

Industrial Cellular RTU

TY511 Series User Guide

User Guide

Version 4.0, 09-01-2026

Thank you for choosing the Bivocom Cellular Industrial 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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About This Guide

Thank you for choosing Bivocom Industrial Cellular RTU TY511Series.

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

This manual is compatible with below models:

Model	Description
TY511-LF	Industrial LTE/WCDMA RTU

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1. Introduction

1.1 Overview

TY511 is an industrial remote telemetry unit(RTU) designed for industrial applications, such as water, wastewater treatment, water quality, weather station, air quality, flood disaster alarm, water pump.

TY511 is a perfect RTU that integrates features of PLC, I/O module and 4G/3G modem into one system. By using the powerful config tool software provided by Bivocom, engineer can easily configure the RTU and collect the data from different sensors and controllers without doing any programming.

TY511 RTU supports multiple I/O, such as DI, ADC, RS232/RS485, Relay, Pulse Input and multiple industrial protocols like MQTT, Modbus RTU/TCP, TCP/UDP, which is ideal for merging legacy and modern sensors and controllers into one system, saving time and cost on hardware investment and maintenance.

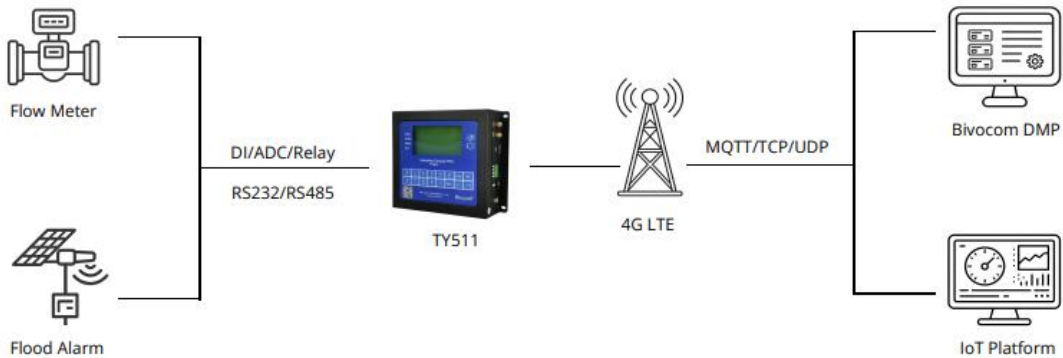
For more device information, please check the official Bivocom [TY511 Datasheet](#).



1.2 Applications

TY511 Series RTU utilizes cellular network to connect your network devices and serial port devices to your data center for remote monitor and control.

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 TY511 RTU using versatile wired connections—specifically RS232/RS485 for serial data and DI/DO/ADC for discrete and analog signals.

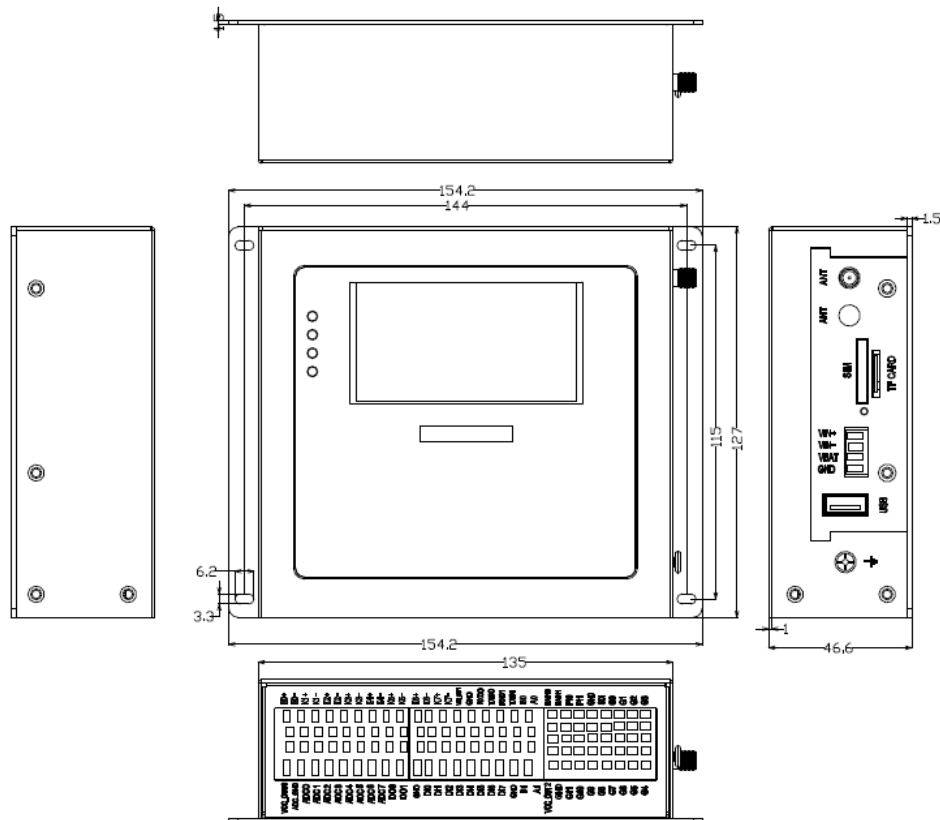
The TY511 acts as a communication bridge between field devices and IoT platform/data center. TY511 aggregates this data and leverages LTE-CAT4 cellular networks to transmit it reliably to the cloud via standard protocols like TCP/UDP and MQTT. Once in the cloud, the data populates the Bivocom DMP (Device 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:** Powered by a high-performance 32-bit industrial MCU, it ensures low power consumption. The industrial design ensures high reliability, and wide operating temperature adaptability for harsh environments.
- **Global High-Speed Connectivity:** Supports global coverage of 2G/3G/4G 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, 68 PINs in total), the TY511 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.

