text message, receiving text message and dialing.

Users can authorize a certain person to receive alarm



4.6.3 AI Setting

Analog input can be used for temperature monitoring, current monitoring, voltage monitoring, power factor monitoring, water level monitoring, pressure monitoring, environmental monitoring, wind speed monitoring, etc. Users can set high and low limit alarm thresholds and restore alarms according to needs. When the limit is exceeded or recovered, personalized notifications can be set to specific users.

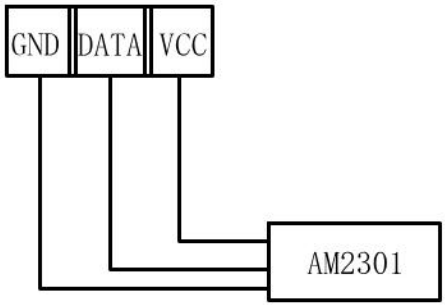
This device features 6 analog input, 12-bit resolution, 200ms sampling frequency, and supports 0-5V, 0-20mA, 4-20mA output sensors. It can be flexibly combined for measurement and monitoring of various different applications. Such as three-phase current and voltage monitoring and so on.

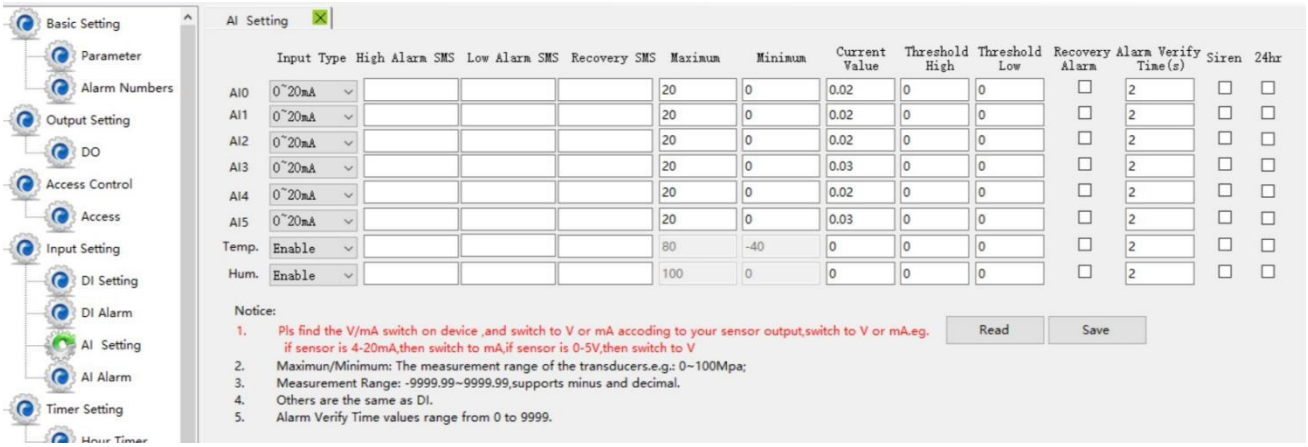
Note: Analog input type

There is DIP switch on the device, switch to mA or V type according to the output type of the transmitter.

2) The input type you choose in the configuration software should be the same as the DIP switch
3) For information on measuring ranges, please refer to transmitter specification

The device features 1 temperature & humidity sensor input for monitoring onsite environment, the sensor model is AM230x/AM240x, temperatures range from -40°C to 80°C, with a 0.5°C accuracy, humidity range from 0 to 100RH%, with a 3% accuracy;





No need to set [High alarm SMS], [Low alarm SMS], [Recovery SMS], when device connect to cloud platform.

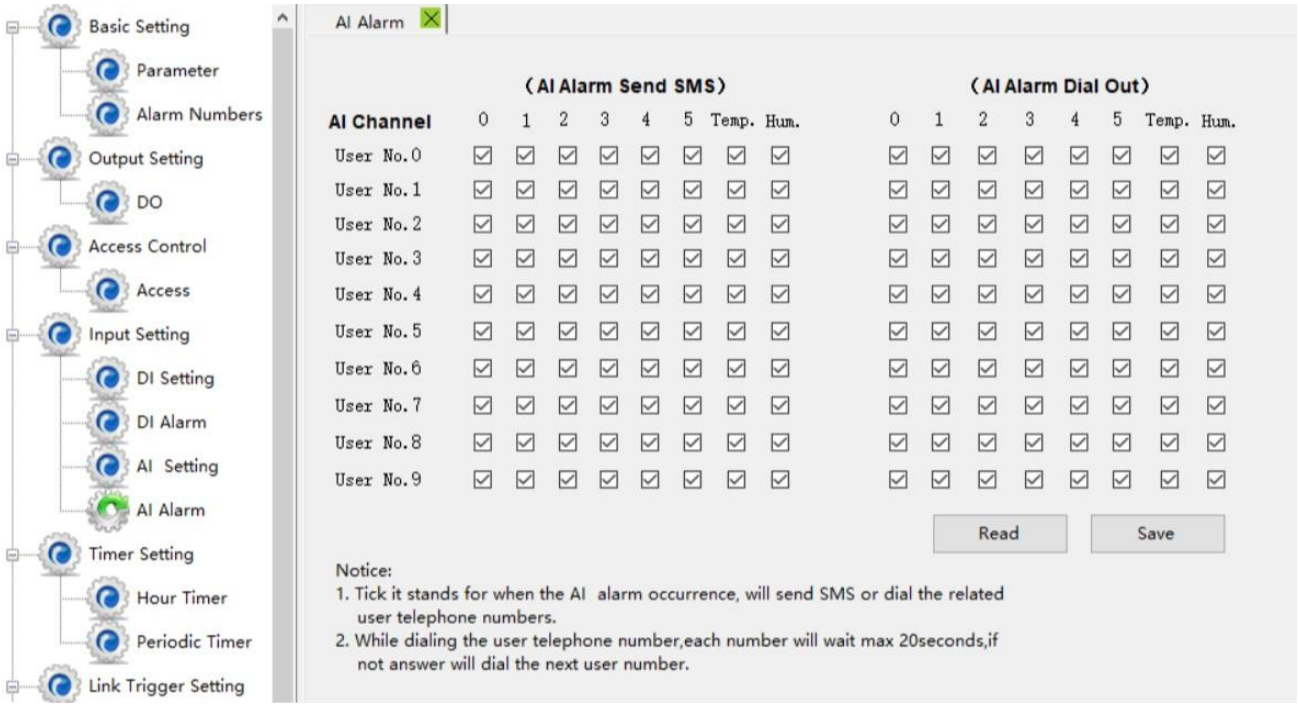
AI setting		
Item	**Description**	**Default**
Input type	Disable: Do not use this channel Enable: Use this channel 0~5V: Connect sensors with 0-5V output 0~20mA: Connect sensors with 0~20mA output 4~20mA: Connect sensors with 4~20mA output	Disable
High alarm SMS	The text message sent to authorized numbers when current value higher than upper limit	Empty
Low alarm SMS	The text message sent to authorized numbers when current value lower than lower limit	Empty
Recovery SMS	The text message sent to authorized numbers when current value return to normal	Empty
Maximum	The maximum measuring range of the sensor	Empty

Minimum	The minimum measuring range of the sensor	Empty
Current value	Refer to the current real value, such as the pressure is xxxPa, or the temperature is xxx°C and other specific values.	--
Threshold high	When the current value exceeds the upper limit of the alarm, an alarm will be triggered;	Empty
Threshold low	When the current value is lower than the alarm lower limit value, an alarm will be triggered;	Empty
Recovery alarm	When the value returns to the normal range, a text message will be sent to authorized numbers	Uncheck
Alarm verify time	When the abnormal event last more than this period, it will be treated as a true alarm.	1
Siren	When DO1 set as Siren, DO1 will be closed when the alarm occurs	Uncheck
24hr	Alarm will be triggered no matter RTU is in Arm or Disarm mode	Uncheck

4.6.4 AI Alarm Settings

Users can authorize a certain person to receive alarm

When device connect to cloud platform, it may be frequently offline due to sending text message, receiving text message and dialing.

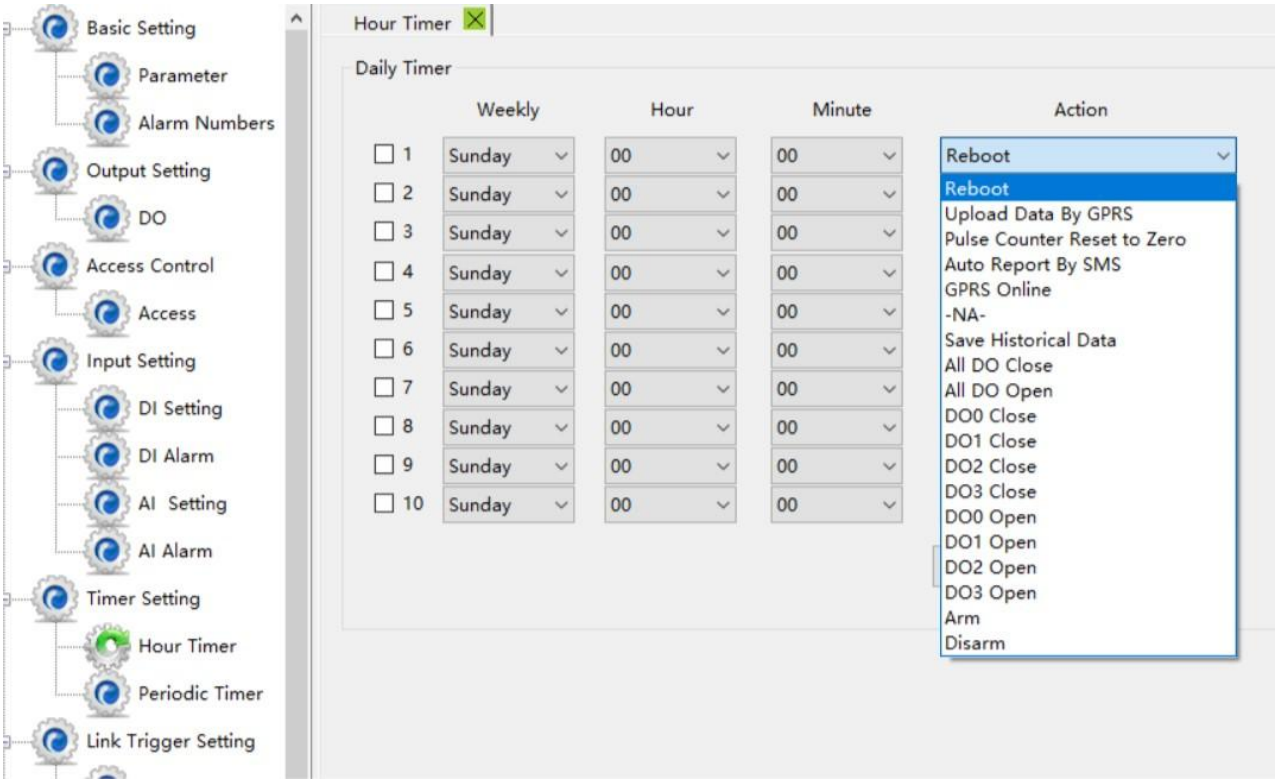


4.7 Timer Setting

The device is able to perform certain actions automatically at a preset time, which can effectively reduce human participation and greatly improve efficiency. For example, turn on the water pump regularly, discharge sewage regularly, start the exhaust fan regularly, switch equipment on and off at regular intervals, and so on.

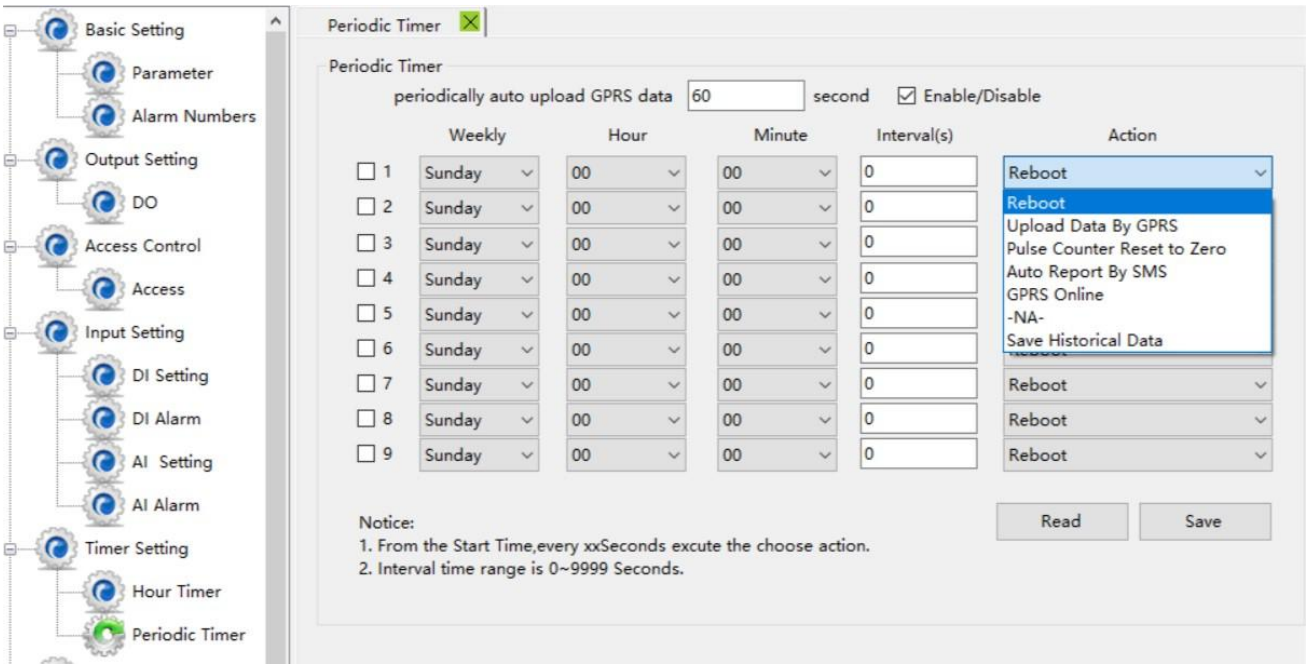
In addition, this device supports a variety of timing functions, which can meet the application requirements of most places. For example, it can perform certain actions according to a certain time every day and every week, and start from a certain preset time point. Interval a certain preset time, and then execute a certain action periodically, a total of 10 timing events can be set.

