

Industrial Mini RTU TG501 Series

User Guide

Version 4.0, 09-01-2026

Thank you for choosing the Bivocom Cellular Industrial Mini RTU. Please read this guide carefully before use; it will help you install, configure, and manage the device safely and efficiently.

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HQ: 27-28/F, Building F14, Software Park Phase III, Xiamen, 361022, China

Factory: 6/F, Building No.18, Anren Industrial Park, No.1068 Jimei North Avenue, Jimei District, Xiamen, 361023, China

W: www.bivocom.com P: +86 158 8026 2905

E: sales@bivocom.com E: support@bivocom.com

About This Guide

Thank you for choosing Bivocom Industrial Cellular Mini RTU TG501 Series.

Please thoroughly read this user guide before you configure and install the device.

This manual is compatible with below models:

Model	Description
TG501-LF	Industrial LTE/WCDMA RTU
TG501-M	Industrial LTE CAT M1/NB-IoT RTU

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1. Introduction

1.1 Overview

TG501 Series RTU is a type of industrial cellular Remote Terminal Unit which adopts high-powered industrial 32-bits CPU, with multi-layer software detection and hardware protection mechanism to ensure reliability and stability of the device, to realize real time data acquisition, storage, control, alarm and transmission, as well as security of data transmission.

TG501 supports worldwide carrier 4G FDD-LTE, TDD-LTE, and 3G/HSPA/UMTS/WCDMA, EVDO, TD-SCDMA, EDGE, CDMA 1X and GPRS, as well as LTE CAT M1/NB-IoT.

TG501 has rich interfaces, including 2x RS232, 1x RS485, 3x analog input, 2x digital input, 2x relay output, 1x pulse input, 1x power input(5-35V), 1x power output(12V), allowing you to connect to different types of sensors and equipment.

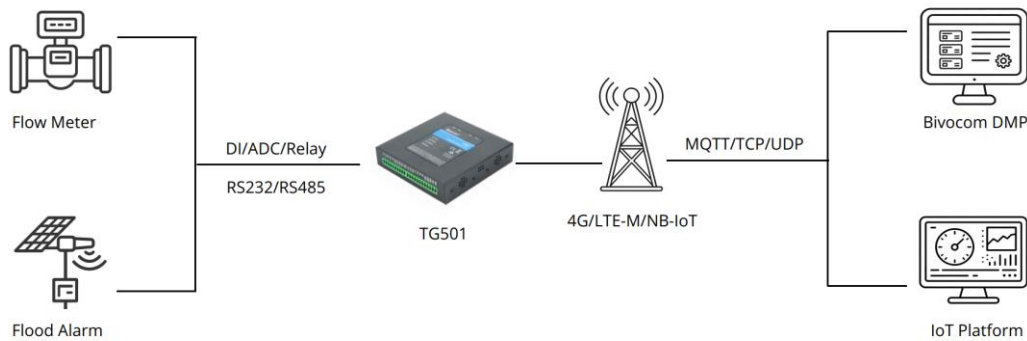
For more device information, please check the official Bivocom [TG501 Datasheet](#).



1.2 Applications

TG501 has been widely used for remote monitoring and control applications, such as, hydrology, water resources, water pollution, water treatment, reservoir dam, mountain flood disaster, geological, disaster, meteorology, environmental protection, new energy resources, etc.

A typical application is as follows:



This diagram illustrates a robust Industrial IoT (IIoT) topology designed for remote environmental and utility monitoring. On the field level, endpoints such as a flow meter and a solar-powered flood alarm collect critical telemetry. These field devices interface with the central TG501 RTU using versatile wired connections—specifically RS232/RS485 for serial data and DI/DO/ADC for discrete and analog signals.

The TG501 acts as a communication bridge between field devices and IoT platform/data center. TG501 aggregates this data and leverages 4G/LTE-M/NB-IoT cellular networks to transmit it reliably to the cloud via standard protocols like TCP/UDP and MQTT. Once in the cloud, the data populates the Bivocom DMP (Device Management Platform) and a dedicated IoT Platform for visualization. In typical IIoT scenarios like smart water management or urban flood warning systems, this architecture enables real-time dashboards, remote device management, and automated alerts, ensuring timely responses to critical environmental events.

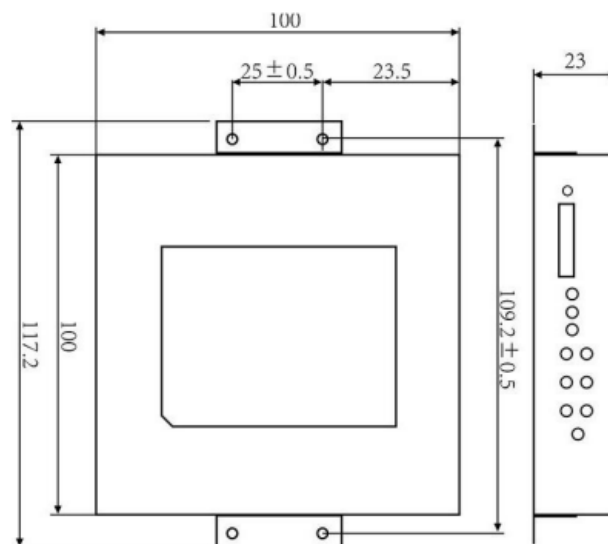
1.3 Key Advantages

- **Industrial-Grade Reliability & Low-Power Design:** Powered by a high-performance 32-bit industrial MCU, the TG501 delivers exceptional reliability with low power consumption. It supports a dedicated sleep mode(Optional) for ultra-low-power operation, perfectly satisfying energy-efficient application scenarios such as remote battery or solar-powered monitoring. Its robust industrial design ensures wide operating temperature adaptability, making it dependable in the harshest environments. **Global High-Speed Connectivity:** Supports global coverage of 2G/3G/4G and NB-IoT cellular networks, enabling fast and stable wireless data transmission, also high-accuracy GPS position.
- **Rich Interfaces for Diverse Applications:** Equipped with a comprehensive suite of

serial ports(RS232/RS485) and I/O interfaces (DI/DO/PI/ADC/PO), the TG501 easily connects to a wide array of field devices—from simple switches and relays to analog sensors and pulse inputs—making it a highly flexible edge node for complex industrial setups.

- **Seamless Protocol Integration:** Natively supports standard industrial protocols (e.g., Modbus) and mainstream network protocols (TCP/UDP, MQTT), ensuring easy integration with diverse devices and platforms.
- **Flexible & Cost-Effective Deployment:** Its compact size allows for flexible deployment across various industries. It is highly cost-effective and easy to install.
- **User-Friendly Management:** Features dedicated configuration tools and supports the Bivocom Device Management Platform(DMP) for efficient remote configuration and management.
- **Comprehensive Support:** Comes with complete documentation (Quick Guides, videos, Data Sheet, User Manuals), professional technical support, and reliable pre-sales and after-sales service.

1.4 Dimensions



1.5 Hardware Specifications

Physical Characteristics	
Ingress Protection	IP30
Housing & Weight	Metal, 320g (0.71lbs), without accessories
Dimensions	100x100x23mm(3.94x3.94x0.91 in), Antenna and other accessories not included
Mounting	Desktop, Wall mounting, DIN-Rail
Power Supply and Consumption	

Standard Adapter	DC 12V/1.5A
Input Voltage	5-35V DC
Power Consumption	Working Mode: 40~60mA@12VDC Idle Mode: 40~45mA@12VDC *NOTE: Power consumption is measured under laboratory conditions and is for reference only
Environmental	
Operating Temperature	-35°C to +75°C (-31°F to +167°F)
Storage Temperature	-40°C to +80°C (-40°F to +176°F)
Relative Humidity	5% to 95% (non-condensing)
Cellular Interfaces	
Antenna	1 x 50 Ω SMA Female
SIM Slot	1
ESD Protection	15KV
Serial Interfaces	
Connector	Terminal block, 3.5mm female socket with lock
Ports	2-RS232(1-Debug, 1-Communication), 1-RS485
Baud Rate	300bps - 115200bps
Data bit, Stop bit, Parity bit	Data bit: 7, 8 Stop bit: 1, 2 Parity bit: None, Odd, Even
ESD Protection	15KV
I/O Interfaces	
Analog Input	3 x 16-bit ADC(Customizable 4 x ADC), default is 4-20mA(0-5 V is optional)
Digital Input	2 x DI(Optical isolation, customizable 4 x DI) Logic 0: Wet contact 0-3V DC, or dry contact close Logic 1: Wet contact 5-30V DC, or dry contact open
Pulse Input	1 x PI(Customizable 2 x PI) Voltage greater than 2V level is valid
Relay Output	2 x Relay Max switching voltage: 30VDC/250VAC Max switching current: 5A Max switching power: 120W
Power Output	1 x PO Output voltage is the same as the power supply voltage of TG501. Default voltage is 12V, rated output current is 1A, built in overcurrent protection.

2. Getting Started

WARNING: Please make sure the device is powered off before you install and configure it.

2.1 Package Checklist

Check the package before you configure and install the device. The following components are included in the TG501 package:

Standard Accessories			
No.	Item	Quantity(Unit: pcs)	Description
1	TG501	1	TG501 cellular Mini RTU
2	4G Cellular Antenna	1	4G cellular antenna(SMA Male), default length:1m
3	Power Adapter	1	Power output (12VDC/1.5A)
4	RS232 Female Cable	1	3- Pin RS232 female cable with DB9 connector
5	Industrial Terminal Block	1	12-Pin industrial terminal block
		1	10-Pin industrial terminal block
Optional Accessories			
1	GPS Antenna	1	*GPS is an optional feature on TG501. When you select GPS build-in cellular module, the accessories will be equipped with a GPS antenna.
2	Wall mount/Din-Rail kit	1	*TG501 supports wall mount and DIN-Rail installation. If you have requirement, please contact Bivocom sales team before confirming order.

NOTE: Please check the list before installation. If you find anything missing, please feel free to contact Bivocom team.

2.2 Installation



2.2.1 SIM/UIM Card

TG501 supports normal SIM/UIM only, so if you're using a Micro SIM or Nano SIM card, you may need to use a Micro SIM or Nano SIM to Normal SIM adapter.

Make sure your RTU is powered off, then use a needle object (such as a pen) to push the yellow button near the SIM/UIM card holder, it will flick out immediately. Put the SIM/UIM card to card holder with chipset upside, insert it to TG501 and make sure it's tightly matched.



Warning: Never install SIM/UIM card when TG501 is powered on.

2.2.2 Cellular Antenna

TG501 supports 1 SMA male cellular antenna-ANT1. Screw the SMA male cellular antenna to TG501 (SMA female interface), make sure it is screwed tightly to ensure the strength of signal.



NOTE: The standard TG501 only has single antenna ANT, which is the cellular antenna for LTE connection. While ANT2 is reserved for the LoRa antenna, GPS is reserved for GPS antenna. If you require LoRa or GPS, please contact our sales team.



2.2.3 Terminal Block, Power Cable and Console Cable

(1) Insert the 12-Pin and 10-Pin terminal block to TG501 correctly.

There are 2 terminal blocks in the package(10-pin and 12-pin), please install all of them to allow you to connect your sensors/PLC/microcontrollers to TG501, and power supply.



(2) Definition of Terminal Block Interfaces.

There are 22 PINs in total as below:



PIN No.	Interface Name	Default Function	Extended Function
1	VIN+	Power Input anode VIN+	NA
2	VIN-	Power Input cathode VIN-(GND)	NA
3	GND	RS232-0 GND	NA
4	RXD0	RS232-0 Debug port RX0	NA
5	TXD0	RS232-0 Debug port TX0	NA
6	A0	RS485 A0	NA
7	B0	RS485 B0	NA
8	DI0	Digital Input 0	Customizable RS485 A1
9	DI1	Digital Input 1	Customizable RS485 B1
10	GND	RS232-1 GND	NA
11	RXD1	RS232-1 Communication port RX1	Customizable DI2/TTL/PI0
12	TXD1	RS232-1 Communication port TX1	Customizable DI3/TTL/PI1
13	VCC_OUT	Power Output 12V	NA
14	GND	Power Output GND	NA
15	ADC0	Analog Input 0	NA
16	ADC1	Analog Input 1	Customizable DO0
17	ADC2	Analog Input 2	Customizable DO1
18	PI1	Pulse Input 1	Customizable ADC3
19	K0+	Relay Output K0+	NA
20	K0-	Relay Output K0-	NA
21	K1+	Relay Output K1+	NA
22	K1-	Relay Output SSK1-	NA

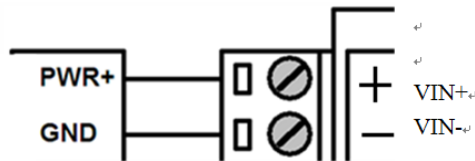
(3) Connect Power Cable and Console Cable.

The interface of TG501 is industrial terminal block, we suggest you use 28-16AWG power cable and console cable. Definition of power cable and console cable in this package are as below:

Power Cable (Output 12VDC/1.5A)

Color of cable	Power Output Polarity
Red	VIN+(Anode)
Black	VIN-(Cathode)

Input range: 5-35VDC, power>4W, we suggest you use our standard power supply.



Warning: Incorrect connection of the power cable may cause device damage.

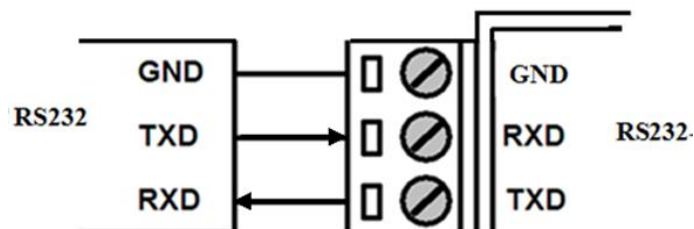
RS232 Cable (with DB9 female interface)

Color of Cable	Definition of cable	Corresponding DB9-M Pin Number
Blue	TX	3
Brown	RX	2
Black	GND	5

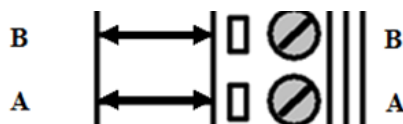
2.2.4 Definition of I/O Cables

TG501 utilizes industrial terminal block, we suggest you use materials of cable 28-16AWG. Definition of cable for serial and I/O are as below:

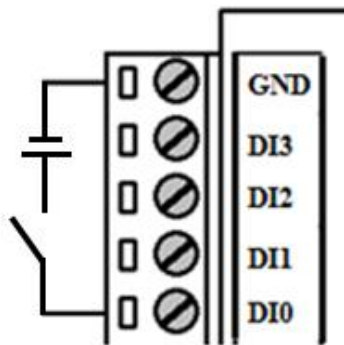
1) RS232 Cable



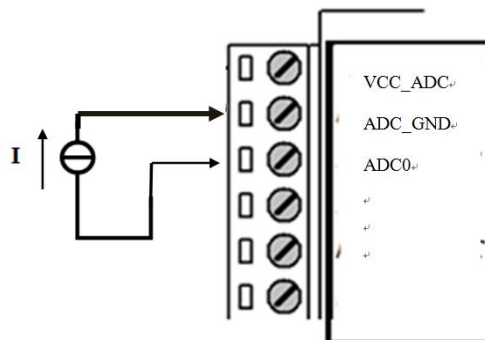
2) RS485 Cable



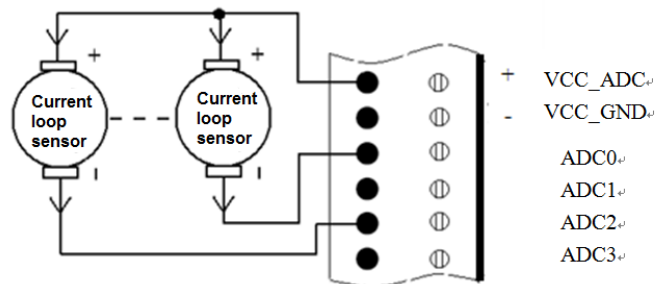
3) Digital Input: (Wet contact)



4) Analog Input(4-20mA)

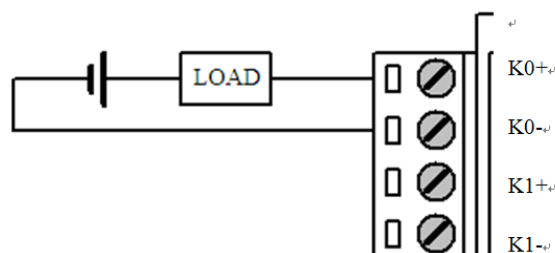


5) Two-wire current loop sensor: (Current 4-20mA)



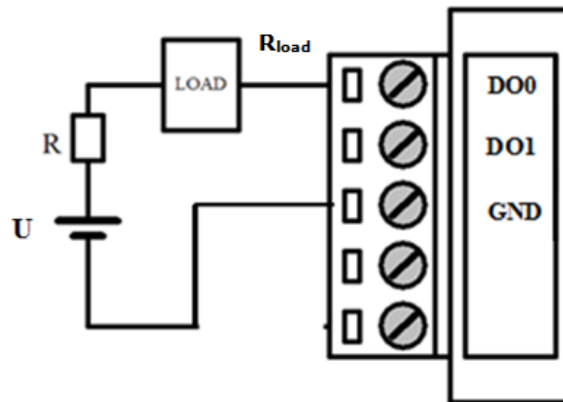
6) Relay Output

Max switch voltage 30VDC, max switch current 1A, max switch power 120W)



7) Digital Output (Optional)

Open Collector output, rated drive current 50mA, rated drive voltage 35VDC, $R+R_{load}>20\Omega$, $U\leq 35\text{VDC}$.



2.3 Power Supply Requirement

After all the accessories and cables mentioned above are connected correctly, then plug the power supply to TG501, connect red cable to VIN+, and black cable to VIN-.

Devices are often used in complex environment, in order to adapt to the complex application environment and improve the stability of the system, the equipment uses advanced power technology. Users can use BIVOCOM 12VDC/1.5A power adapter to supply power to the device, or directly supply power to the device with DC 5-35V power supply. When the user supplies power to the device with an external power supply, the stability of the power supply must be ensured (Ripple shall be less than 300mV, and Instantaneous voltage shall not larger than 35V), and the power supply is guaranteed to be more than 4W (excluding the power consumption of the external sensor).

NOTE: Using Bivocom standard 12VDC/1.5A power adapter is highly recommended.

2.4 LED Indicators

TG501 has 4 LED indicators, 'Power', 'System', 'Online', 'Error', LED description is as follows:



LED Indicator	Status	Content
Power	Off	Power Off
	On	Power On
System	Off	System error
	Blink	System work
Online	Off	Device isn't connected to server
	On	Device is online, connecting to remote server via cellular network
Error	On	Error alarm

2.5 Mounting

This device supports 4 screw holes of 6mm diameter, support M4 screw, which can be used for Bivocom wall mount kits or DIN-Rail kits. For details, please refer to item [1.4 Dimensions](#) above mentioned.

2.6 Lightning Protection Instructions

When this device is connected to outdoor sensors (rain gauge, water level gauge, etc.), we suggest you take lightning protection measures (such as installing lightning arresters, etc.) to improve the safety level of the device.

3. Configuration

In this chapter, you'll learn more details about how to configure and setup the TG501 via the config tool. If you're familiar with Bivocom config tool, and know how to enter the tool, then you can start to change the device parameters. Or directly jump to [Common Scenario Configuration](#).

3.1 Tools Required

Before configure the TG501, please make sure the following tools are ready:

- RS232 Cable in the package



- Serial to USB converter



- Computer(Windows)
- SIM card(insert to TG501)

3.2 Connect TG501 to Computer

To start configuring the RTU, you need to follow these steps.

3.2.1 Bivocom TG501 Config Tool

Bivocom TG501 config tool is a software developed based on Windows system. It can connect to TG501 via RS232 serial port, enabling user to configure, debug, download historical data, and upgrade firmware for the RTU through an intuitive, user-friendly interface.

You can go to BIVOCOM website to [download](#) the config tool and firmware. Or you can contact Bivocom support team, and let us know the device information(model, SN, PN or label) and firmware version, team will share the correct config tool with you.

NOTE: The config tool only support Windows OS, Mac OS is not supported.

3.2.2 Connect RS232 Cable

We recommend using the original RS232 female cable from [Package](#) to connect the RS232-0(DEBUG) of TG501(TX0-Blue, RX0-Brown, GND-Black). Then connect TG501 RS232-0 to your computer via Serial to USB converter(male). The connection example is shown in the below figure :





3.3 Enter Config Software

After completing the device installation and cable connection, now it's time to configure the TG501.

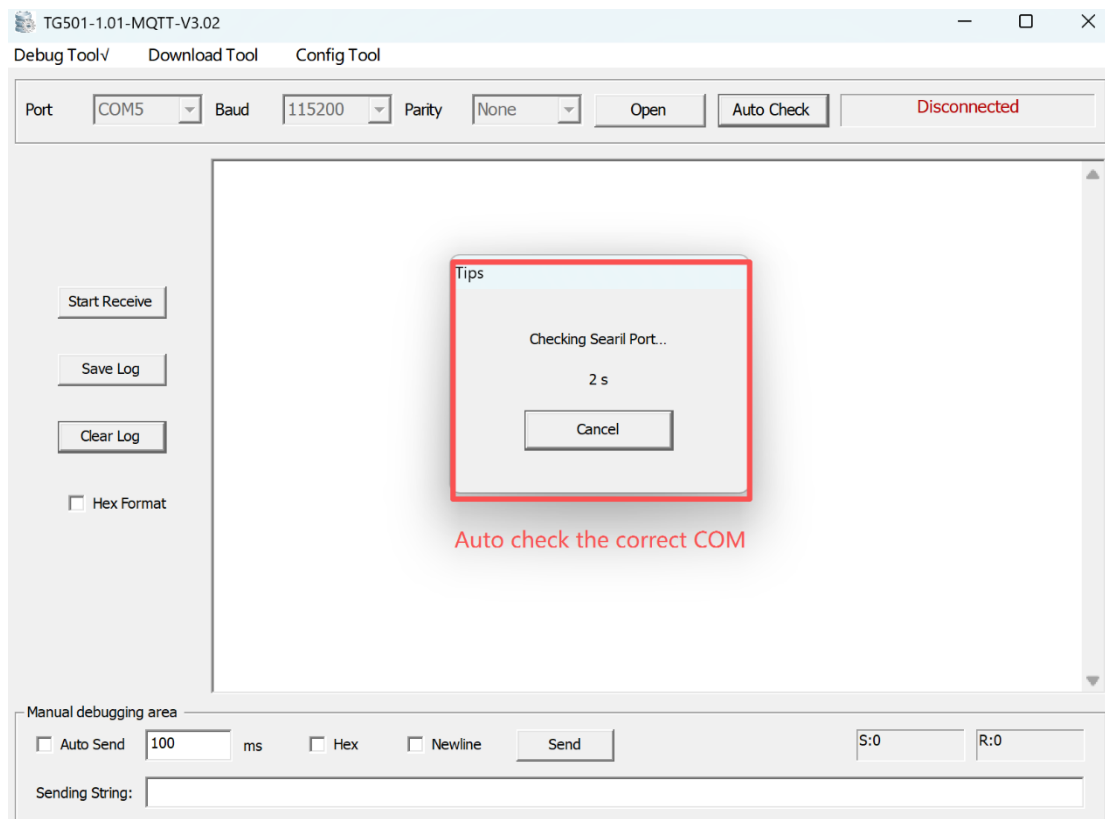
There are different versions(Transparent and MQTT) of config tool, each config tool has corresponding firmware. In this user manual, the demo config tool is based on the version "TG501-1.01-MQTT-EN-V3.02.exe", and firmware version is "TG501B1-CQB000-18.2.bin" for MQTT.



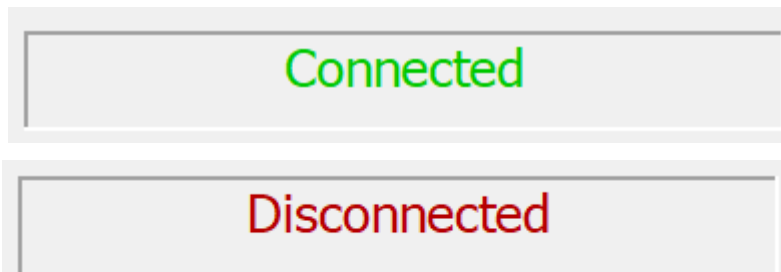
TG501-1.01-MQTT-EN-V3.02.exe

Power on the TG501, then open the config tool, normally it will pop up a tips "Checking Serial Port...". It can automatically identify and connect the available serial COM port that

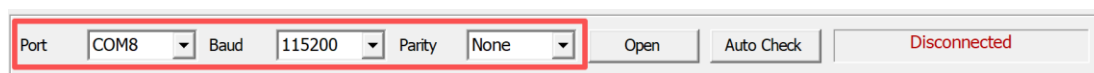
connect with TG501.



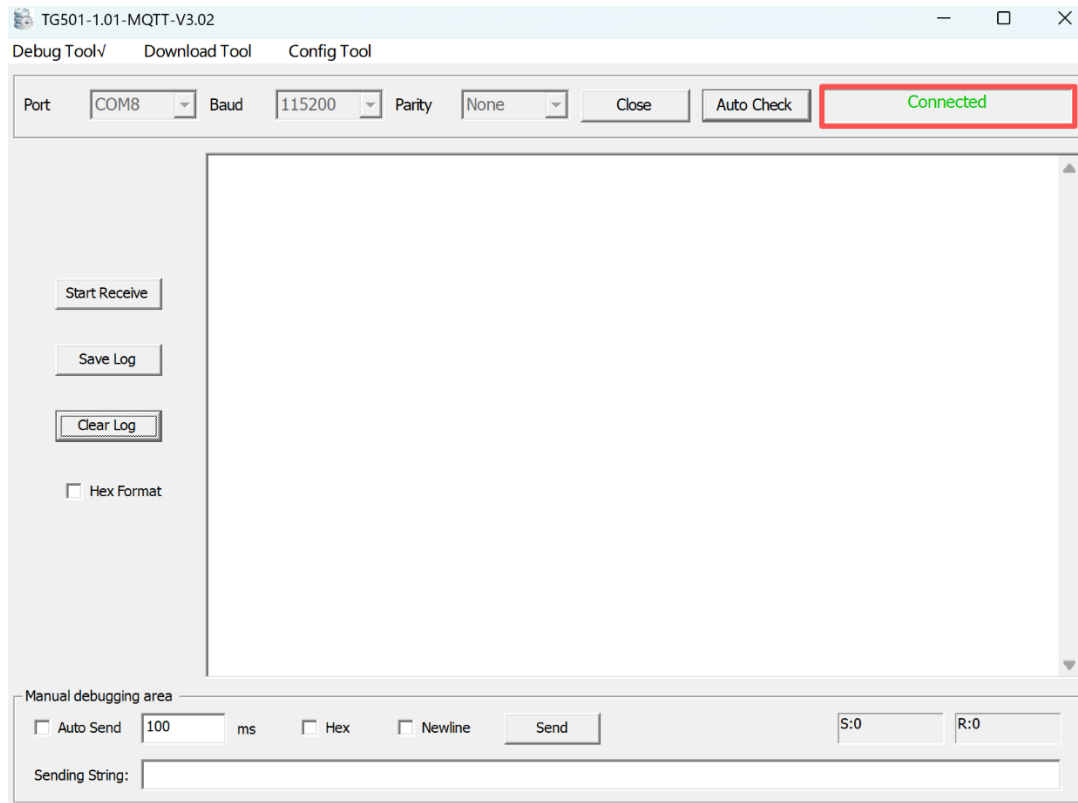
After a few seconds of automatic checking, the indicator in the upper right corner will turn green and display "Connected" when the COM port is recognized and connected successfully, while the red "Disconnected" indicates a connection failure.



If it fails to connect COM, you can click "Auto Check" again, it'll detect the COM port again. Or you can manually select the correct COM port which connect with TG501. Then select the specific "Baud rate" and "Parity" parameters, and click "Open" to connect your COM port.