- **Intuitive On-Device Operation:** Equipped with a 7-inch 128×64 dot-matrix LCD display and a push-button keypad, allowing users to read real-time data directly from the screen and making operation and maintenance more convenient.
- **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 robust hardware 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, 770g (1.70lbs without accessories)
Dimensions	154.2×127×46.6mm(6.07×5×1.83in), Antenna and other accessories not included
Mounting	Desktop, Wall mounting
Power Supply and Consumption	
Standard Adapter	DC 12V/1.5A
Input Voltage	5-35V DC, built-in power reverse phase protection and overvoltage protection
Power Consumption	Working Mode: 40~85mA@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	2 x 50 Ω SMA Female
SIM Slot	1
ESD Protection	15KV
GNSS(Optional)	
Module	GNSS from cellular module
Antenna	1 x 50 Ω SMA-
Serial Interfaces	
Connector	Terminal block, 3.5mm female socket with lock
Ports	2-RS232 (1-Debug, 1-Communication), 2-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	8 x 16-bit ADC, default is 4-20mA(0-5 V is optional)

Digital Input	8 x DI(Optical isolation, dry contact) Logic 0: Wet contact(Optional) 0-3V DC, or Dry contact close Logic 1: Wet contact(Optional) 5-30V DC, or Dry contact open
Pulse Input	2 x Tipping bucket rain gauge input (Low level 0-1V) 2 x Pulse input (High level 2-30V)
Relay Output	8 x Relay Max switching voltage: 30VDC/250VAC Max switching current: 5A Max switching power: 120W
Digital Output	2 x DO (Optical isolation, open collector) Rated driving current/voltage: 50mA/35V
Power Output	3 x PO Output voltage is the same as the power supply voltage of TY511. Default voltage is 12V, rated output current is 1A, total 2A in 3-PO, built in overcurrent protection.
LCD Screen	
Size	128*64 dot matrix, backlight
Keyboard	16 Keys (2*8 keys)

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 TY511 package:

Standard Accessories			
No.	Item	Quantity(Unit: pcs)	Description
1	TY511	1	TY511 cellular Mini RTU
2	4G Cellular Antenna	2	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	1 x 4-Pin industrial terminal block
		1	4 x 12-Pin industrial terminal block
		1	2 x 10-Pin industrial terminal block
Optional Accessories			
1	GPS Antenna	1	*GPS is an optional feature on TY511.

			When you select GPS build-in cellular module, the accessories will be equipped with a GPS antenna.
2	Wall mount	1	*TY511 supports wall mount 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

TY511 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 TY511 and make sure it's tightly matched.



Warning: Never install SIM/UIM card when TY511 is powered on.

2.2.2 Cellular Antenna

TY511 supports 2 SMA male cellular antenna ANT1 and ANT2. Screw the SMA male cellular antenna to TY511 (SMA female interface), make sure it is screwed tightly to ensure the strength of signal.



2.2.3 Terminal Block, Power Cable and Console Cable

(1) Insert terminal block to TY511 correctly.

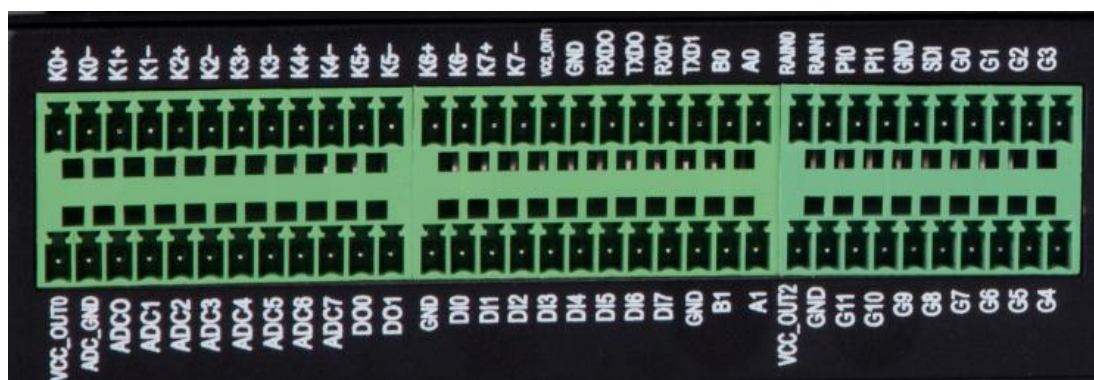
There are 7 terminal blocks in the package(2 x 10-pin, 4 x 12pin and 1 x 4pin), please install all of them to allow you to connect your sensors/PLC/microcontrollers to TY511, and power supply.