1) Hour Timer



Hour Timer		
Item	Description	**Default**
1-10	Represents timers 1-10	**Uncheck**
Weekly	Monday to Sunday or Everyday	--
Hour	Specific hour	--
Minute	Specific minute	--
Action	The action to be executed at preset time	--

2) Periodic Timer

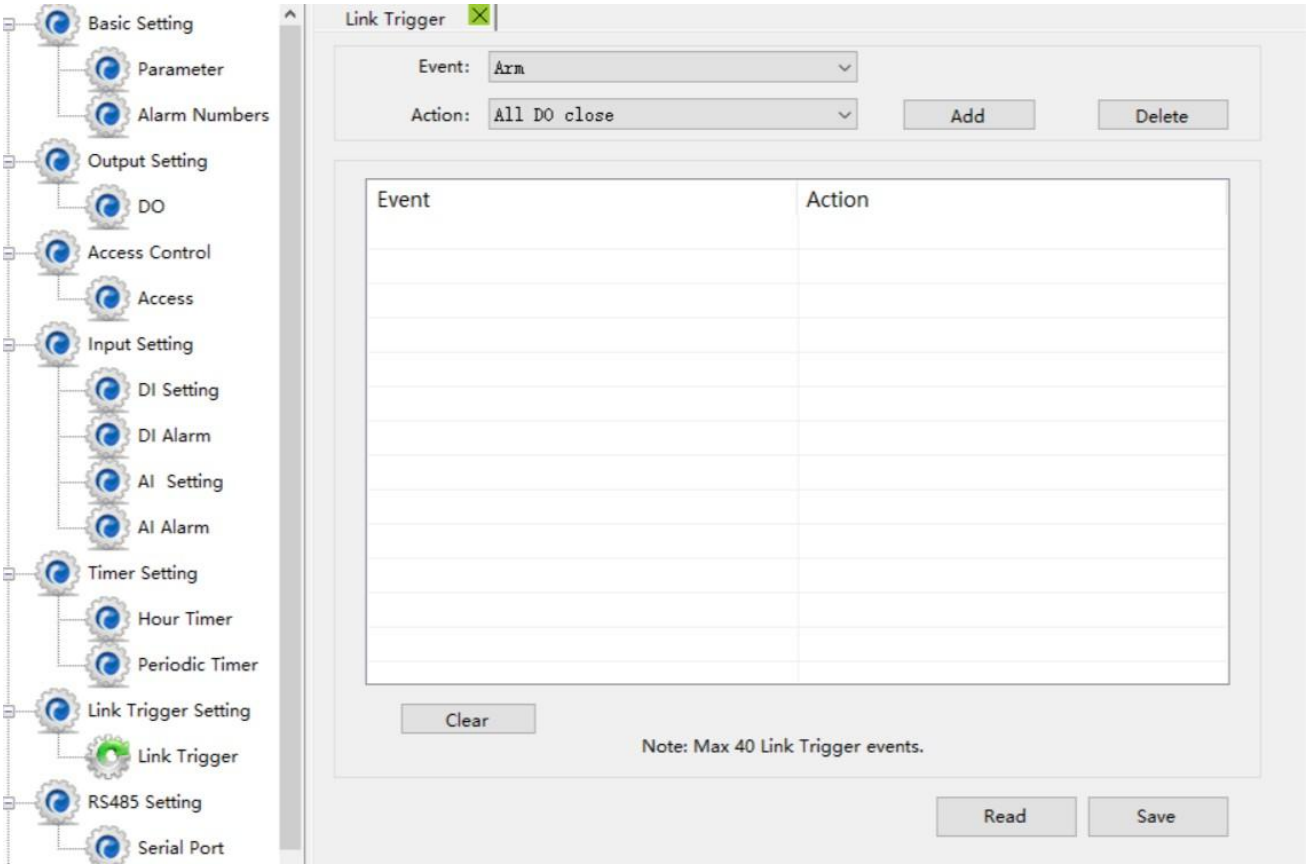


Periodic Timer		
Item	Description	**Default**
Periodically auto upload GPRS data	When GPRS/3G/4G data transmission protocol is BLIIoT IoT RTU Protocol, enable periodically auto upload is the default. Unit: Minute	**5**
1-10	Represents timers 1-10	**Uncheck**
Weekly	Monday to Sunday or Everyday	--
Hour	Specific hour	--
Minute	Specific minute	--
Action	The action to be executed at preset time	--

4.8 Logic Trigger Setting

Users can quickly set up to 40 automatic logic control functions, which can meet the automation control needs of most applications. It is automatically triggered according to preset conditions without human intervention, and the device automatically performs predetermined actions and notifies the user with text messages or network data. On the one hand, it saves time and reduces losses, on the other hand, it improves work efficiency.

For example: it can be set to automatically start the exhaust cooling equipment when the temperature is too high, and automatically shut down the exhaust cooling equipment when the temperature recovers, or start the diesel generator when the current and voltage are low, and stop the diesel generator when the current and voltage are high, or turn off the water pump when the water pressure is high, start the water pump when the water pressure is low, and so on.



Logic trigger		
Item	Description	**Default**
Event	Including “Arm”, “DIx trigger”, “DIx recovery”, “DIx alarm of pulse interval”, “DIx alarm of total number of pulse”, “AIx high alarm”, “AIx low alarm”, “AIx recovery”, “Temperature high alarm”, “Temperature low alarm”, “Temperature recovery”, “Humidity high alarm”, “Humidity low alarm”, “Humidity recovery”	--
Action	Including “Reboot”, “All DO close”, “All DO open”, “DO0 close”, “DO0 open”, “DO1 close”, “DO1 open”, “DO2 close”, “DO2 open”, “DO3 close”, “DO3 open”, “Open door”, “Siren”, “Arm”, “Disarm”, “GPRS online”	--
Add	Add selected settings	--
Delete	Delete selected settings	--

Note: "x" in "DIx" means serial number of DI channel, range: 0-7; "x" in "AIx" means serial number of AI channel, range: 0-5

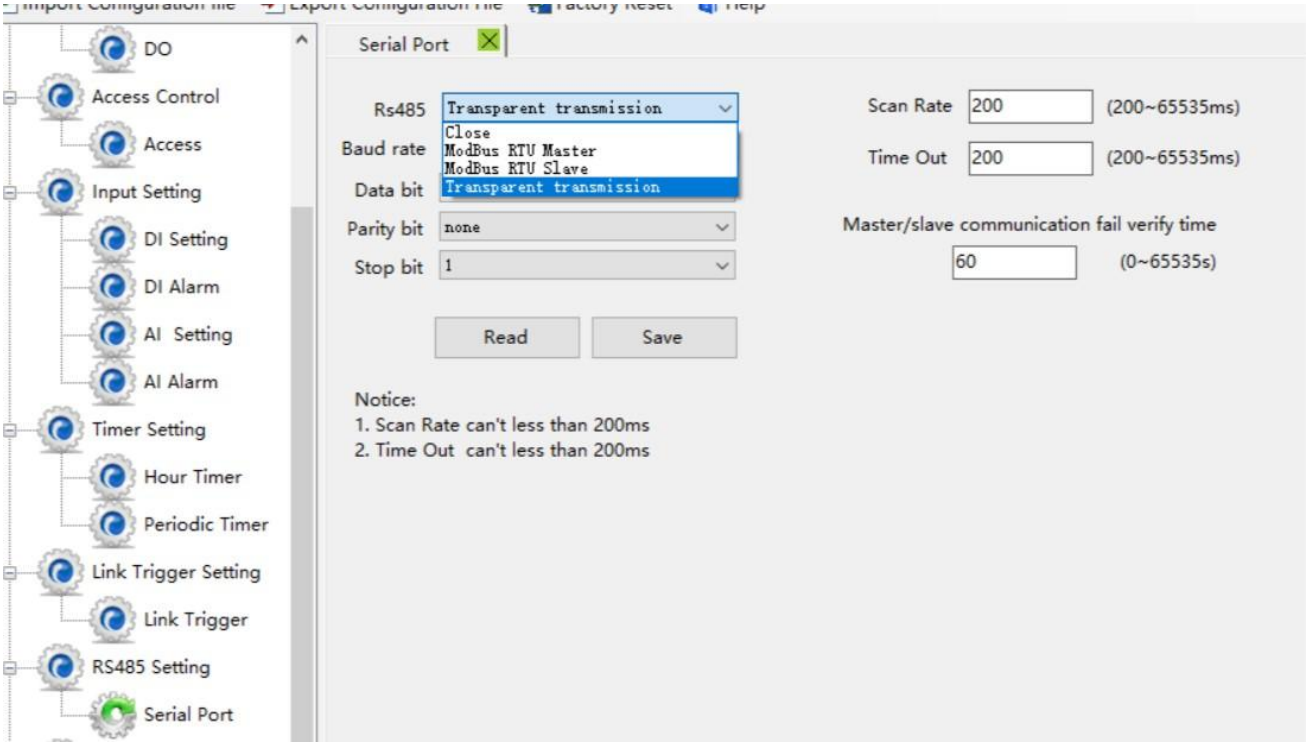
4.9 Serial Port Settings

This chapter introduces the purpose and parameters of the RS485 serial port, including Modbus master, Modbus slave, and transparent transmission.

As Modbus master, S275 can be used to connect to expansion I/O module or read data from instruments, PLC and other devices;

As Modbus slave, S275 can be connected to HMI, PLC, and DSC for local data communication;

When serial port set as transparent transmission, the data of built-in I/O cannot be transmitted to the cloud platform via network. If you need this function, please choose other model like S475.



Serial port		
Item	Description	**Default**
RS485	Including ”Close”, “ModBus RTU master”, “ModBus RTU Slave” and “Transparent transmission”	Close
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	9600
Data bit	8	8
Parity bit	none, even, odd	none
Stop bit	1, 2	1
Scan rate	Interval time between two polling command(unit:ms)	200
Time out	The longest time waited for slave to return data when master sent a command to slave(unit: ms). If the waiting time longer than this time, the slave will be considered as no response.	200
Master/slave communication	When master and slave communication fails many times, the period of communication fail more than	60

fail verify time	this value, the slave will be regarded as lost, and a slave failure message will be sent.(unit:s)	

Note: "Scan rate", "Time out" and "Master/slave communication fail verify time" are only valid when the RS485 set as "ModBus RTU Master".

4.10 Modbus RTU Slave Settings

When RS485 serial port set as "Modbus RTU master", the device will actively poll the slave continuously according to the Modbus RTU protocol, and read the value of the register in the slave into the mapping area of the device for storage, so that the registers in the slave are mapped to the device, and the reading and writing of the mapped registers of the device will be directly transmitted to the slave via RS485 serial port.

There is a one-to-one correspondence between the address of the slave register and the address of the mapping register in this device, which is the list of mapping registers.

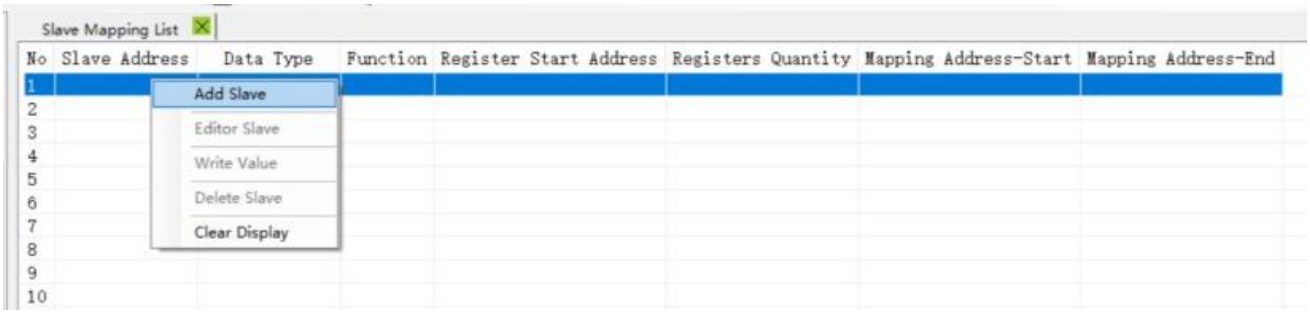
S275 can connect various slaves via serial port, and it supports up to 16 slave, expansion I/O module can be connected to the device.

For example, S275 connect to M series Ethernet I/O module to expanding the number of DI, DO, AI, AO, and PT100 input, or connect to the power monitoring module to read the current, voltage, and power of the three-phase power, or connect to the UPS power supply for data monitoring, etc.

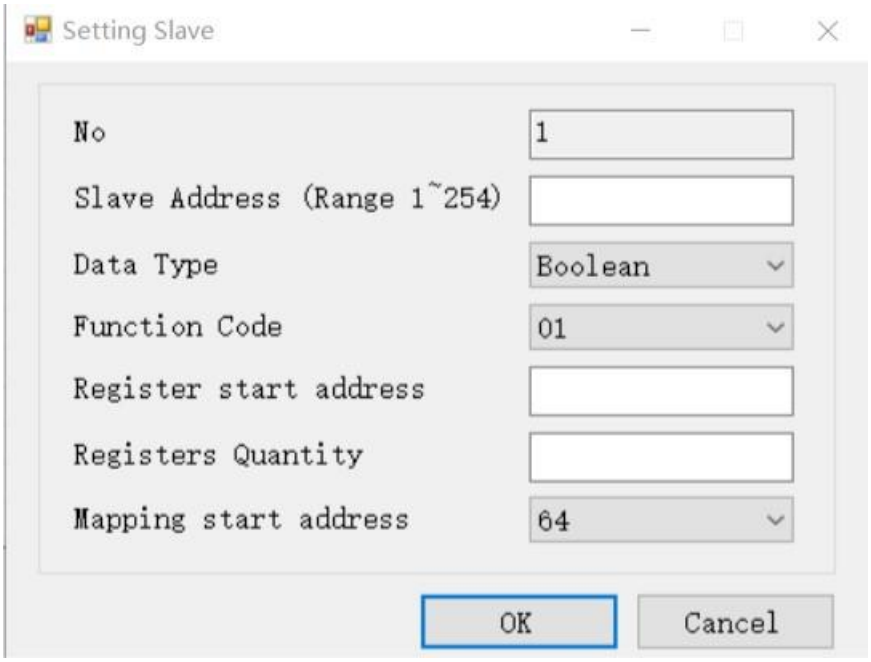
4.10.1 Slave Mapping List

Users can add, modify, and delete slave. After entering the slave mapping list, please read the mapped slave information first to prevent new slaves from overwriting the previous slave. To edit a slave, just select a line and click the right mouse button to complete operations such as deletion, addition, and parameter modification.