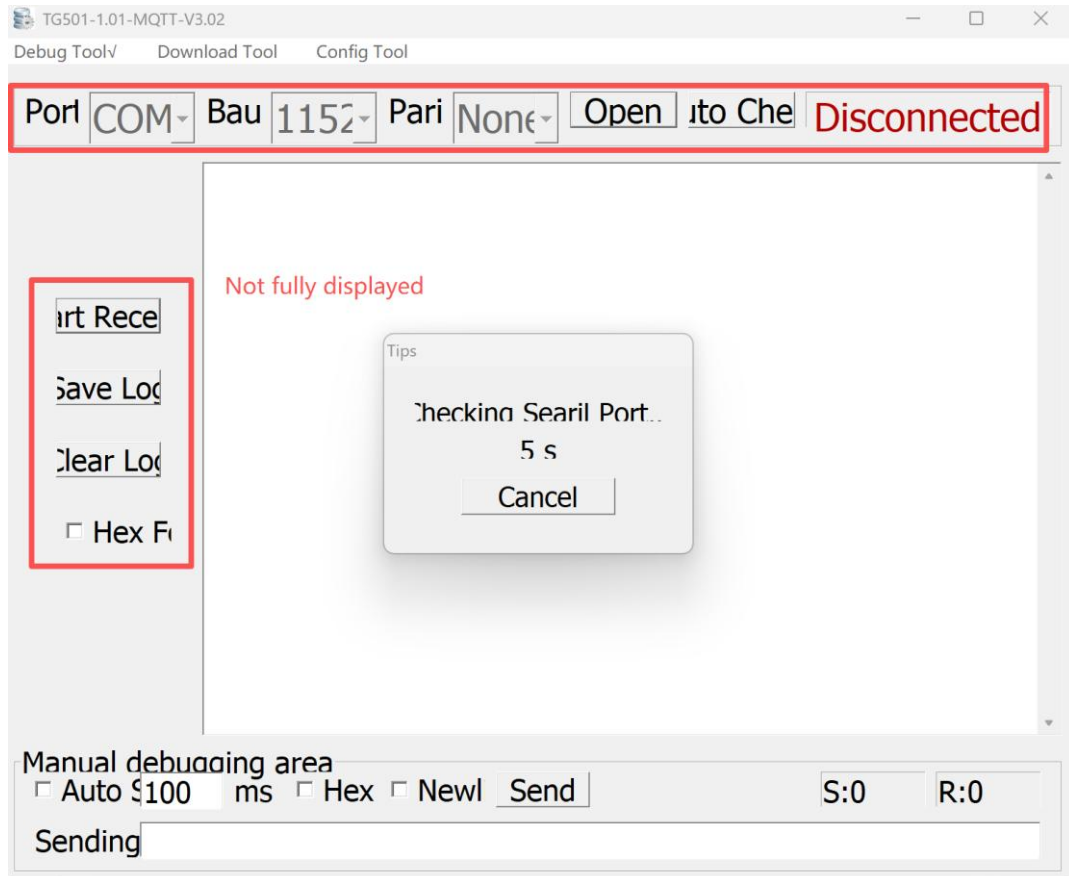


NOTE: Only when the indicator in the upper right corner turns green does it mean the correct COM port is connected with software, then you can start to configure the device. Connected status, as shown in the figure below:



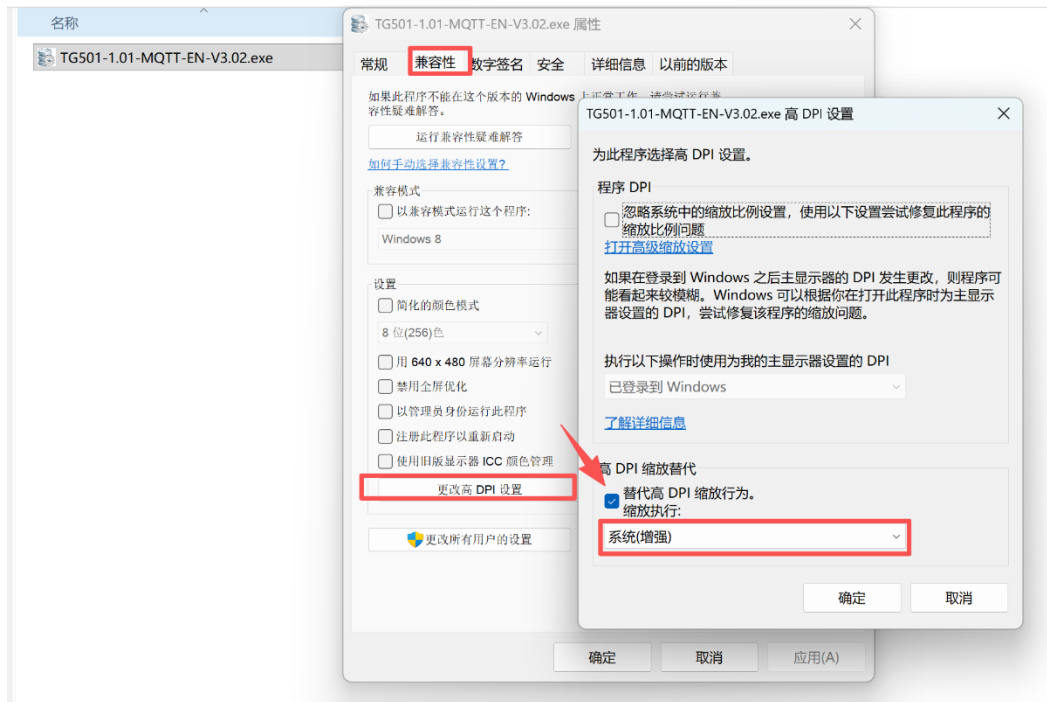
Common Issues:

- Can't enter the config tool even the RS232 is connected with computer: Check if the RS232 cable is connected with the RS232-0(DEBUG) of TG501, do not connect to RS232-1(Communication port). And ensure the wiring sequence is correct(TX0-BLUE, RX0-Brown, GND-Black).
- When I open COM port, nothing response in the config tool: You may select a wrong COM port, or set incorrect baud rate and parity. Make sure the COM port No. is correct and set the baud rate, parity the same as COM parameters.
- When you open the config tool for the first time, you may encounter an abnormal issue: each option in the software is not fully displayed, as shown in the figure below:



This is a problem comes with your computer resolution, the software tool is not adapted to the computer resolution. You can refer to the following solution:

Right click the config tool, select the “compatibility” menu, change the **DPI setting** to “System”, and apply this modification. Then open the config tool again, this abnormal issue will be resolved, the setting as shown in figure below:



3.4 Config Tool

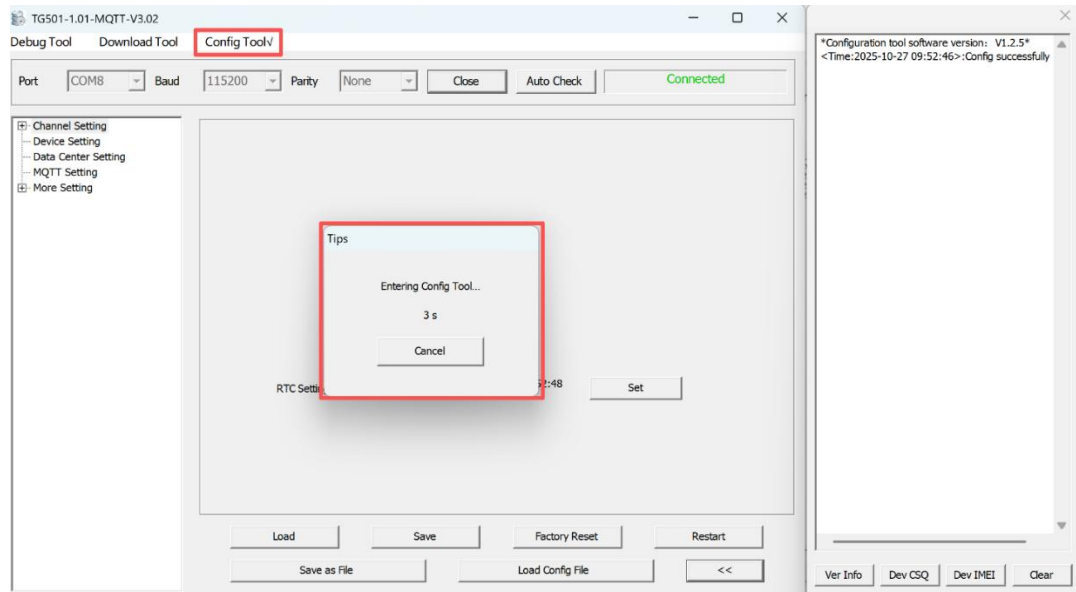
There are 3 tools, Config Tool, Download Tool and Debug Tool, each with a different function as shown below:

Debug Tool	Download Tool	Config Tool ✓
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Tool	Function
Config Tool	Configure TG501 and setup device parameters
Download Tool	Firmware download and upgrade
Debug Tool	Debug TG501, System log output, Send AT commands

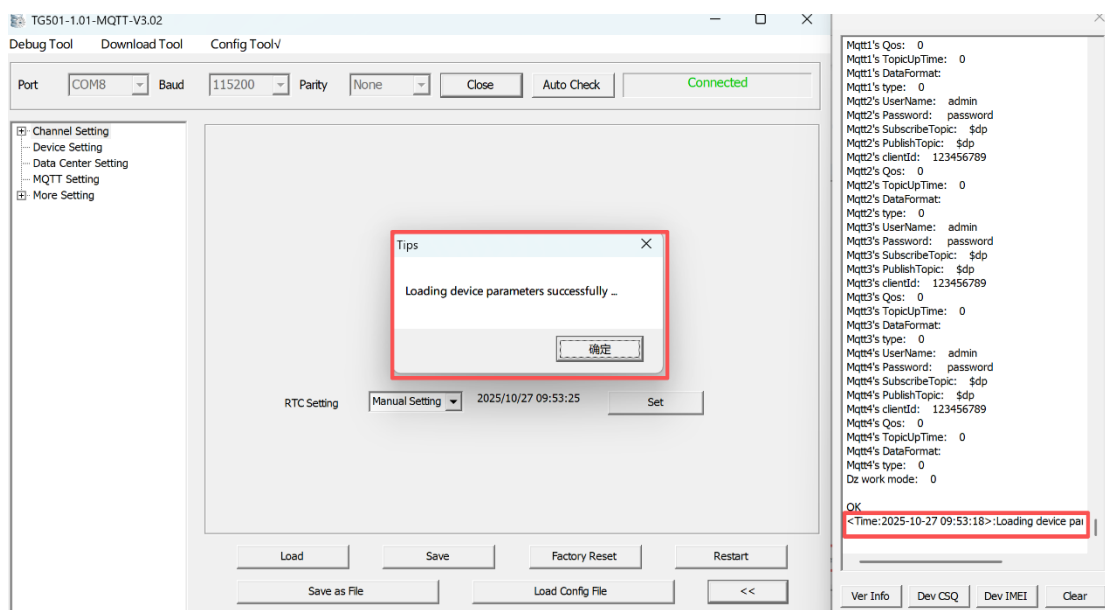
3.4.1 Enter Config Mode

Click "Config Tool", it'll be ticked "✓", then a pop-up tips will appear, displaying "Enter Config Tool...". It's entering config mode, will take 3-10 seconds.



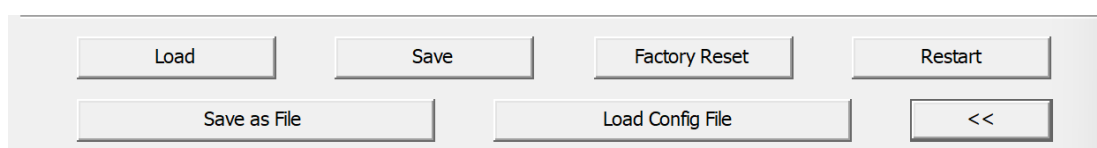
After successfully entering the config tool, it'll automatically load the device parameters, and show "Loading device parameters successfully".

NOTE: Parameter settings can only be configured after successfully entering config mode.



3.4.2 Basic Config Options

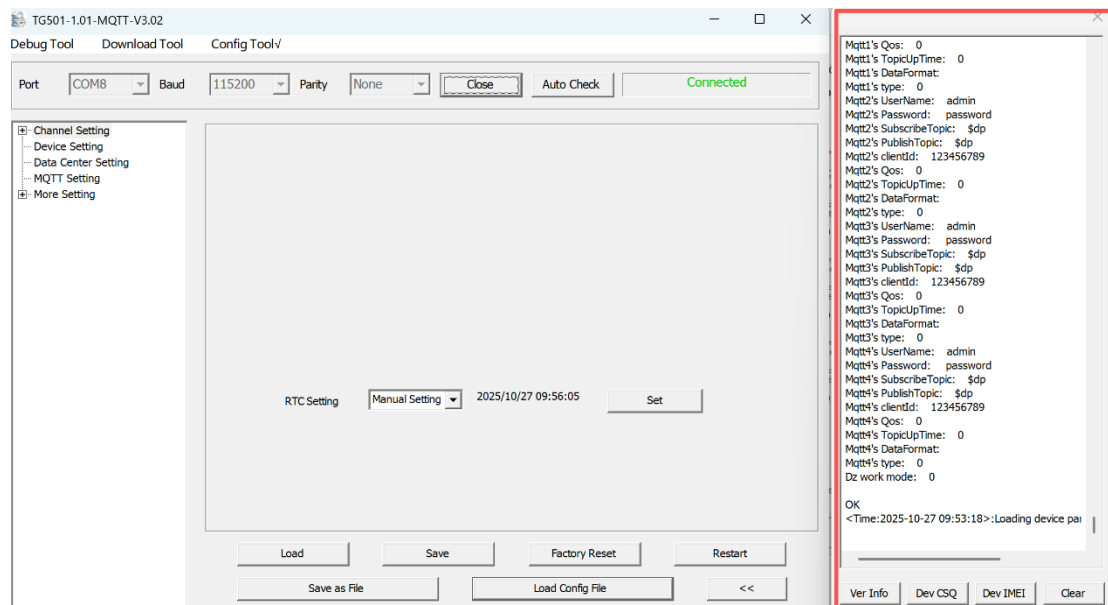
There are several common config options in the config tool. Below are descriptions of each config option. If you're familiar with these parameters, you can go to next step [3.4.5 Device Setting](#).



Config Option	Function
Load	Load the current parameters of TG501 and display in the config tool.
Save	Save and apply parameter changes.
Factory Reset	Reset all parameters to factory setting.
Restart	Restart device
Save as File	Save current configuration of TG501 in config file format(.cfg), which can use to upload in other TG501.
Load Config File	Load config file to TG501, then it'll load parameters in the config file.

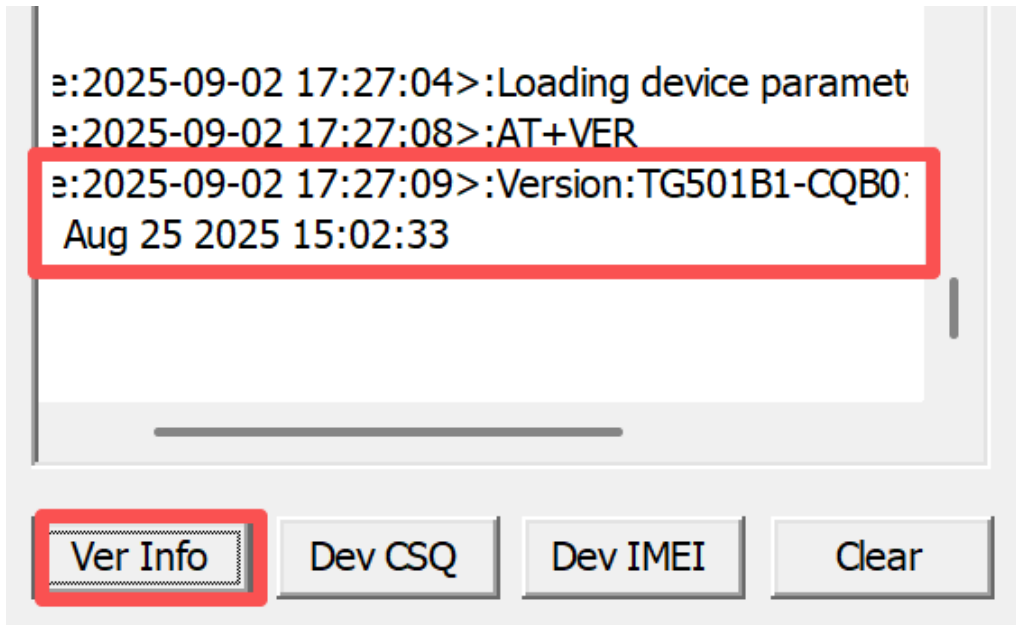
3.4.3 Config Information Box

There is a configuration information display box on the right side of the config tool. It's used to display basic configuration information. When you modify parameters and save them, the corresponding operation will be output in the box. Click the "<<" button, the box will be hidden.

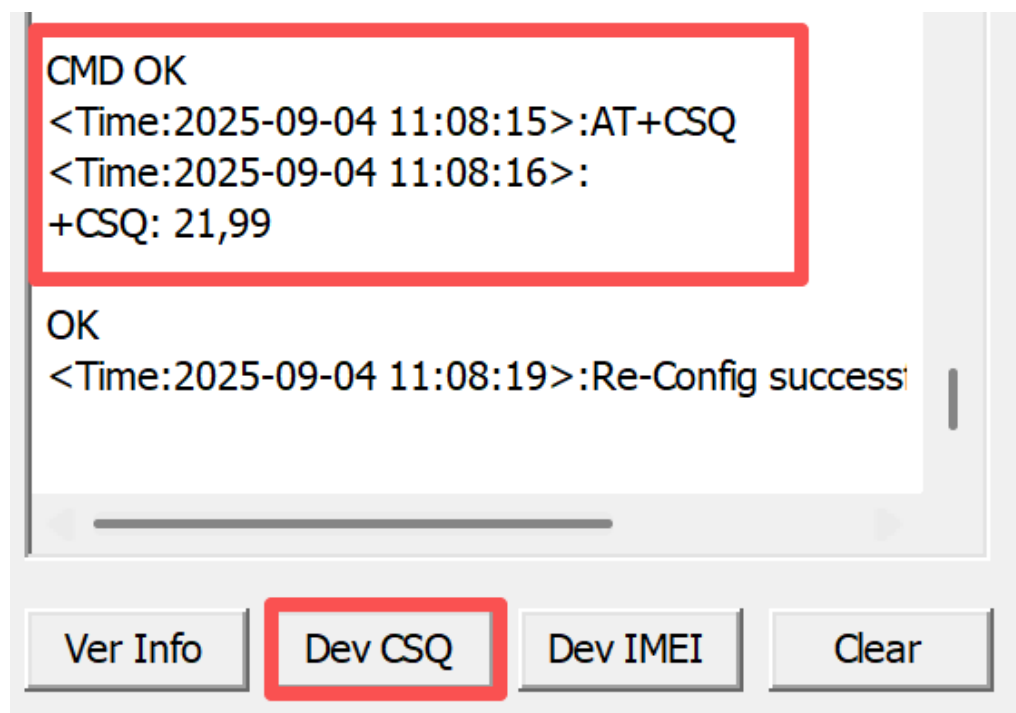


Below is the description of each option:

- **Ver Info:** Check the firmware version of TG501, it'll show specific firmware version and release time.

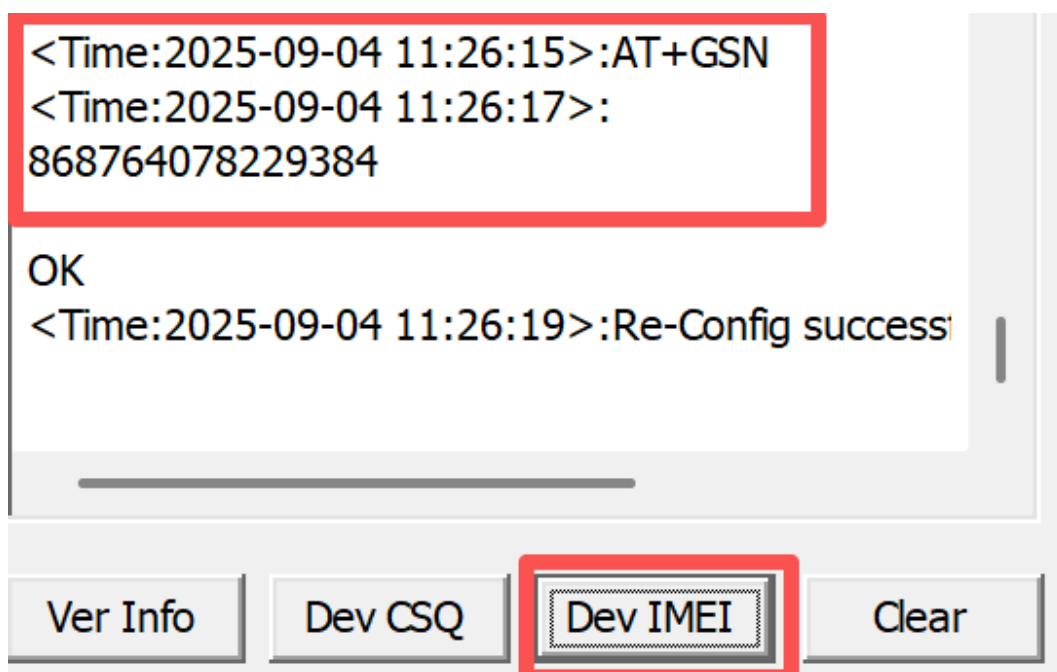


- **Dev CSQ:** Check the network signal strength of TG501. In this case, “21” is the RSSI(Received Signal Strength Indication).



NOTE: The rssi value range is typically from 0 to 31, a larger value indicates a stronger signal. When the rssi is 99, it indicates unknown or not available(usually indicates no network signal is detected).

- **Dev IMEI:** Check the device IMEI of cellular module.

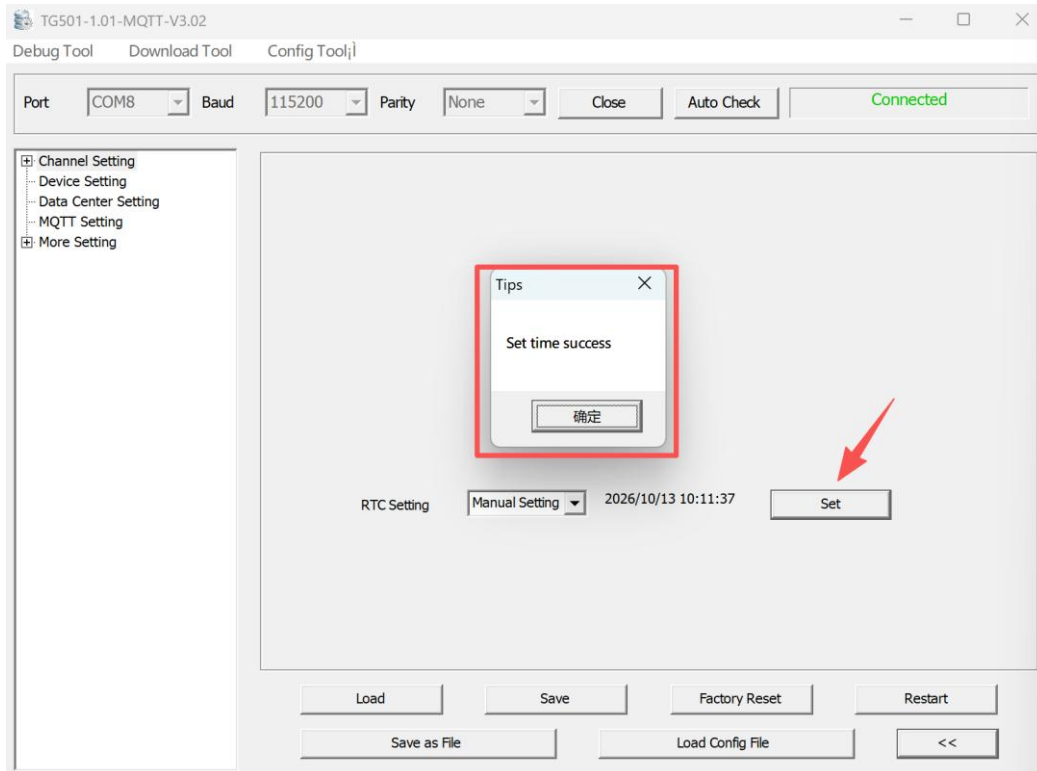


- **Clear:** Clear all output information in the box.

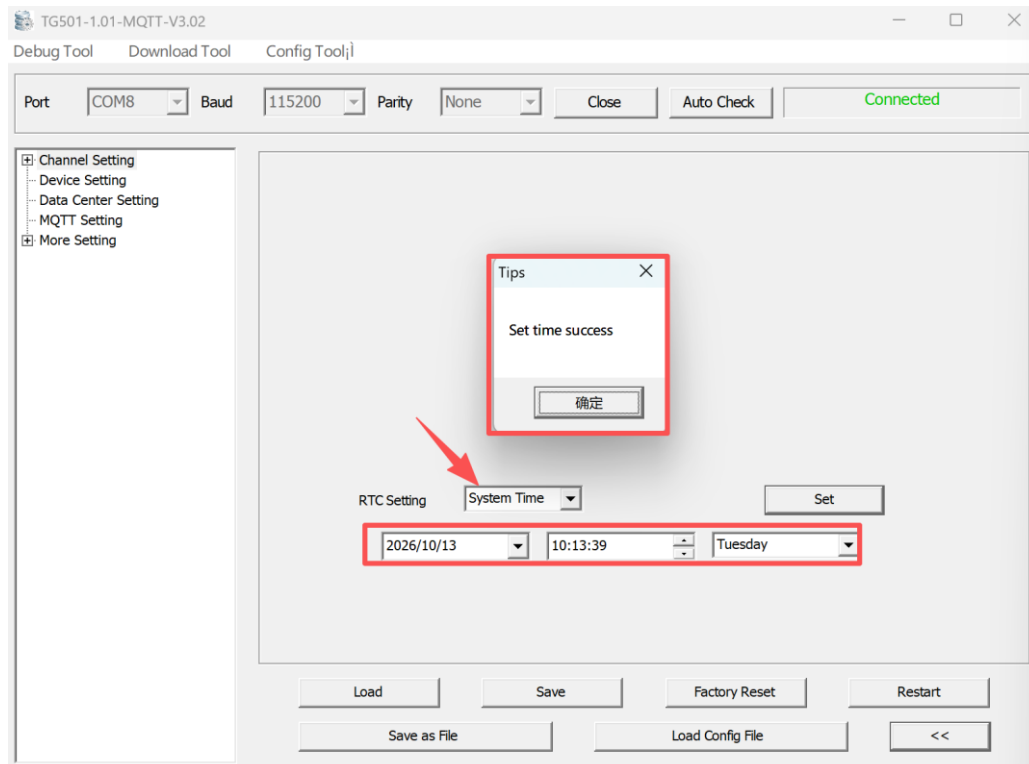


3.4.4 RTC Setting

The TG501 has a RTC clock inside, user can calibrate the system time using the RTC Setting. Click “Set” button, you can setup the system time according to the hardware clock.

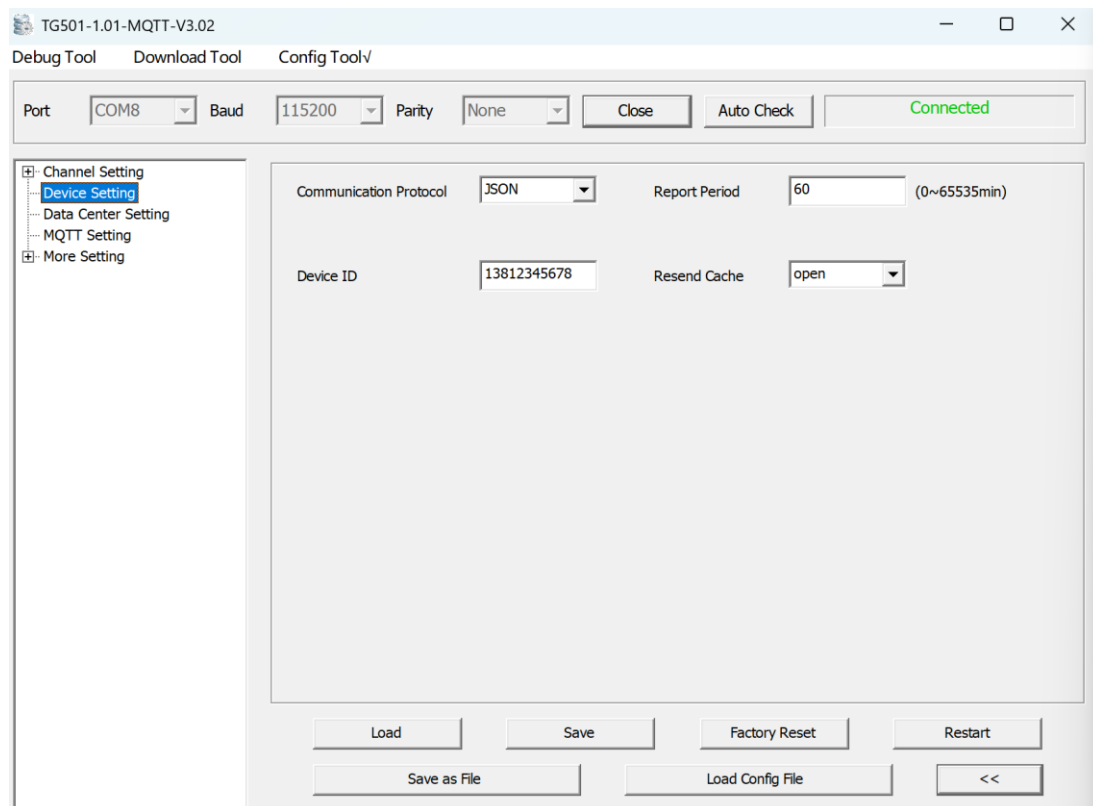


In another way, you can set system time manually.



3.4.5 Device Setting

User can set basic parameters in the Device Setting.

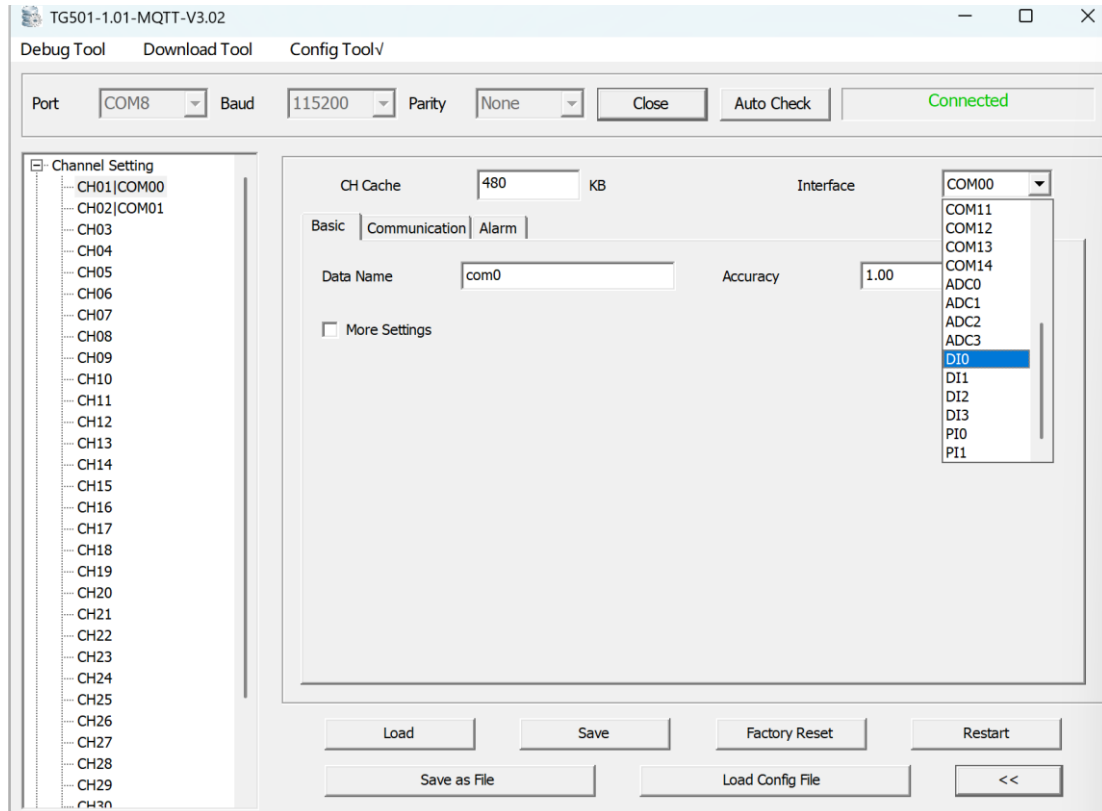


Parameter Name	Description
Device ID	Setting the TG501 device ID, it is used for recognizing the device during register and keep alive with server.
Communication Protocol	Data encapsulation type, JSON is the default data format.
Report Period	Time interval for reporting data to the server regularly(0~65535min).
Resend Cache	Open or Close, when the device disconnects network or server connection, TG501 will cache data in the system storage, and resend data after network recover.