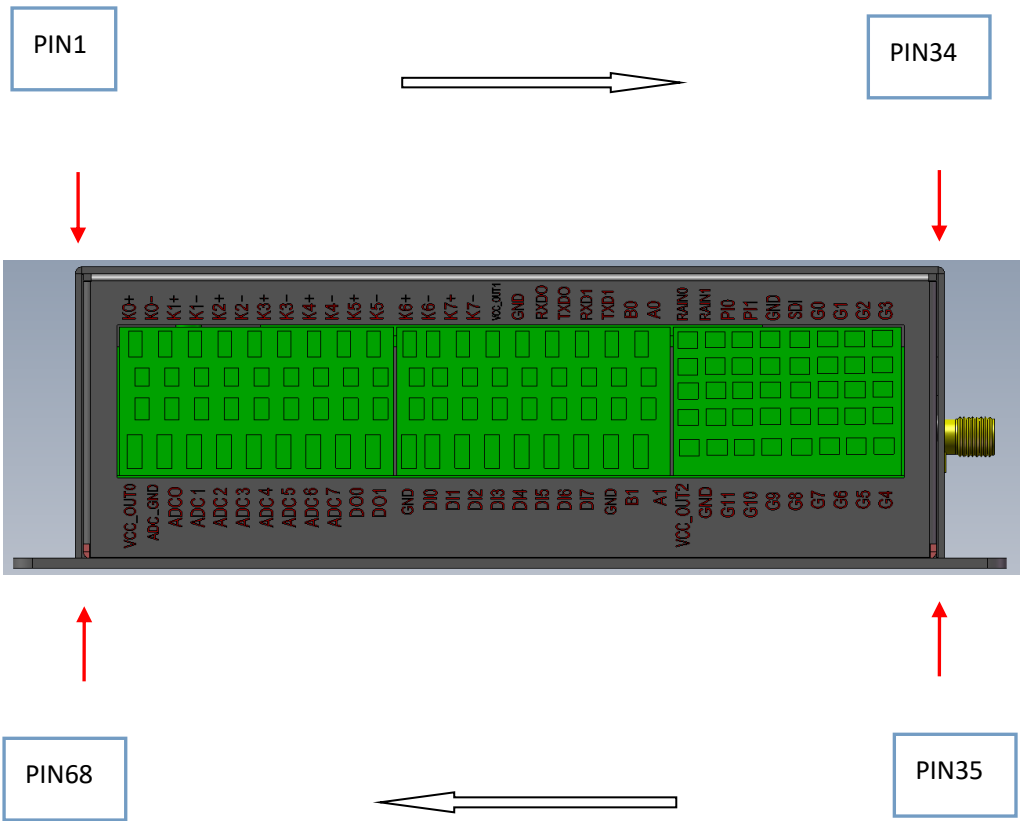




(2) Definition of Terminal Block Interfaces.

There are 68 PINs in total as below:





Pin No.	Function	Interface Name	Default Function	Description
1	Relay Output	K0+	CH 0 NO relay output	NO: normal open CH: Channel
2		K0-	CH 0 NO relay output	
3		K1+	CH 1 NO relay output	
4		K1-	CH 1 NO relay output	
5		K2+	CH 2 NO relay output	
6		K2-	CH 2 NO relay output	
7		K3+	CH 3 NO relay output	
8		K3-	CH 3 NO relay output	
9		K4+	CH 4 NO relay output	
10		K4-	CH 4 NO relay output	
11		K5+	CH 5 NO relay output	

12		K5-	CH 5 NO relay output	
13		K6+	CH 6 NO relay output	
14		K6-	CH 6 NO relay output	
15		K7+	CH 7 NO relay output	
16		K7-	CH 7 NO relay output	
17	Power Output	VCC_OUT 1	Voltage Output 1	
18	RS232	GND	GND	Default baud rate:115200
19		RXD0	RS232-0 RXD(Debug)	
20		TXD0	RS232-0 TXD(Debug)	
21		RXD1	RS232-1 RXD(Communication)	
22		TXD1	RS232-1 TXD(Communication)	
23	RS485-0	B0	RS485-0 B	Default baud rate:115200
24		A0	RS485-0 A	
25	Rain/Pulse	RAIN0	CH 0 rainfall input	Rainfall input, Low level input counting, Pulse input, High level(>2V) input counting
26		RAIN1	CH 1 rainfall input	
27		PI0	CH 0 pulse input	
28		PI1	CH 1 pulse input	
29		GND	GND	
30	SDI	SDI	SDI12 signal	Reserved(Not enabled by

				default)
31	Gray Code	G0	Gray code 0 bit	12-bit Gray code port
32		G1	Gray code 1 bit	
33		G2	Gray code 2 bit	
34		G3	Gray code 3 bit	
35		G4	Gray code 4 bit	
36		G5	Gray code 5 bit	
37		G6	Gray code 6 bit	
38		G7	Gray code 7 bit	
39		G8	Gray code 8 bit	
40		G9	Gray code 9 bit	
41		G10	Gray code 10 bit	
42		G11	Gray code 11 bit	
43		GND	GND	
44	Power Output	VCC_OUT 2	Voltage Output 2	
45	RS485-1	B1	RS485-1 B	Default baud rate:115200
46		A1	RS485-1 A	
47	Digital Input	GND	GND	8 channels digital input, default is
48		DI7	CH 7 digital input	

49		DI6	CH 6 digital input	Dry Contact, Optional Wet Contact (Status "0": 0-3V, Status "1": 5-30V) CH: Channel
50		DI5	CH 5 digital input	
51		DI4	CH 4 digital input	
52		DI3	CH 3 digital input	
53		DI2	CH 2 digital input	
54		DI1	CH 1 digital input	
55		DI0	CH 0 digital input	
56	Digital Output (OC)	GND	GND	2 channels digital output OC: Open Collector
57		DO1	CH 1 digital output	
58		DO0	CH 0 digital output	
59	Analog Input	ADC7	CH 7 analog input	8 channels analog input (4 ~ 20mA or 0~5V optional)
60		ADC6	CH 6 analog input	
61		ADC5	CH 5 analog input	
62		ADC4	CH 4 analog input	
63		ADC3	CH 3 analog input	
64		ADC2	CH 2 analog input	
65		ADC1	CH 1 analog input	
66		ADC0	CH 0 analog input	
67		ADC_GN D	ADC Ground	
68	Power Output	VCC_OUT 0	Voltage output 0	

There are 4 PINs for power input, as shown in below figure:



PIN No.	Interface Name	Default Function	Description
1	VIN+	Power Input anode VIN+	
2	VIN-	Power Input cathode VIN-(GND)	
3	VBAT	Backup battery power input	Backup power input: 5-35V DC NOTE: When you connect power adapter to VBAT and GND, the RTU can be powered on as well
4	GND	GND	

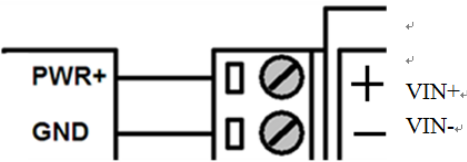
(3) Connect Power Cable and Console Cable.

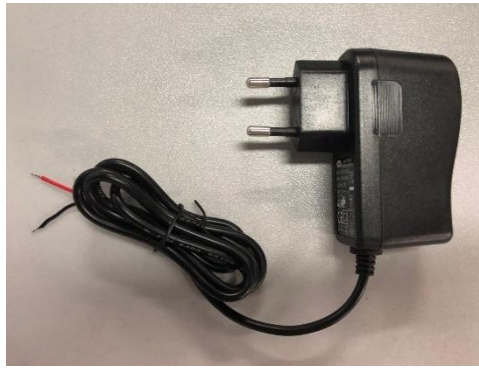
The interface of TY511 is industrial terminal block, we suggest you use 28-16AWG power cable and console cable. Definition of power cable and console cable in this package are as below:

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.