1) Add slave

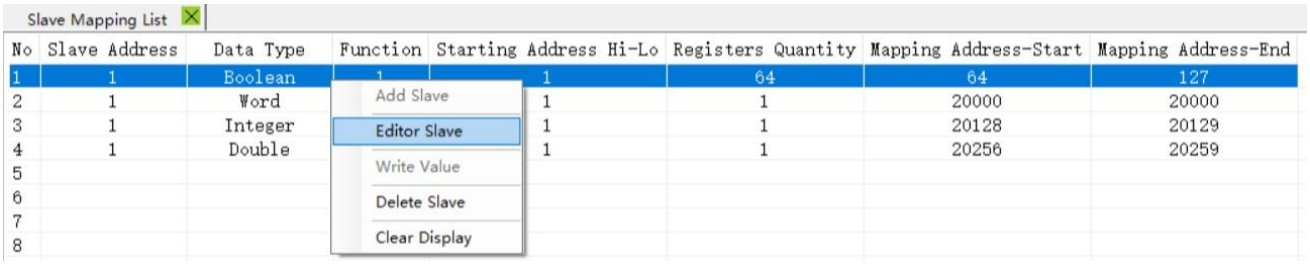


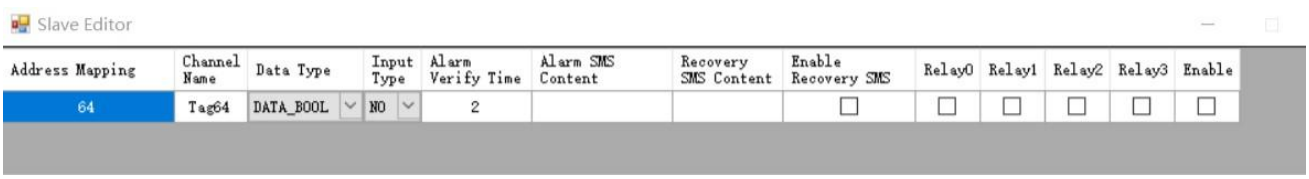
Right-click to Add Slave

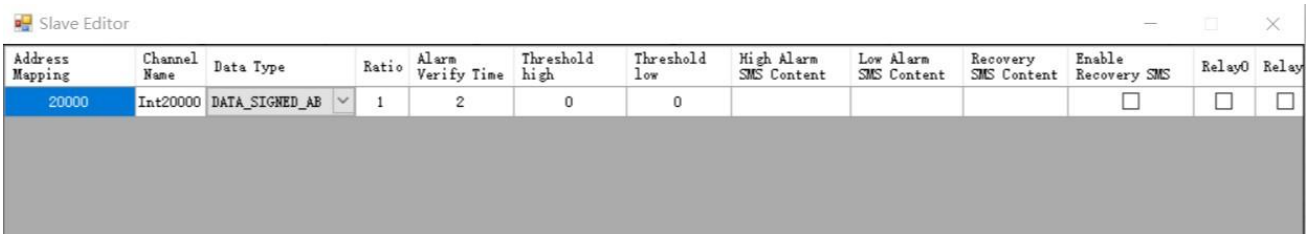


Add slave		
Item	Description	**Default**
Slave address	Slave address range: 0-247	Empty
Data type	Boolean, 16 bit, 32bit, 64bit	Boolean
Function code	01, 02, 03, 04, 15, 16	Empty
Register start address	Register start address for reading and writing slave data	Empty
Register quantity	The number of slave data	Empty
Mapping start address	The start address of slave register start address which mapped to the device register map area.	Empty
Mapping end address	Calculate the end mapping address according to start address and reading data quantity	Empty

2) Edit slave







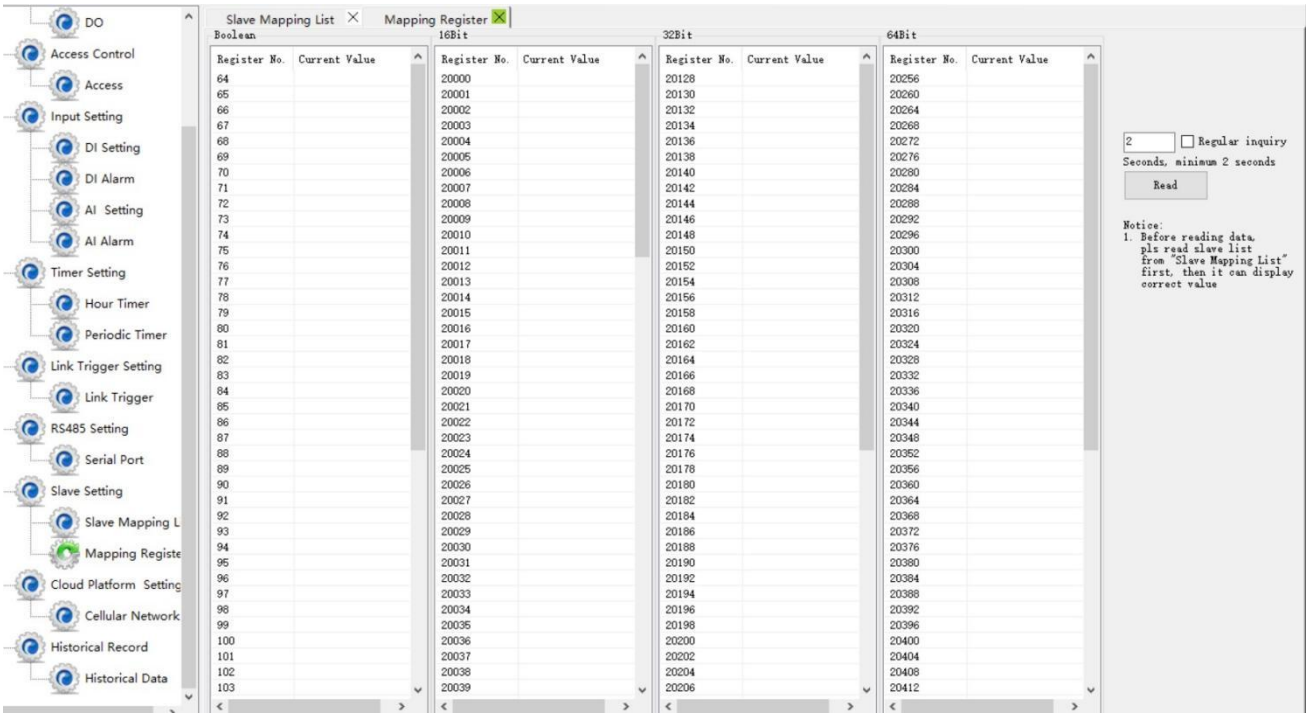
Edit slave		
Item	Description	**Default**
Address mapping	The device mapping address corresponding to the slave register	--
Channel name	"Channel name + Alarm content" include in the text message sent to authorized number when alarm/recovery	--
Data type	● **Boolean** It has been selected as a Boolean type when adding a slave ● **16bit/32bit/64bit** According to the type of data point selected from the slave, the letter ABCDEFGH indicates the sorting of the data in the slave register	Boolean ABCDEFGH
Input type	● NO: The normal state is normally open (0) ● NC：The normal state is normally closed (1)	NO
Ratio	The data in the mapping address will be multiplied by this ratio, and the multiplied value will be compared with the upper limit value and the lower limit value. If the threshold value is exceeded, an alarm will be triggered, and the alarm content and the current value will be sent to the authorized number. The data of the mapped address will not be multiplied by this ratio when it is collected by GPRS/3G/4G	1
Alarm verify time	When the abnormal event last more than this period, alarm will be triggered, and text message sent to authorized number	2
Threshold high	If value of the mapped address data multiplied by the ratio higher than this value, when alarm occurs, the "channel name" + "high limit alarm SMS content" will be sent to the authorized number	Empty
Threshold low	If value of the mapped address data multiplied by the ratio lower than this value, when alarm occurs, the "channel name" + "low limit alarm SMS content"	Empty

	will be sent to the authorized number	
High alarm SMS content	When the high limit alarm occurs, "channel name" + this SMS content will be sent to the authorized number.	Empty
Low alarm SMS content	When the low limit alarm occurs, "channel name" + this SMS content will be sent to the authorized number.	Empty
Alarm SMS content	When alarm occurs, "channel name" + this SMS content will be sent to the authorized number.	Empty
Recovery SMS content	When alarm restored, "channel name" + this SMS content will be sent to the authorized number.	Empty
Enable recovery SMS	Text message will be sent when alarm restored	Uncheck
Relay0	First relay will close when alarm occurs	Uncheck
Relay1	Second relay will close when alarm occurs	Uncheck
Relay2	Third relay will close when alarm occurs	Uncheck
Relay3	Fourth relay will close when alarm occurs	Uncheck
Enable	Enable alarm function	Uncheck

Note: Check "slave alarm" in "alarm numbers settings" page to enable the slave alarm function

4.10.2 Mapping Register

Click “Mapping Register” to view the value of the current slave



Note: If you want to view the current value of the slave, you need to click the [Read] button in the

[Slave Mapping list], first read the slave configuration information to the configuration software, and then go to the [Mapping Register] page to view The current value of the slave.

4.11 Network Settings

If you want to use BLIIoT platform, please contact BLIIoT sales person to get Login message/Client ID.

Note:

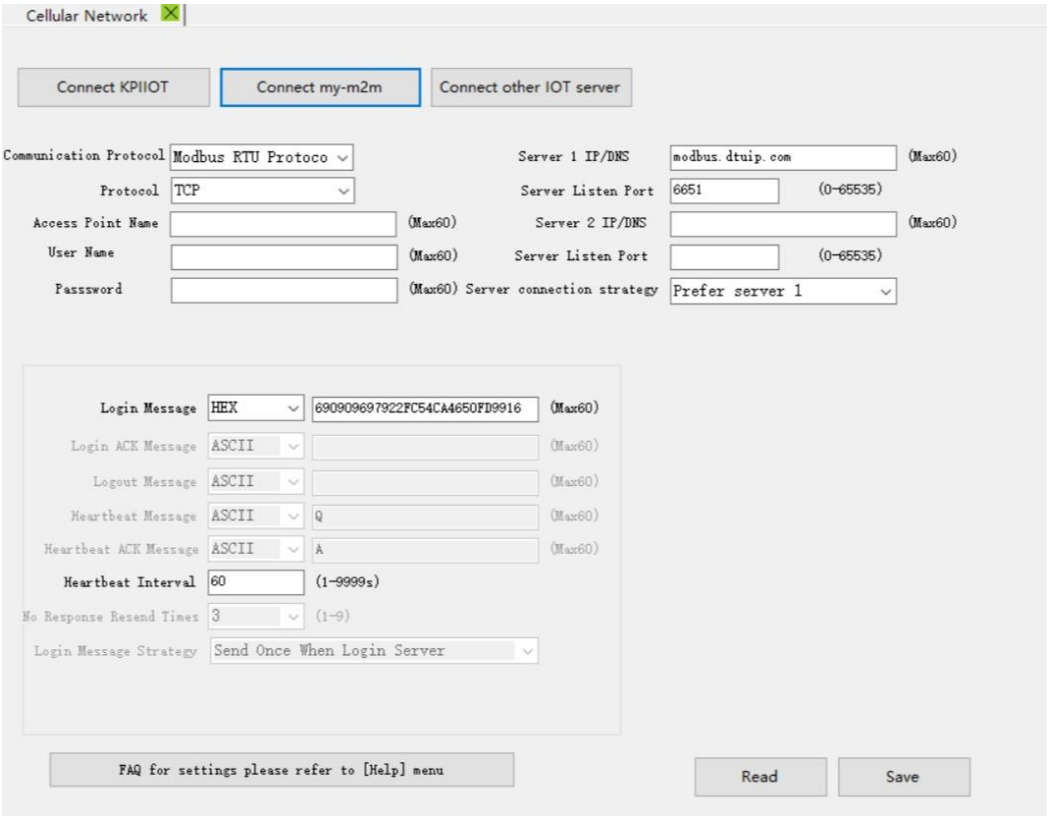
1, The device must be configured in [SET] mode, switch to [SET] before power ON the device;

2, Click the "Save" button to saving parameters in device;

3, When configuration is complete, power OFF the device, then switch to [RUN] mode;

4, At last, reboot the device, then the device will enter into normal running mode.

*Refer to chapter 4.1 Preparation before configuration



BLIIoT Cloud via Modbus		
Item	**Description**	**Default**
Communication protocol	When choosing BLIIoT cloud, the parameter is default	
Protocol	TCP	TCP
Access point name	Access point name provided by mobile operator	Empty
APN user name	User name provided by mobile operator	Empty
APN password	Password provided by mobile operator	Empty

Login message	Device serial number issued by BLIIoT (Contact sales to get the serial number)	**Pay for cloud services**
Login ACK message	System default	
Logout message	System default	
Heartbeat message	System default	
Heartbeat ACK message	System default	
Login message strategy	System default	Send once when login server
Server 1 IP/DNS	modbusrtu.kpiiot.com(BLIIoT V3.0 modbus) modbus.dtuip.com(BLIIoT V2.0 modbus)	Default
Server listen port	Target server 1 port number(BLIIoT V3.0 modbus)	4000
	Target server 1 port number(BLIIoT V2.0 modbus)	6651
Server 2 IP/DNS	Target server 2 DNS or IP	Empty
Server listen port	Target server 2 port number(0-65535)	Empty
Heartbeat interval	If the connection to the server fails 3 times in a row, the time interval for the next connection to the server.(1-9999) seconds	60
No response resend time	After setting heartbeat and login message, if server no response, the times of data resend(1-9)	3

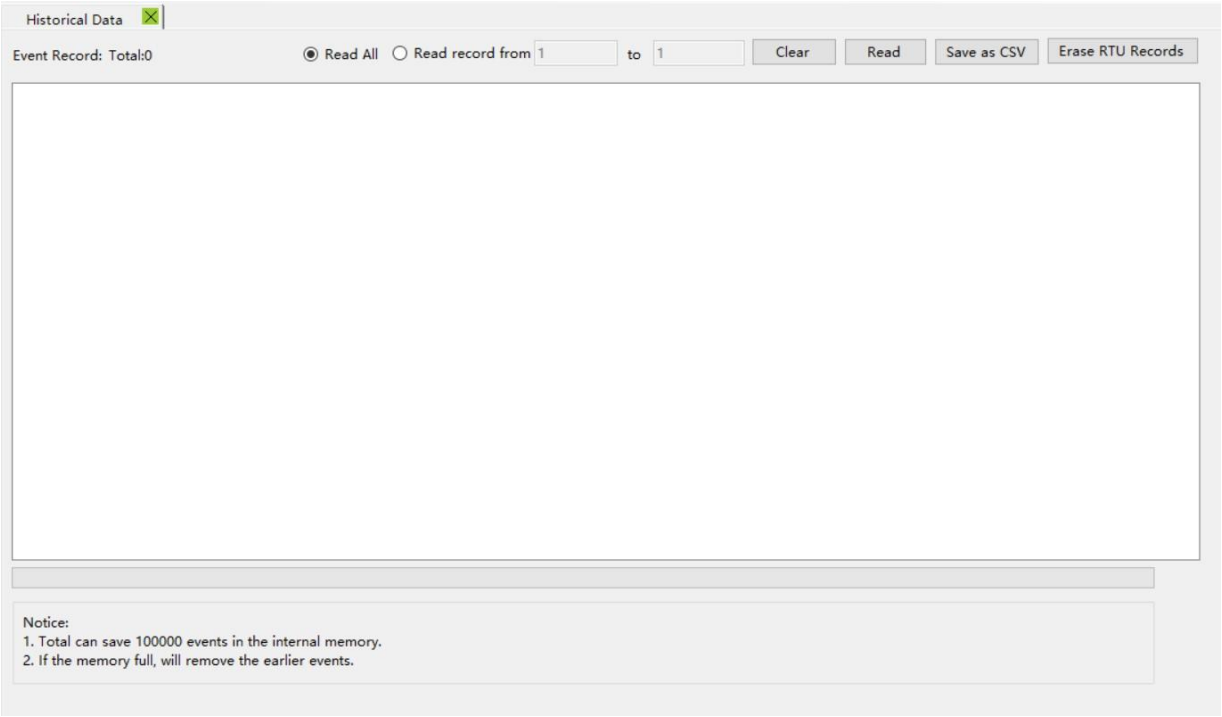
BLIIoT Cloud via MQTT		
Item	Description	**Default**
Access point name	Access point name provided by mobile operator	Empty
APN user name	User name provided by mobile operator	Empty
APN password	Password provided by mobile operator	Empty
Server 1 IP/DNS	mqtt.dtuip.com	Default
Server listen port	Target server 1 port number	1883
Server 2 IP/DNS	Target server 2 DNS or IP	Empty
Server listen port	Target server 2 port number(0-65535)	Empty

Subscribe topic	The topic when the device subscribes to the information /+	Automatically generate
Publish topic	The topic when the device publishes information	Automatically generate
MQTT Client ID	Device serial number issued by BLIIoT(Contact sales to get the serial number)	**Pay for cloud services**
MQTT user name	The account that publishes the topic on the proxy server	MQTT
MQTT password	The password to publish the topic on the proxy server	MQTTPW
Publish period	The time interval for the device to upload data regularly (10-65535)	10
MQTT data re-transmission	Whether to enable data re-transmission	Enable/Disable

4.12 Historical Record

The device has a built-in 32G SD card, which is used to store the alarm records and historical records of the device. If you need the device to record historical records, then you need to set the interval for saving historical records in the [Periodic Timer] page, and alarm records do not need to be set separately, and the device will automatically save them.