NOTE: Remember to click "Save" after each parameter change to make the configuration take effect. Then you can click "Load" to check if the parameters have been modified.

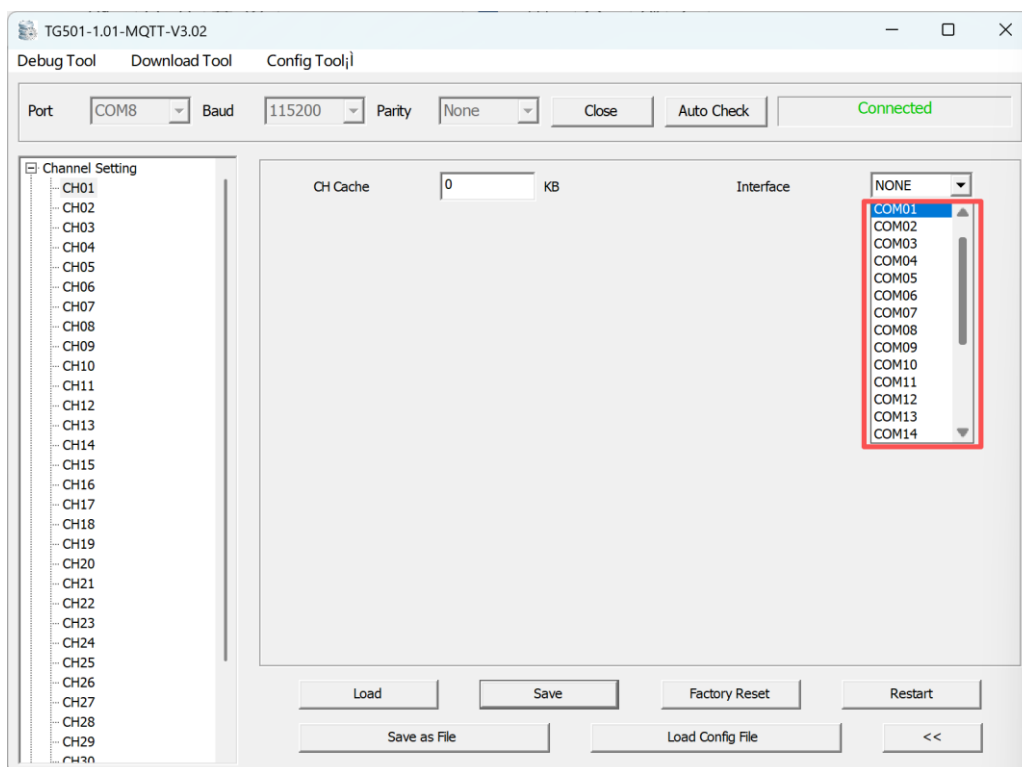
3.4.6 Channel Setting

The standard TG501 has 30 reserved channels for data acquisition, including serial data, DI, PI and ADC....etc. In the channel setting, when you add a new channel, you have to select a hardware interface. Each channel represents a specific data element, and can be configured with independent parameters and alarm information.

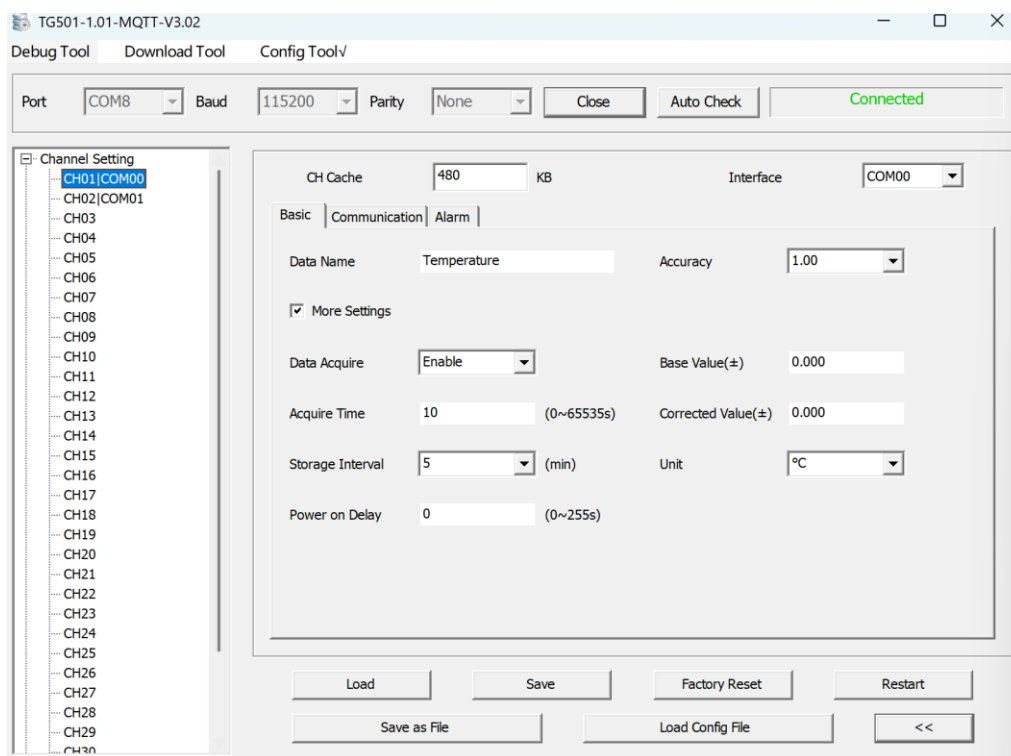


(1) COM Setting

There are 15 COM interfaces (COM00~COM14) which can be used to collect serial data. In the standard TG501, there are 2-RS232 (RS232-0 for debug, RS232-1 for communication) and 1-RS485. If you need to collect Modbus RTU data ([Scenario 1: Modbus RTU Data Collection](#)), you have to add a COM channel. Below are the descriptions of COM parameters:



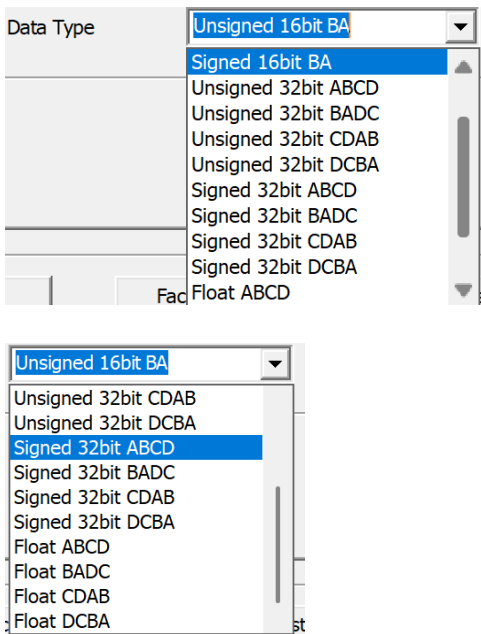
- **Basic**



Parameter Name	Description
Data Name	Data factor name
Accuracy	Data accuracy, when you need to collect decimal data, you can change the accuracy. If set as "1.00", the collected data will be multiplied by 1.00, which means two decimal values will be retained.
Data Acquire	Enable or Disable, enable to activate data acquire feature.
Acquire Time	Data collection interval.
Storage Interval	Data storage interval, cache data can be stored in the system memory.
Power on Delay	When the sensor is powered by the RTU, it'll take some time delay after power is turned on before it starts collecting data.
Base Value	You can define a base value, the collected data will be calculated(+ or -) with this base value, and report data after calculated.
Corrected Value	Correct collected value.
Unit	Data unit(m/cm/m ³ /s), or you input directly, such as "°C".
CH Cache	Data storage size in this channel, up to 480 KB.

• Communication

The screenshot shows the 'Config Tool V' window for the TG501-1.01-MQTT-V3.02 device. The 'Communication' tab is selected. The 'Port' is set to COM8, 'Baud' to 115200, and 'Parity' to None. The 'CH Cache' is 480 KB and the 'Interface' is COM00. The 'COM Type' is RS485-0, 'Baud Rate' is 115200, 'Parity Bit' is 8N1, and 'Sensor Type' is MODBUS RTU. The 'MODBUS' section shows 'Slave ID' as 1, 'Function Code' as 3, 'Register Address' as 0, 'Register Number' as 1, and 'Data Type' as Unsigned 16bit BA. The status bar at the top right indicates 'Connected'.

Parameter Name	Description
COM Type	Select which COM for collecting data, there is only RS232-1 and RS485-0 is available in standard TG501.
Baud Rate	Communication baud rate for this COM, must set the same as sensor or slave device.
Parity Bit	Data bit, stop bit and parity bit for this COM, must set the same as sensor or slave device.
Sensor Type	Communication protocol of your sensor or slave device, normally is Modbus RTU or other customized protocol.
Slave ID	Modbus device ID or your sensor or slave.
Function Code	Function code for reading different registers.
Register Address	Modbus register start address.
Register Number	Modbus register number or count.
Data Type	Modbus data type of your sensor register, normally is signed, unsigned or float data as below:  *NOTE: If there is no data type of your sensor data, you may need to contact our technique team and check if it's possible to customize.

NOTE: Alarm menu is not available in COM Setting.

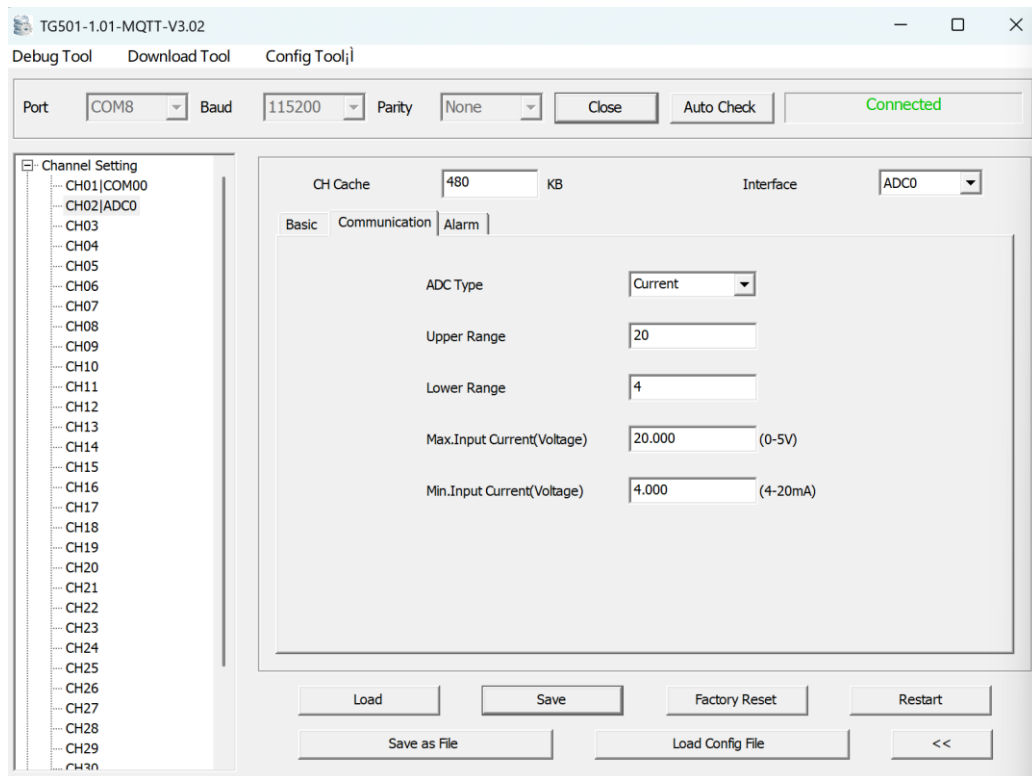
(2) ADC setting

In the standard TG501, There are 3-ADC interfaces(ADC0~ADC2) which can use to detect current or voltage. Below are the description of ADC parameters:

- Basic

Parameter Name	Description
Data Name	Data factor name.
Accuracy	Data accuracy, when you need to collect decimal data, you can change the accuracy. If set as “1.00”, the collected data will be multiplied by 1.00, which means two decimal values will be retained.
Data Acquire	Enable or Disable, enable to activate data acquire feature.
Acquire Time	Data collection interval.
Storage Interval	Data storage interval, cache data can be stored in the system memory.
Power on Delay	When the sensor is powered by the RTU, it'll take some time delay after power is turned on before it starts collecting data.
Base Value	You can define a base value, the collected data will be calculated(+ or -) with this base value, and report data after calculated.
Corrected Value	Correct collected value.
Unit	Data unit(m/cm/m³/s), or you input directly, such as “A”.
CH Cache	Data storage size in this channel, up to 480 KB.

- **Communication**



Parameter Name	Description
ADC Type	Analog input data type, current(4-20mA) or voltage(0-5V), default is current type, voltage is optional.
Upper Range	The upper range of analog input, refer to your sensor specification.
Lower Range	The lower range of analog input, refer to your sensor specification.
Max.Input Current(Voltage)	The maximum range of the sensor for the input current or voltage value.
Min.Input Current(Voltage)	The minimum range of the sensor for the input current or voltage value.

(3) DI Setting

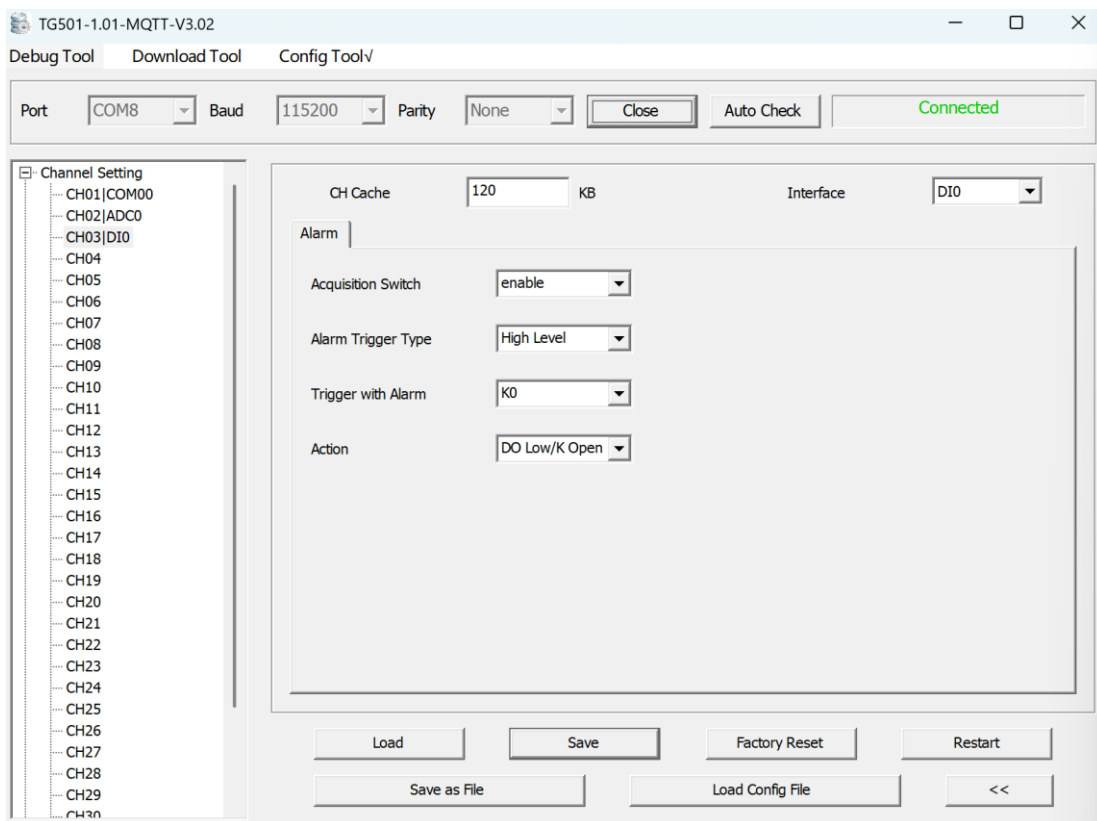
In the standard TG501, there are 2-DI interfaces(DI0 and DI1) which can support dry contact or wet contact(optional).

Logic 0: Wet contact 0-3V DC, or dry contact close

Logic 1: Wet contact 5-30V DC, or dry contact open

NOTE: Wet contact is an optional feature, each DI can support dry or wet contact. If you have requirement for wet contact, you have to contact Bivocom sales team before confirming an order.

Below are the description of DI parameters:



Parameter Name	Description
Acquisition Switch	Enable or Disable, enable data acquisition for this DI channel. Need to enable when you need to read DI data.
Alarm Trigger Type	High level or Low level or No.
Trigger with Alarm	DO0/DO1 or K0/K1.
Action	Set alarm operation, Digital output value or relay status. When the value or status changes, it'll trigger alarm.

(4) PI Setting

On the standard TG501, there is 1-PI interface(PI1) which can use to detect pulse input signal. Below are the description of PI parameters:

- **Basic**

TG501-1.01-MQTT-V3.02

Debug Tool Download Tool Config Tool

Port: COM8 Baud: 115200 Parity: None Close Auto Check Connected

Channel Setting

- CH01|COM00
- CH02|ADC0
- CH03|DIO
- CH04|PI1
- CH05
- CH06
- CH07
- CH08
- CH09
- CH10
- CH11
- CH12
- CH13
- CH14
- CH15
- CH16
- CH17
- CH18
- CH19
- CH20
- CH21
- CH22
- CH23
- CH24
- CH25
- CH26
- CH27
- CH28
- CH29
- CH30

CH Cache: 120 KB Interface: PI1

Basic Alarm

Element: counter1 Accuracy: 0.01

☒ More Settings

Data Acquisition: open Storage Interval: 1 (min)

Counting Type: Rising edge Base Value: 0.000

Power on delay: 0 (0~255s) Corrected value: 0.000

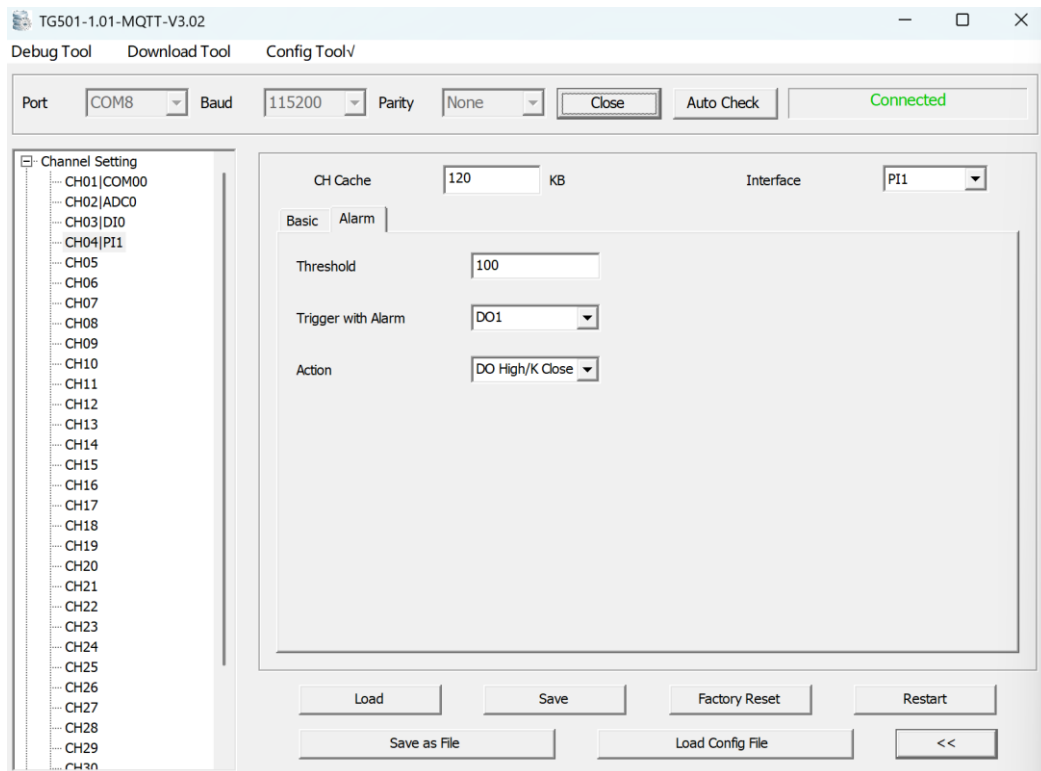
Shake Interval: 50 (ms) Unit: m

Load Save Factory Reset Restart

Save as File Load Config File <<

Parameter Name	Description
Element	PI data name.
Accuracy	Data accuracy, when you need to collect decimal data, you can change the accuracy. If set as "1.00", the collected data will be multiplied by 1.00, which means two decimal values will be retained.
Data Acquisition	Enable or Disable, enable data acquisition for this PI channel.
Counting Type	Pulse signal type, Rising edge, Falling edge or Double edge.
Storage Interval	Data storage interval, cache data can be stored in the system memory.
Power on Delay	When the sensor is powered by the RTU, it'll take some time delay after power is turned on before it starts collecting data.
Shake Interval	PI debounce interval. When the interval between two pulses is less than this setting interval, the first pulse is judged as shaking and only one is counted.
Base Value	You can define a base value, the collected data will be calculated(+ or -) with this base value, and report data after calculated.
Corrected Value	Correct collected value.
Unit	Data unit(m/cm/m³/s), or you input directly, such as "A".
CH Cache	Data storage size in this channel, up to 480 KB.

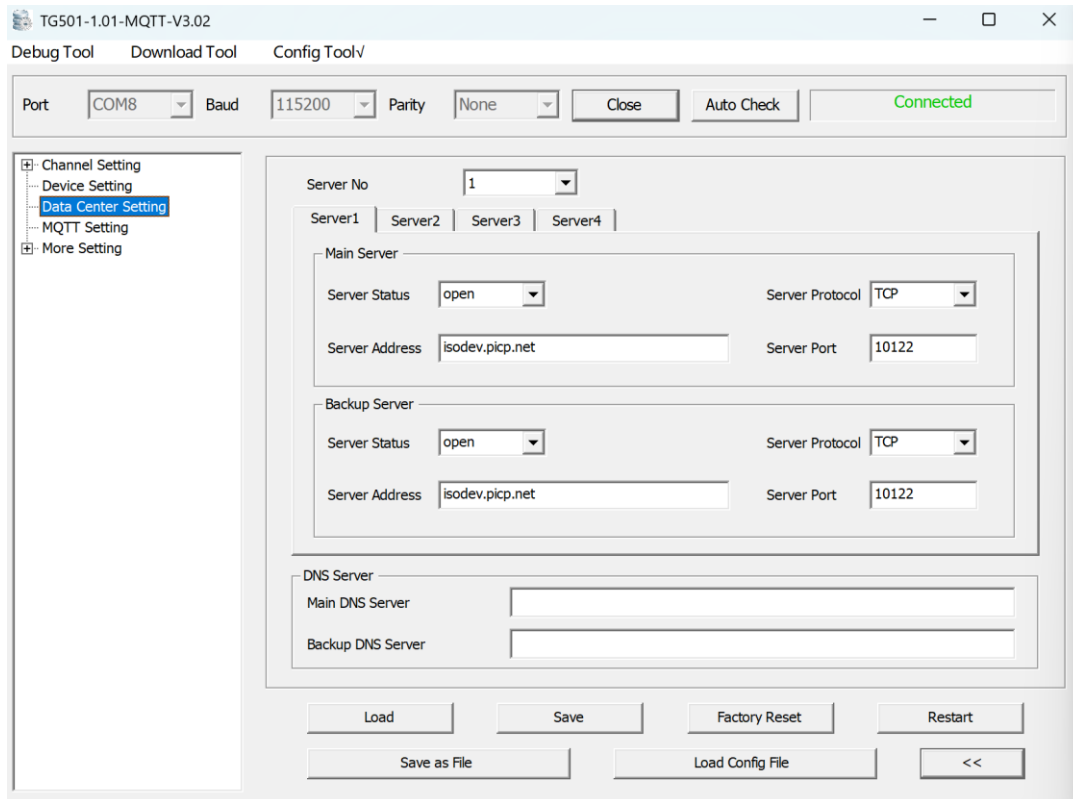
- Alarm



Parameter Name	Description
Threshold	Send an alarm message when the difference between two collected data exceeds the alarm threshold.
Trigger with Alarm	D00/DO1 or K0/K1.
Action	Set alarm operation, Digital output value or relay status. When the value or status changes, it'll trigger alarm.

3.4.7 Data Center Setting

Data center is used to receive the data transnitted by RTU. It can support various communication protocols, such as TCP, UDP, MQTT...etc, it depends on your server protocol. Here you can configure up to 4 servers(Server1-Server4) for reporting the data. And you can report data to different servers at the same time. Bleow are the description of data center parameters:



Parameter Name	Description	
Server No	There are 4 servers, if you enable 2 servers, the “Server No” should be set as “2”, 4 servers should be “4”. NOTE: When you set as “0”, the TG501 won’t connect to cellular network and data center, so the “Online” LED won’t turn on.	
Server1~Server4	Each server setting is configured separately.	
Main Server	Server Status	Open or Close, open to enable main server.
	Server Protocol	Server communication protocol, common TCP/UDP and MQTT, set the same as your server.
	Server Address	Server address The default address is “isodev.picp.net:10122”, you can change to your server address.
	Server Port	Server Port for communication.

Backup Server	Server Status	Open or Close, open to enable backup server. NOTE: TG501 will connect to the backup server when main server goes offline.
	Server Protocol	Server communication protocol, common TCP/UDP and MQTT, set the same as your backup server.
	Server Address	Server address of your backup server.
	Server Port	Server port of your backup server.
DNS Server	Main DNS Server	When you set server address as a domain, it requires a DNS server to analyze the domain name to a specific IP address. It's empty by default, which means TG501 will use the DNS server from network operator.
	Backup DNS Server	Backup DNS server for analyzing your server domain.

NOTE: When you enable main server and backup server at the same time, the TG501 will connect to the main server as priority, if the connection fails or disconnected, it'll automatically switch to backup server connection. Besides, you can set the backup server the same as main server setting. This mechanism is like a network watchdog, ensuring that the RTU can always be online.

Common Issues:

- Server status is opened, and server address/port are configured, but the RTU still can't connect to the server: When you enable Server1~Server4, the "Server No" must be selected according to your server numbers, can't be set as "0". It won't connect any servers when "Server No" is 0.

3.4.8 MQTT Setting

TG501 can support MQTT protocol, allowing you publish sensor or slave data to your MQTT broker. It can support username and password connection, but TLS connection is not available in TG501. Before configuring the MQTT parameters, you have to enable one server for MQTT broker connection in "Data Center Setting".

Open a main server, select "Server Protocol" as MQTT, then you have to set the server address and port of your MQTT broker.

The screenshot shows the 'Config Tool' window for 'TG501-1.01-MQTT-V3.02'. The top bar includes 'Debug Tool', 'Download Tool', and 'Config Tool'. Below this is a status bar with 'Port' set to 'COM8', 'Baud' to '115200', 'Parity' to 'None', and a 'Connected' status indicator. The left sidebar contains a tree view with 'Channel Setting', 'Device Setting', 'Data Center Setting', 'MQTT Setting' (highlighted), and 'More Setting'. The main area is titled 'Server No' with a dropdown set to '1'. It features four tabs: 'Server1', 'Server2', 'Server3', and 'Server4'. The 'Main Server' section has a 'Server Status' dropdown set to 'open', a 'Server Protocol' dropdown set to 'MQTT' (highlighted with a red box and the text 'Select MQTT'), 'Server Address' set to 'isodev.picp.net', and 'Server Port' set to '1833'. The 'Backup Server' section has a 'Server Status' dropdown set to 'close'. Below these are 'Main DNS Server' and 'Backup DNS Server' text boxes. At the bottom are buttons for 'Load', 'Save', 'Factory Reset', 'Restart', 'Save as File', 'Load Config File', and '<<'. The 'Auto Check' button is also present in the top status bar.

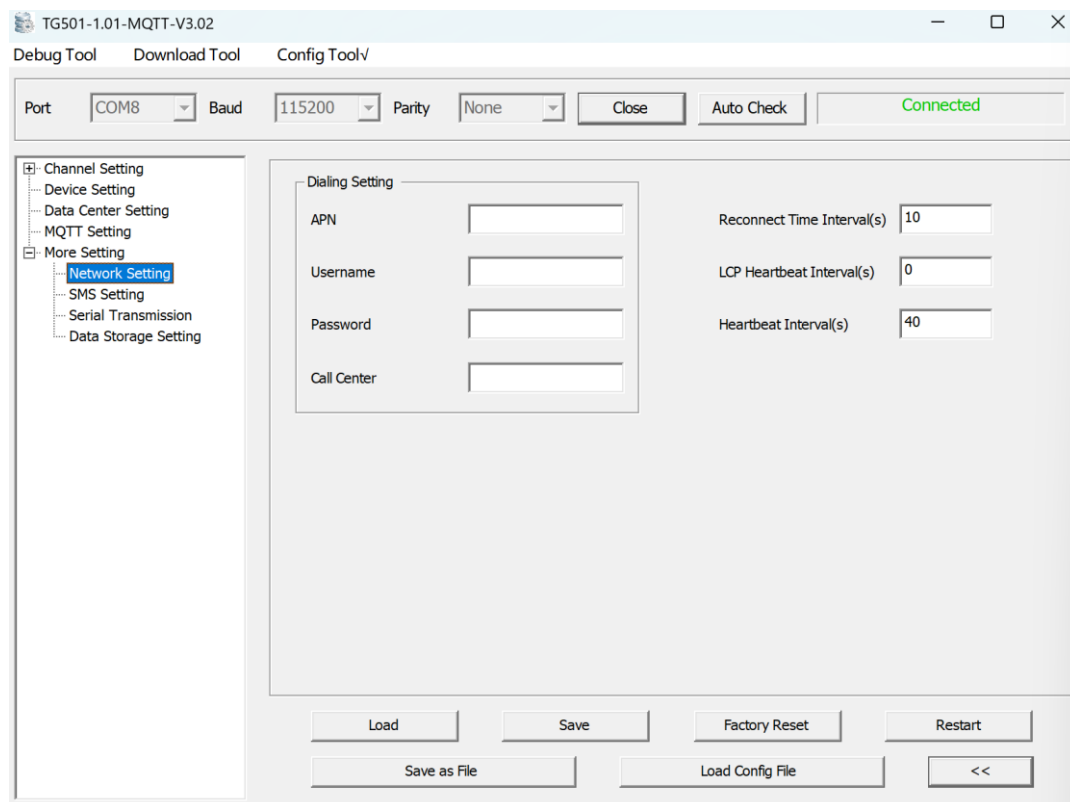
Below is the description of MQTT Setting:

The screenshot shows the 'MQTT Setting' tab selected in the 'Config Tool'. The left sidebar shows 'MQTT Setting' highlighted. The main area is titled 'Server1' with tabs for 'Server2', 'Server3', and 'Server4'. It contains fields for 'Username' (admin), 'Password' (password), 'Subscribe Topic' (subscribe), 'Publish Topic' (publish), and 'Client ID' (123456789). A 'Qos0' dropdown is next to the 'Publish Topic' field. The 'Client ID' field has '(dev ID)' next to it. At the bottom are buttons for 'Load', 'Save', 'Factory Reset', 'Restart', 'Save as File', 'Load Config File', and '<<'. The top status bar shows 'Port' set to 'COM8', 'Baud' to '115200', 'Parity' to 'None', and a 'Connected' status indicator.