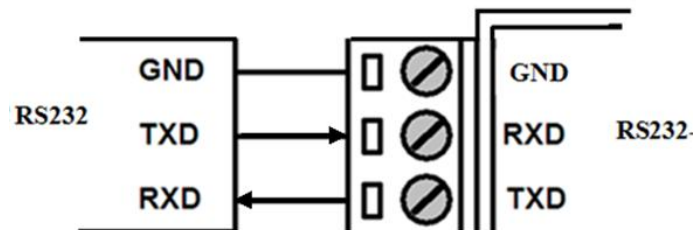
RS232 Cable (with DB9 female interface)

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

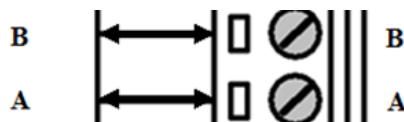
2.2.4 Definition of I/O Cables

TY511 utilizes industrial terminal block, we suggest you use materials of cable 28-16AWG. Definition of cable for serial and I/O are as below:

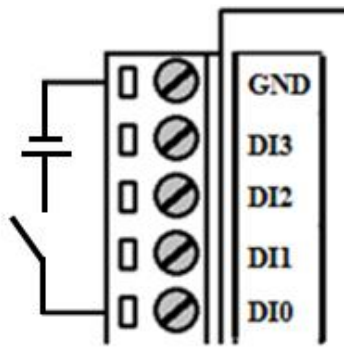
1) RS232 Cable



2) RS485 Cable

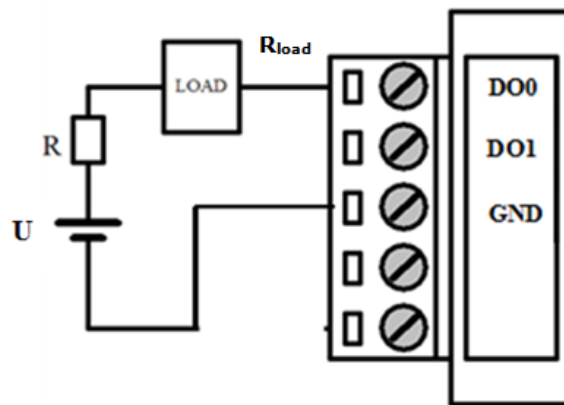


3) Digital Input: (Wet contact)



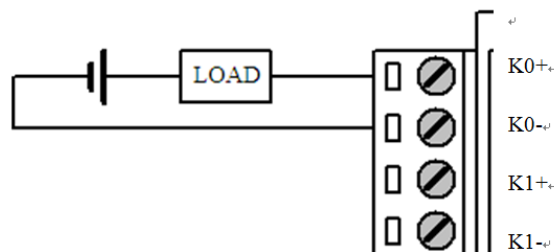
4) Digital Output

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

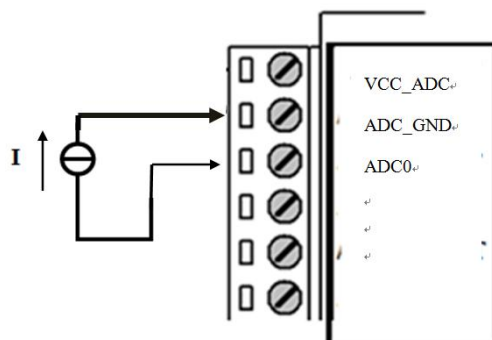


5) Relay Output

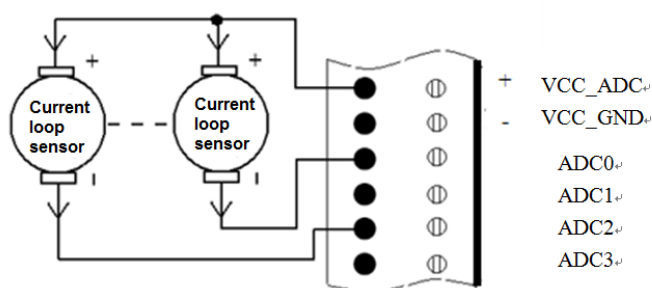
Max switch voltage 30VDC, max switch current 1A, max switch power 30W)



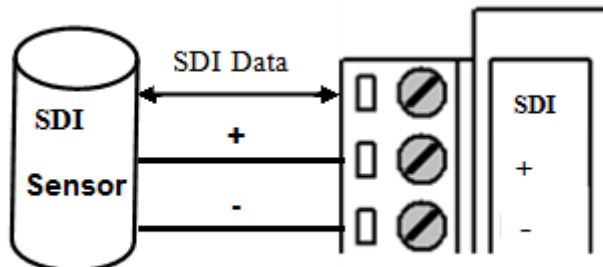
6) Analog Input(4-20mA)



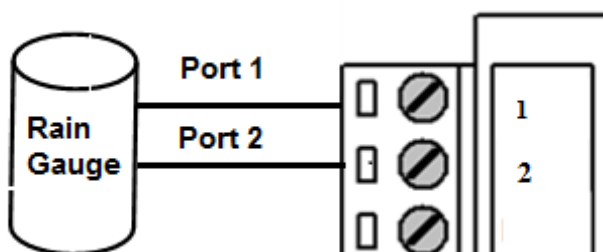
7) Two-wire current loop sensor: (Current 4-20mA)



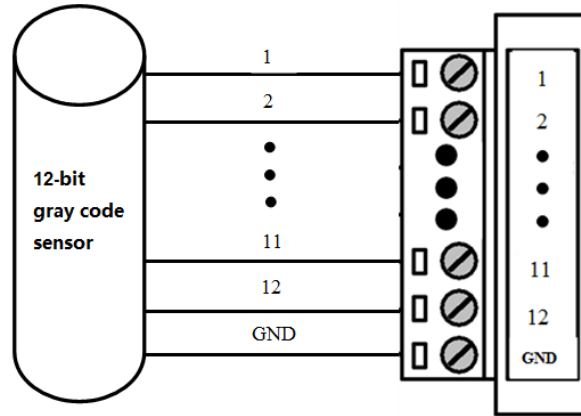
8) SDI Sensor(Reserved)