The device will automatically manage the historical records. When there is no space in the memory, it will automatically delete the previous data and keep the latest half of the historical data. It is convenient for users to inquire. In addition, users can also export data to computers for permanent storage. Details as follows:



Historical Record		
Item	Description	**Default**
Total	All records	--
Read all	Read all records in the device	Check
Read record from	Customize filtering of records	Uncheck
Clear	Clear the screen	Empty
Read	Read historical records	Empty
Save as CSV	Export to a CSV format file	--
Erase RTU records	Clear all the historical data	--

4.13 System

The same parameters can be quickly configured for multiple devices through the export and import function, and the factory reset function will restore the device to the factory settings.

4.13.1 Export Configuration File

It is convenient for the user to save the configuration parameters of the device and configure multiple devices in batches.

4.13.2 Import Configuration File

Click Import Configuration File button at the top left of the page and select the file to load

4.14.3 Factory Reset

Reset device through the factory reset button in configuration software.
All parameters of the device will be restored to the factory default initial value.
If you forget the password you set, please contact the after-sales service of Beilai Technology.

5 SMS Functions

This device supports remote setting, query, control and other operations through SMS commands.
Notes:
1. The default password is 1234, you can use SMS command to modify the password;
2. The "password" in the SMS command refers to the device password, such as 1234, just enter the password directly;
3. The "+" sign in the SMS command is not the content of SMS, please do not add any spaces or other characters in SMS;
4. SMS commands must distinguish between uppercase English letters, such as "PWD" instead of "pwd";
5. If the password is entered correctly and the command is entered incorrectly, the host will return a text message: "The command format is wrong, please confirm!" At this time, please check whether the Chinese and English input methods or uppercase and lowercase letters are correct;
6. If the password is entered incorrectly, no information will be returned;
7. The host will return a confirmation message after receiving the message command, if no message is returned, please check whether the password is correct and the signal is normal.

5.1 SMS Command List

1) Modify password

Event	SMS Command	Return SMS Content
Setting	Old Password＋P＋New Password	This is the New Password, please remember it carefully.

Default password: 1234, new password must be 4 digits

2) Arm/Disarm

Event	SMS Command	Return SMS Content
Arm	Password+AA	Armed
Disarm	Password+BB	Disarmed

3) Set RTU Time

Event	SMS Command	Return SMS Content
Setting	Password+Dxxxx-xx-xxTxx: xx: xxWxx For example: 1234D2015-05-22T15:20:30W01 W01 stands for Monday, W07 stands for Sunday	xxxx(Y)XX(M)XX(D)xx(H)X(M)xx(W)

4) Query Device Current State

Event	SMS Command	Return SMS Content
Query	Password+EE	Status: Armed/Disarmed: Model: Version: IMEI: GSM Signal Value:

5) Set User Numbers

Event	SMS Command	Return SMS Content
Setting	Password＋A＋series number+T+tel number Series number = 0~9	Telx: ---
Query	Password+A	Return all numbers
Delete	Password+A+series number	Return 0~4 or 5~9 numbers.

6) Call-in to open the door

Authorized number can dial to open the door

Event	SMS Command	Return SMS Content
Setting	● **Open door within the authorized time** Password＋B＋series number+S+start time+E+end time ● **Always have permission to open door** Password＋B＋series number+P	Tel1: --- Tel2: --- Tel3: 13570810254 Tel4: --- Tel5: ---

Query	Password＋B	Return all authorized user numbers
Delete	Password＋B＋series number	Return all authorized user numbers

Example: "1234B0S201505231230E201605231230", where "201505231230" represents the year, month, day, hour and minute respectively.

7) Set Daily Report Time

Event	SMS Command	Return SMS Content
Setting	Password+DR+series number+T+time	Daily SMS Report at: xx:xx
Query	Password+DR	
Delete	Password+DRDEL	

Serial number: 0~9, example: "1234DR1T12:30"

8) Digital Input

Event	SMS Command	SMS Command
Query state	Password+DINE	DI1: Open/Close DI2: Open/Close -----

9) Analog Input

Event		SMS Command	SMS Command
Threshold	Setting	Password+AINR+channel number+Lxxx+Hxxx	AIx: Low:xxx, High:xxx.
	Query	Password+AINR+channel number	AIx: Low:xxx, High:xxx. AIy: Low:xxx, High:xxx.
	Delete	Password+AINR+channel number+DEL	
AI measurement range	Setting	Password+AINM+channel number+Lxxx+Hxxx	AIx: Min:xxx, Max:xxx
	Query	Password+AINM+channel number	AIx: Min:xxx, Max:xxx. AIy: Min:xxx, Max:xxx.
	Delete	Password+AINM+channel number+DEL	
Query current value		Password+AINE+channel number	AINx：xxxx ,【Normal/Higher/Lower】
Query all current value		Password+AINE	AIN1：xxxx ,【Normal/Higher/Lower】 AIN2：xxxx ,

			【Normal/Higher/Lower】 ----

You can query the value of multiple channels by enter several channel number

10) Control Relay

Event		SMS Command	Return SMS Content
DO Name	Setting	Password+DO+channel number+T	DOx:xxxx
	Query	Password+DO+channel number	DOx:xxxx
	Delete	Password+DO+ channel number+DEL	
Close Relay		Password+DOC+ channel number	DOx: Close DOy: Close
Open Relay		Password+DOO+ channel number	DOx: Open DOy: Open
Query current value		Password+DOE+ channel number	DOx: Close/Open DOy: Close/Open
Query all current value		Password+DOE	DO1: Close/Open DO2: Close/Open ---
Close relay according to configured closing time		Password+DOLC+ channel number	DOx： DOy：
Pulse output	Set time	Password+DOT+Time	Pulse Output Time: xxxS
	Query	Password+DOT	Pulse Output Time: xxxS
	Delete	Password+DOP+channel number	

11) Set Server (cellular network)

Event	SMS Command	Return SMS Content
Setting	Password+IP+ IP address+P+Com port	Sever: Port:
Query	Password+IP	
Delete	Password+IPDEL	

12) Set cellular network parameters

Event	SMS Command	Return SMS Content
Setting	Password+AP+apn+#+user name+#+user password	APN: User name: Password
Query	Password+AP	

Delete	Password+APDEL	

13) GPRS Online

Event	SMS Command	Return SMS Content
Online	Password+GPRSonline	GPRS always online

14) Historical Data

Event	SMS Command	Return SMS Content
Delete	Password+HISDEL	Delete all historical records

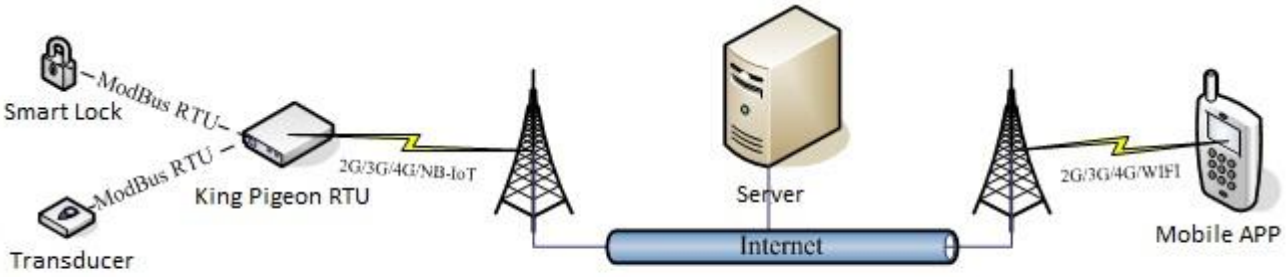
15) Set pulse counter

Event	SMS Command	Return SMS Content
Clear	Password+DIN+Channel number+CLR	Clear Successfully
Query	Password+PR	Counter Current Value: xxx

Channel number is 0~3, corresponding to DI0~3 pulse counter

6 Communication Protocols

S275 can be connected to servers, SCADA or cloud platform via GPRS/3G/4G.



Make sure mobile phone communication is normal

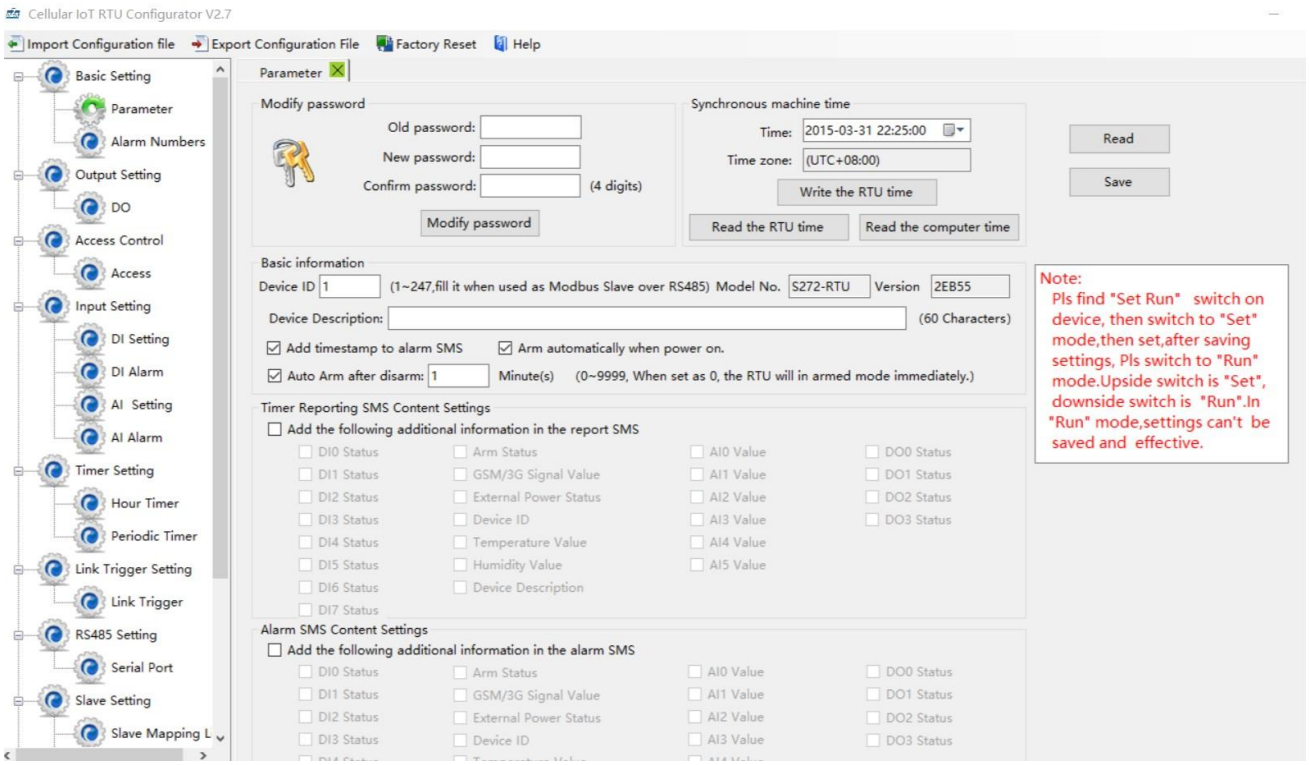
1, The device must be configured in [SET] mode, switch DIP switch on device to [SET] first, then power ON the device. Open configuration software to login in.

*Refer to chapter 4.1 Preparation before configuration

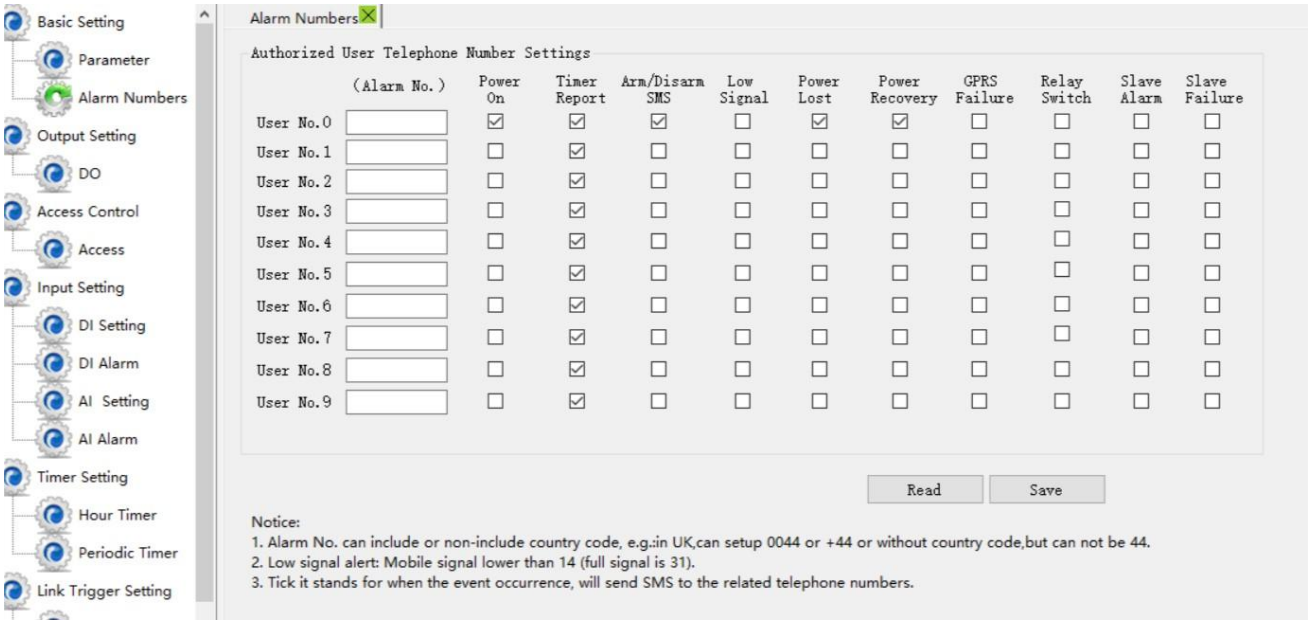
2, On parameter page, click "Read the computer time", "Write the RTU time" to set up time synchronization.

3, Check arm automatically when power on

4, Click the "Save" button to saving parameters in device



5, On alarm numbers page, enter the mobile phone number used to receive the alarm, and then check the corresponding options, if you want to receive text messages from device power on, power lost, and power recovery, check the power on, power lost, power recovery, then click the [Save] button.



6, Power OFF the device first, switch DIP switch on device to [RUN] mode, then reboot the device to enter into normal running mode.

7, Install the SIM card, and then turn on the device, wait for about 1-2 minutes, the number used to

receive the alarm should receive message notify the device is turned on. Unplug the external power supply of the device, the number used to receive the alarm should receive message notify the external power lost. Then re-connect the external power supply to the device, then the mobile phone number used to receive the alarm should receive message notify the external power recovery. So far, it has been verified that the device can communicate normally.

8, Power off the device, switch DIP switch on device to [SET], reboot device, and enter the configuration page again. Click [Read] button on the page, read the previously set parameters first, otherwise it will be overwritten by the new parameters.