Parameter Name	Description
Server1~Server4	Each server setting is configured separately, you can connect multiple MQTT servers at the same time.
Username	Username of your MQTT broker.
Password	Password of your MQTT broker.
Subscribe Topic	Set a subscribe topic, then TG501 can subscribe the specific topic publish from MQTT broker.
Publish Topic	Set a publish topic to publish the collecting data to your MQTT broker.
Client ID	Set a unique client ID to connect MQTT broker.
Qos	Qos0, Qos1, Qos2. It defines the level of guarantee for delivering a message between a sender and a receiver.

3.4.9 More Setting

(1) Network Setting



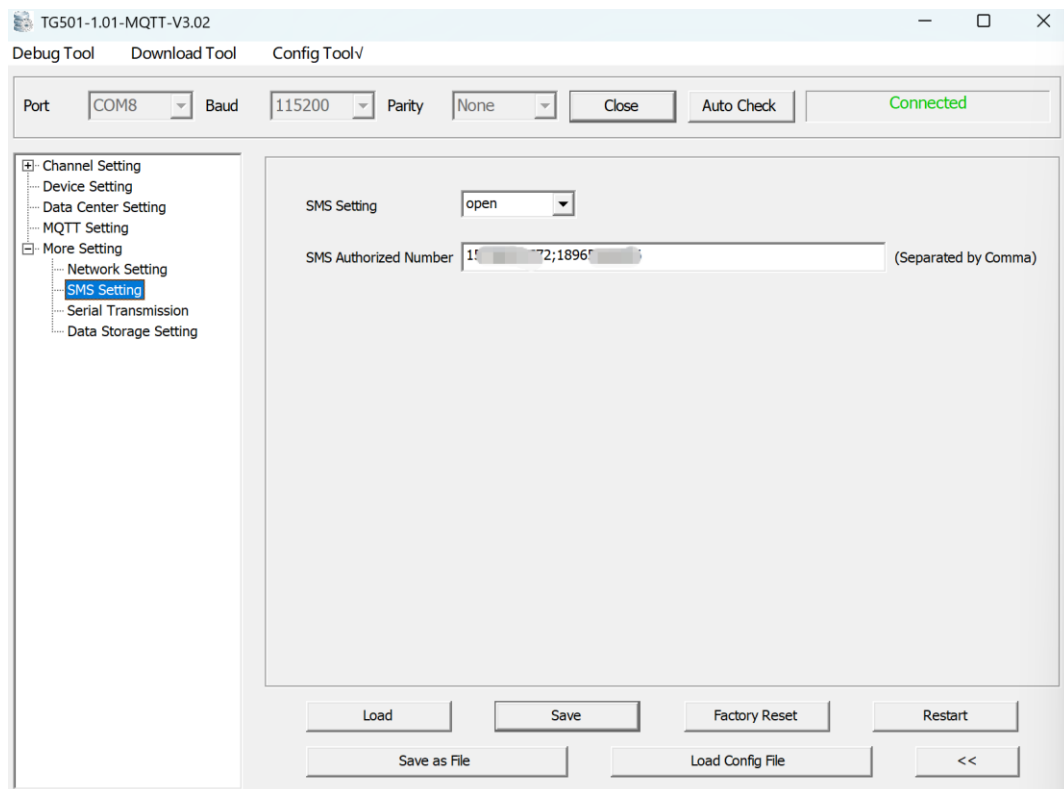
Parameter Name	Description
APN	APN of SIM card from your network operator, set the specific APN if your SIM card required.
Username	Authentication username of APN.
Password	Authentication password of APN.

Call Center	Call center number of cellular network.
Reconnect Time Interval	Cellular network reconnection time.
LCP Heartbeat Interval	LCP Heartbeat interval between RTU and server.
Heartbeat Interval	Heartbeat time, 60 seconds is suggested for TCP mode, and 31 seconds for UDP.

Common Issues:

- SIM card inserted and LTE antenna also connected, but device can't be online: Please check if your SIM card requires APN authentication. If your SIM card is private network, you may need to obtain the APN parameters from the SIM operator. Set the correct APN parameters, then check network connection again.
- If the APN parameters are correct, but the device still cannot connect to the network, you can share the system log with Bivocom support team for troubleshooting.

(2) SMS Setting

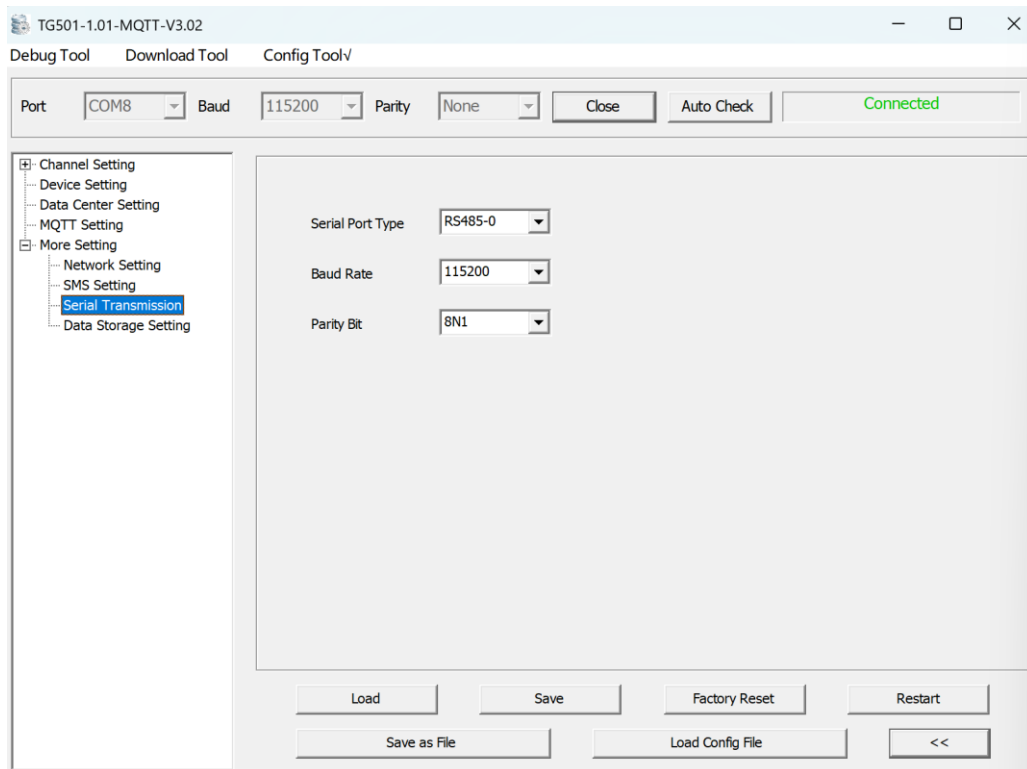


Parameter Name	Description
SMS Setting	Open or Close, open to enable SMS feature.
SMS Authorized Number	Set target phone number as SMS receiver, different numbers should be separated by Comma “,”.

(3) Serial Transmission

In the standard TG501, there are 2-RS232(RS232-0 for debug, RS232-1 for communication) and 1-RS485. If you need to collect Modbus data, you have to select which COM for

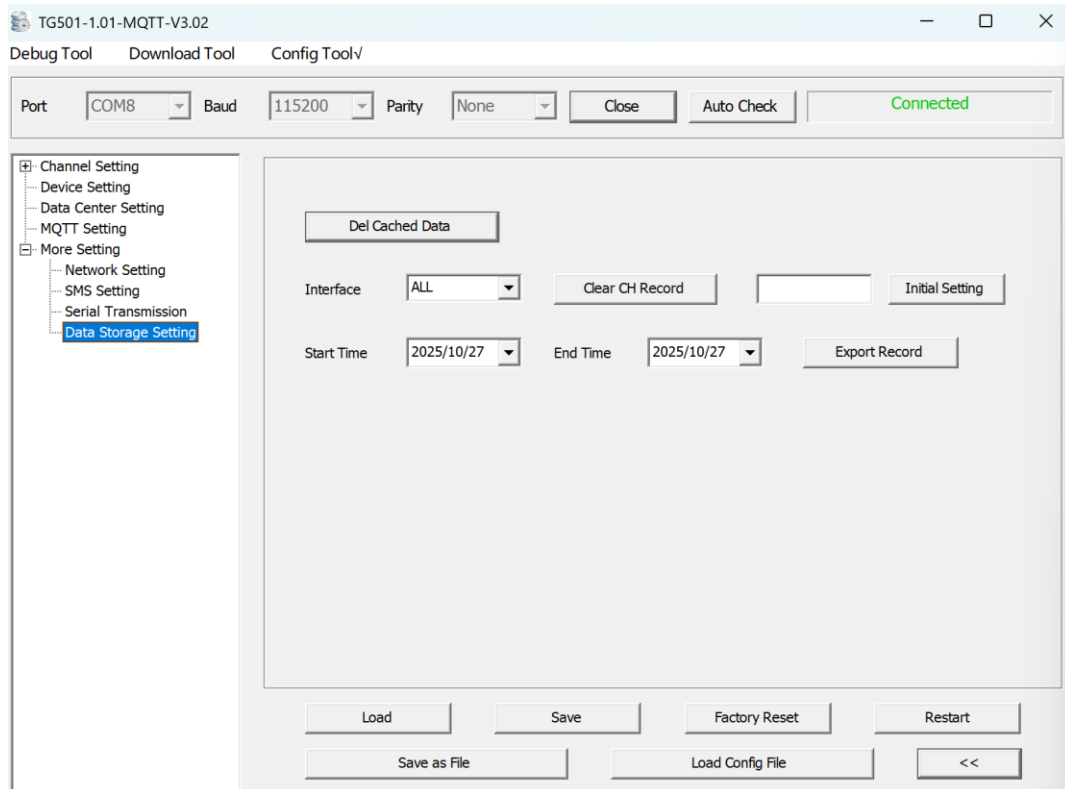
communication. Below are the description of serial parameters:



Parameter Name	Description
Serial Port Type	Select which COM for connecting with your sensor or slave device. Or you can directly set COM in "Channel Setting".
Baus Rate	Communication baud rate for this COM, must set the same as sensor or slave device.
Parity Bit	Data bit, stop bit and parity bit for this COM, must set the same as sensor or slave device.

(4) Data Storage Setting

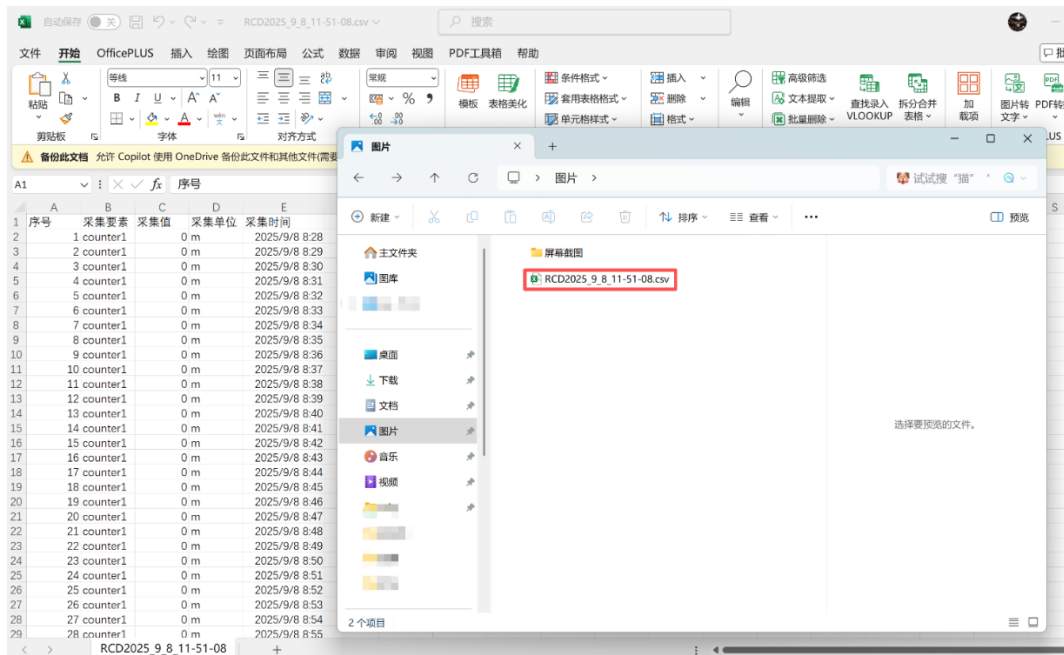
TG501 can store cache data when network or server disconnected, and resend data after connection recovered. Below are the descriptions of data storage parameters:



Parameter Name	Description
Interface	Select which channel for storing cache data, you can check the hardware interface in “Channel Setting”. Or you can select “All” for storing all collected data。
Clear CH Record	Delete cache data for selected or all channel
Start Time/End Time	Select a start and end time period, record data can be exported to file in the setting interval.
Export Record	Export data to csv file.
Del Cached Data	Delete all cache data.

Click “Export Record”, then cache data can be exported as csv file.

- Example csv file of export record:



3.4.10 Sleep Mode Setting(Optional Feature)

Sleep mode is an optional function on TG501, it requires a special firmware, hardware and config tool. If you have requirement for sleep mode, you have to contact Bivocom sales team before ordering the device.

- Special firmware and config tool for sleep mode:

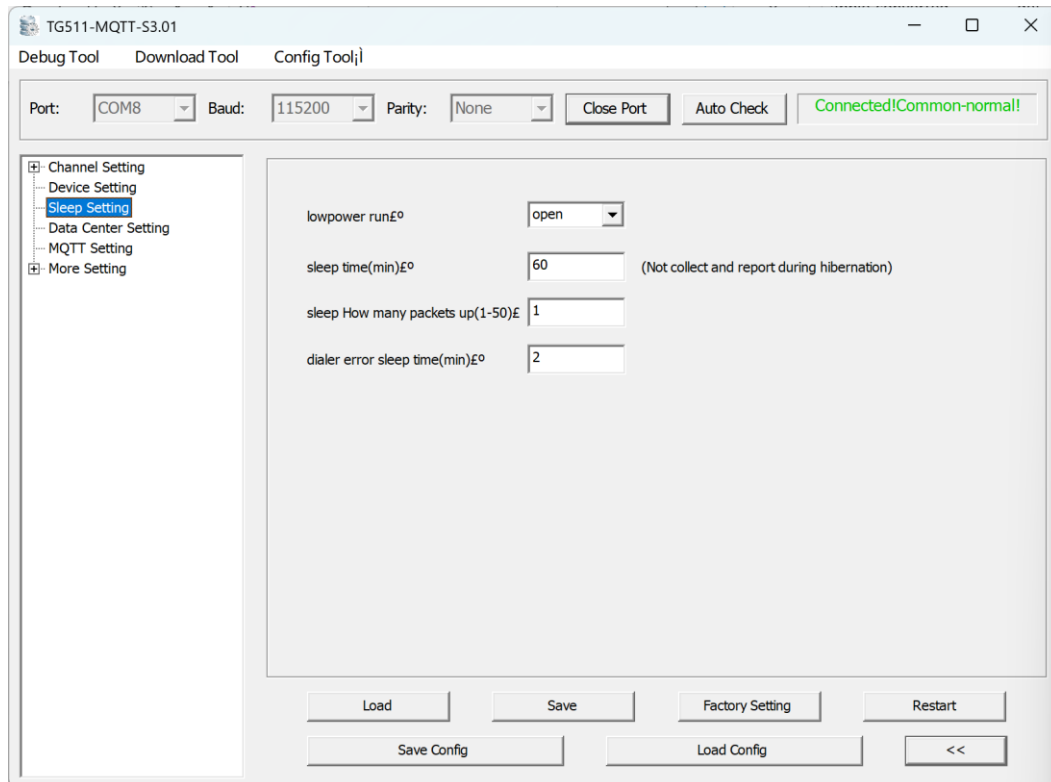


TG511-MQTT-S3.01.exe



TG501B1-CQB010-18.2.bin

Regarding the common usage of sleep mode, please refer to . Below are the descriptions of sleep mode parameters:



Parameter Name	Description
lowpower run	Sleep mode switch, open or close. Open the switch when you need to enable sleep mode.
sleep time(min)	Sleep time interval. When you enable lowpower run, it defines how long it will sleep, if set 60, it will sleep 60 minutes, then wake up and connect to server, report the collected data to server. After reporting, it will enter sleep mode again, wait for next 60 minutes to wake up.
sleep How many packets up(1-50)	Defines after how many packets collected then wake up to report. After wake up from sleep mode, the TG501 will upload the data after the setting packets.
dialer error sleep time(min)	The time limitation of dialing program, it can ensure the device always online. It'll keep dialing until limited time, and back to sleep mode again. If set 2, it'll keep dialing to network for 2 mins, then enter sleep mode after 2 mins.

4. Common Scenario Configuration

Scenario 1: Modbus RTU Data Collection

Objective: Collect sensor or slave data through Modbus RTU protocol.

Prerequisites: Modbus register information/description of your sensor; RS232-1 or RS485-0 connected with sensor(Or simulated Modbus slave); TG501 and sensor are powered on; TG501-B config tool(TG501-1.01-MQTT-EN-V3.02); Firmware version(TG501B1-CQB000-18.2.bin).

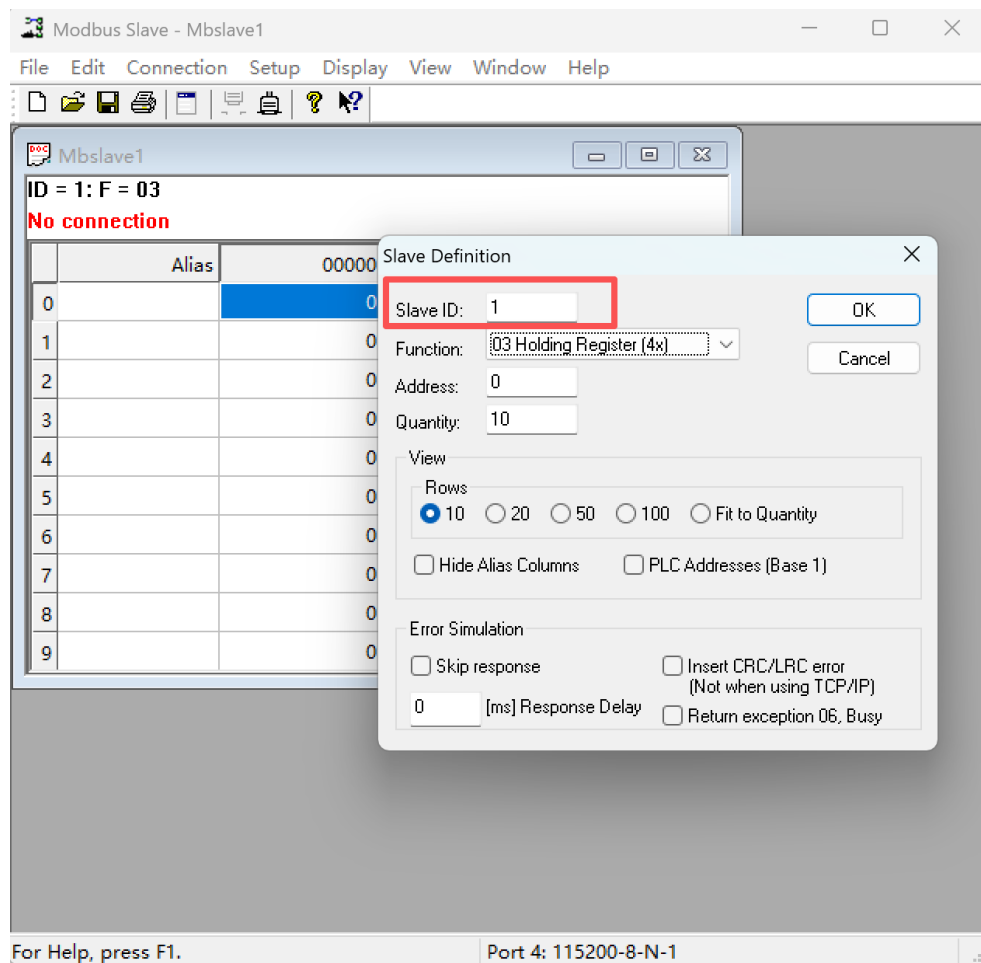
Configuration Steps:

In this demo case, I'm going to use software "**Mbslave**" to simulate a Modbus slave. TG501 acts as a Modbus master, and connect with my computer for reading Modbus RTU data from Mbslave.

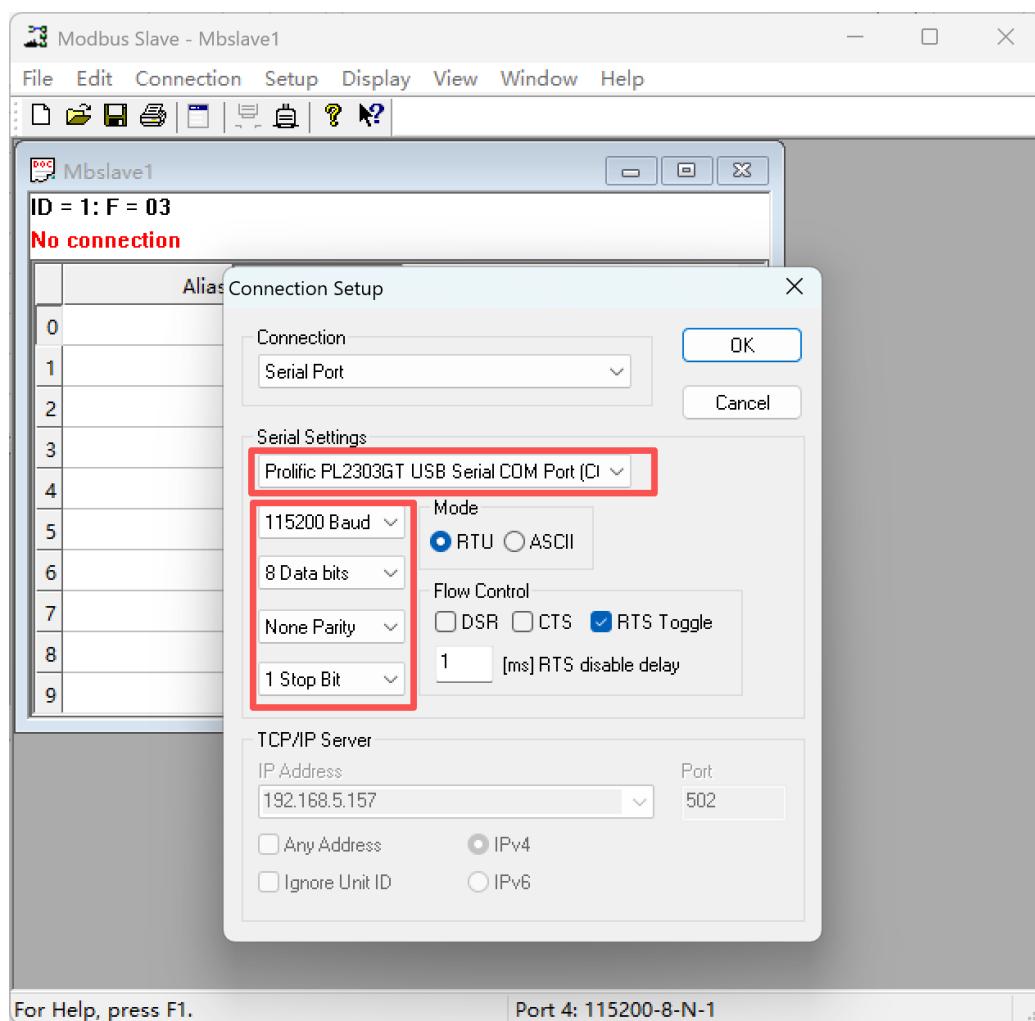
1. Select one of the communication COMs(**RS232-1** or **RS485-0**) for TG501, in this case, RS232-1 is the target COM. Then connect RS232-1 to computer through a USB to Serial converter.



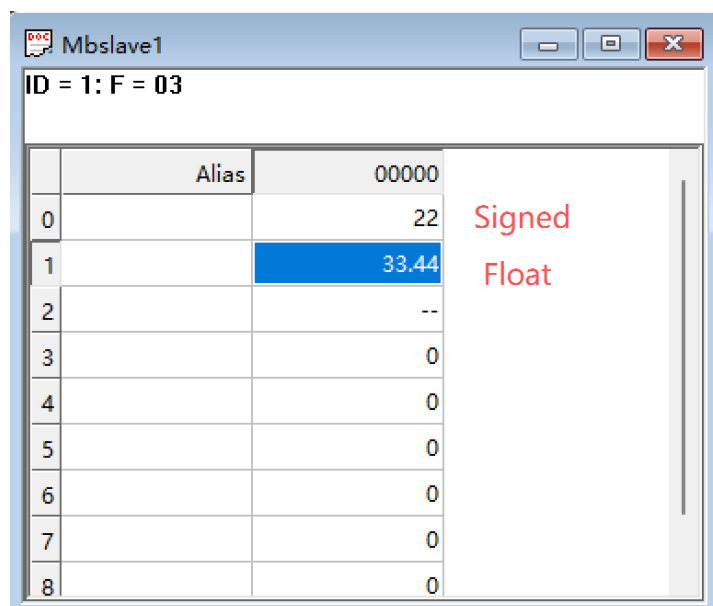
2. Open the "Mbslave" software, set a Slave ID, select function code as "03" for holding register.



Set COM parameters and connect to this COM.