9) Tipping-bucket rain gauge



10) 12-bit Gray code water level sensor



2.3 Power Supply Requirement

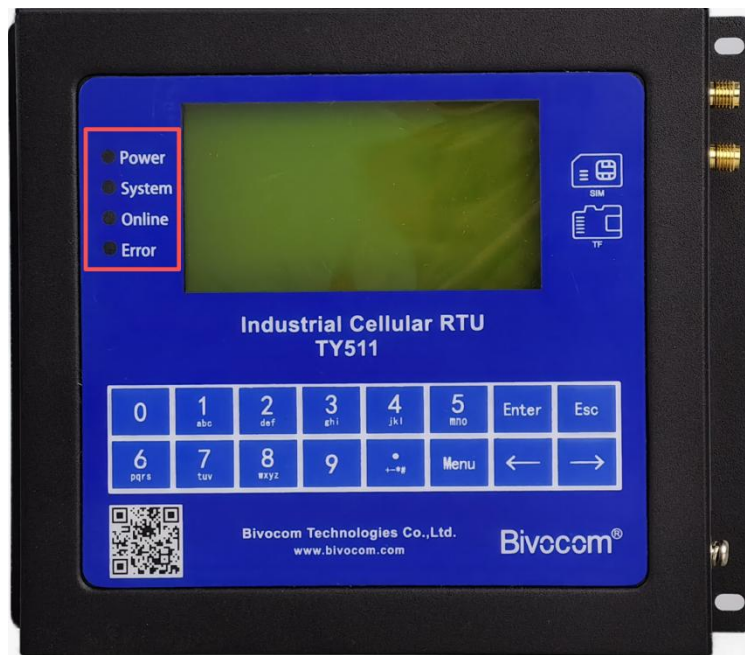
After all the accessories and cables mentioned above are connected correctly, then plug the power supply to TY511, connect red cable to VIN+, and black cable to VIN-.

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 (the ripple is less than 300mV, and the instantaneous voltage does not exceed 36V), 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

TY511 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 wall mount with 4 screw holes, support M4 screw. 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.

2.7 Grounding Screw

There is a grounding terminal , using M3 screw, which allows users to connect the device to the ground. After grounding, the device is required to be reliably connected to the ground, and the grounding impedance is less than 4 ohms.



3. Configuration

In this chapter, you'll learn more details about how to configure and setup the TY511 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 TY511, please make sure the following tools are ready:

- RS232 Cable in the package



- Serial to USB converter



- Computer(Windows)
- SIM card(insert to TY511)

3.2 Connect TY511 to Computer

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

3.2.1 Bivocom TY511 Config Tool

Bivocom TY511 config tool is a software developed based on Windows system. It can connect to TY511 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 TY511(TX0-Blue, RX0-Brown, GND-Black). Then connect TY511 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 TY511.

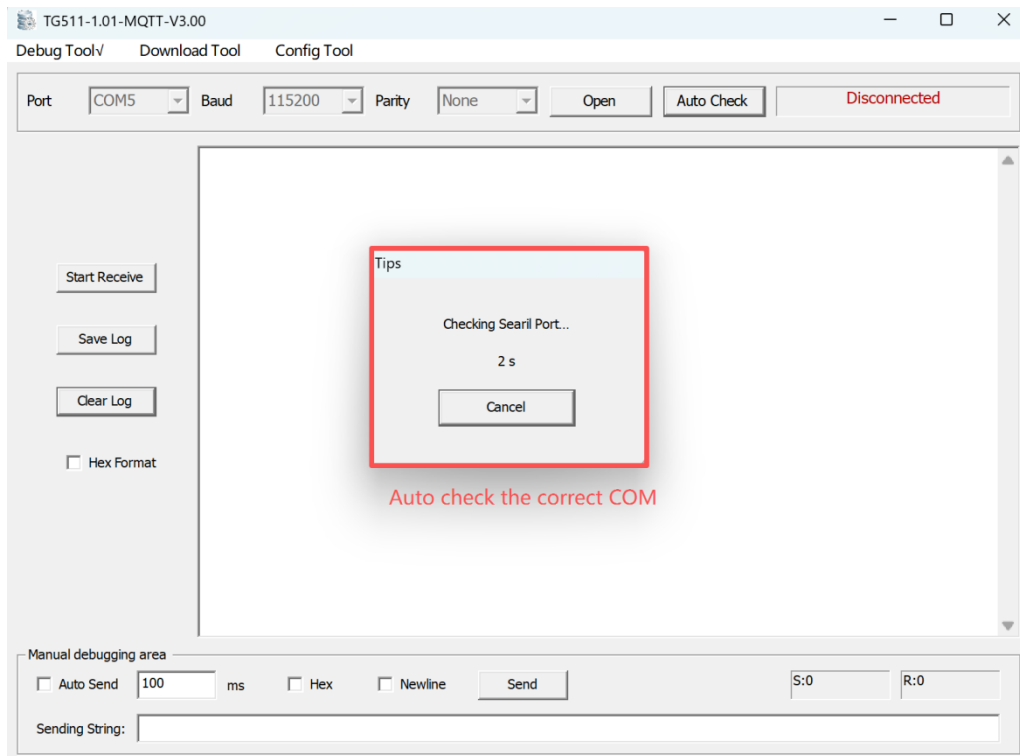
There are different versions(Transparent and MQTT) of config tool, each config tool has corresponding firmware. In this user manual, the demo config tool is based on the version "TG511-1.01-MQTT-EN-V3.00.exe", and firmware version is "TG511B1-EQS010-18.0.bin" for MQTT.