6.1 Modbus RTU Slave Application

6.1.1 Read DO State

Relay DO register address as holding coil, address 0~3, refer to chapter 8.1 Device Register Address

Master Send Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, Range: 1-247, according to setting address
Function Code	1	01H	Read holding coil type, function code 01
DO Register start address	2	00 00H	Range: 0000H-0003H
Read DO Register QTY	2	00 04H	Range: 0001H-0004H
16CRC Verify	2	3D C9H	CRC0 CRC1 low byte in front, high byte in behind

Receiver Return Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, according to the data Master send
Function Code	1	01H	Read holding coil
Return Byte Length	1	01H	Return Data Length

<table>
<tr><td>Returning Data</td><td>1</td><td>02H</td><td>02H means 4 DO status, high 4 byte invalid, low 4 Byte converter Binary as below
<table>
<tr><td>DO3(bit3)</td><td>DO2(bit2)</td><td>DO1(bit1)</td><td>DO0(bit0)</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>Open</td><td>Open</td><td>Close</td><td>Open</td></tr>
</table>
Device current relay status: DO0,DO2,DO3 = Open, DO1= Close</td></tr>
<tr><td>16CRC Verify</td><td>2</td><td>D0 49H</td><td>CRC0 CRC1 low byte in front, high byte in behind</td></tr>
</table>

Example: Read 4 relays DO0~DO3 status, device address as 1 :
Server send: 01 01 00 00 00 04 3D C9
01H= Device address; 01H= Read relay function code; 00 00H= Read starting relay DO0 address; 00 04H= Read serial 4 DO status; 3D C9H CRC= Verify.

Device answer: 01 01 01 02 D0 49
01H= Device address; 01H= Read relay function code; 01H= Return data byte qty; 02H= Returning data, stands for Binary 0000 0010 high 4 byte invalid, low 4 byte 0010, sort as DO3 DO2 DO1 DO0 status, D0 49HCRC verify.
If read DO or multi DO status, only need to revise " DO Register start address" and " Read DO Register QTY ", calculate the CRC again, returning data according to description data.

6.1.2 Control DO

1) Control 1 channel device DO output

Master Send Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, Range: 1-247, according to setting address
Function Code	1	05H	Write single holding coil type, function code 05
DO Register Address	2	00 00H	Range: 0000-0003, stands for DO0-DO3
Active	2	FF 00H	This value: FF 00H or 00 00H, FF 00H= Close relay, 00 00H= Open relay
16CRC Verify	2	8C 3AH	CRC0 CRC1 low byte in front, high byte in behind

Receiver Return Data Format:

Content	Bytes	Data	Description

		(H: HEX)	
Device Address	1	01H	01H Device, according to the data Master send
Function Code	1	05H	Write single holding coil type, function code 05
DO Register Address	2	00 00H	Range: 0000H-0003H, stands for DO0-DO3
Active	2	FF 00H	This value: FF 00H or 00 00H, FF 00H= Already actived close relay, 00 00H= Already actived open relay
16CRC Verify	2	8C 3AH	CRC0 CRC1 low byte in front, high byte in behind

Example: Control relay DO0 close, then:
Server send: 01 05 00 00 FF 00 8C 3A
01H= Device address; 05H= Control single relay command; 00 00H = Address of DO0; FF 00H= DO0 close;
8C 3A H16 byte CRC verify.
Device answer: 01 05 00 00 FF 00 8C 3A
01H= Device address; 05H= Control single relay command; 00 00 H = DO0 Address; FF 00H= Active DO0 close; 8C 3AH 16 byte CRC verify.
If single control other relay outputs, only need to change "DO Register Address" and "Active", calculate CRC verify again.

2) Multi control DO outputs
Master Send Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, according to setting address
Function Code	1	0FH	Write multi holding coil
DO Register start address	2	00 00H	Range: 0000H-0003H, stands for DO0-DO3
Control Relay Qty	2	00 04H	Range: 00001H-0004H
Write Byte QTY	1	01H	Write 1 byte, since device only 4DO, use 4 binary can do it
Writing Data	1	0FH	0FH stands for 4 DO status, high 4 byte invalid, low 4 byte converter to binary as below DO3(bit3) | DO2(bit2) | DO1(bit1) | DO0(bit0) 1 | 1 | 1 | 1 Active close | Active close | Active close | Active close 1= Active close， 0= Active open
16CRC Verify	2	7E 92H	CRC0 CRC1 low byte in front, high byte in behind

Receiver Return Data Format:

Content	Bytes	Data	Description

		(H: HEX)	
Device Address	1	01H	01H Device, according to setting address
Function Code	1	0FH	Write multi holding coil
DO Register start address	2	00 00H	Range: 0000H-0003H, stands for DO0-DO3
Active Relay Qty	2	00 04H	Qty: 0-4, stands for how many relays already actived
16CRC Verify	2	54 08H	CRC0 CRC1 low byte in front, high byte in behind

Example: Close device 4 DO at same time, then:
Server send: 01 0F 00 00 00 04 01 0F 7E 92
01H= Device address; 0FH= Control multi relay; 00 00H= Relay DO0 starting address; 00 04H= Control 4 relays; 01H= Send data qty; 0FH= Data sent converter to binary 0000 1111 high 4 byte invalid, low 4 byte 1111 sort to match DO3 DO2 DO1 DO0, 1 stands for close relay, 7E 92H CRC verify.
Device answer: 01 0F 00 00 00 04 54 08
01H= Device address; 0FH= Control multi relay; 00 00H= Relay DO0 starting address; 00 04H= Actived 4 relays; 54 08H CRC verify.

6.1.3 Read DI State

Master Send Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, Range: 1-247, according to setting address
Function Code	1	02H	02 read input coil DIN status
DIN Register Start Address	2	00 00H	Range: 0000H-0007H, stands for DIN0-DIN7
Read DIN Register Qty	2	00 08H	Range: 0001H-0008H, Read qty of DIN status
16CRC Verify	2	79 CCH	CRC0 CRC1 low byte in front, high byte in behind

Receiver Return Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, Range: 1-247, according to setting address
Function Code	1	02H	02 read input coil DIN status
Return Bytes Qty	1	01H	Return Data Length

<table>
<tr><td>Returning Data</td><td>1</td><td>0FH</td><td>0FH converter to binary 1111 1111 from high to low byte, stands for DIN7-DIN0 status
<table>
<tr><td>DIN 7 (bit7)</td><td>DIN6 (bit6)</td><td>DIN5 (bit5)</td><td>DIN4 (bit4)</td><td>DIN3 (bit3)</td><td>DIN2 (bit2)</td><td>DIN1 (bit1)</td><td>DIN0 (bit0)</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>Close</td><td>Close</td><td>Close</td><td>Close</td><td>Close</td><td>Close</td><td>Close</td><td>Close</td></tr>
</table>
1= Close, 0= Open</td></tr>
<tr><td>16CRC Verify</td><td>2</td><td>E1 8CH</td><td>CRC0 CRC1 low byte in front, high byte in behind</td></tr>
</table>

Example: Inquiry device 8 DIN data at same time, then:

Server send: 01 02 00 00 00 08 79 CC

01H= Device address; 02H= Inquiry DIN status; 00 00H= DI Starting address; 00 08H= Serial reading 8 DIN status; 79 CC H CRC verify.

Device answer: 01 02 01 0F E1 8C

01H= Device address; 02H= Inquiry DIN status; 01H= Returning data bytes qty; 0FH DIN status, every byte stands for one DIN status, 0FH converter to binary 1111 1111 from high to low byte, stands for DIN7-DIN0 status, 0= Open, 1= Close, E1 8CH 16 byte CRC verify.

If need to inquiry multi DIN status, only need to change "DIN Register Start Address", "Read DIN Register Qty", calculate CRC verify again.

6.1.4 Read AI, Tem&Hum, DI0, Power value

Master Send Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, Range: 1-247, according to setting address
Function Code	1	04H	04 read input register
Register Starting Address	2	00 00H	One address can read 2 bytes. AIN address range: 0000-000BH, One AIN data take two address, temperature address: 0018H, humidity address: 0019H, DIN1 count value address: 001A, 001B External power voltage address: 000E

Read Register Qty	2	00 1CH	Read qty of input register, read AIN0 to DIN0 count value address, total 28 register, 0000H to 0001BH.
16CRC Verify	2	F1 C3H	CRC0 CRC1 low byte in front, high byte in behind

Receiver Return Data Format:

<table>
<tr><th>Content</th><th>Bytes</th><th>Data (H: HEX)</th><th>Description</th></tr>
<tr><td>Device Address</td><td>1</td><td>01H</td><td>01H Device, Range: 1-247, according to setting address</td></tr>
<tr><td>Function Code</td><td>1</td><td>04H</td><td>04 read input register</td></tr>
<tr><td>Data Bytes Range</td><td>1</td><td>38H</td><td>One address can read 2 bytes.
AIN address range: 0000-000BH, One AIN data take two address, temperature address: 0018H, humidity address: 0019H, DIN0 count value address: 001A,001B
External power voltage address: 000E</td></tr>
<tr><td>Returning Data</td><td>N</td><td>00 00 00 E7 00 00 00 DD 00 00 00 DD 00 00 00 DC 00 00 00 DE 00 00 00 DF 00 00 00 04 C6 01 9A 00 00 00 01 00 01 00 01 00 01 00 01 00 01 00 01 00 01 0B 36 1B E4 00 00 00 0BH</td><td>N= Returning bytes, sample data 56 points:
<table>
<tr><td>AIN</td><td>AIN0</td><td>AIN1</td><td>AIN2</td><td>AIN3</td><td>AIN4</td><td>AIN5</td></tr>
<tr><td>Receiving Data</td><td>00 00 00 E7H</td><td>00 00 00 DDH</td><td>00 00 00 DDH</td><td>00 00 00 DCH</td><td>00 00 00 DEH</td><td>00 00 00 DFH</td></tr>
<tr><td>Decimal Value</td><td>194</td><td>207</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Real Value</td><td>1.94</td><td>2.07</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table>
<table>
<tr><td>Other Value</td><td>External Power Voltage</td><td>Temperature</td><td>Humidity</td><td>DIN0 Count Value</td></tr>
<tr><td>Receiving Data</td><td>04 C6H</td><td>0B 36H</td><td>1B E4H</td><td>00 00 00 0B</td></tr>
<tr><td>Decimal Value</td><td>1222</td><td>2870</td><td>7140</td><td>11</td></tr>
<tr><td>Real Value</td><td>12.22V</td><td>28.7℃</td><td>71.4%RH</td><td>11 times</td></tr>
</table>
AIN, External Power Voltage, Temperature, Humidity real value=Register value/100</td></tr>
<tr><td>16CRC Verify</td><td>2</td><td>A9 3CH</td><td>CRC0 CRC1 low byte in front, high byte in behind</td></tr>
</table>

Example: Inquiry device 28 input type register at same time, start from address 0. Include 6 AIN, one

device temperature, humidity, external power voltage, DIN0 count value, then:
Server send: 01 04 00 00 00 1C F1 C3
01H= Device address; 04H= Read input register value; 00 00H AIN0= Starting address; 00 1CH= Serial reading 28 input register value; F1 C3H CRC verify.
Device answer: 01 04 38 00 00 00 E7 00 00 00 DD 00 00 00 DD 00 00 00 DC 00 00 00 DE 00 00 00 DF 00 00 00 00 04 C6 01 9A 00 00 00 01 00 01 00 01 00 01 00 01 00 01 00 01 0B 36 1B E4 00 00 00 0B A9 3C
01H= Device address; 04H= Read input register value; 56 bytes data after 38H, 00 00 00 E7H AIN0 value, 00 00 00 0DD AIN1 value, 00 00 00 DDH AIN2 value, 00 00 00 DCH AIN3 value, 00 00 00 DEH AIN4 value, 00 00 00 DFH AIN5 value, 00 00 00 00H invalid value, 04 C6H external power voltage value, 01 9A 00 00 00 01 00 01 00 01 00 01 00 01 00 01 00 01H invalid value, 0B 36H temperature value, 1B 36H humidity value, 00 00 00 0BH DIN0 count value, A9 3C CRC verify.

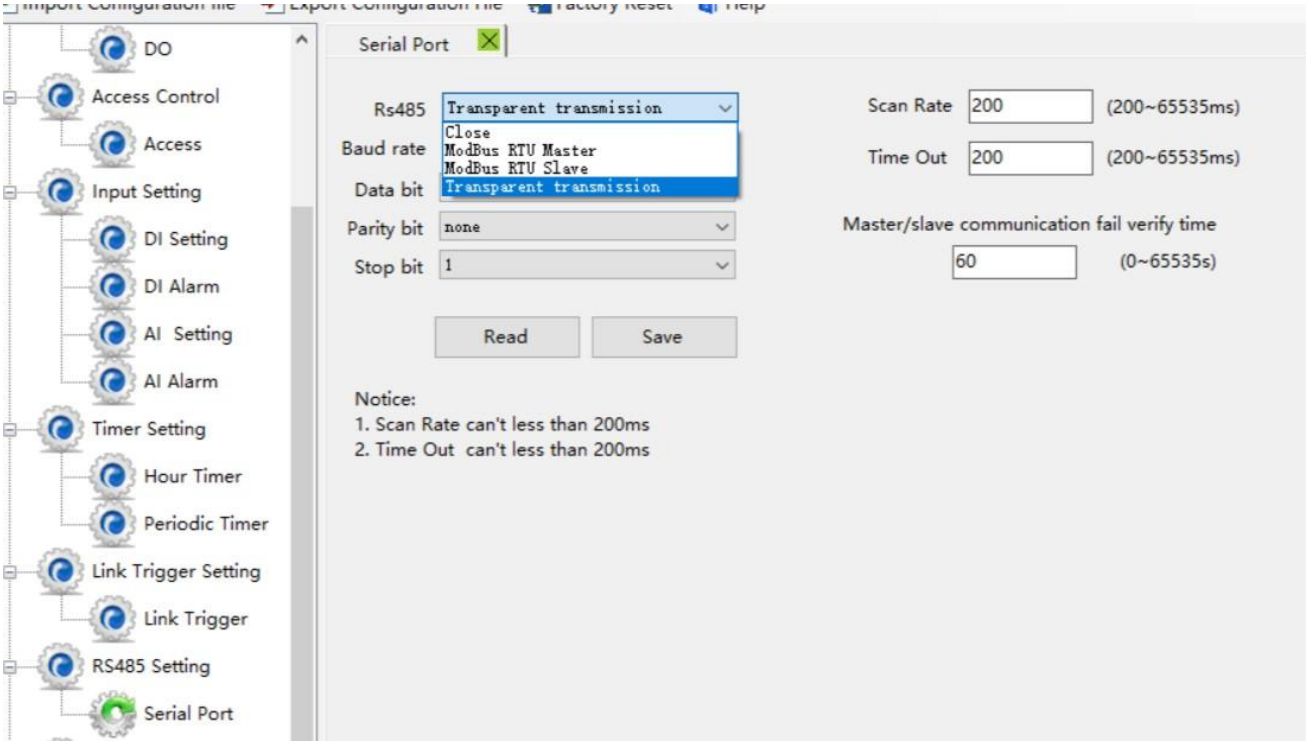
6.2 Modbus RTU Master Application

As Modbus master, RTU can be used to connect to expansion I/O module via RS485 serial port.

This section takes this RTU as a Modbus RTU master connect to Modbus RTU slave as an example, the details are as follows:

1) Serial port settings

In the [Serial Port] page, select "ModBus RTU Master", the baud rate, data bit, parity bit, and stop bit are consistent with the parameters of device connected to RS485 serial port, and the scan rate, timeout time and The master/slave communication fail verify time can be set as default.



2) Slave settings

Refer to chapter 4.10.1 Slave Mapping List

3) Shut down and restart the device

The device will running according to the configuration parameters.

Note: After adding slave information, the device must be shut down and restart.