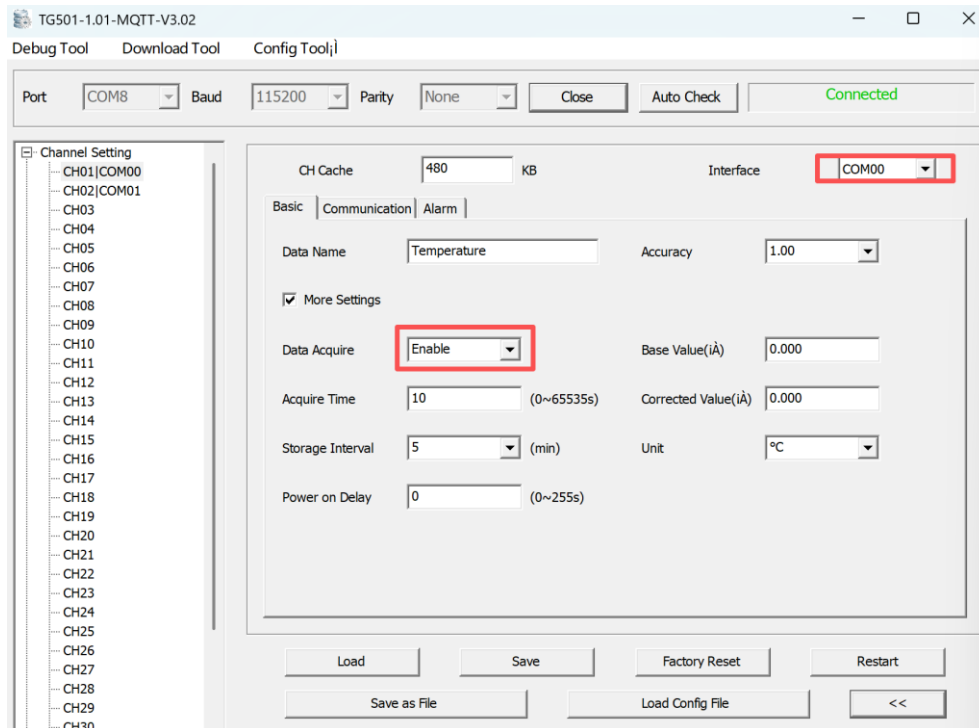


3. Select data format, then edit register value.

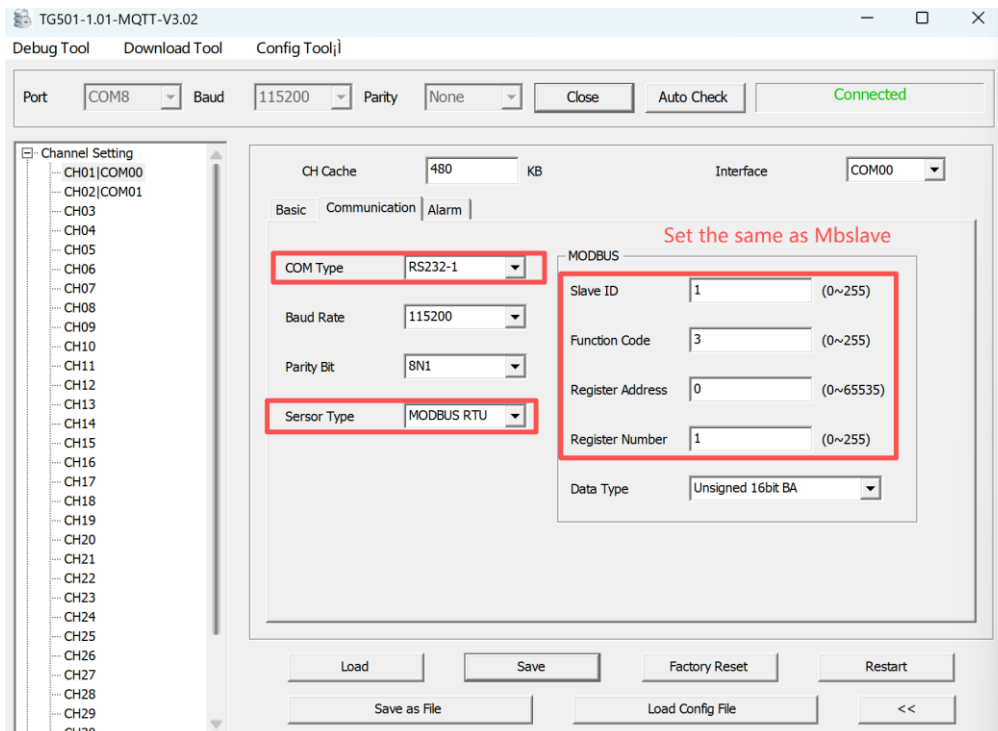


4. Go to **Config tool -> Channel Setting**, add new channel and COM interface. Enable

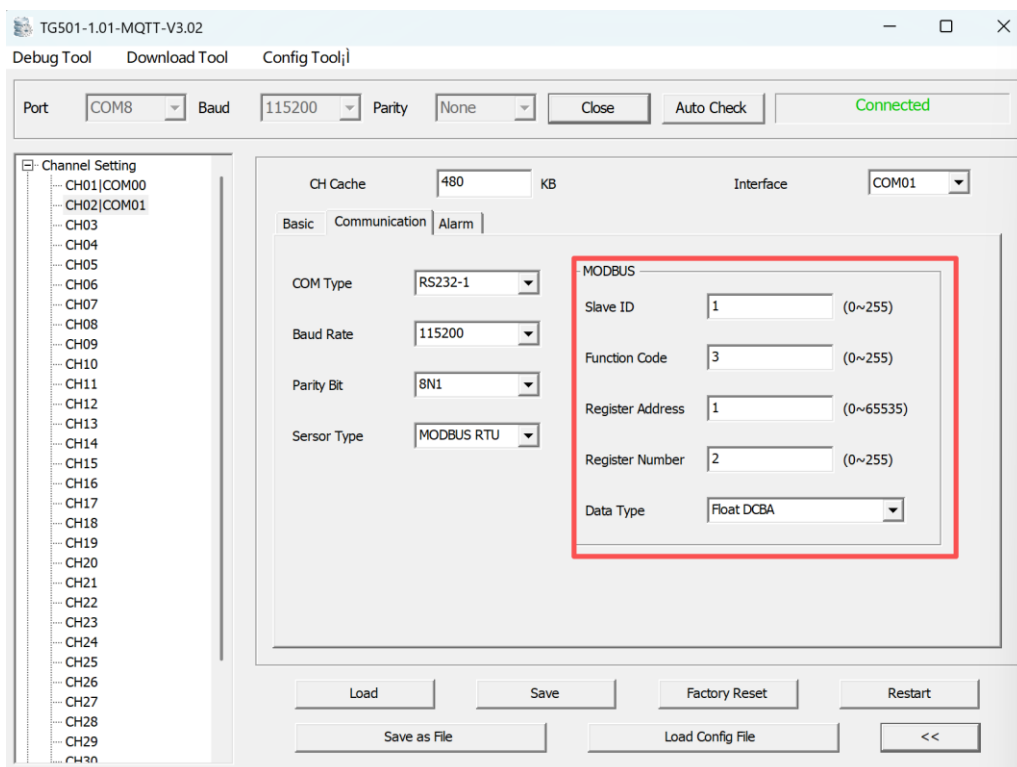
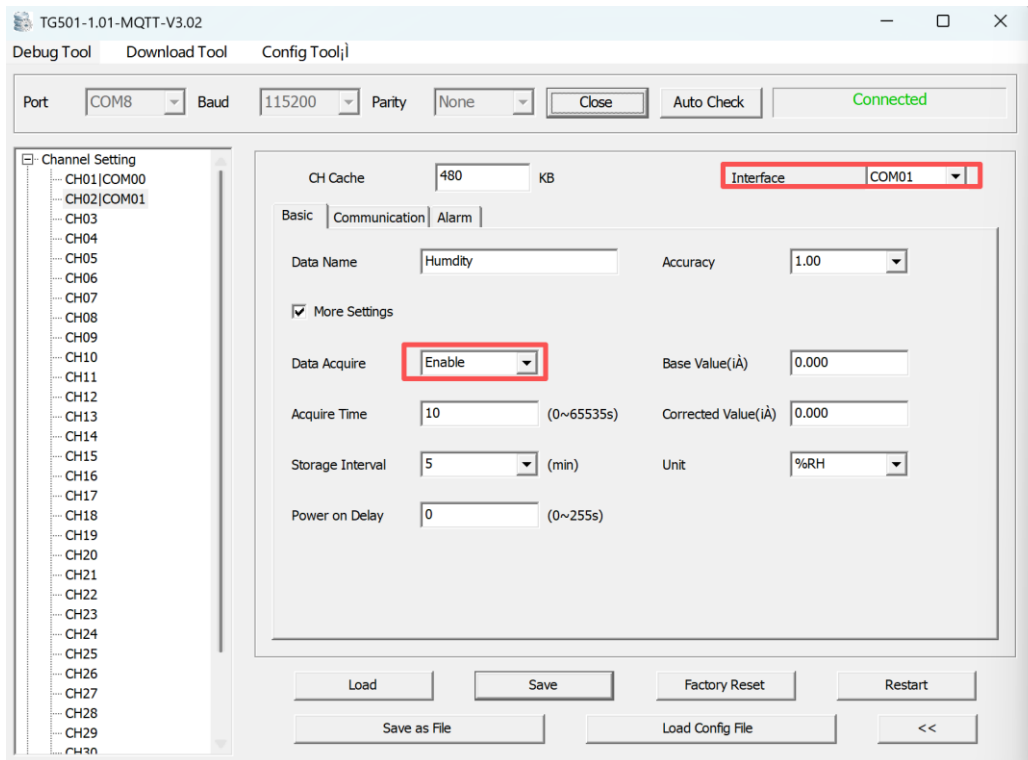
COM00 for channel 01. For the parameter descriptions, you can check for [COM Setting](#) more details.



“COM Type” should be RS232-1, “Sensor Type” should be MODBUS RTU. Configure the register parameters according to Mbslave setting.



Enable another COM01 for channel 2, then configure Modbus parameters according to Mbslave setting.

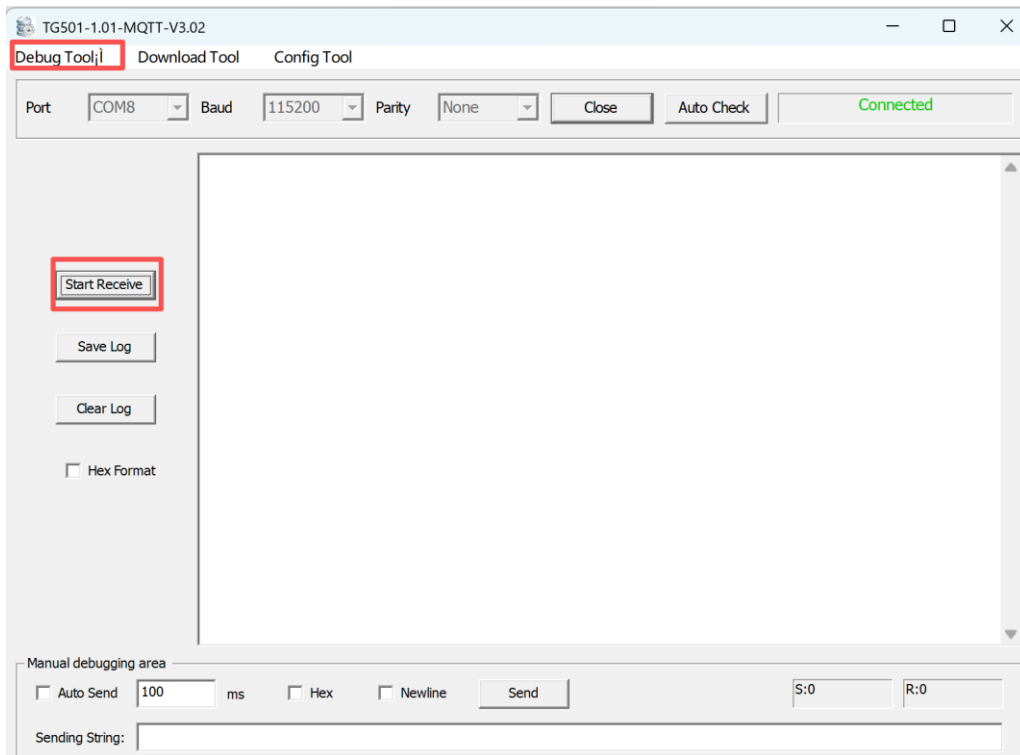


NOTE: Each channel corresponds to a unique COM interface, one COM cannot be configured by 2 channels. Besides, only one Modbus factor can be configured per channel, if you need to collect more Modbus registers, you have to add multiple channels.

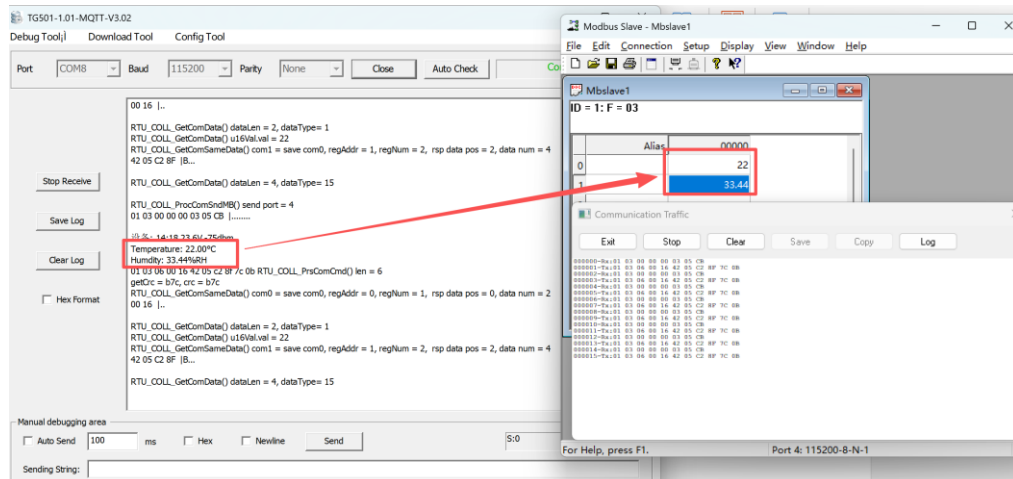
5. Click "Save" button after setup all parameters, then click "Load" button to apply the new configuration.

Verification Method:

1. Go to **Debug Tool**, then click "Start Receive", it'll output the system log for TG501.



2. Check the log output, you'll see the Modbus RTU data(Register 0 and Register 1~2) coming from Mbslave.



Scenario 2: Upload Modbus RTU data to MQTT

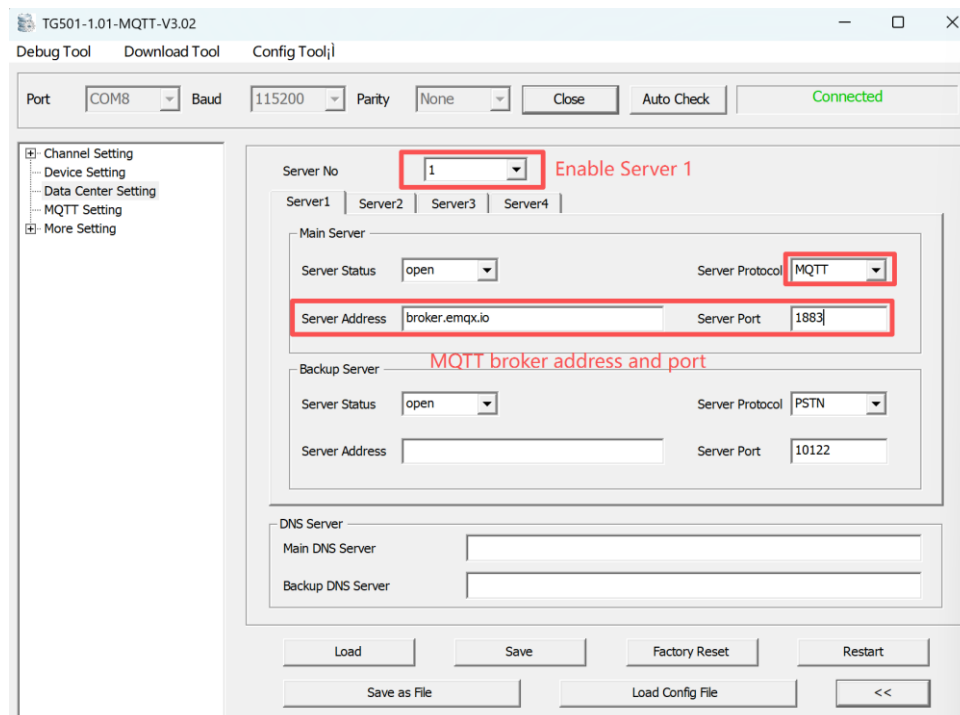
Objective: Upload Modbus data to MQTT broker.

Prerequisites: Collected Modbus data, you have to finish the first step [Scenario 1: Modbus RTU Data Collection](#); TG501 and sensor are powered on; SIM card inserted and can connect to Internet; MQTT broker; MQTT client tool(MQTTX or MQTT.fx); TG501-B config tool(TG501-1.01-MQTT-EN-V3.02); Firmware version(TG501B1-CQB000-18.2.bin).

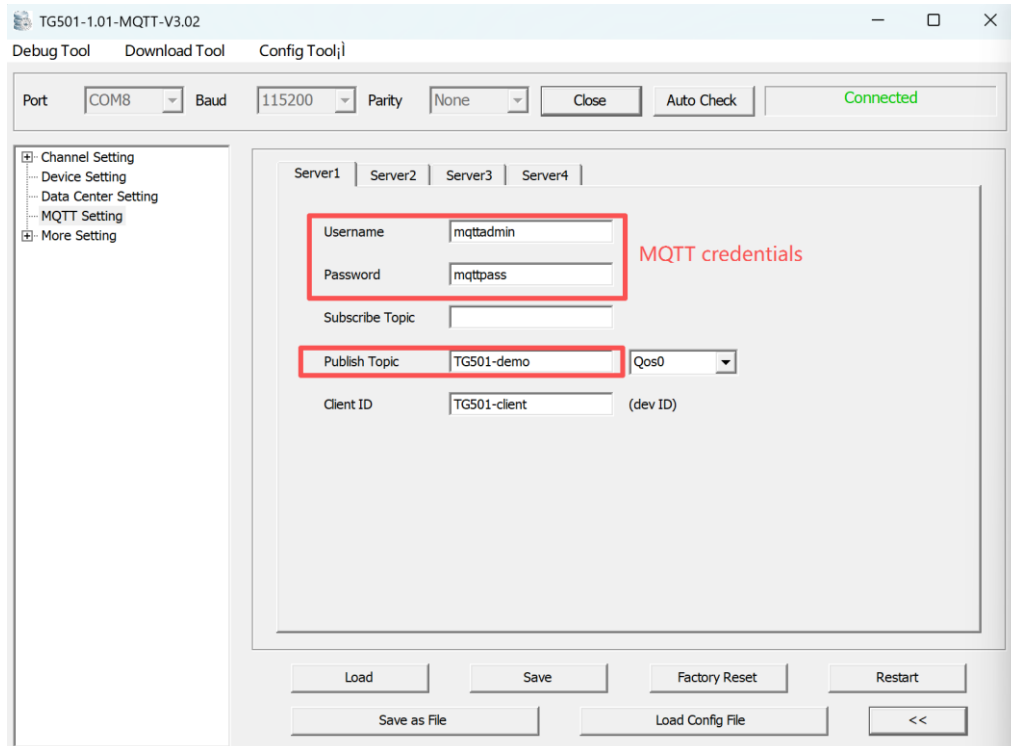
Configuration Steps:

In this demo case, I'm going to use **MQTTX** to subscribe topic, and receive Modbus data published from TG501.

1. Go to **Config Tool -> Data Center Setting**, enable one server for MQTT broker connection. "Server Protocol" should be MQTT. Set your MQTT broker address and port.

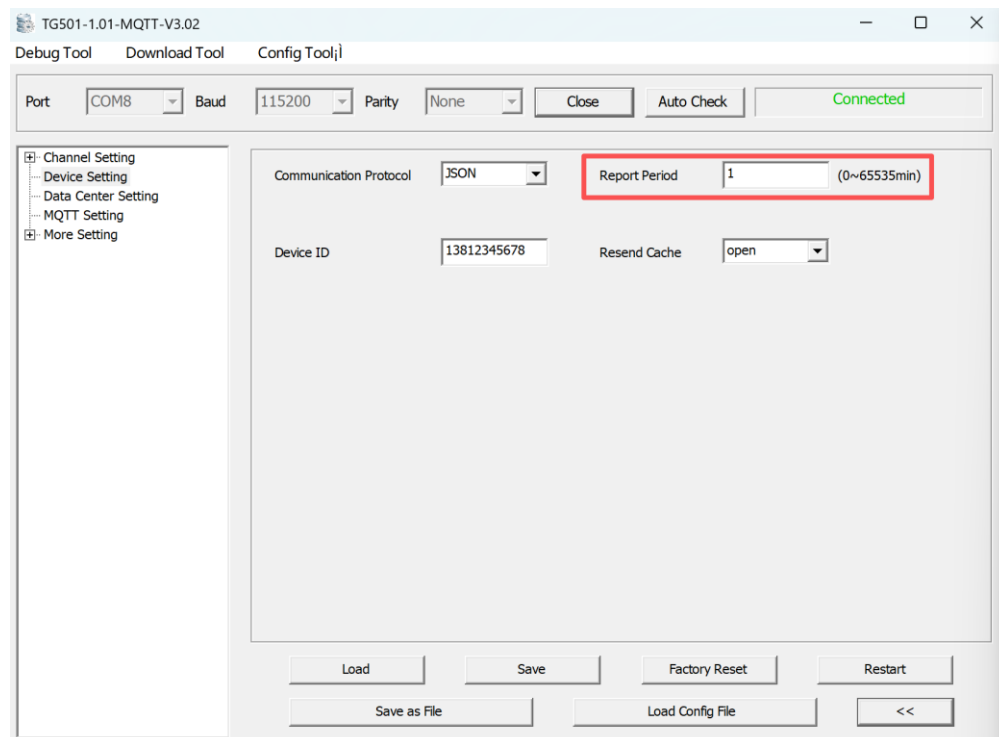


2. Go to **MQTT Setting**, configure the MQTT credentials the same as your MQTT broker. Then set a "Publish Topic", and define a unique "Client ID".



NOTE: The Client ID cannot be the same as other clients.

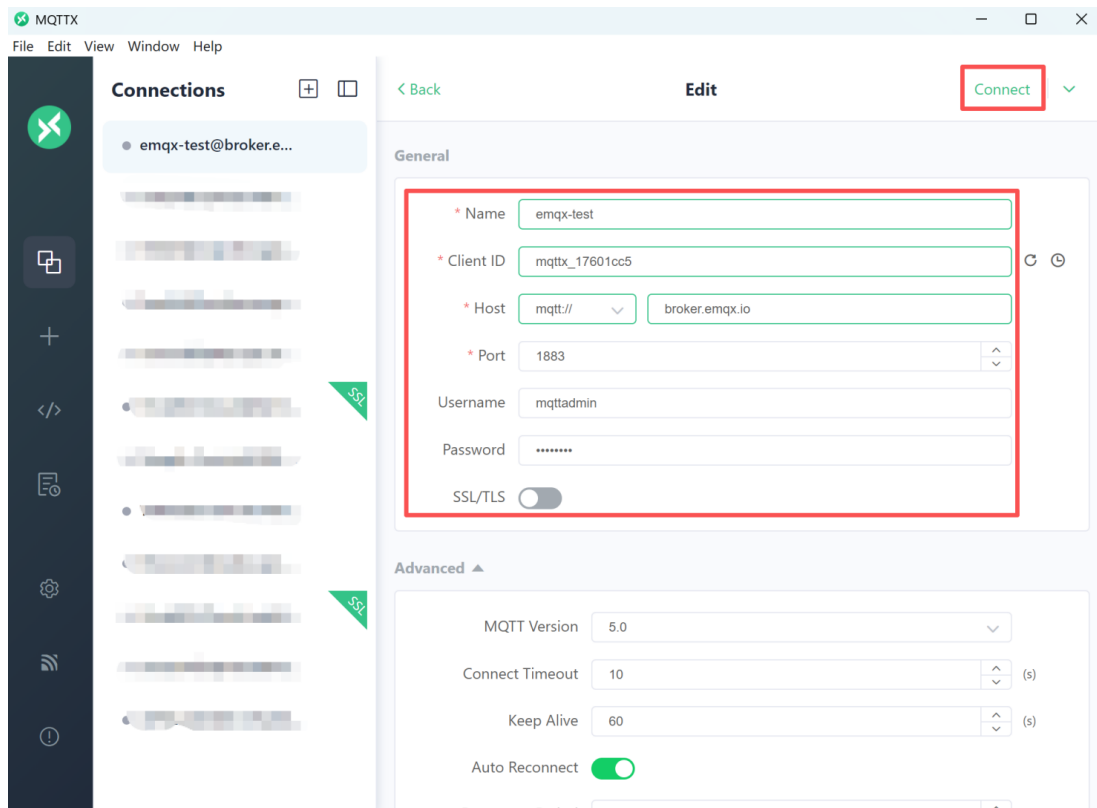
- Go to **Device Setting**, here you can set the MQTT report period. In this setting, TG501 will publish topic every 1 min.



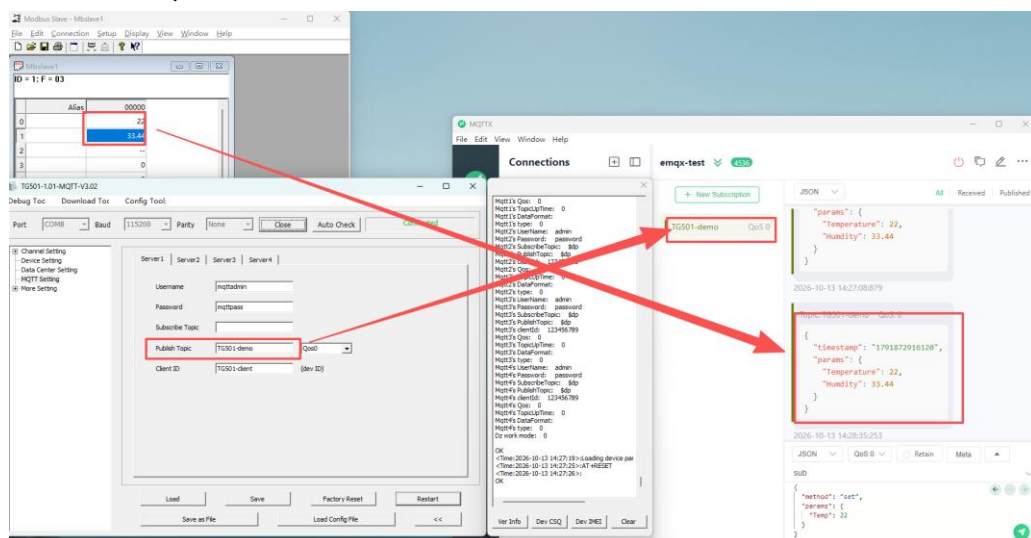
- Click "Save" button after setup all MQTT parameters, then click "Load" button to apply the new configuration.

Verification Method:

1. Open MQTT client software in computer. Then connect to the MQTT broker.



2. Subscribe the specific topic setup in TG501, then Modbus RTU data(Mbslave) will be received in MQTTX with JSON format.



Common Issues:

- Data Center and MQTT Setting are configured, but TG501 doesn't publish data for long time: Check the **"Report Period"** in Device Setting, the default period is 60 mins, you have to change the period according to your application.

- All configurations are complete, but no data receive in MQTT, and device is offline: Go to **Data Center Setting**, check the “**Server No**”, when you enable server, the “**Server No**” must be selected 1 or more, cannot be 0.



Scenario 3: Upload Modbus RTU data to TCP Server

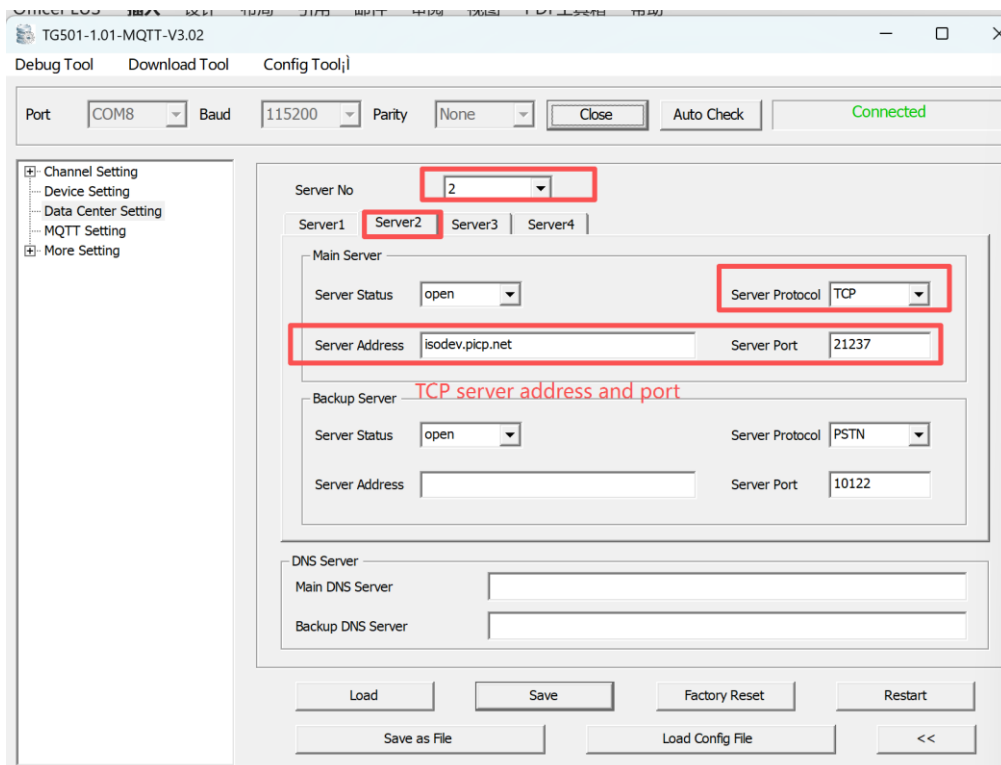
Objective: Upload Modbus data to TCP Server.

Prerequisites: Collected Modbus data, you have to finish the first step [Scenario 1: Modbus RTU Data Collection](#); TG501 and sensor are powered on; SIM card inserted and can connect to Internet; TCP Server(Net Assistant); TG501-B config tool(TG501-1.01-MQTT-EN-V3.02); Firmware version(TG501B1-CQB000-18.2.bin).

Configuration Steps:

In this demo case, I going to connect TG501 to a remote server, the server address is bonded to a specific public domain.

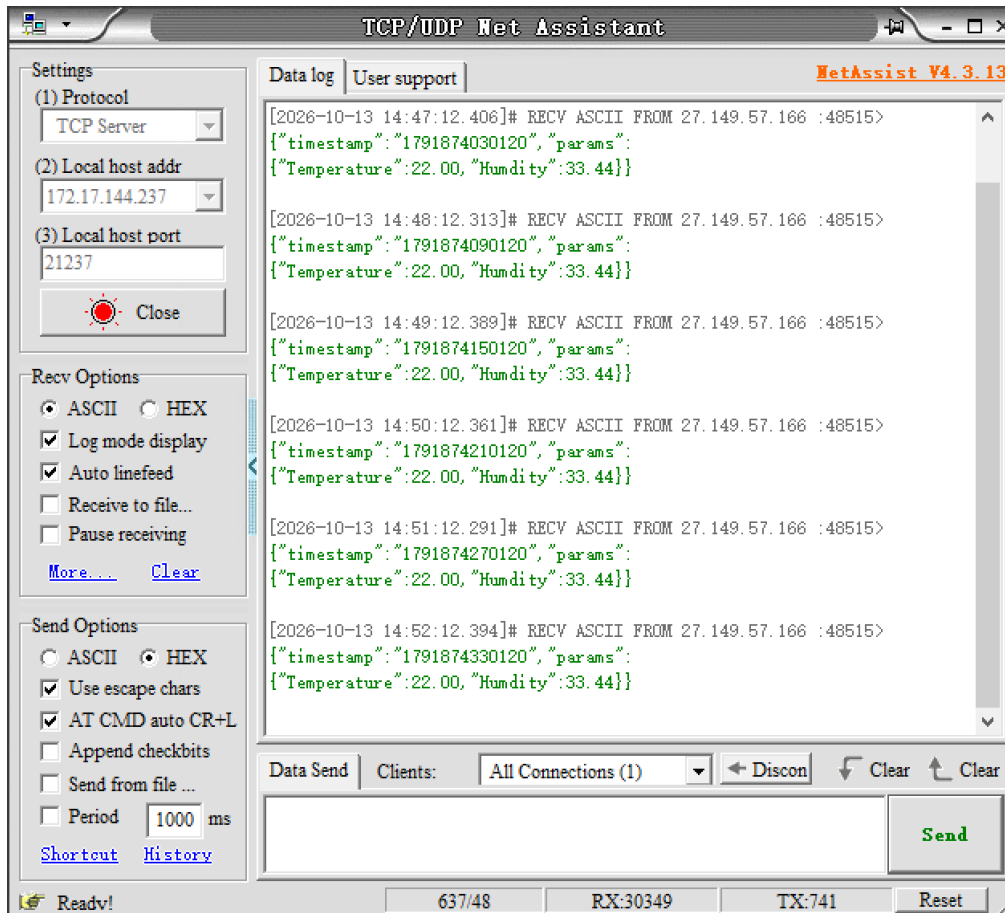
- Go to **Config Tool -> Data Center Setting**, enable Server 2 for TCP connection. “Server No” should be 2, “Server Protocol” is TCP. Then configure your TCP address and port.