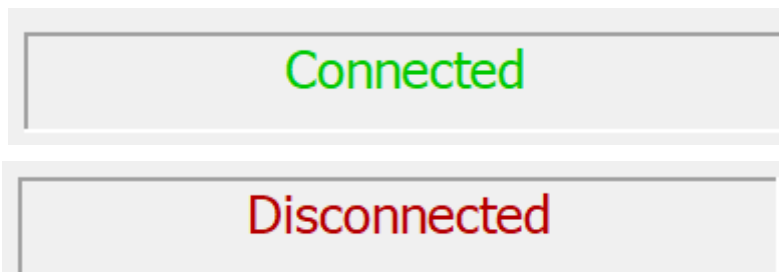
TG511-1.01-MQTT-EN-V3.00.exe

NOTE: The config tool of TY511 is the same as TG511, they are universal, which means TY511=TG511.

Power on the TY511, 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 TY511.



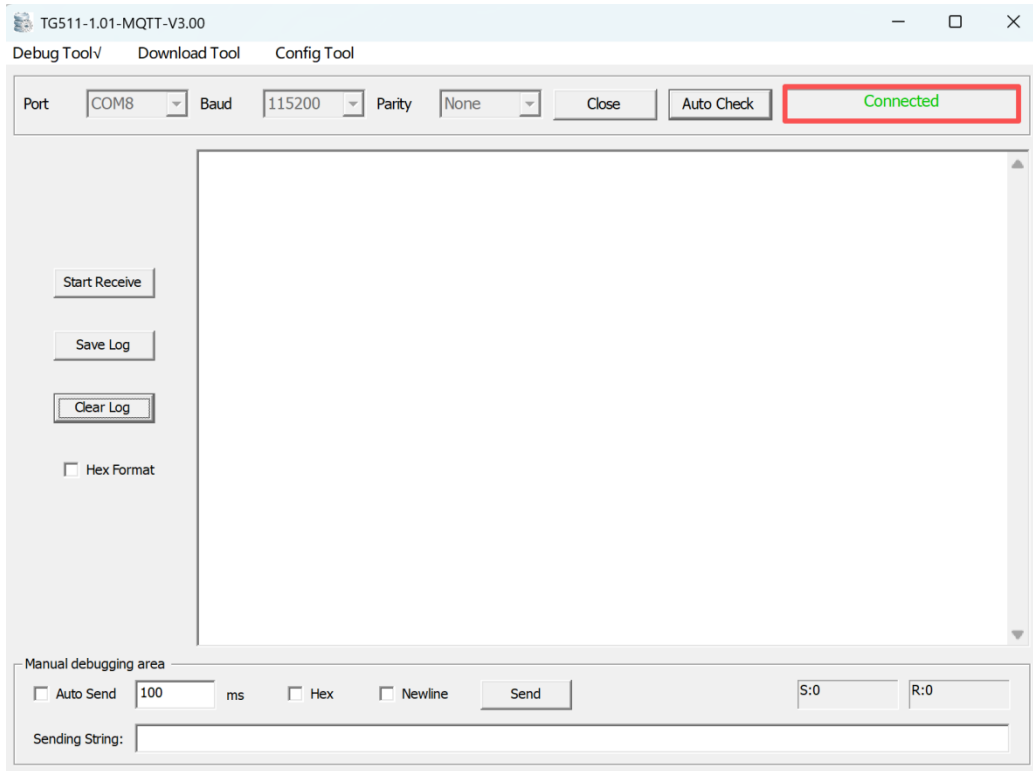
After a few seconds of automatic checking, the indicator in the upper right corner will turn green and display "Connected" when the COM port is recognized and connected successfully, while the red "Disconnected" indicates a connection failure.



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 TY511. Then select the specific "Baud rate" and "Parity" parameters, and click "Open" to connect your COM port.

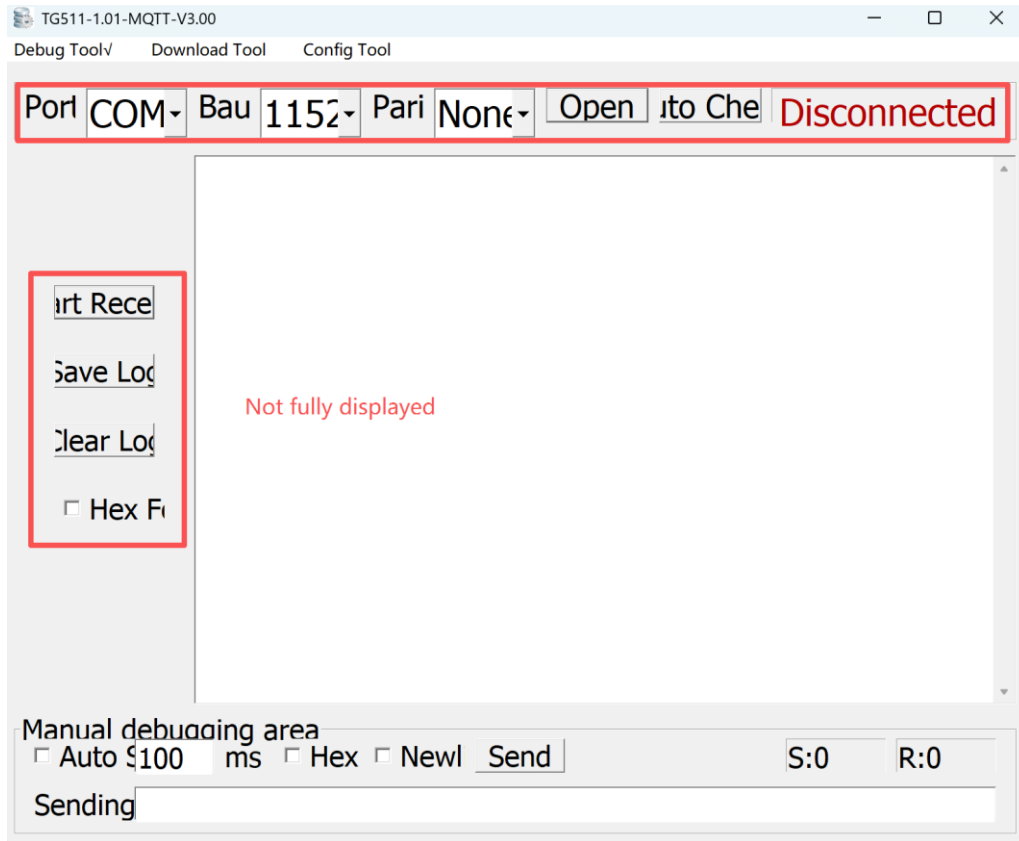


NOTE: Only when the indicator in the upper right corner turns green does it mean the correct COM port is connected with software, then you can start to configure the device. Connected status, as shown in the figure below:



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 TY511, 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

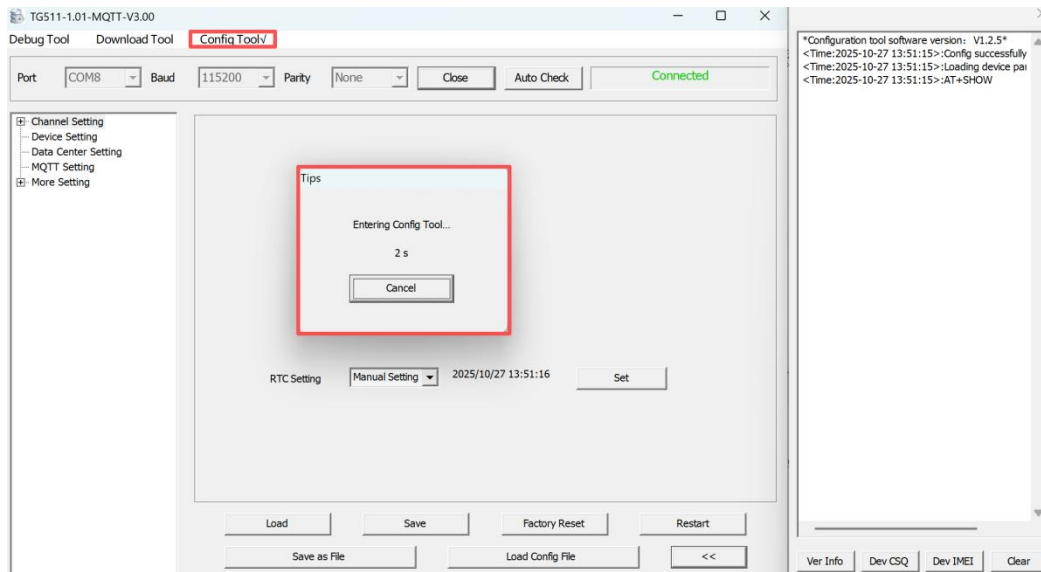
Download Tool

Config Tool✓

Tool	Function
Config Tool	Configure TY511 and setup device parameters
Download Tool	Firmware download and upgrade
Debug Tool	Debug TY511, System log output, Send AT commands

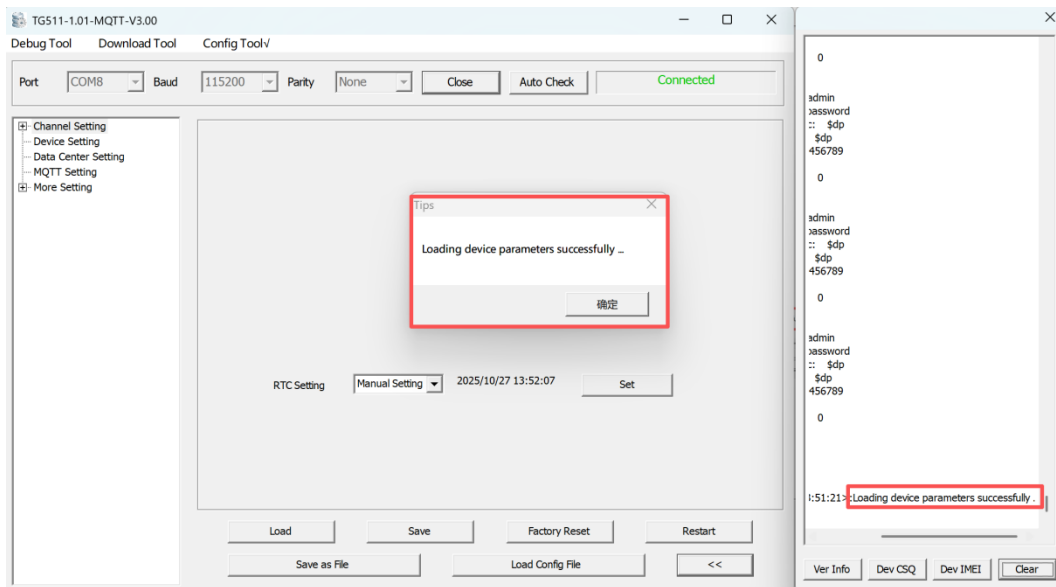
3.4.1 Enter Config Mode

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.

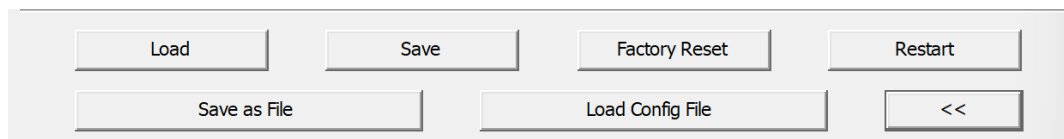


After successfully entering the config tool, it'll automatically load the device parameters, and show "Loading device parameters successfully".