6.2.1 Read Bool Mapping Address Data

Master Send Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, Range: 1-247, according to setting address
Function Code	1	01H	Read Holding Coil type, Function Code 01
Boolean Register Starting Address	2	00 40H	Range: 0040H-007FH, Address refer to chapter 8.2 Mapping Register
Read Register Qty	2	00 0AH	Range: 0001H-0040H, Boolean mapping address, total 64 address
16CRC Verify	2	BD D9H	CRC0 CRC1 low byte in front, high byte in behind

Receiver Return Data Format:

<table>
<tr><th>Content</th><th>Bytes</th><th>Data (H: HEX)</th><th>Description</th></tr>
<tr><td>Device Address</td><td>1</td><td>01H</td><td>01H Device, according to the data Master send</td></tr>
<tr><td>Function Code</td><td>1</td><td>01H</td><td>Read Holding Coil</td></tr>
<tr><td>Return Bytes Length</td><td>1</td><td>02H</td><td>Return data length</td></tr>
<tr><td>Returning Data</td><td>N
N= Returning bytes length</td><td>73 01H</td><td>High byte means low address data, low byte means high data, According to Modbus protocol, fix 73 01H real value to 01 73H converter binary as below:
<table>
<tr><td>BIT Position</td><td>Bit15</td><td>Bit 14</td><td>Bit 13</td><td>Bit 12</td><td>Bit 11</td><td>Bit 10</td><td>Bit 9</td><td>Bit 8</td></tr>
<tr><td>Boolean Address</td><td>Invalid</td><td>Invalid</td><td>Invalid</td><td>Invalid</td><td>Invalid</td><td>Invalid</td><td colspan="2">73 72</td></tr>
<tr><td>Value</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>BIT Position</td><td>Bit7</td><td>Bit 6</td><td>Bit 5</td><td>Bit 4</td><td>Bit 3</td><td>Bit2</td><td>Bit 1</td><td>Bit 0</td></tr>
<tr><td>Boolean</td><td>71</td><td>70</td><td>69</td><td>68</td><td>67</td><td>66</td><td>65</td><td>64</td></tr>
</table></td></tr>
</table>

			<table><tr><td>Address</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Value</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr></table> Eg: Read 10 value, high 10 byte address value looked as invalid
16CRC Verify	2	5D 0CH	CRC0 CRC1 low byte in front, high byte in behind

Example: Read 10 mapping Boolean value starting from address 64, then:

Server send: 01 01 00 40 00 0A BD D9

01H= Device address; 01H= Read holding coil; 00 40H= Read Boolean value starting from address 64; 00 0AH= Serial reading 10 Boolean status; BD D9H CRC verify.

Device answer: 01 01 02 73 01 5D 0C

01H= Device address; 01H= Read holding coil; 02H= Returning data bytes; 73 01H= 10 Boolean status read, refer to table above; 5D 0CH CRC verify.

6.2.2 Revise Bool Mapping Address Data

If need to revise slaves connected, need to add slave and use function code 15 for mapping command in configuration software. After mapping address value changed, will revise to write RS485 matched slave address data.

Master Send Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, Range: 1-247, according to setting address
Function Code	1	05H	Write single Holding Coil type, Function Code 05
Boolean Mapping Register Address	2	00 40H	Range: 0040H-007FH, address refer to chapter 8.2 Mapping Register
Writing Value	2	FF 00H	This value: FF 00H or 00 00H, FF 00H= Write 1, 00 00H= Write 0
16CRC Verify	2	8D EEH	CRC0 CRC1 low byte in front, high byte in behind

Receiver Return Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, according to the data Master send
Function Code	1	05H	Write single Holding Coil type, Function Code 05

Boolean Register Address	2	00 40H	Range: 0040H-007FH
Writing Value	2	FF 00H	This value: FF 00H or 00 00H, FF 00H= Write 1, 00 00H= Write 0
16CRC Verify	2	8D EEH	CRC0 CRC1 low byte in front, high byte in behind

Example: Revise Boolean mapping address 64 status value, revise to 1, then:

Server send: 01 05 00 40 FF 00 8D EE

01H= Device address; 05H= Revise Boolean value; 00 40 H= Revise mapping address; FF 00H= Write 1, 8D EEH16 byte CRC verify.

Device answer: 01 05 00 40 FF 00 8D EE

01H= Device address; 05H= Revise Boolean value; 00 40 H= Revise mapping address; FF 00H= Write 1, 8D EEH16 byte CRC verify.

If need revise multi, please refer to Modbus protocol, Function code 15.

6.2.3 Read Data Type Mapping Address

Master Send Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, Range: 1-247, according to setting address
Function Code	1	03H	03 function code, read holding register
Mapping Register Starting Address	2	4E 20H	One address can read 2 bytes. Address range: 4E20H-501CH, mapping data type address range, address refer to chapter 8.2 Mapping Register
Read Mapping Register Qty	2	00 0AH	Read qty of input register
16CRC Verify	2	3D 2FH	CRC0 CRC1 low byte in front, high byte in behind

Receiver Return Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, Range: 1-247, according to setting address
Function Code	1	03H	Read holding register

<table>
<tr><td>Data Bytes Range</td><td>1</td><td>14H</td><td>One address can read 2 bytes.</td></tr>
<tr><td>Returning Data</td><td>N= Returning Bytes</td><td>00 14 00 1E 00 28 00 32 00 4B 00 41 00 0A 00 25 00 14 00 2AH</td><td>N= Returning bytes, sample data 56 points:
<table>
<tr><td>Mapping Address</td><td>20000</td><td>20001</td><td>20002</td><td>20003</td><td>20004</td></tr>
<tr><td>Receive Data</td><td>00 14H</td><td>00 1EH</td><td>00 28H</td><td>00 32H</td><td>00 4BH</td></tr>
<tr><td>Mapping Address</td><td>20005</td><td>20006</td><td>20007</td><td>20008</td><td>20009</td></tr>
<tr><td>Receive Data</td><td>00 41H</td><td>00 0AH</td><td>00 25</td><td>00 14</td><td>00 2A</td></tr>
</table>
Mapping address data real value need to calculate slave mapping data type according device RS485 connected, refer to " Mapping Register Address and Function code"</td></tr>
<tr><td>16CRC Verify</td><td>2</td><td>FB 34H</td><td>CRC0 CRC1 low byte in front, high byte in behind</td></tr>
</table>

Example: Read 10 mapping address data, start from 20000, then:

Server send: 01 03 4E 20 00 0A D3 2F

01H= Device address; 03H= Read holding register; 4E 20H= Read starting address, decimal 20000 00 0AH read 10 register value, D3 2FH 16 byte CRC verify.

Device answer: 01 03 14 00 14 00 1E 00 28 00 32 00 4B 00 41 00 0A 00 25 00 14 00 2A FB 34

01H= Device address; 03H= Read holding register; 14H return 20 bytes, 00 14 00 1E 00 28 00 32 00 4B 00 41 00 0A 00 25 00 14 00 2A return data, refer to table above, FB 34H 16 byte CRC verify.

6.2.4 Revise Data Type Mapping Address

If need to revise slave data which RS485 connected, need to add slave and use function code 16 for mapping command in configuration software. After mapping address value changed, will revise to write RS485 matched slave address data.
If the data type of address 20000 mapping salves is signed-int AB:

Master Send Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, Range: 1-247, according to setting address

Function Code	1	06H	Write single holding register
Mapping Register Address	2	4E 20H	Address range: 4E20H-501CH, mapping data type address range, address refer to chapter 8.2 Mapping Register
Writing Data	2	00 64H	Sample data writing value is decimal 100
16CRC Verify	2	9E C3H	CRC0 CRC1 low byte in front, high byte in behind

Receiver Return Data Format:

Content	Bytes	Data (H: HEX)	Description
Device Address	1	01H	01H Device, Range: 1-247, according to setting address
Function Code	1	06H	Write single holding register
Mapping Register Address	2	4E 20H	Address range: 4E20H-501CH, mapping data type address range
Writing Data	2	00 64H	Writing 100 successfully
16CRC Verify	2	9E C3H	CRC0 CRC1 low byte in front, high behind

Example: If the data type of address 20000 mapping salves is signed-int AB, revise mapping address 20000 register to 100, then:

Server send: 01 06 4E 20 00 64 9E C3

01H= Device address; 06H= Revise single holding register value, 4E 20H= Revise address 20000 register value, 00 64H= Write to decimal value 100, 9E C3 H16 byte CRC verify.

Device answer: 01 06 4E 20 00 64 9E C3

01H= Device address; 06H= Revise single holding register value, 4E 20H= Revise address 20000 register value, 00 64H= Revise to decimal value 100, 9E C3 H16 byte CRC verify.

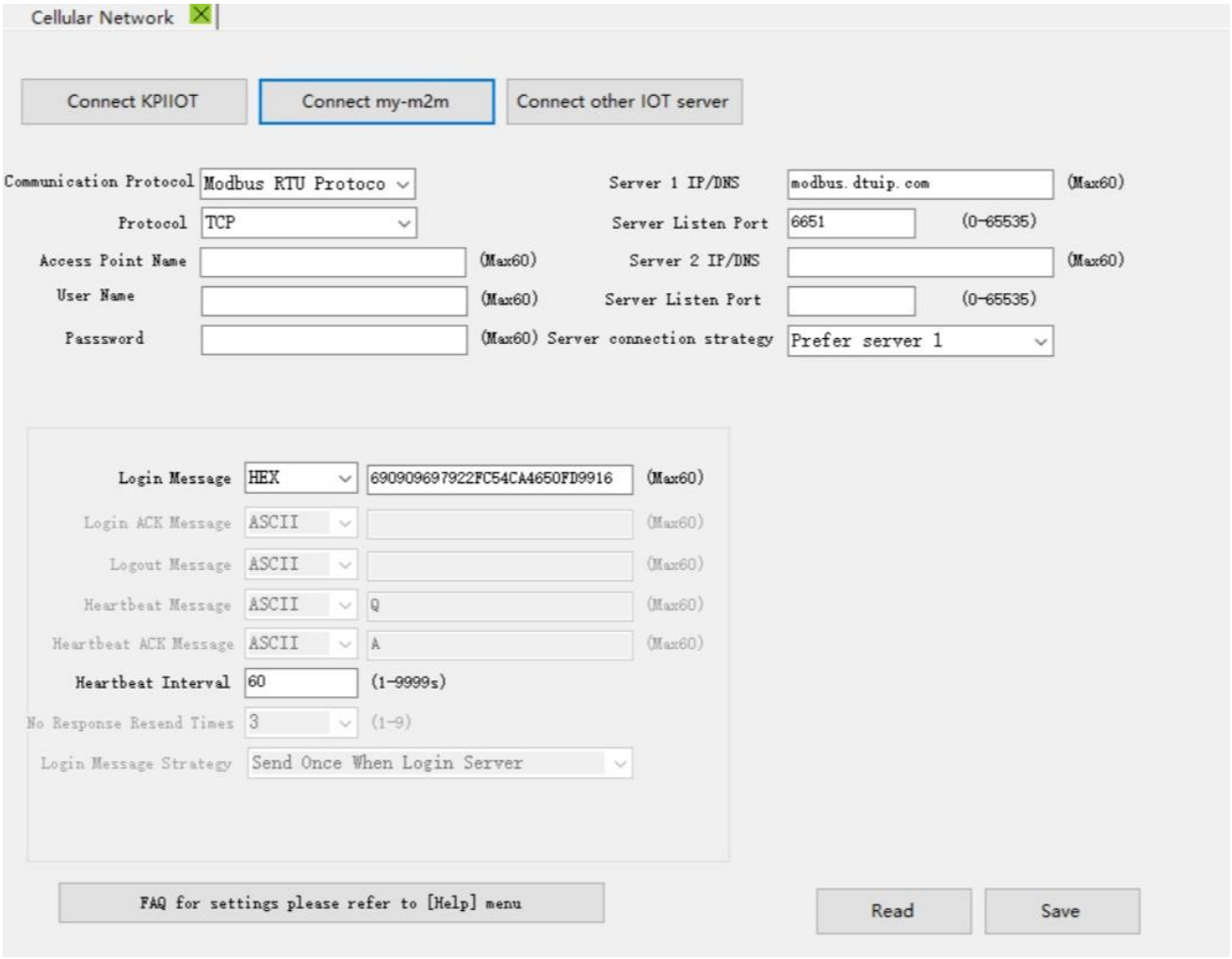
If need to revise multi data type mapping address, refer to Modbus protocol, Function code 16.