- Click “Save” button after setup all TCP parameters, then click “Load” button to apply the new configuration.

Verification Method:

1. Go to TCP server, and check the data transmission.

**Scenario 4: DI/PI and ADC Configuration**

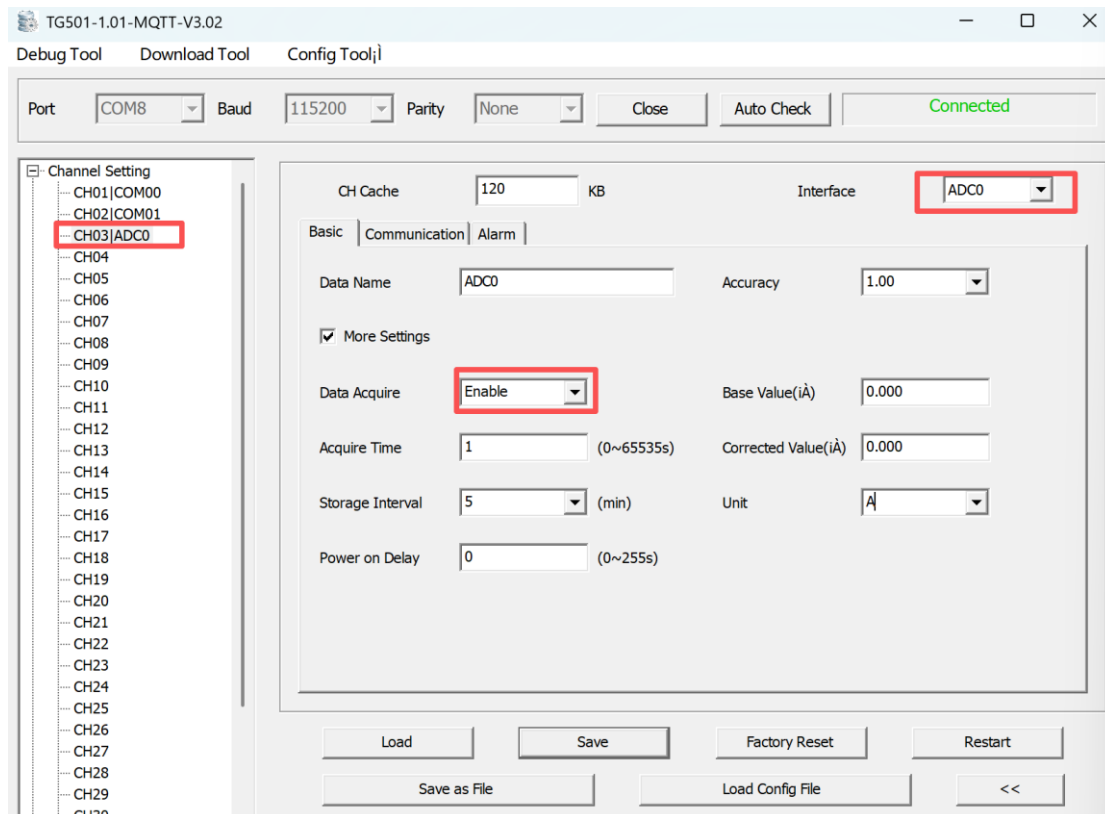
Objective: Enable data acquisition for DI, PI and ADC, and upload data to MQTT.

Prerequisites: TG501 and sensor are powered on; SIM card inserted and can connect to Internet; MQTT broker; MQTT client tool(MQTTX or MQTT.fx); TG501 config tool(TG501-1.01-MQTT-EN-V3.02); Firmware version(TG501B1-CQB000-18.2.bin).

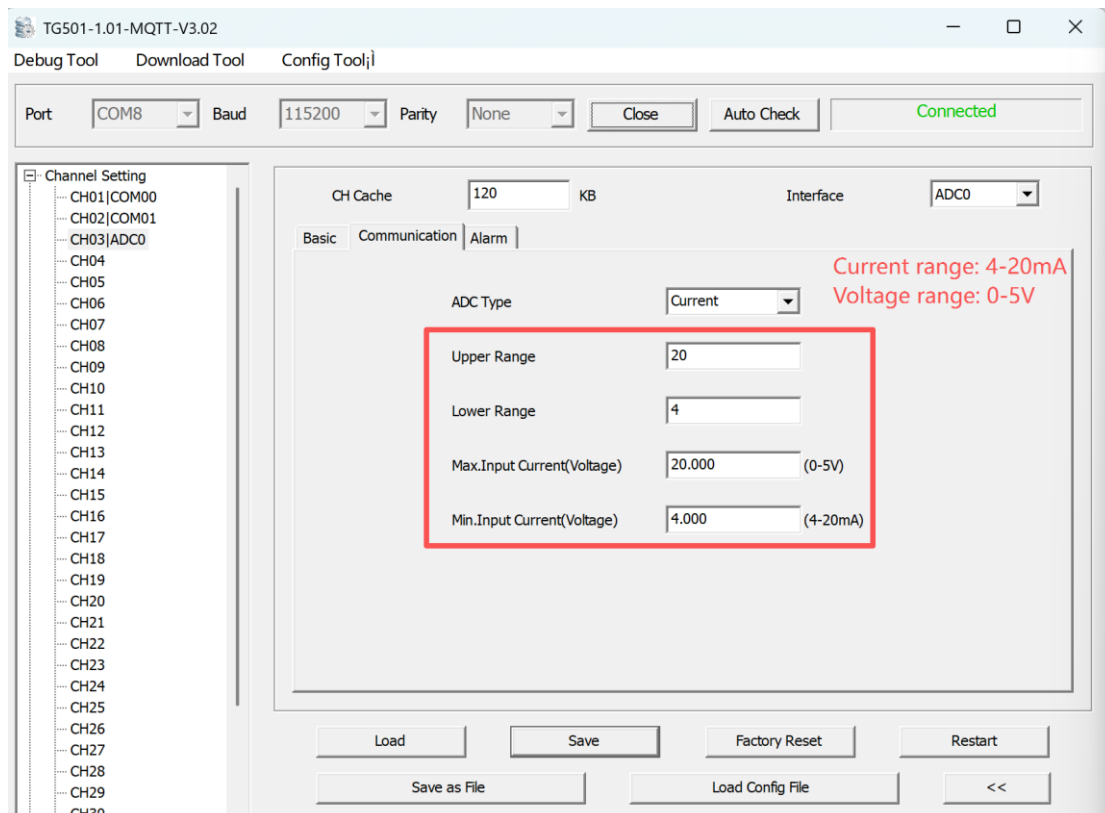
Configuration Steps:

In this demo case, I going to collect DI, PI and ADC data using TG501, and upload data to MQTT.

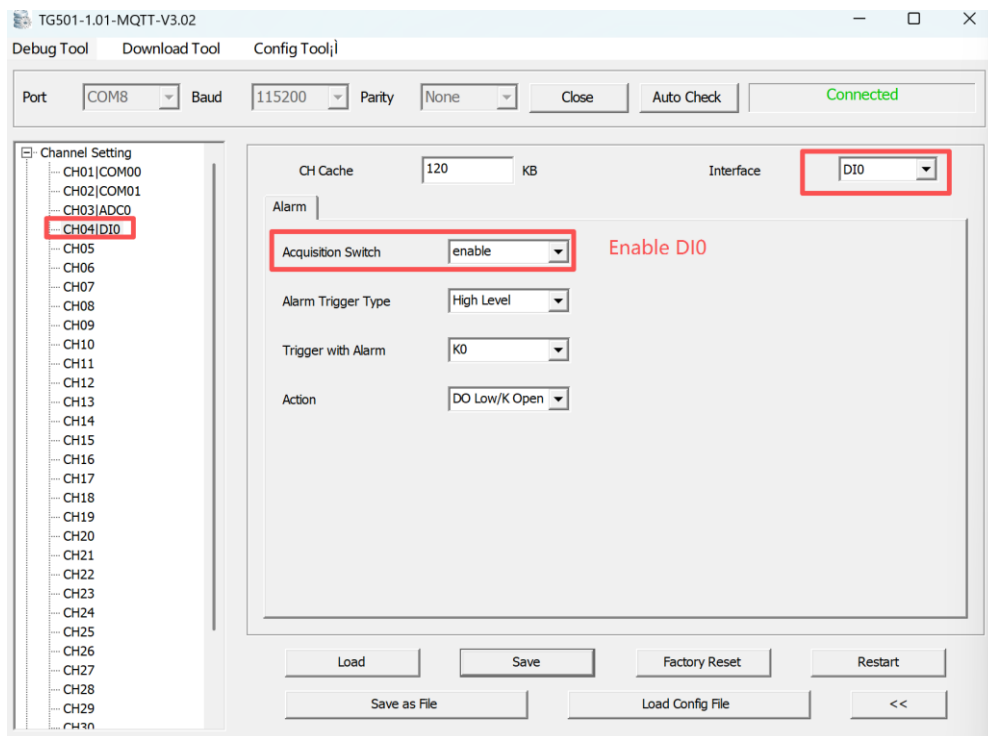
1. Open TG501 config tool(TG501-1.01-MQTT-EN-V3.02), and enter config mode.
2. Go to **Channel Setting**, add new channels for ADC, DI and PI separately.
 - ADC channel



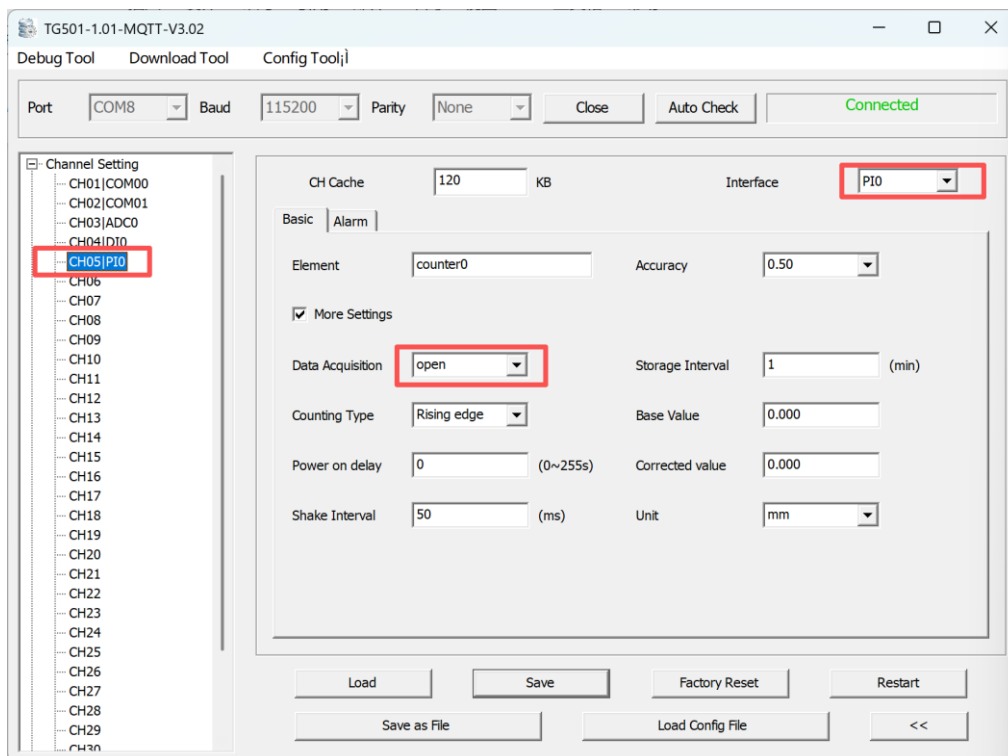
NOTE: Default ADC is current type, if you require voltage type, you have to contact Bivocom sales team before purchasing the RTU.



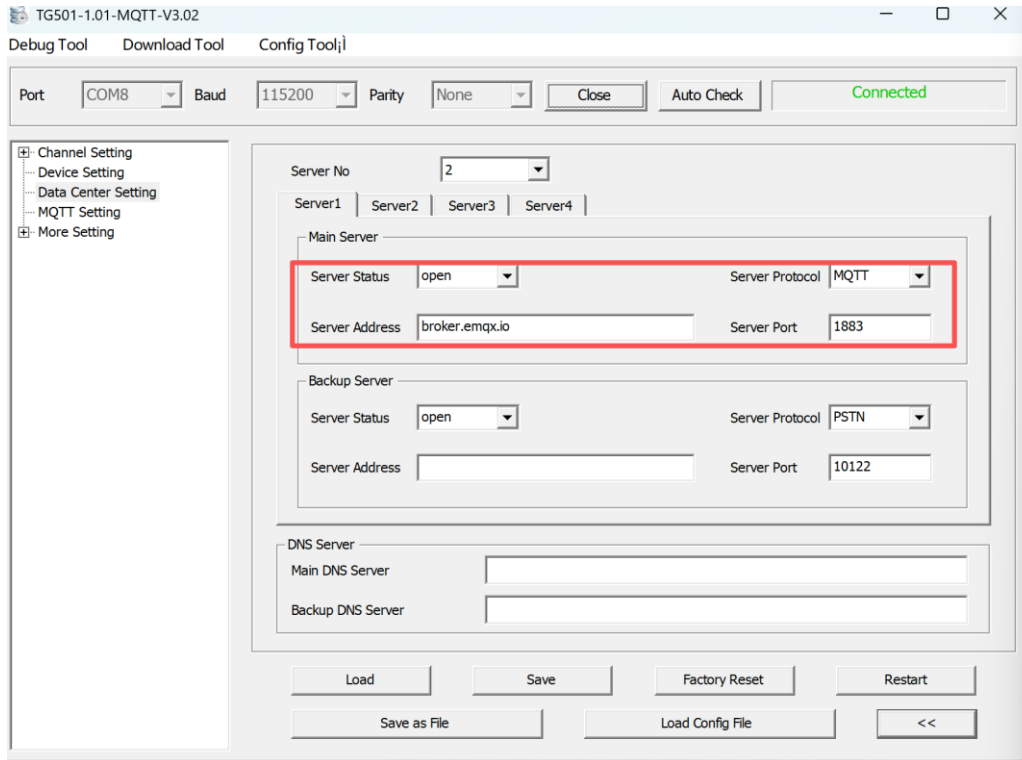
- DI channel



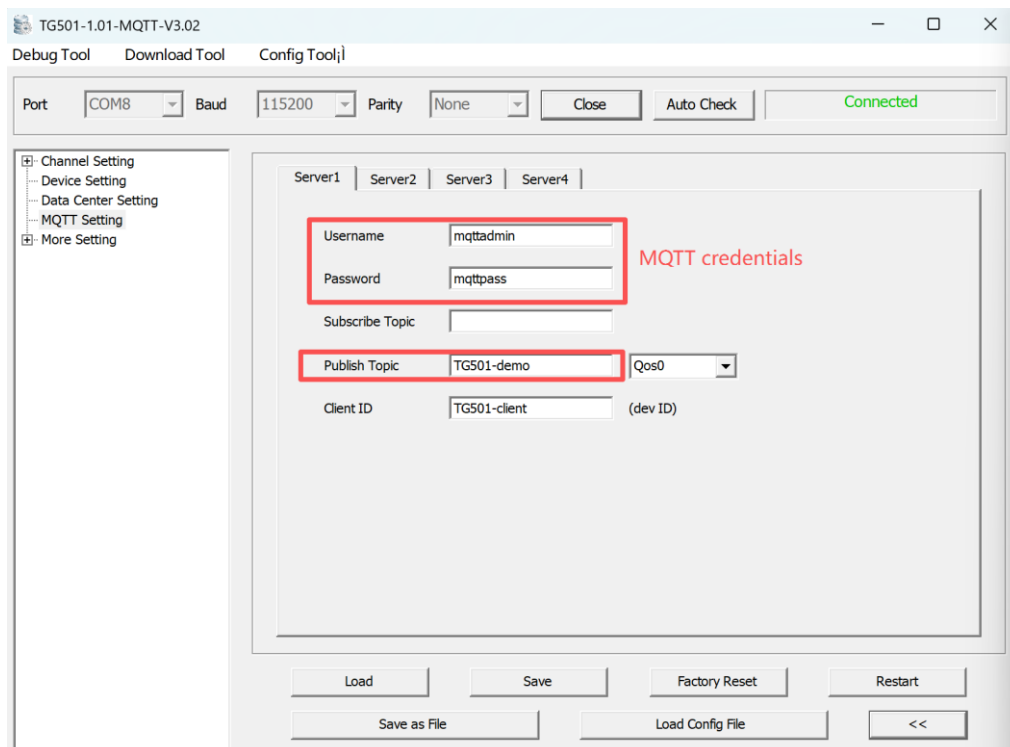
- PI channel



- Go to **Data Center Setting**, enable one server for MQTT broker connection. "Server Protocol" should be MQTT. Set your MQTT broker address and port.

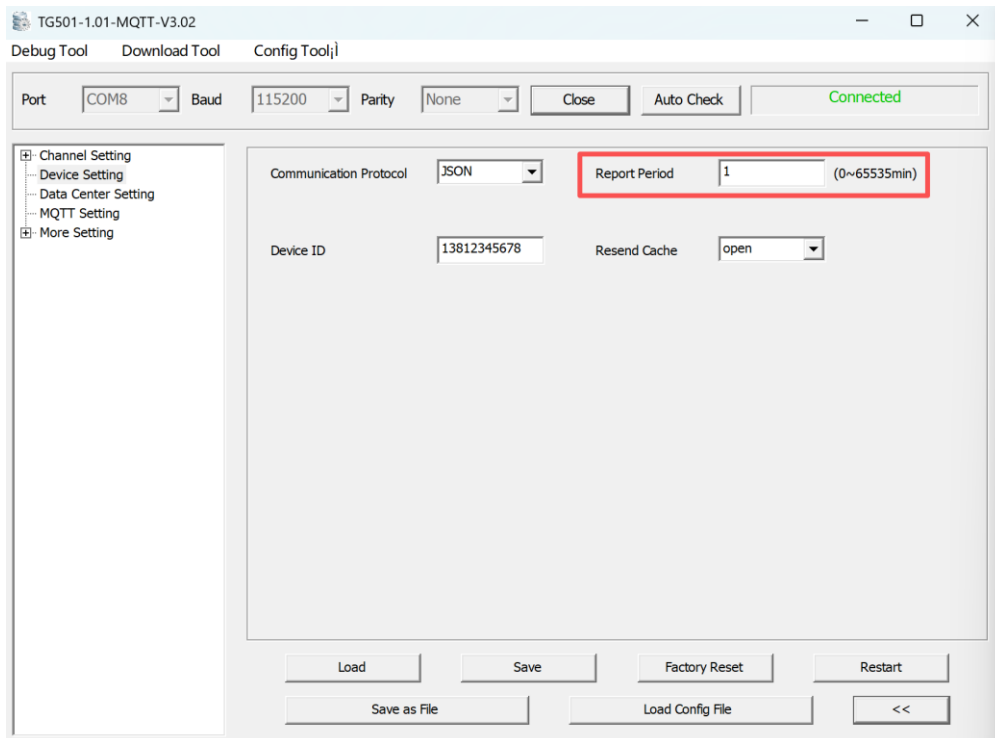


4. Go to **MQTT Setting**, configure the MQTT credentials the same as your MQTT broker. Then set a "Publish Topic", and define a unique "Client ID".



NOTE: The Client ID cannot be the same as other clients.

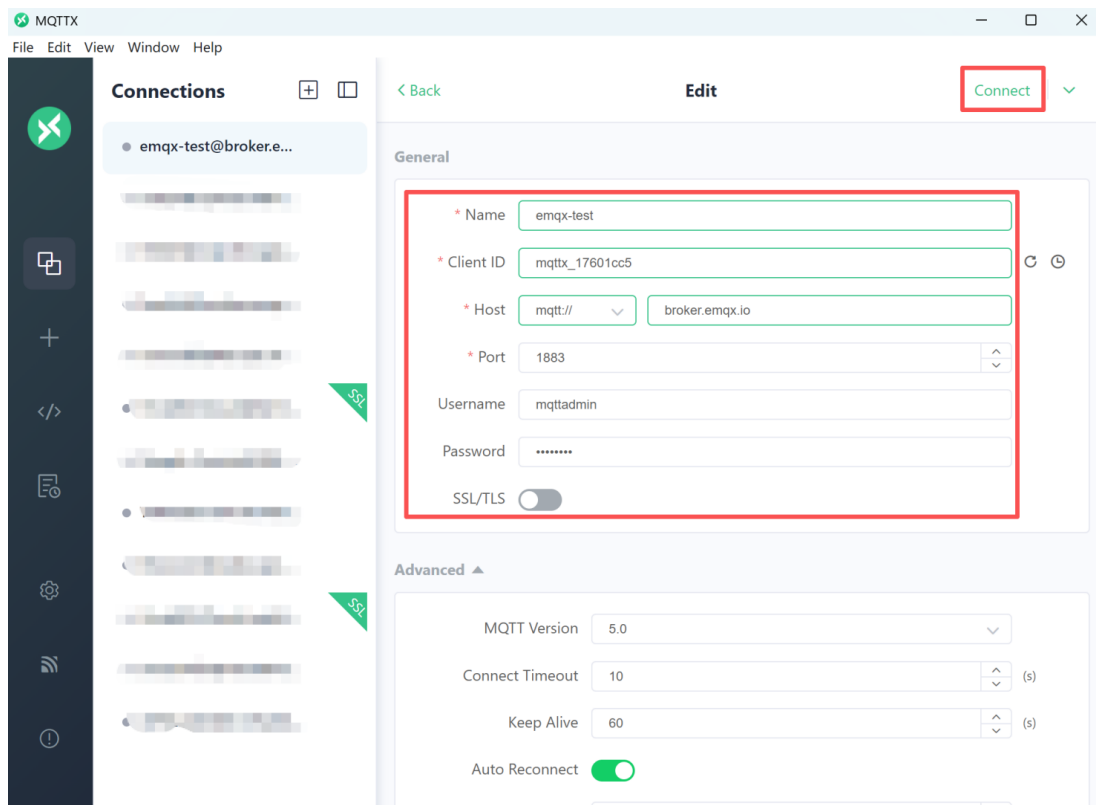
5. Go to **Device Setting**, here you can set the MQTT report period. In this setting, TG501 will publish topic every 1 min.



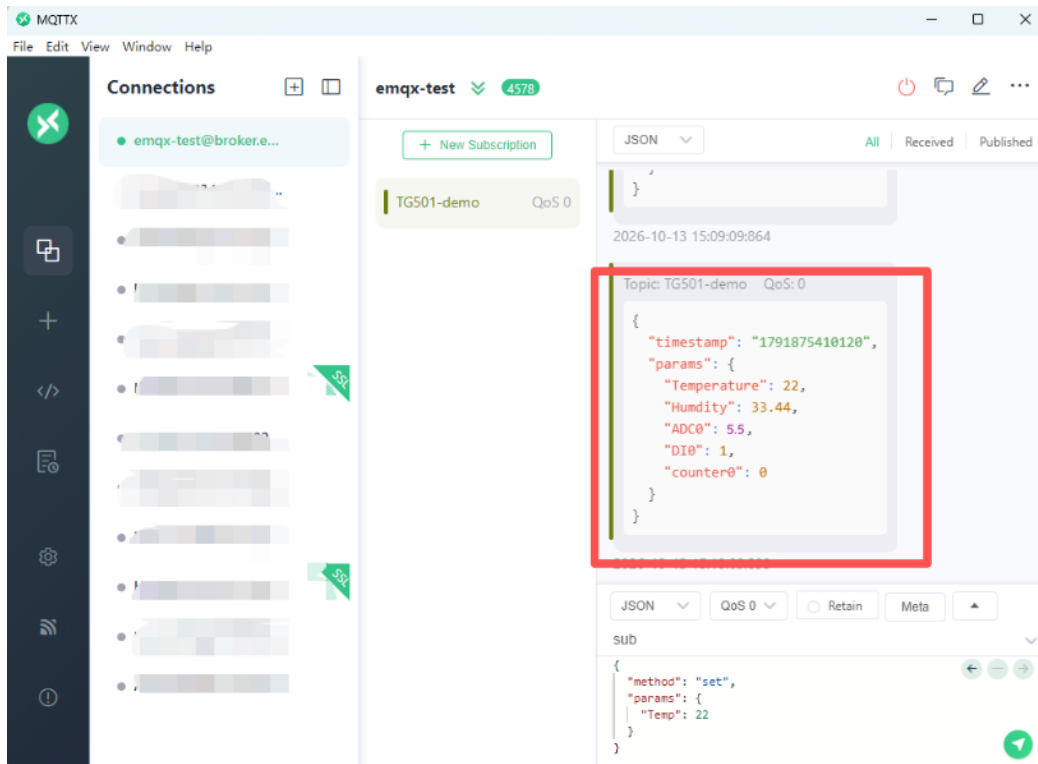
- Click "Save" button after setup all MQTT parameters, then click "Load" button to apply the new configuration.

Verification Method:

- Open MQTT client software in computer. Then connect to the MQTT broker.



2. Subscribe the specific topic setup in TG501, then the DI, PI and ADC data will be received in MQTTX with JSON format.



Scenario 5: Sleep Mode Configuration(Optional)

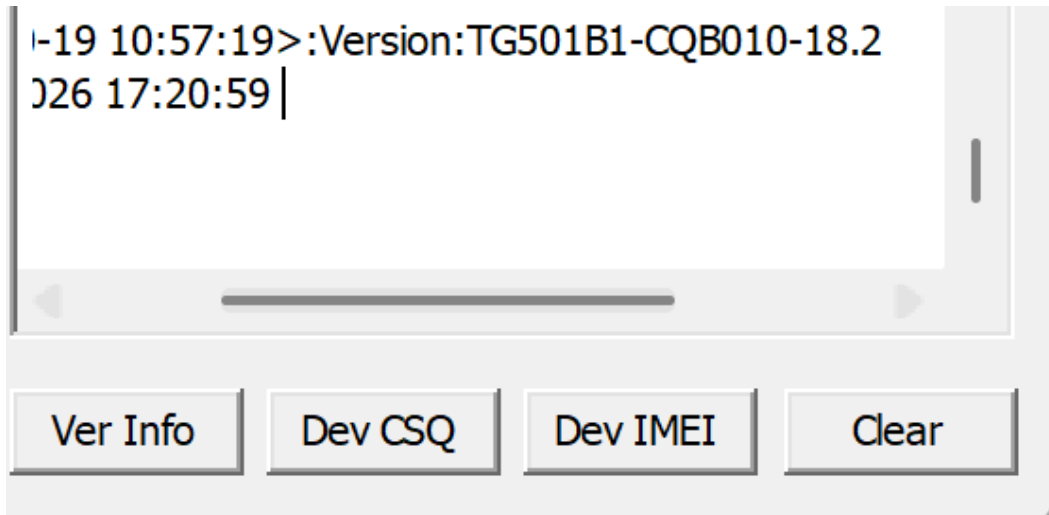
Objective: Enable sleep mode on TG501, and upload data after sleep mode.

Prerequisites: TG501 and sensor are powered on; Collected Modbus or I/O data, you can check the above scenarios; SIM card inserted and can connect to Internet; MQTT client tool(MQTTX or MQTT.fx); TG501-B config tool for sleep mode(TG511-MQTT-S3.01); Firmware version for sleep mode(TG501B1-CQB010-18.2.bin); TG501-B(Hardware modification).

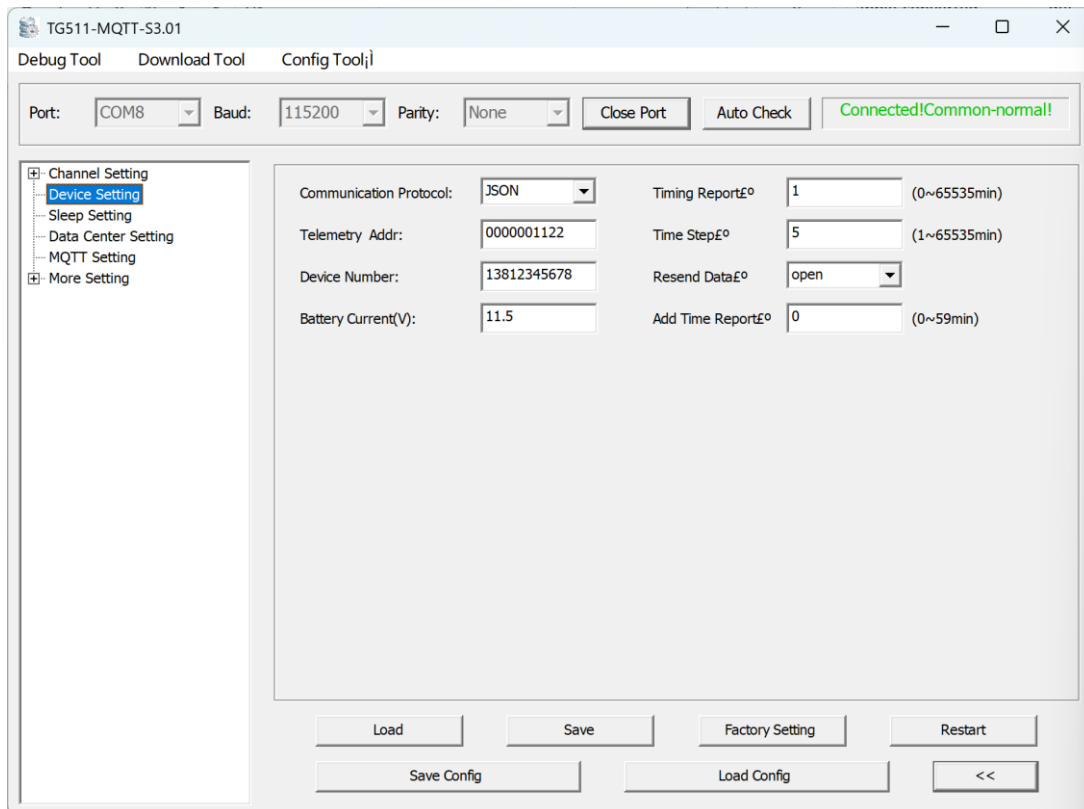
NOTE: Since sleep mode requires a special hardware modification based on standard TG501-B, you must contact Bivocom sales team before ordering device, team will modify the hardware for your device.

Configuration Steps:

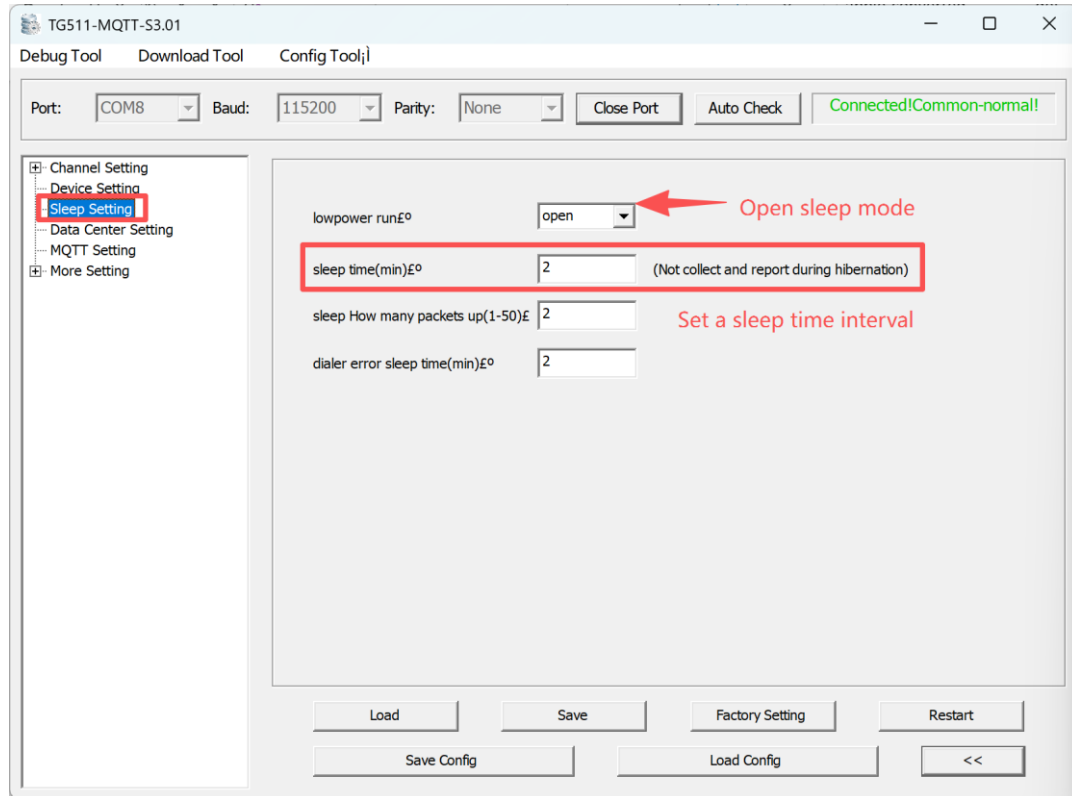
1. Upgrade firmware to sleep mode version(TG501B1-CQB010-18.2.bin), you can jump to [Firmware Upgrade](#) to check the detailed upgrade steps.



2. Open config tool for sleep mode(TG511-MQTT-S3.01), then enter config mode.

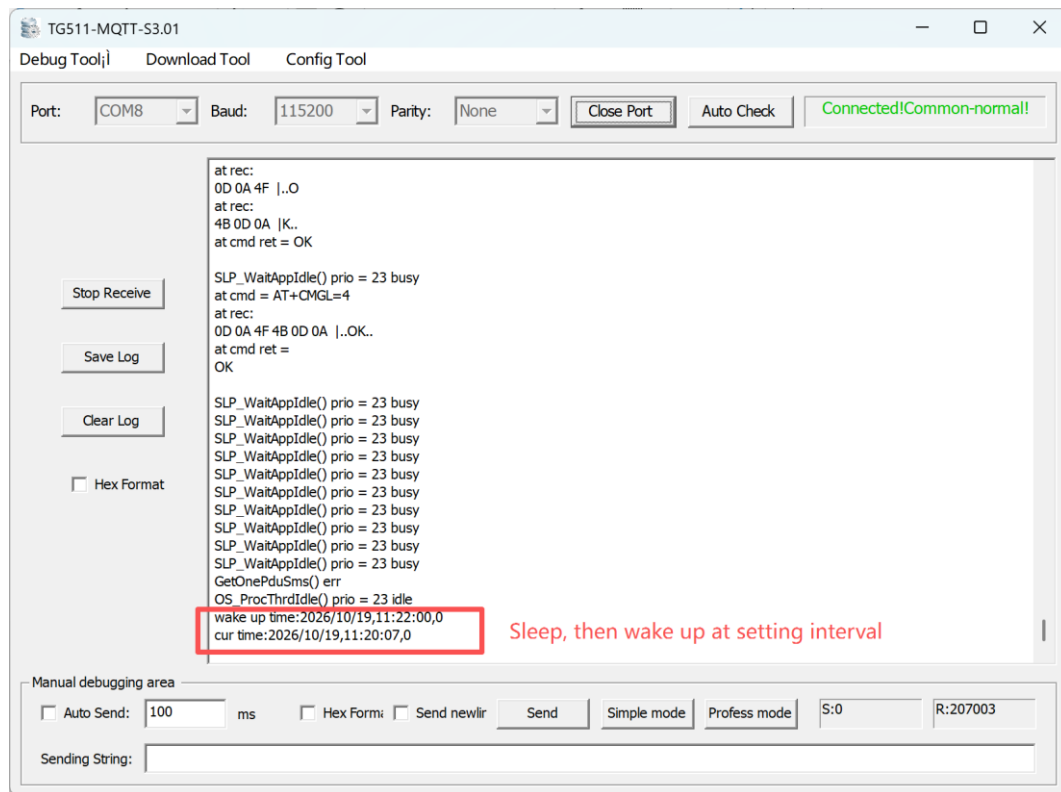


3. Go to **Sleep Setting**, open sleep mode, then setup other parameters according to your application. In this case, the TG501 will sleep 2 minutes at first. Then wake up, it'll dial up the network, if it can get online immediately, the device will collect and send data in the setting interval. If the device is offline, it'll keep dialing for two minutes, after two minutes, it'll get into sleep mode again.

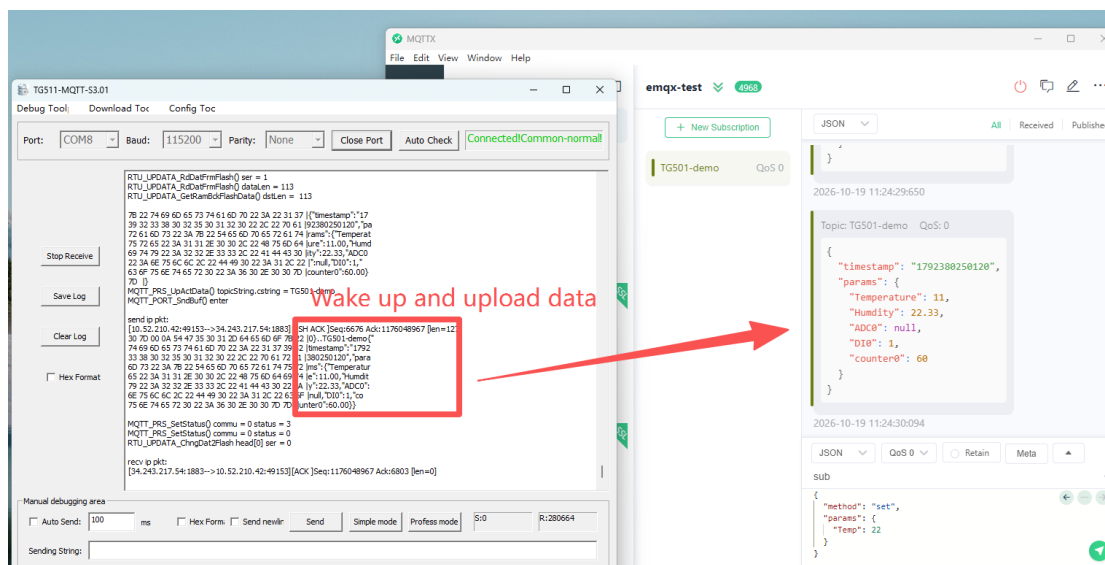


Verification Method:

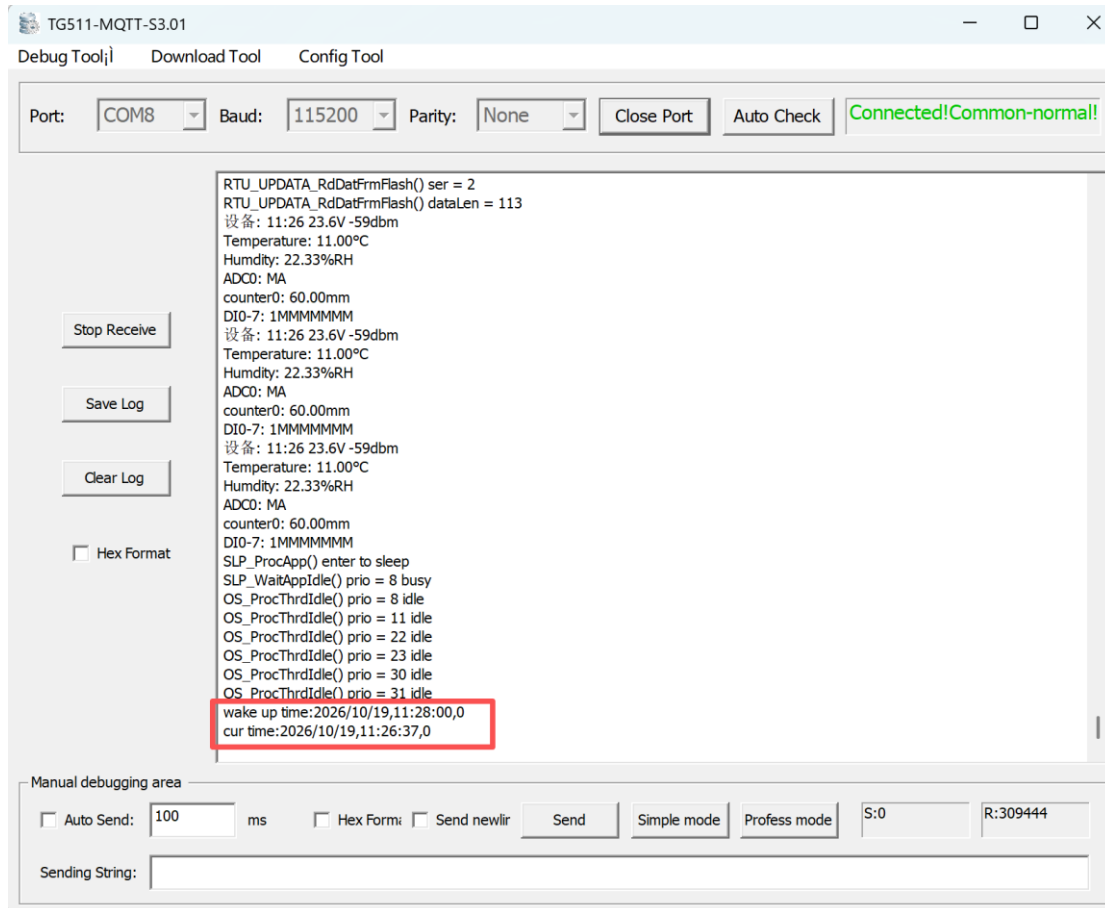
1. Enter Debug tool, it'll enter sleep mode after you enabled sleep mode and setup sleep time.



2. Wake up and upload data to MQTT.



3. After collecting and publishing data, it'll re-enter sleep mode.

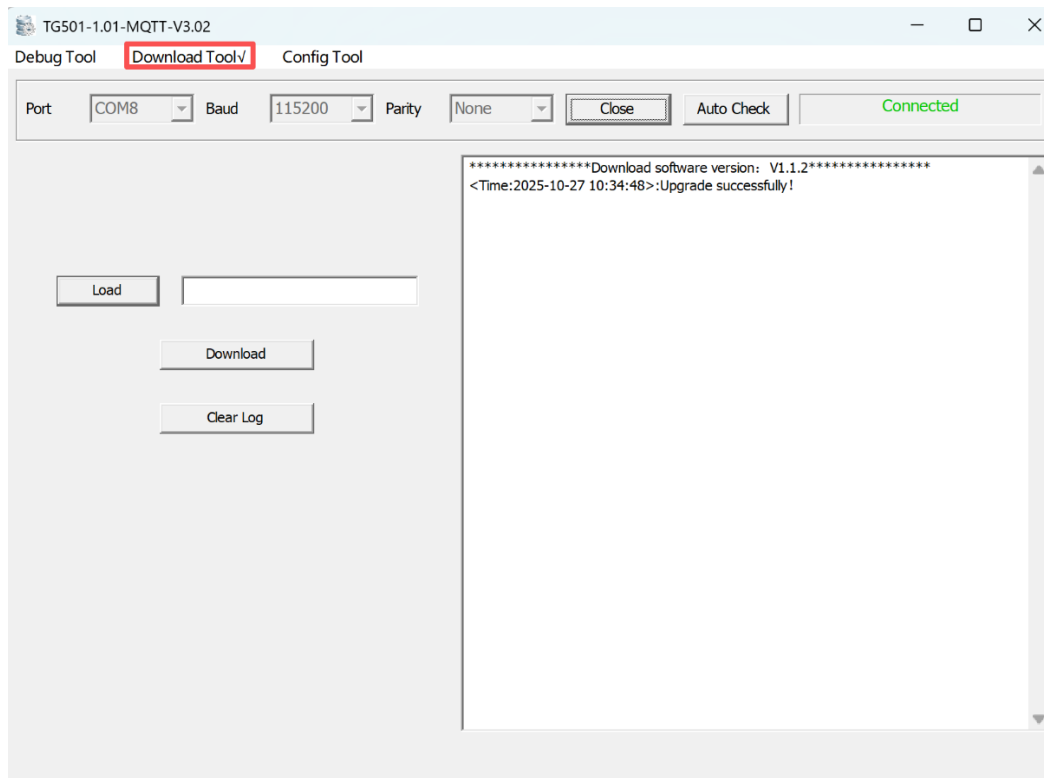


5. Firmware Upgrade

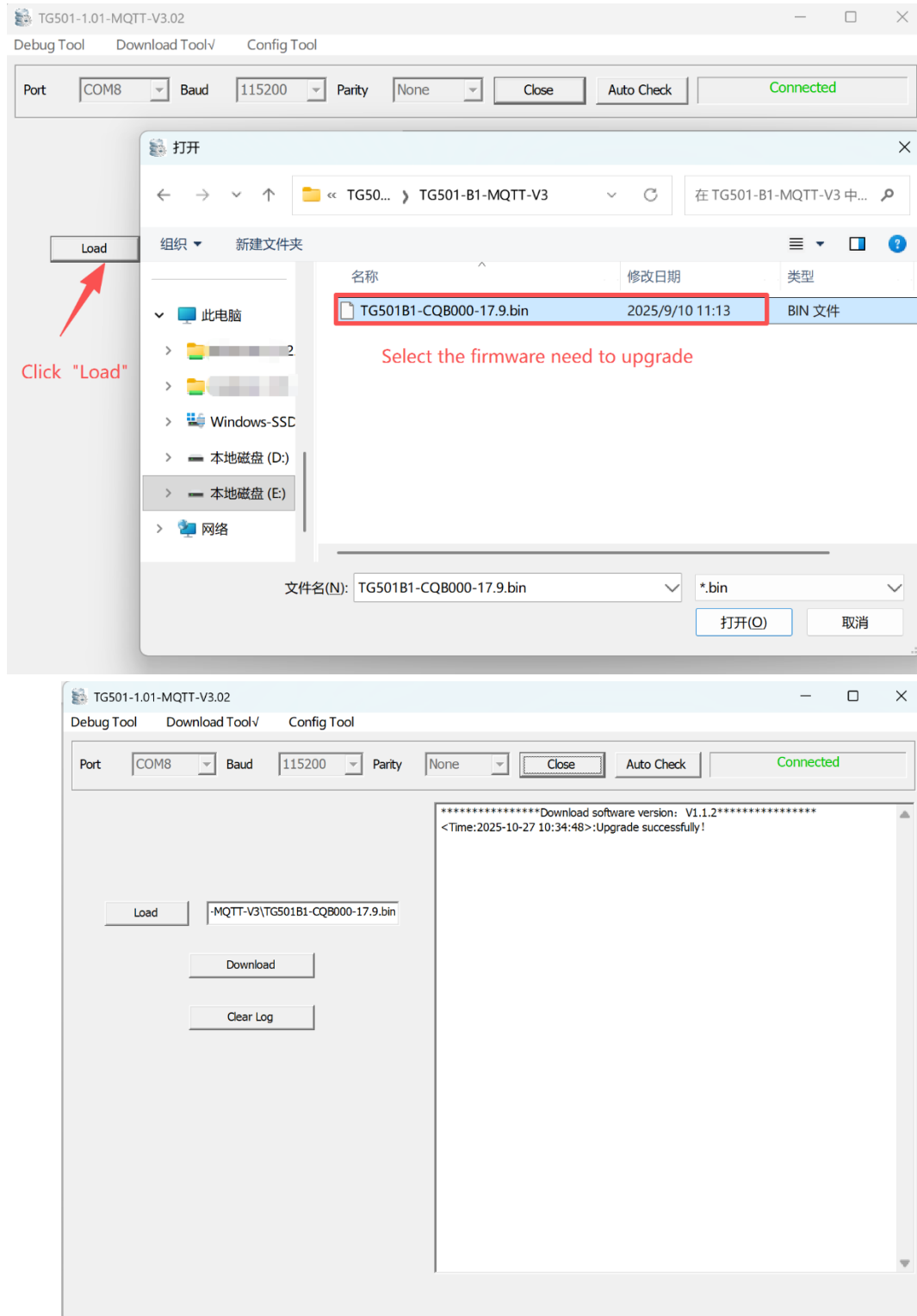
1. Before upgrading firmware, please connect **RS232-0(DEBUG)** to your computer through Serial to USB converter, as shown in the figure below:



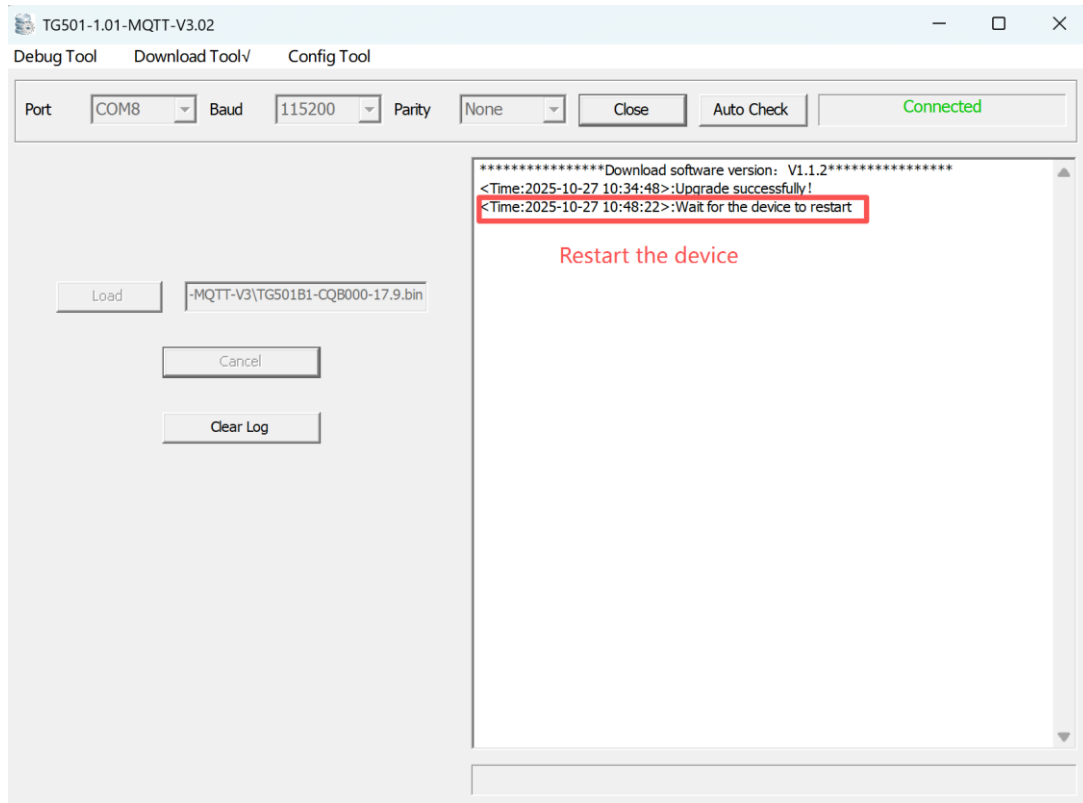
2. Click "Download Tool", it'll be ticked "√", then it'll automatically enter the download tool.



- Click "Load" button to select a firmware that you need to upgrade, then it'll be uploaded to the download tool.

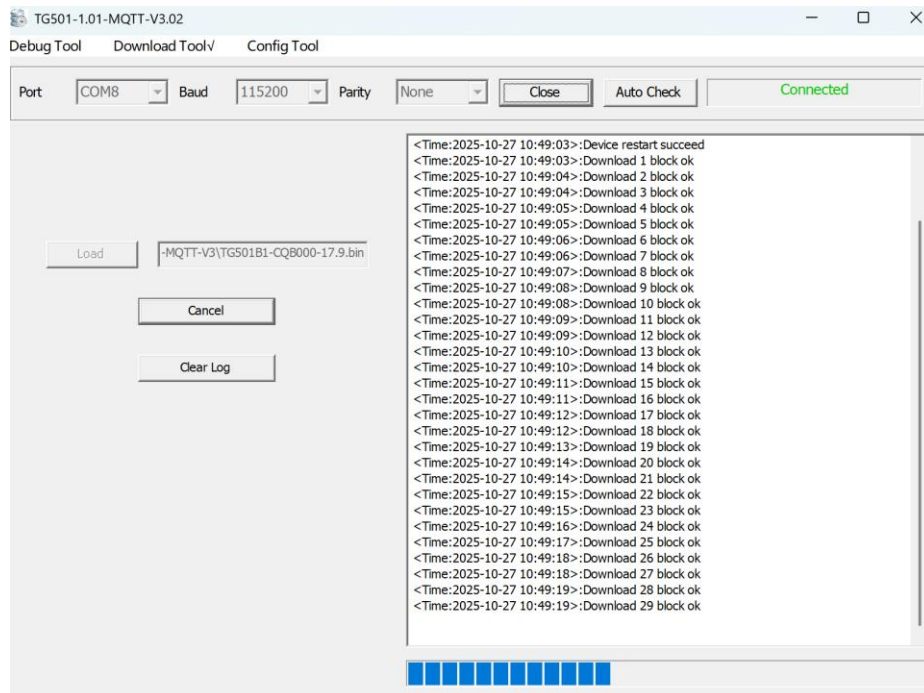


- Click "Download" button to start the firmware upgrade, then you have to restart the device according to the tips.

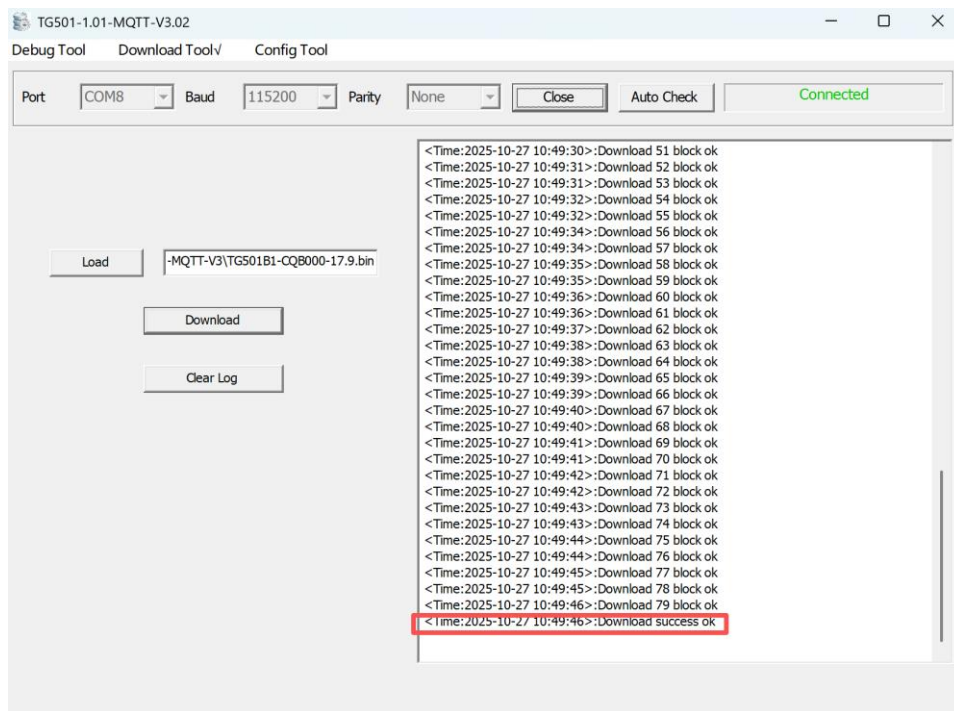


5. After restarted device, it'll start to upgrade the firmware, will take 1-2 mins. Then it'll show **"Download success ok"**, it indicates the firmware has been successfully upgraded.

Firmware upgrading

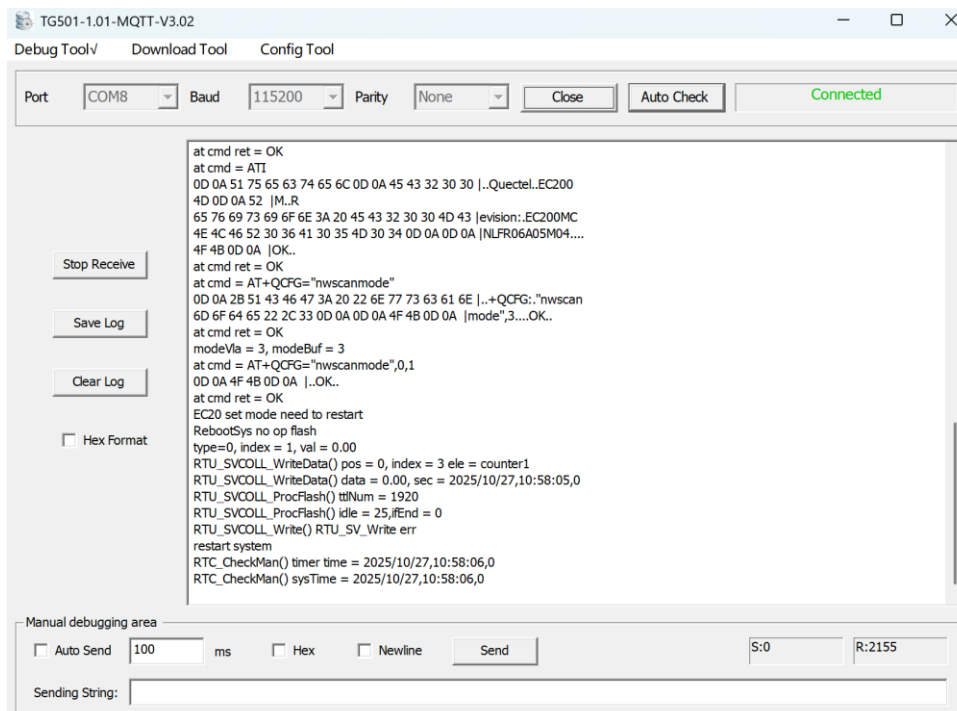


Firmware download complete



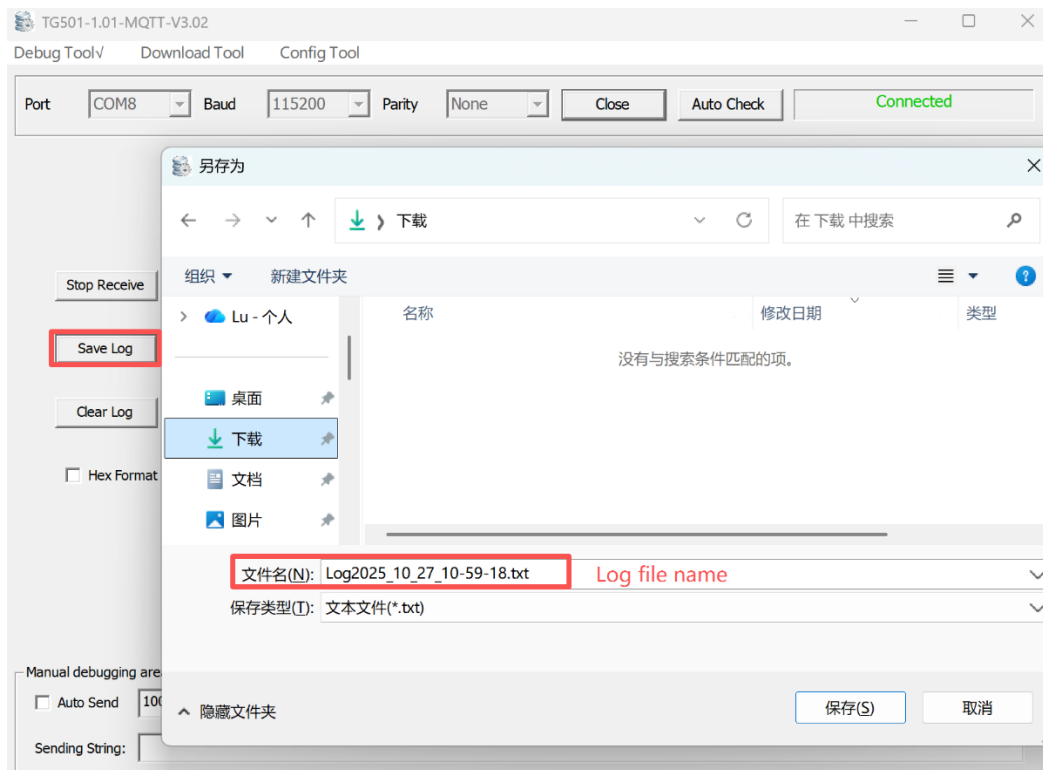
6. Debug Tool

1. Connect **RS232-0(DEBUG)** to your computer through Serial to USB converter. Click "Debug Tool", it'll be ticked "✓", then it'll automatically enter the debug mode. Click "Start/Stop Receive" button, it can start or stop the system log output of TG501.