7 Connect to Cloud Platform

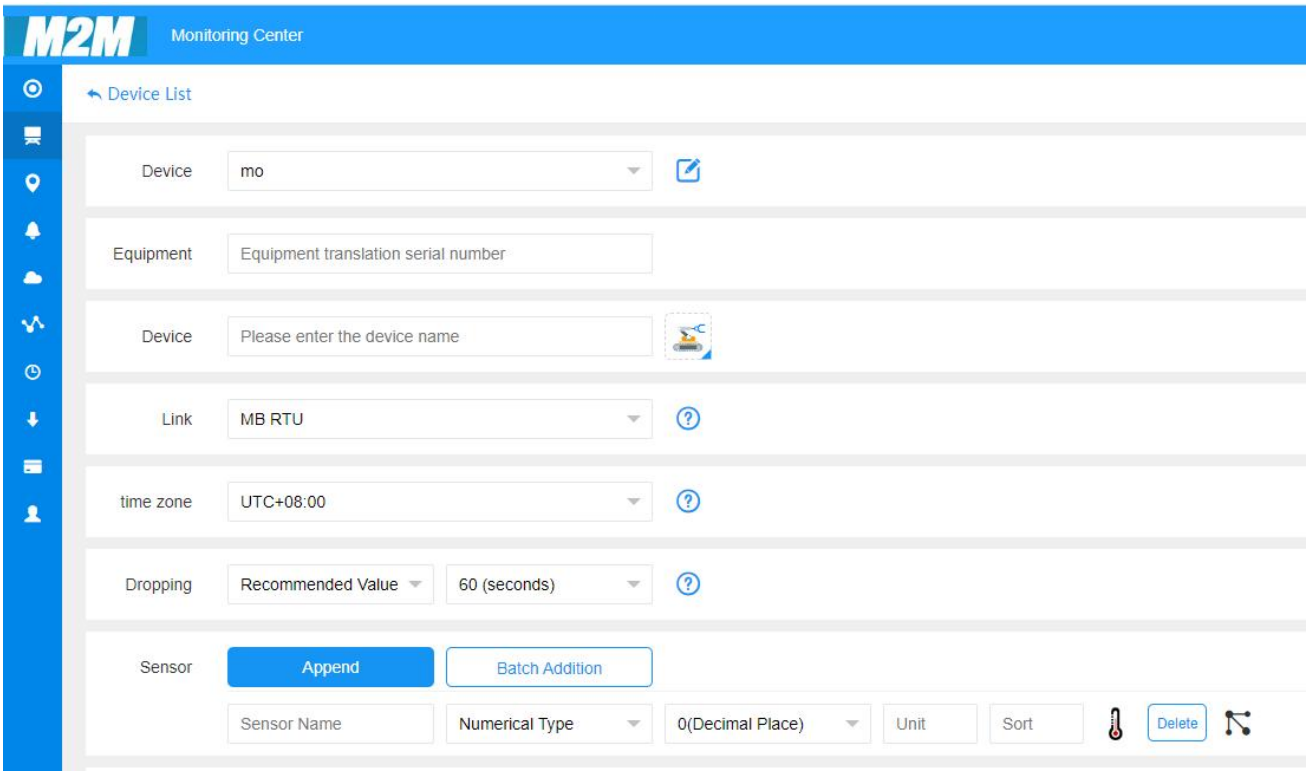
7.1 BLIIoT Modbus Cloud

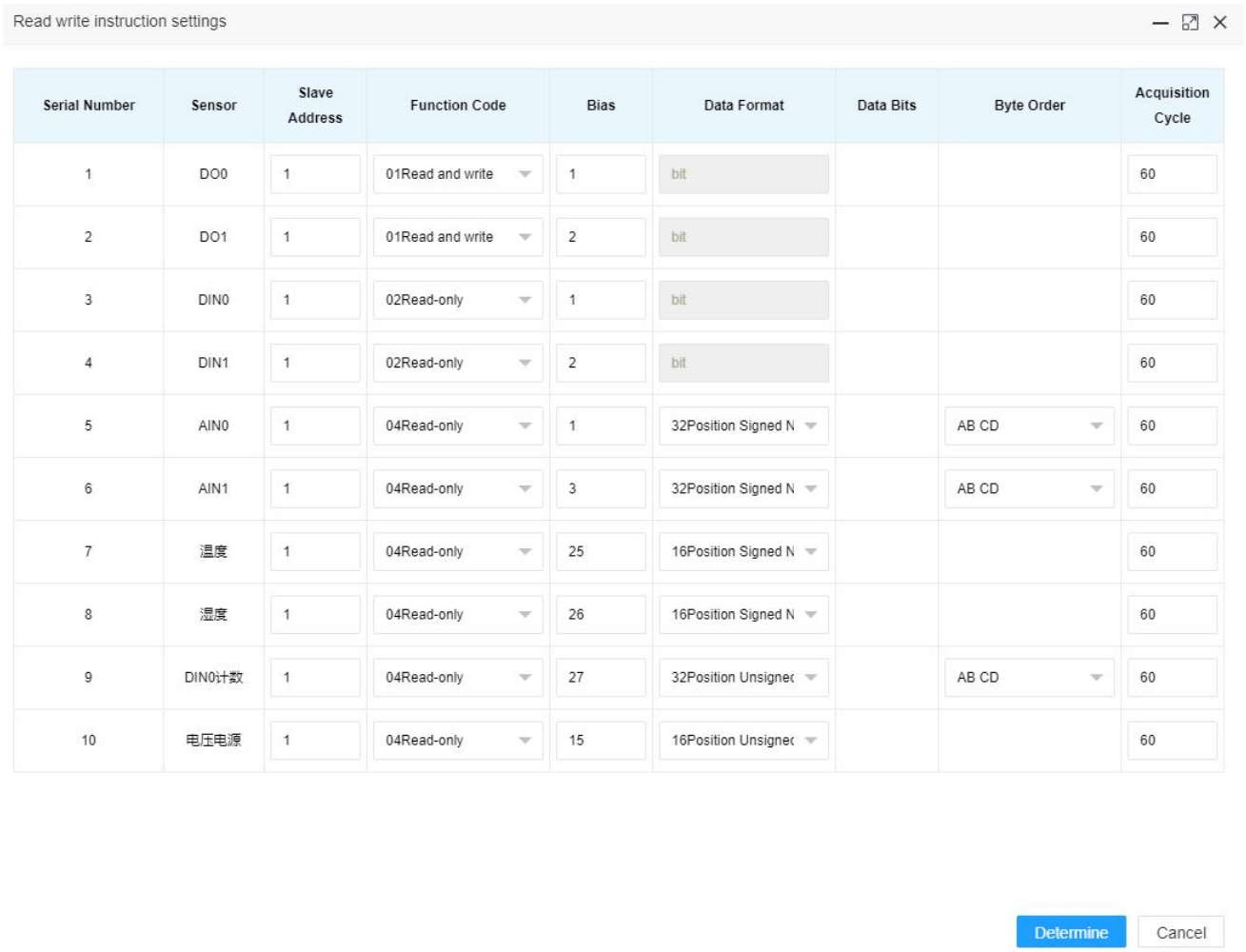
1) Enter "Login message" then click "Save"

Please contact sales person to get Login message

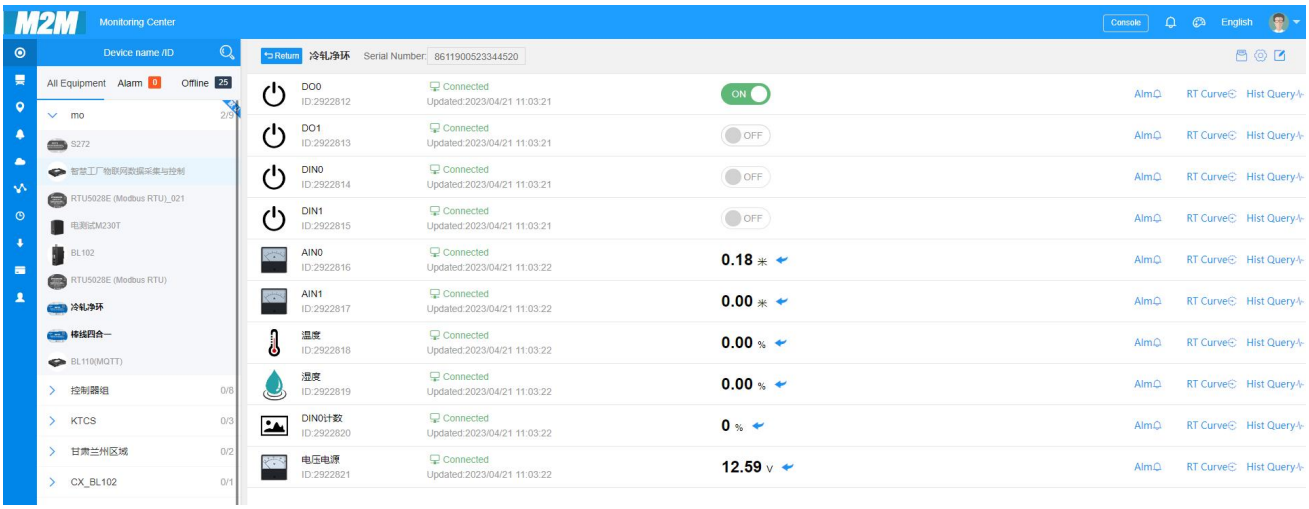


2) Add data points BLIIoT cloud(Data point identification REGXXX refer to chapter 8.1 Device Register Address)





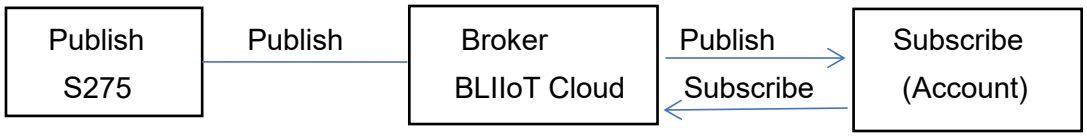
- Slave address: S27X ID
- Function code: Select the corresponding function code according to the slave type(Refer to chapter 8.2 Mapping Register)
- Bias: The register address of S27X needs to plus 1, such as address 0 bias item enter 1
- Data format: The Boolean type does not need to be set, and the numerical type is selected according to the actual situation.
- Byte order:Sorting of numerical data points
- Acquisition cycle: Interval time of data acquisition



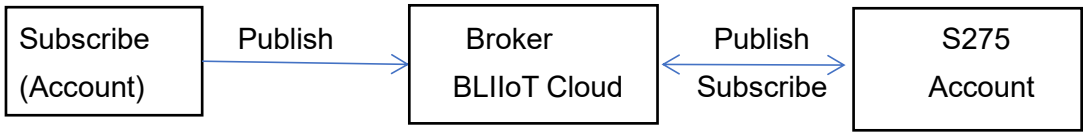
7.2 BLIIoT MQTT Cloud

There are three kinds of identities in the MQTT protocol: Publisher (Publish), Broker (Broker) (server), and Subscriber (Subscribe). Among them, the publisher and subscriber are both clients, the broker is server, and the message publisher can also be a subscriber. Take S27X connected to BLIIoT cloud 2.0 platform as an example:

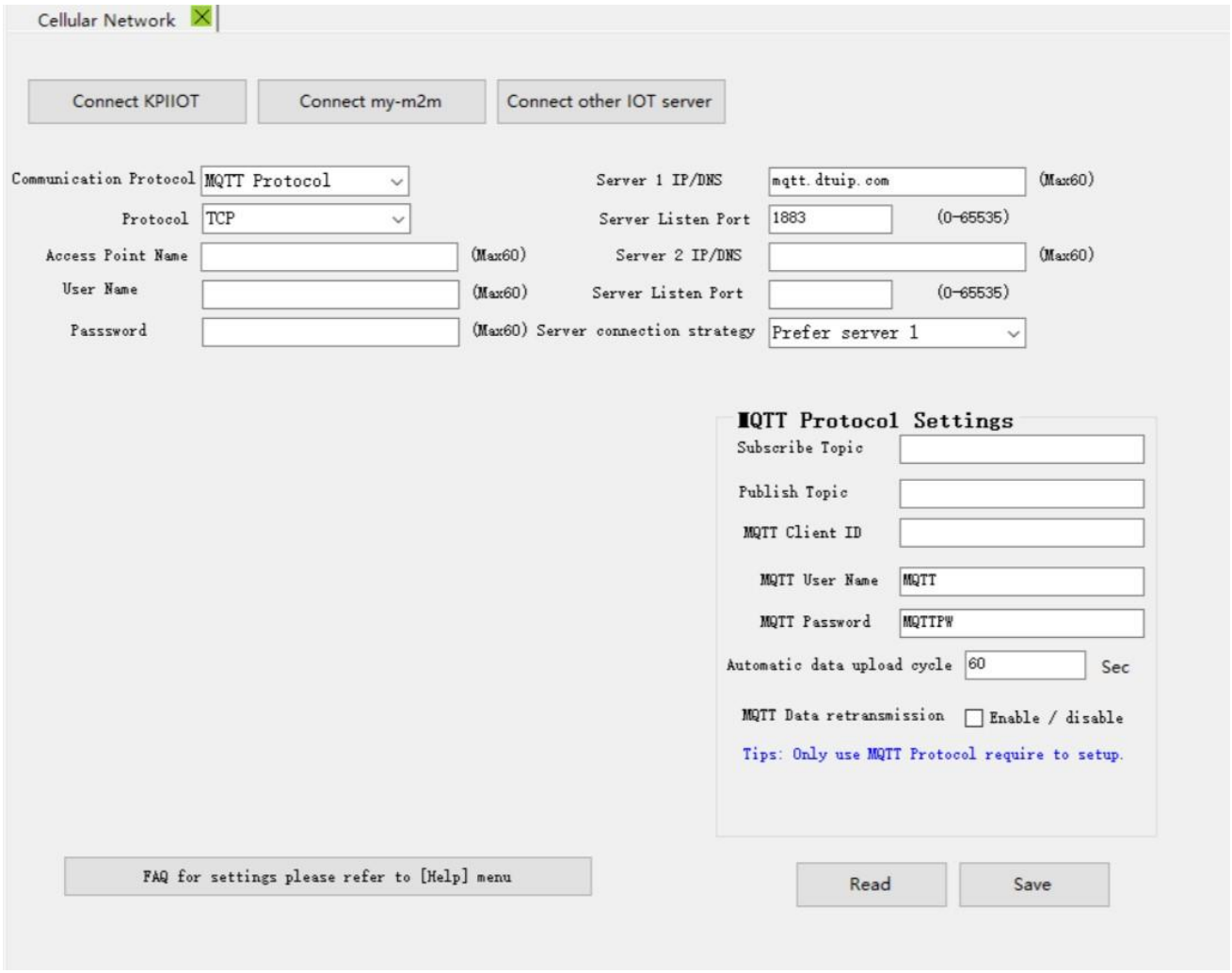
When device publish I/O point data:



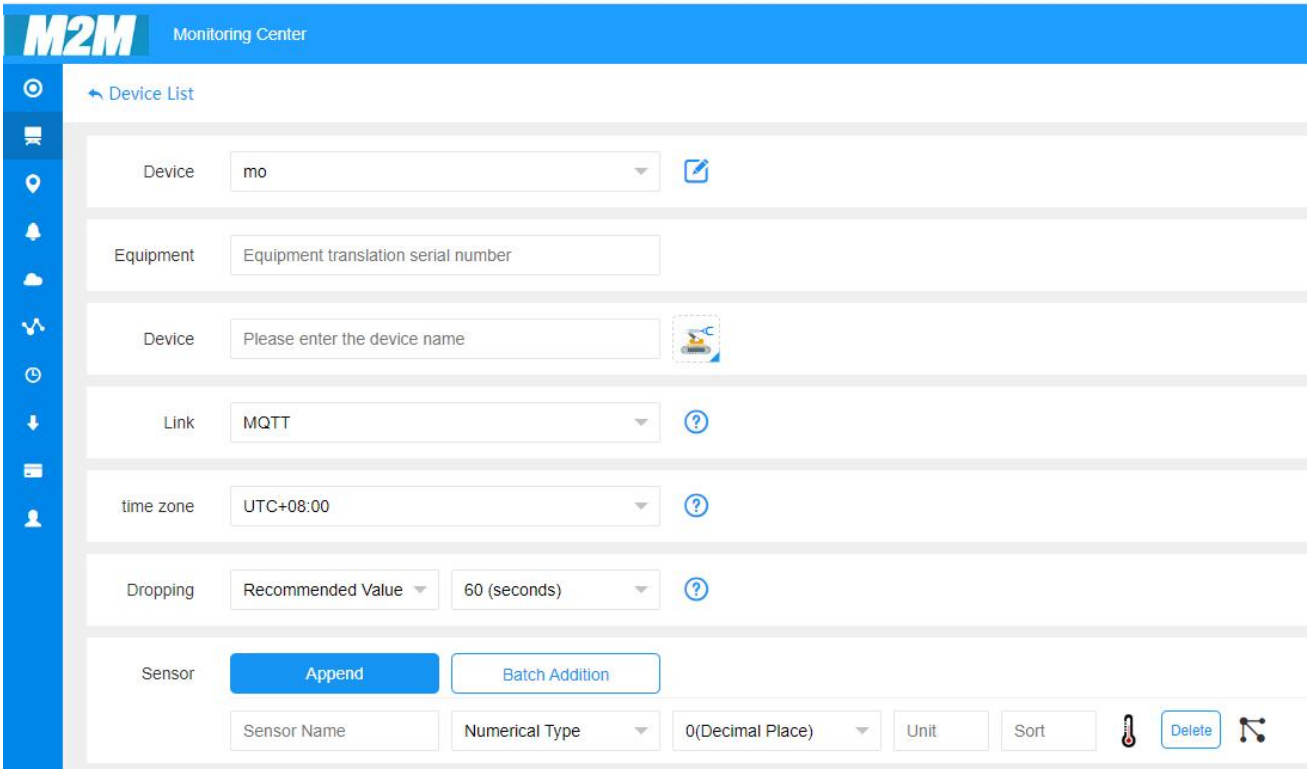
When customer control the device:



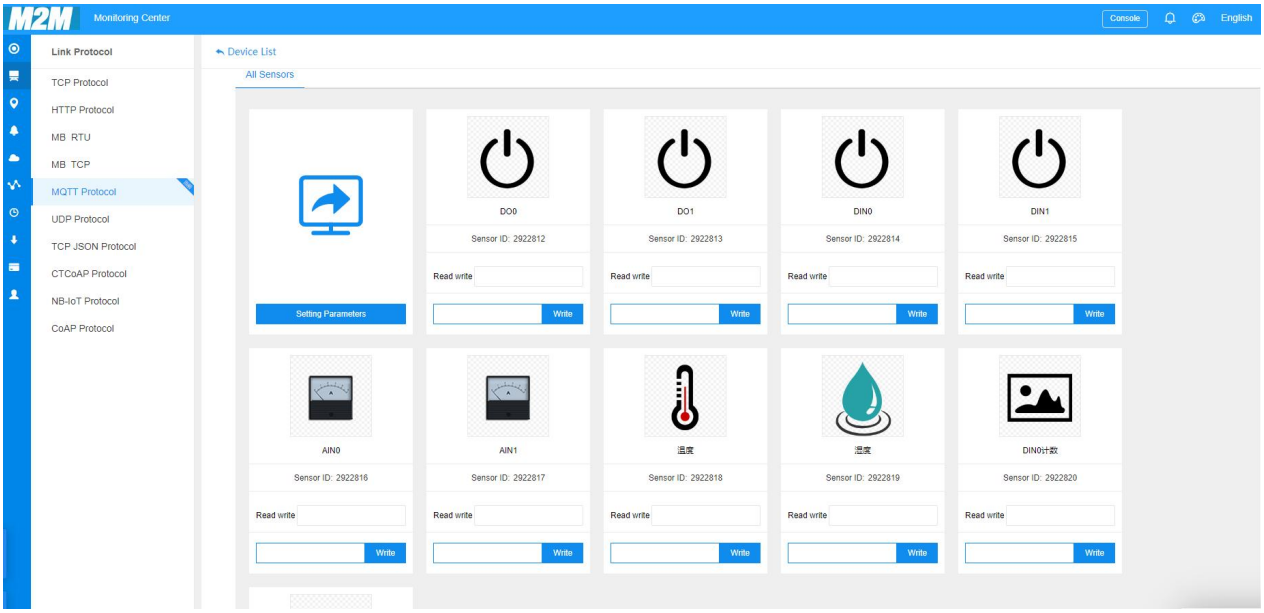
Enter MQTT Client ID



Add data points on BLIIoT cloud



Read and write identification setting, slave identification unified as REG plus mapping register address, refer to chapter 8.2 Mapping Register



❖ Payload data format of device publish message

Publish Topic: MQTT client ID

```
{
        "sensorDatas": [
            {
                "flag":"DI1",              //Read and write flag
                "switcher":1               //data type and value
            },
            {
                "flag":"AI1",
                "value":10.00
            }
            {
                "flag":"REG20000",       // Register address and value
                "value":1.00
            }

        ],
        "time":"1591841863",               //Time stamp (When power on,first time connection no time stamp,later connections have time stamp)
        "state":"alarm",                   //Alarm(Only appears when alarm occurs)
        "state":"recovery",                //Alarm(Only appears when alarm recover)
        "retransmit":"enable"              //Historical data (only for re-transmission of historical data, but not for real-time data)
    }
```

Note:

//Read and write flag: the character is "flag", followed by "MQTT identification of data points"

//Data type and value:

1. Switch-type data: the character is "switcher", followed by "0" or "1" (0 open, 1 closed)

2. Numerical data: the character is "value", followed by "specific value"

//Timestamp: the character is "time", followed by "specific timestamp "

//Alarm and recovery identification: the characters are "state", followed by "alarm" or "recovery" (alarm is alarm data, recovery is recovery data)

//Historical data identification: the character is "retransmit", followed by "enable"

The data collected during the network disconnection will be temporarily stored in the device, and will be republished when the network is recovered. It is identified by the "retransmit" character, indicating historical data. (Need to enable MQTT data retransmission function in the configuration software)

❖ Payload data format in device subscription message

(The topic of the BLIIoT 2.0 platform downstream publish message is called "device serial number/sensor ID", so the device subscribe topic needs to add the wildcard "/+" in order to receive the data sent by the platform to achieve control)Subscribe topic: device serial number /+ (corresponding to the data filled in the subscribe topic item on the configuration software)

```
{
    "sensorDatas":
    [
        {
            "sensorsId": 211267,    //platform sensor ID
            "switcher":1,           //data type :value
            "flag":"DO1"            // Read and write flag
        }
    ],
    "down":"down"                   //Platform downstream packet identification
}
```

Note:

//Platform sensor ID: The character is "sensorsID", followed by the ID number (ID is automatically generated by the platform)

//Data type and value:

1. Switch-type data: The character is "switcher", followed by "0" or "1" (0 open, 1 closed)

2. Numerical data: The character is "value", followed by "specific value"

//Read and write flag: The character is "flag", followed by "MQTT identification of data points"

//Downstream packet identification of the platform: The character is "down", followed by "down", which means that this is the downlink data of the platform.

Device I/O data point read and write flag

Data Point	Flag	Type	Description
DO	DOx	Switcher	0 is open, 1 is closed
DI	DIx	Switcher	0 is open, 1 is closed
AI	AIx	Value	True value = original value
Temperature	TEMP	Value	True value = original value
Humidity	HUMI	Value	True value = original value
External power voltage	EXTPWR	Value	True value = original value
DIN0 counter	COUNT	Value	True value = original value
DIN1counter	COUNT1	Value	True value = original value
DIN2 counter	COUNT2	Value	True value = original value
DIN3 counter	COUNT3	Value	True value = original value

Note：

“DOx": DO0, DO1, DO2, DO3

“DIx": DI0, DI1, DI2, DI3, DI4, DI5, DI6, DI7

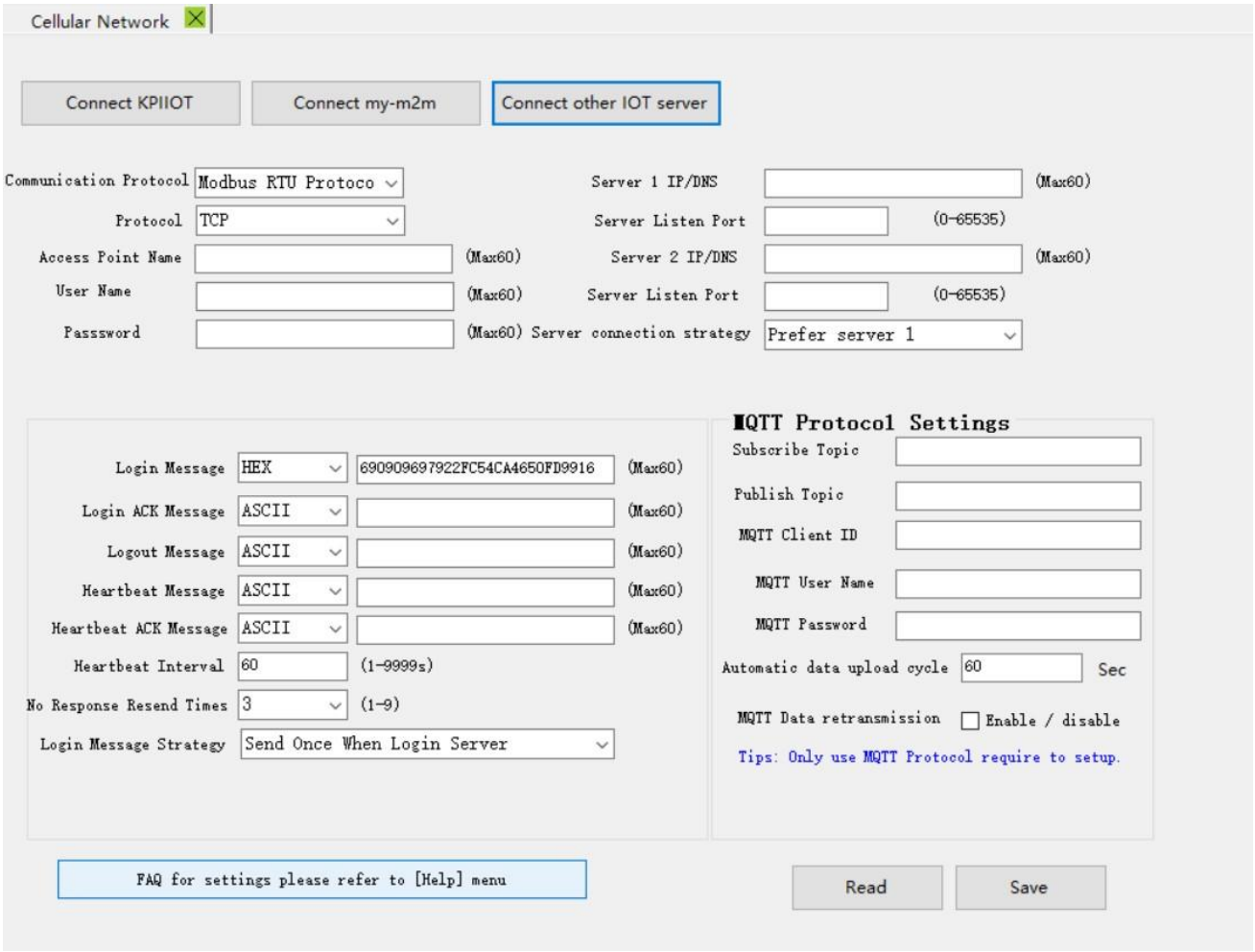
“AIx": AI0, AI1, AI2, AI3, AI4, AI5

7.3 Other IoT Server

S27X supports custom cloud platform configuration, which supports MODBUS RTU, MOBUDS TCP, and MQTT protocols.

The data format of the custom MQTT protocol is the same as the data format of the MQTT of the BLIIoT Cloud V2.0 platform.

The Modbus RTU and Modbus TCP protocols are standard Modbus protocols.



8 Register

8.1 Device Register Address

1) Read and Write, Holding Coil (Function Code 01, Function Code 05, Function Code 15)

Register Address		Definition	Data Type	Description
Hexadecimal	Decimal			
0	0	DO0	Bool	● 1: Relay close ● 0: Relay open
1	1	DO1	Bool	
2	2	DO2	Bool	
3	3	DO4	Bool	

2) Read, Input Coil (Function Code 02: Read Coil)

Register Address		Definition	Data Type	Description
Hexadecimal	Decimal			
0	0	DI0	Bool	● Dry contact

1	**1**	DI1	Bool	Short circuit: Logic 1 Open circuit: Logic 0 ● Wet contact 0-0.5V: Logic 1 3-30V: Logic 0
2	**2**	DI2	Bool	
3	**3**	DI3	Bool	
4	**4**	DI4	Bool	
5	**5**	DI5	Bool	
6	**6**	DI6	Bool	
7	**7**	DI7	Bool	

3) Read, Input Register (Function Code 04: Read Input Register)

Register Address		**Definition**	**Data Type**	**Description**
Hexadecimal	**Decimal**			
0	**0**	AI0	32bit int	Y=X/100
2	**2**	AI1	32bit int	Y=X/100
4	**4**	AI2	32bit int	Y=X/100
6	**6**	AI3	32bit int	Y=X/100
8	**8**	AI4	32bit int	Y=X/100
A	**10**	AI5	32bit int	Y=X/100
C-D	**12-13**	Unavailable	---	---
E	**14**	Voltage	16bit unint	Y=X/100
F-17	**15-23**	Unavailable	---	---
18	**24**	Temperature	16bit int	Y=X/100
19	**25**	Humidity	16bit int	Y=X/100
1388	**5000**	DI0 count value	32bit uint	Enable when DIN0 as counter mode
138A	**5002**	DI1 count value	32bit uint	Enable when DIN1 as counter mode
138C	**5004**	DI2 count value	32bit uint	Enable when DIN2 as counter mode
138E	**5006**	DI3 count value	32bit uint	Enable when DIN3 as counter mode

In the description, each variable is defined as follows:

Y: True value

X: The value stored in the register

"Y=X/100" means: "real value = the value stored in the current register/100"

4) Read and Write, Holding Register (Function Code 03, Function Code 06, Function Code 16)

Register Address		**Definition**	**Data Type**	**Description**
Hexadecimal	**Decimal**			

5A(bit0)	**90(bit0)**	DI0 count clear	Bool	Write 1 to clear DI0 count
5A(bit1)	**90(bit1)**	DI1 count clear	Bool	Write 1 to clear DI1 count
5A(bit2)	**90(bit2)**	DI2 count clear	Bool	Write 1 to clear DI2 count
5A(bit3)	**90(bit3)**	DI3 count clear	Bool	Write 1 to clear DI3 count

Device I/O data point read and write flag

Data Point	Flag	Type	Description
DO	DOx	Switcher	0 is open, 1 is closed
DI	DIx	Switcher	0 is open, 1 is closed
AI	AIx	Value	True value = original value
Temperature	TEMP	Value	True value = original value
Humidity	HUMI	Value	True value = original value
External power voltage	EXTPWR	Value	True value = original value
DIN0 counter	COUNT	Value	True value = original value
DIN1counter	COUNT1	Value	True value = original value
DIN2 counter	COUNT2	Value	True value = original value
DIN3counter	COUNT3	Value	True value = original value

Note：

“DOx": DO0, DO1, DO2, DO3

“DIx": DI0, DI1, DI2, DI3, DI4, DI5, DI6, DI7

“AIx": AI0, AI1, AI2, AI3, AI4, AI5

8.2 Mapping Register

1) Holding Coil (Function Code 01, Function Code 05, Function Code 15)

Register Address		Definition	Data Type	Description
Hexadecimal	Decimal			
40	64	Bool 64	Bool	Boolean type, slave mapping address, can mapping slave input coil and holding coil status. Total 64
41	65	Bool 65	Bool	
42	66	Bool 66	Bool	
...	...	...	Bool	
...	...	...	Bool	
7F	127	Bool 127	Bool	

2) 16 Bit Slave Register: Read and Write, Holding Register, Function Code 03, 06, 16

Register Address	Definition	Data Type	Description

Hexadecimal	Decimal			
4E 20	20000	16bit data 20000	Sort AB, its data type according to slave mapping data type	According to mapping rules set via configuration software, this address will sort slave mapping data to AB, stock in this address, for cloud reading together, can mapping slave input and holding register. Total 128
4E 21	20001	16bit data 20001		
4E 22	20002	16bit data 20002		
...	...	...		
...	...	...		
4E 9F	20127	16bit data 20127		

3) 32 Bit Slave Register: Read and Write, Holding Register, Function Code 03, 06, 16

Register Address		Definition	Data Type	Description
Hexadecimal	Decimal			
4E A0	20128	32bit data 20128	Sort ABCD, its data type according to slave mapping data type	According to mapping rules set via configuration software, this address will sort slave mapping data to ABCD, stock in this address, for cloud reading together, can mapping slave input and holding register. Total 64
4E A2	20130	32bit data 20130		
4E A4	20132	32bit data 20132		
...	...	...		
...	...	...		
4F 1E	20254	32bit data 20254		

4) 64 Bit Slave Register: Read and Write, Holding Register, Function Code 03, 06, 16

Register Address		Definition	Data Type	Description
Hexadecimal	Decimal			
4F 20	20256	64bit data 20256	Sort ABCDEFGH, its data type according to slave mapping data type	According to mapping rules set via configuration software, this address will sort slave mapping data to ABCDEFGH, stock in this address, for cloud reading together, can
4F 24	20260	64bit data 20260		
4F 28	20264	64bit data 20264		
...	...	...		
...	...	...		
50 1C	20508	64bit data 20508		

				mapping slave input and holding register. Total 64

MQTT identifier of the mapping register is unified as "REG" + the corresponding value

For example: Slave Boolean 64, MQTT ID is REG64, 16-bit 20000 ID is REG20000.

9 Upgrade

1) User is able to replacing the communication module inside the device to upgrade the device from GSM network to 3G network, or from 3G network to 4G network.

2) Firmware of this device can be upgraded through USB, please contact BLIIoT sales person if you need to upgrade the firmware.

10 Warranty Term

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.

11 Technical Support

Shenzhen Beilai Technology Co., Ltd.
Website: https://www.bliiot.com