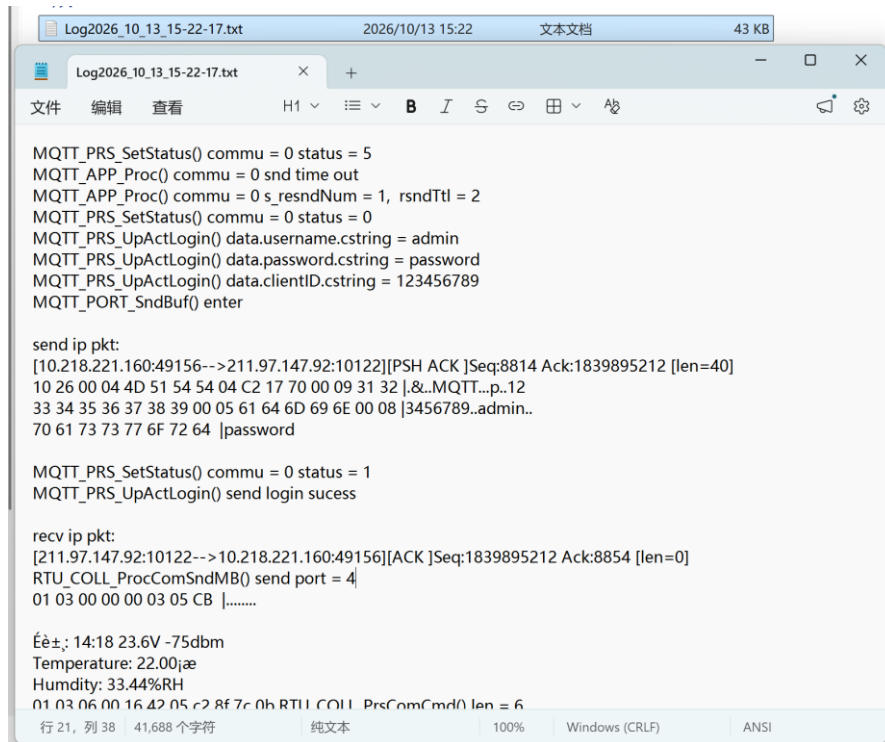
The system log is mainly used for troubleshooting, recording operational status, communication link events(such as network registration, heartbeats, and data transmission/reception), and abnormal errors(e.g., signal loss, connection interruptions or packet verification failures). It provides engineers with critical diagnostic evidence, enabling rapid fault localization, network performance optimization, and ensuring the reliability of IoT data transmission.

2. Click “Save log” button, the current output system log can be saved in your computer as txt format.



NOTE: When you encounter some uncertain errors, you may need to save the system log and send it to our technicians for analysis and diagnosis.

Example log file in txt format:



The screenshot shows a text editor window titled "Log2026_10_13_15-22-17.txt" with a file size of 43 KB. The window contains the following text:

```
MQTT_PRS_SetStatus() commu = 0 status = 5
MQTT_APP_Proc() commu = 0 snd time out
MQTT_APP_Proc() commu = 0 s_resndNum = 1, rsndTtl = 2
MQTT_PRS_SetStatus() commu = 0 status = 0
MQTT_PRS_UpActLogin() data.username.cstring = admin
MQTT_PRS_UpActLogin() data.password.cstring = password
MQTT_PRS_UpActLogin() data.clientID.cstring = 123456789
MQTT_PORT_SndBuf() enter

send ip pkt:
[10.218.221.160:49156-->211.97.147.92:10122][PSH ACK]Seq:8814 Ack:1839895212 [len=40]
10 26 00 04 4D 51 54 04 04 C2 17 70 00 09 31 32 |&..MQTT...p.12
33 34 35 36 37 38 39 00 05 61 64 6D 69 6E 00 08 |3456789..admin..
70 61 73 73 77 6F 72 64 |password

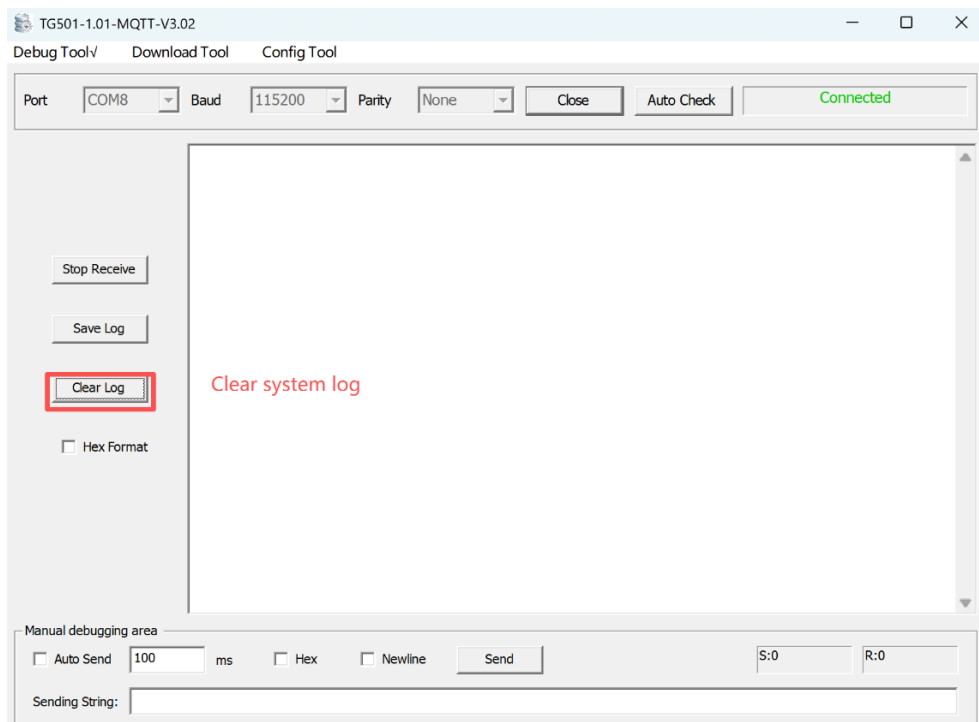
MQTT_PRS_SetStatus() commu = 0 status = 1
MQTT_PRS_UpActLogin() send login sucess

recv ip pkt:
[211.97.147.92:10122-->10.218.221.160:49156][ACK]Seq:1839895212 Ack:8854 [len=0]
RTU_COLL_ProcComSndMB() send port = 4|
01 03 00 00 00 03 05 CB |.....

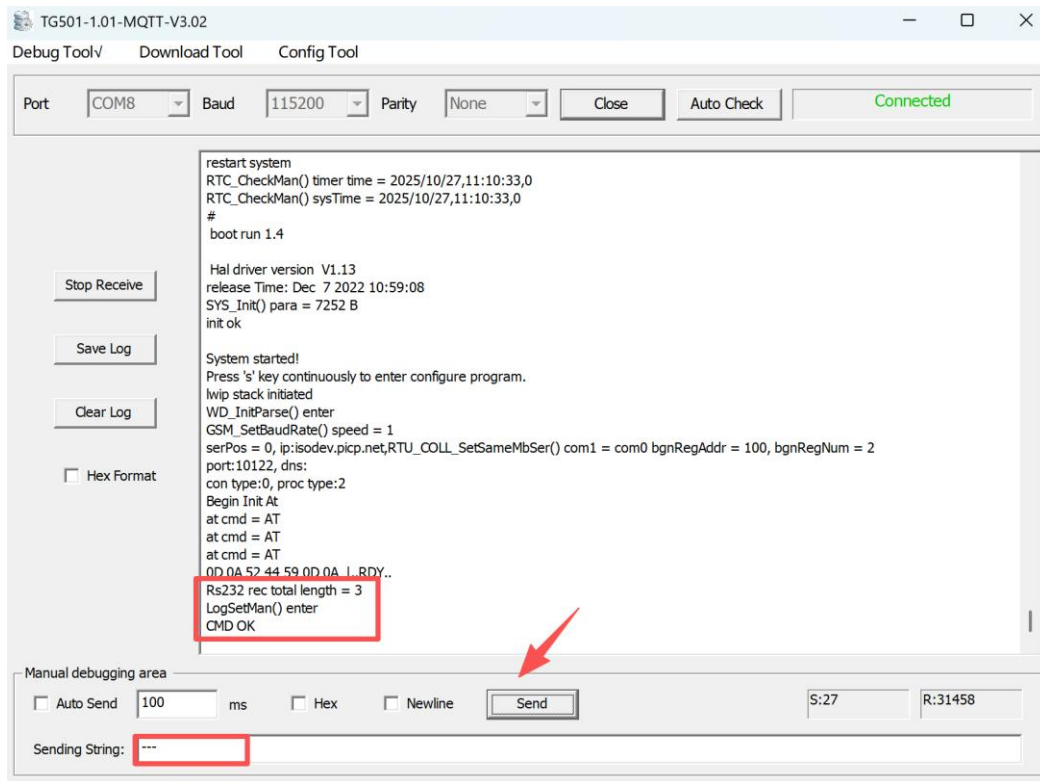
Éè±: 14:18 23.6V -75dbm
Temperature: 22.00jæ
Humdity: 33.44%RH
01 03 06 00 16 42 05 c2 8f 7c 0b RTU_COLL_ProcComCmd() len = 6
```

The status bar at the bottom indicates "行 21, 列 38", "41,688 个字符", "纯文本", "100%", "Windows (CRLF)", and "ANSI".

3. Click "Clear Log" button, all system logs will be deleted.

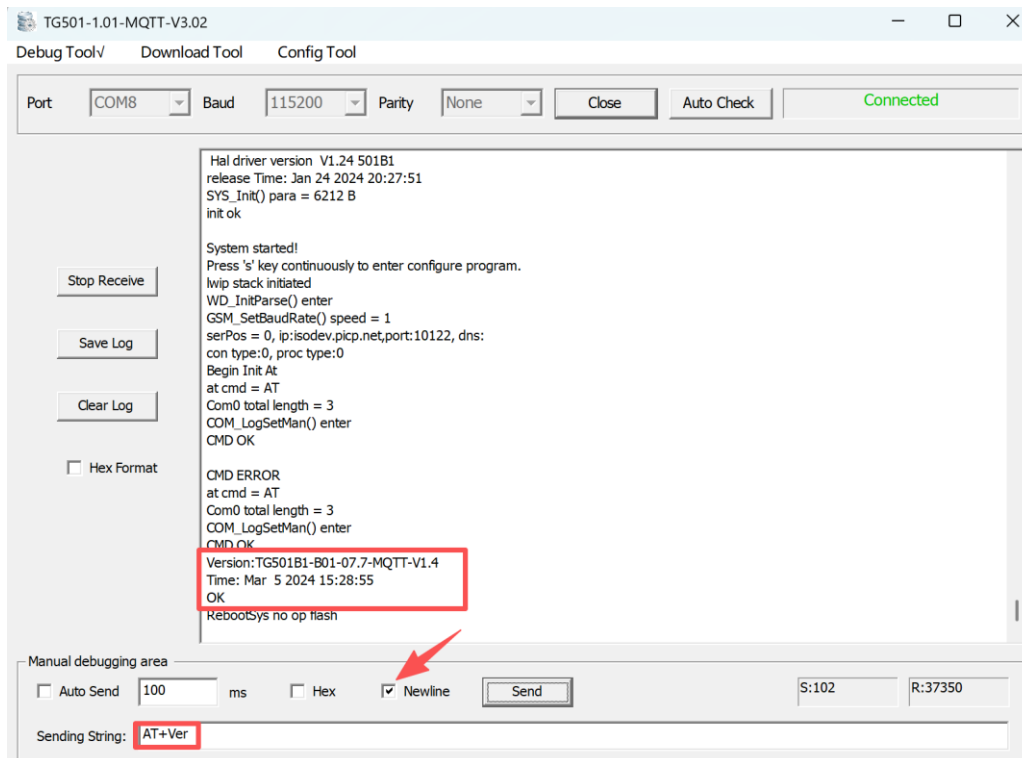


4. You can send AT commands in this command box. Send "---" to enter config mode.

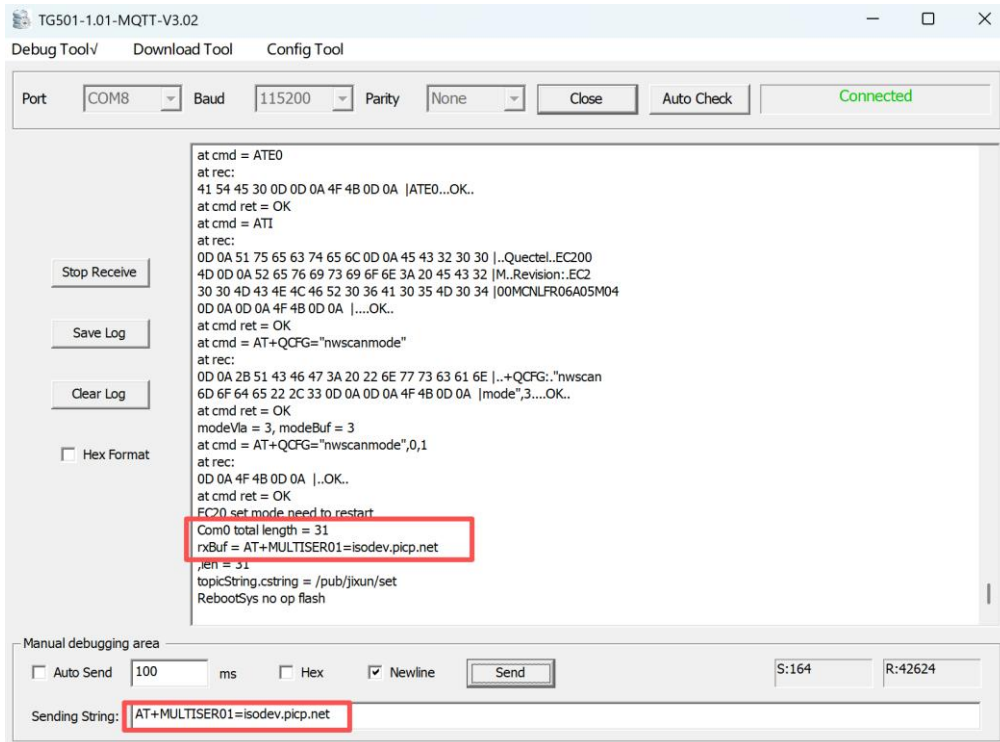


The following are examples of AT commands:

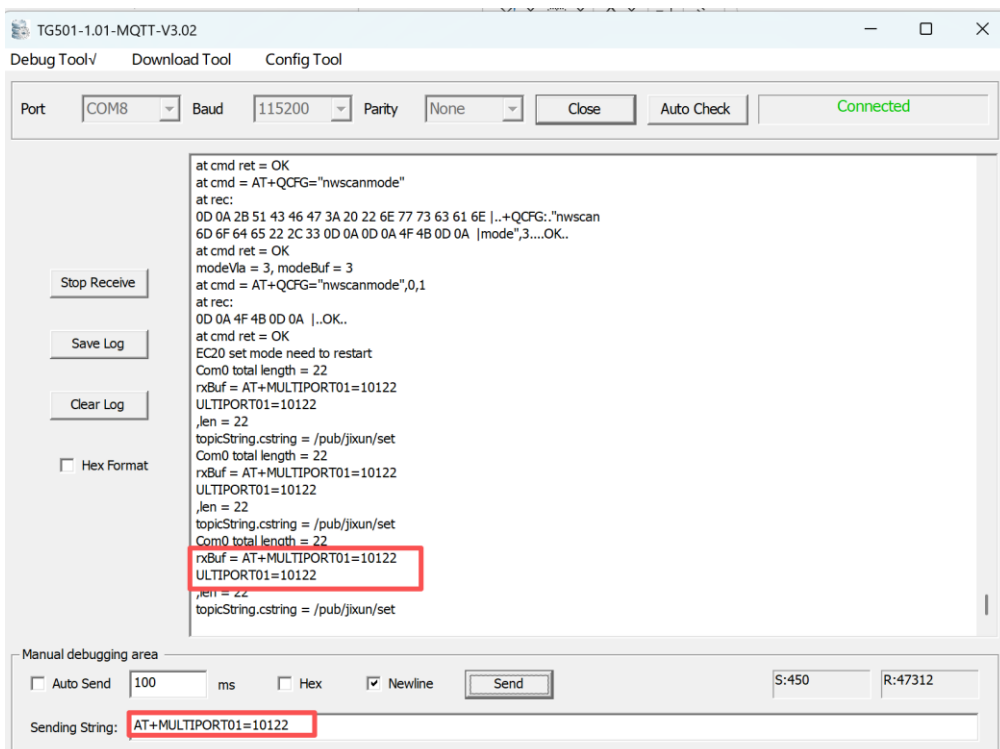
AT+Ver #Firmware version



AT+MULTISER01=isodev.picp.net #Set main center address



AT+MULTIPORT01=10122 #Set main center port



NOTE: You have to click "Newline" when sending AT commands.

7. Configure TG501 via SMS

If config command exceeds 140 bytes, please send the command through multi SMS

Note: Long SMS is not supported.

SMS Config format:

<password; command 1; command 2>

Password: 123456(default)

Command: Please refer to command after 'AT+' of [Appendix I AT Commands](#)

Example: <123456;IPAD=121.204.221.34;PORT=9999>

Explanation: password: 123456, IP address: 121.204.221.34, Port: 9999

8. FAQ

Q1: What to do if the cellular network doesn't dial successfully? Online LED is off.

1. Check the SIM card installation and the cellular antenna connection. The SIM card and antenna must be installed correctly. You can follow the steps [2.2.1 SIM/UIM Card](#).
2. Try to restart the RTU and check the network connection again. If the network is connected, the **"Online"** LED will turn green.
3. Ensure your SIM card service is normal, you can remove the SIM card from TG501 and insert to a cellphone, and check whether it can access the Internet.
4. If you SIM card is private card, you have to confirm with your SIM card operator whether the SIM card requires **APN parameters**. If so, you'll need to configure the correct APN credentials in the config tool(More Setting -> Network Setting).
5. Check the server address/port setting in the [3.4.7 Data Center Setting](#) . You must enable a server and configure an available server address and port, and ensure that the server can be accessed via your SIM card network. If the server address is empty, the TG501 will never connect to the network.
6. If you don't have a server address, you can click **"Factory Reset"** to restore the configuration to default parameters. TG501 will connect to the default TCP server **"isodev.picp.net:10122"**, which is a public address.

Q2: Why can't enter the config tool even RS232 connected?

1. Check the connection of RS232-0(DEBUG) is correct(**TX0-BLUE, RX0-BROWN, GND-BLACK**).



2. Ensure your serial COM can be recognized by Windows system. Unless you may need to change another COM for connection.
3. Select the correct COM number in your computer, and make sure the COM could be opened in the config tool.
4. Check whether the **baud rate** of TG501 is the same as computer COM. Default baud rate: 115200.

Q3: The device is powered on, but the Power LED is off.

1. Check if the power supply range is 5~35V. You'd better use the original power adapter, and make sure the power polarity is correct(Red-VIN+, Black-VIN-).

Q4: What are the differences between TG501-A, TG501-B?

1. TG501-A, TG501-B represents 2 different **hardware versions**.
 - TG501-A is the earliest hardware version and has now reached its **EOL**. Bivocom will no longer sell or maintain it, but existing customers can still continue to use it.
 - The 210-B is currently Bivocom's main DTU model sold to users worldwide. TG501 has added a new PI interface in hardware, while the previous TG50-A did not have it. Besides, TG501-B can customize function according to customer needs.
2. Different hardware has its own independent firmware version, and cannot be compatible with each other. Firmware-B can only be upgraded in Hardware-B, cannot be upgraded in Hardware-A or -C. Please select the correct firmware version before upgrading your device.
3. You can distinguish different version by firmware name directly. There is also a special mark "**B1**" for firmware B.



TG501-CQB010-17.7.bin
BIN 文件
333 KB



TG501**B1**-CQB000-18.2.bin
BIN 文件
338 KB

Firmware for TG501-A

Firmware for TG501-B

4. Different hardware has its own independent config tool, you can go to [Bivocom website](#) to download the correct config tool for your device. Or you can contact Bivocom support team, and let us know your hardware version, we will share the specific config tool with you.

Q5: How to enable sleep mode(optional) on TG501-B?

1. Sleep mode is an optional function on TG501-B, and it requires a special hardware modification. If you have requirement for sleep mode, you can contact Bivocom sales team, and let us know your detailed needs, we can modify the hardware to meet your application.
2. Since the sleep mode is not a standard feature, the standard firmware doesn't support this function. It requires a special config tool and firmware.
3. If you have already purchased TG501 unit with sleep mode function, please contact Bivocom technical team, we'll share the correct config tool and firmware with you. Besides, we can provide the quick guide for sleep mode configuration.



How to Configure Sleep Mode
on TG501.pdf
Microsoft Edge PDF Document



TG501B1-CQB010-17.9.bin
BIN 文件
321 KB



TG511-MQTT-S3.01.exe
RTUTool
TODO: <公司名>

Appendix 1: AT Commands

1. RTC Setting

Configuration Item	AT Command	Description
RTC Time Setting	AT+EXCCLK=XX	XX: Time Example : AT+EXCCLK=2025/09/01,16:51:00,5

2. Device Setting

Configuration Item	AT Command	Description
Device ID	AT+IDNT=x	X: device ID Example: AT+IDNT=12345678
Modbus work mode	AT+MBCHNNL=x	Set Modbus work mode X: 0 disable MODBUS 1 Network RTU Example: AT+MBCHNNL=1
Device SIM Number	AT+SIMNO=xx	Set SIM Card No. Xx: the max length is 19 Example: AT+SIMNO=13812345678
Modbus Device Address (1-255)	AT+MBADDR=xx	Set the Modbus Device Address Xx: device address Example: AT+MBADDR=2
Work Mode	AT+PROTTXT=xx	Set Work Mode Xx: 0 DTU 1 MODEM Example: AT+PROTTXT=0

3. Com Setting

Configuration Item	AT Command	Description
Function switch	AT+COMIFENyy=xx	yy: 1=RS232-1 2=RS485-0 xx: 0=disable 1=enable Example: AT+COMIFEN01=0
		yy:

Baud rate	AT+COMSPEEDyy=xx	1=RS232-1 2=RS485-0 xx: Baud rate Example: AT+TRANCOMSPEED01=115200
Frame Interval	AT+COMFRMINTRYy=xx	yy: 1=RS232-1 2=RS485-0 xx: frame interval value Example: AT+COMFRMINTR01=30
Databit, Parity, Stopbit	AT+COMPARITYyy=xx	yy: 1=RS232-1 2=RS485-0 x: 8N1,8E1,8O1 Example: AT+COMPARITY01=8E1
Command Content	AT+DETAILCONTyy=x	yy : 1-10 X:command content Example: AT+DETAILCONT03=01 03 00 00 00 22 C5 D3
hex	AT+DETAILCODEyy=x	yy : 1-10 X: 0=string 1=HEX Example: AT+DETAILCODE03=1
Interval Time	AT+DETAILTIMEyy=x	yy : 1-10 X: second Example: AT+DETAILTIME03=10
COM Choose	AT+DETAILCOMyy=x	yy : 1-10 X: 0 1 RS232-1 2 RS485-0 Example: AT+DETAILCOM03=2

4. Data Center Setting

Configuration Item	AT Command	Description
Data Center	AT+SERNUM=x	Set the number of datacenter x: 0-5, 0=disable this feature

		Example: AT+SERNUM=1
Protocol	AT+TRANMODEyy=xx	Set the channel communication protocol yy: 01-05=center No. x: 0 ftp 1 CTCP 2 HTCP 3 NUDP 4 CUDP 5 HUDP Example: AT+TRANMODE01=1
Cache	AT+SERSVLENNyy=xx	yy: 01-05=center No. x: Cache size Example: AT+SERSVLEN01=10
Main Address	AT+MULTISERYy=xx	yy: 01-05=main server, 06-10=backup server xx: address Example: AT+MULTISER01=isodev.picp.net
Port	AT+MULTIPORTyy=xx	yy: 01-05=main server port accordingly, 06-10=backup server port x: 0-65535 Example: AT+MULTIPORT01=10121
Com Select	AT+SERCOMTYPEyy=xx	yy: 01-05 center No. xx: 0 Rs232-1 1 Rs485-0 Example: AT+SERCOMTYPE01=1
Offline Data Storage	AT+SERSVOFFyy=xx	yy: 01-05=center No. xx: 0 disable 1 enable Example: AT+SERSVOFF01=0
Main DNS Server	AT+MULTIDNS01=xx	xx: DNS address Example: AT+MULTIDNS01=8.8.8.8
Backup DNS Server	AT+MULTIDNS02=xx	xx: Backup DNS server Example: AT+MULTIDNS02=8.8.8.8

5. Other Settings

Configuration Item	AT Command	Description
APN	AT+APN=xx	xx: APN value Example: AT+APN=nbio
APN Username	AT+USERNAME=xx	xx: APN username value Example: AT+USERNAME=test1
		xx: APN password value

APN Password	AT+USERPASSWORD=xx	Example: AT+USERPASSWORD=testpwd
Call center	AT+CALLNO=xx	Set the APN call center xx: call center value Example: AT+CALLNO=
Heartbeat Interval	AT+HRTSEC=x	x : 0-65535 second, 0=disable heartbeat Example: AT+HRTSEC=40
Reconnect Time	AT+RECONSEC=x	x: 0-65535 second Example: AT+RECONSEC=10
TCP Keepalive	AT+KPLVMIN=x	x: keepalive interval Example: AT+KPLVMIN=12
Network Selection	AT+NETMODE=x	X: 0 auto 1:GSM only 2:TD-SCDMA only 3:WCDMA only 4. CDMA only 5. HDR only 6. LTE only Example: AT+NETMODE=0
FTCP Transfer Meaning	AT+CONVERT=x	x : 0=No, 1=Yes, Example: AT+CONVERT=0
Custom Login Data	AT+SELFLGN=x	X: register data Example: AT+SELFLGN=hello
Custom heartbeat Data	AT+SELFHRT=x	Set the heartbeat data X: heartbeat data value Example: AT+SELFHRT=hello
Custom Login data type	AT+SELFLGNHEX=x	Set the custom register data type x : 0=string,1=hex Example: AT+SELFLGNHEX=0
Custom heartbeat data Type	AT+SELFHRTHEX=x	Set the custom heartbeat data type x : 0=string,1=HEX Example: AT+SELFLGNHEX=0

6. ADC Get

Configuration Item	AT Command	Description
ADC type	AT+ADCTYPEyy=xx	Set the ADC input type yy: 00-02=adc0 to adc2 xx: 0=current 1=voltage Example: AT+ADCTYPE02=0

Up Range	AT+ADCUPPRNGyy=xx	yy: 01-08 = ADC0 to ADC7 xx: range value Example: AT+ADCUPPRNG01=120
Low Range	AT+ADCLOWRNGyy=xx	yy: 01 to 08, = ADC0 to ADC7 xx: range value Example: AT+ADCLOWRNG01=10
Input the Max Cur(Vol)	ATADCCURUPLYy=xx	yy: 00 to 02, =ADC0 to ADC2 xx: current range 4-20mA, voltage range 0-5V Example: AT+ADCTYPE02=0 AT+ADCCURUP02=23
Input the Min Cur(Vol)	AT+ADCCURLOWyy=xx	yy: 00 to 02, =ADC0 to ADC3 xx: current range 4-20mA, voltage range 0-5V Example: AT+ADCCURLOW02=4

Appendix 2: Data Structure

No	Parameter	Description	Example
0	Unsigned 16bit AB	unsigned 16bit integer (2 byte), low byte first	Example: 01 03 02 11 22 0D 34 Note: HEX 2211 DEC 8721
1	Unsigned 16bit BA	unsigned 16bit integer (2 byte), high byte first	Example: 01 03 02 11 22 0D 34 Note: HEX 1122 DEC 4386
2	Signed 16bit AB	Signed 16bit integer (2 byte), low byte first	Example: 01 03 02 11 22 0D 34 Note: HEX 2211 DEC 8721
3	Signed 16bit BA	Signed 16bit integer (2 byte), high byte first	Example: 01 03 02 11 22 0D 34 Note: HEX 1122 DEC 4386
4	Unsigned 32bit ABCD	Unsigned 32bit integer (4 byte)	Example: 01 03 02 11 22 33 44 C6 C3 Note: HEX 44332211 DEC 1144201745
5	Unsigned 32bit BADC	Unsigned 32bit integer (4 byte)	Example: 01 03 02 11 22 33 44 C6 C3 Note: HEX 33441122 DEC 860098850
		Unsigned 32bit integer	Example: 01 03 02 11 22 33 44 C6 C3

6	Unsigned 32bit CDAB	(4 byte)	Note: HEX 22114433 DEC 571556915
7	Unsigned 32bit DCBA	Unsigned 32bit integer (4 byte)	Example: 01 03 02 11 22 33 44 C6 C3 Note: HEX 11223344 DEC 287454020
8	Signed 32bit ABCD	Unsigned 32bit integer (4 byte)	Example: 01 03 02 11 22 33 44 C6 C3 Note: HEX 44332211 DEC 1144201745
9	Signed 32bit BADC	Signed 32bit integer (4 byte)	Example: 01 03 02 11 22 33 44 C6 C3 Note: HEX 33441122 DEC 860098850
10	Signed 32bit CDAB	Signed 32bit integer (4 byte)	Example: 01 03 02 11 22 33 44 C6 C3 Note: HEX 22114433 DEC 571556915
11	Signed 32bit DCBA	Signed 32bit integer (4 byte)	Example: 01 03 02 11 22 33 44 C6 C3 Note: HEX 11223344 DEC 287454020
12	Float ABCD	Signed 32bit float (4 byte)	Example: 01 03 02 11 22 33 44 C6 C3 Note: HEX 44332211 Float 716.532288
13	Float BADC	Signed 32bit Float (4 byte)	Example: 01 03 02 11 22 33 44 C6 C3 Note: HEX33441122 Float 0.000000
14	Float CDAB	Signed 32bit Float (4 byte)	Example: 01 03 02 11 22 33 44 C6 C3 Note: HEX22114433 Float 0.000000
15	Float DCBA	Signed 32bit Float (4 byte)	Example: 01 03 02 11 22 33 44 C6 C3 Note: HEX11223344 Float 0.000000