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



3.4.2 Basic Config Options

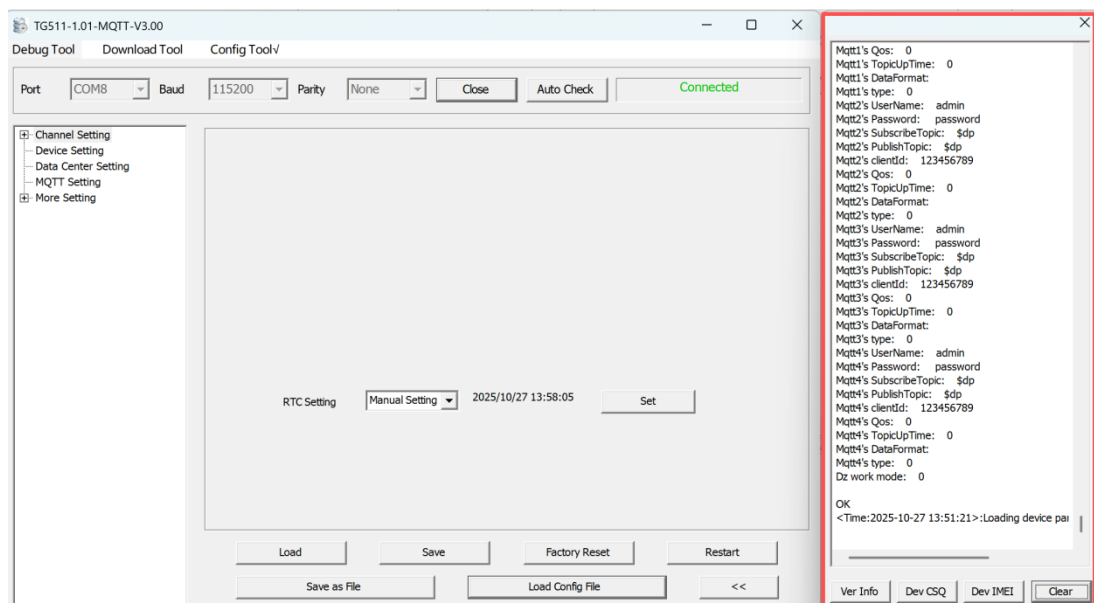


There are several common config options in the config tool. Below are descriptions of each config option. If you're familiar with these parameters, you can go to next step [3.4.5 Device Setting](#).

Config Option	Function
Load	Load the current parameters of TY511 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 TY511 in config file format(.cfg), which can use to upload in other TY511.
Load Config File	Load config file to TY511, then it'll load parameters in the config file.

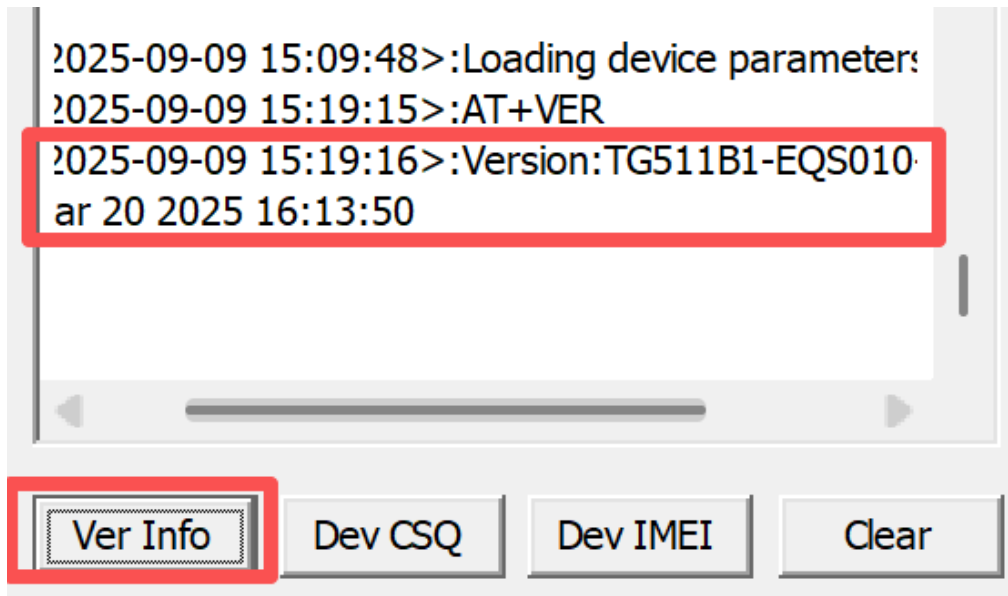
3.4.3 Config Information Box

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.

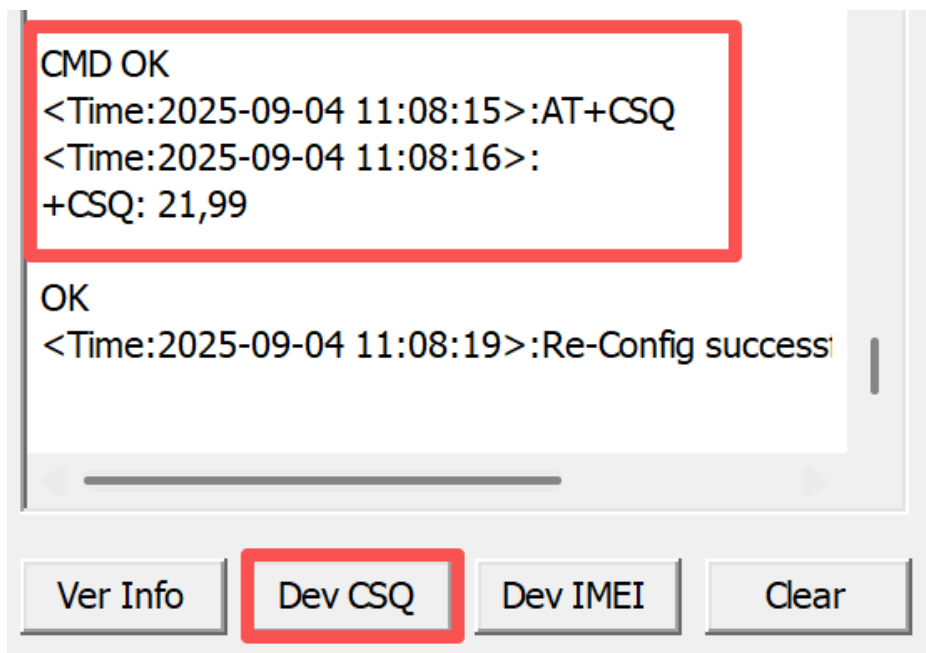


Below is the description of each option:

- **Ver Info:** Check the firmware version of TY511, it'll show specific firmware version and release time.

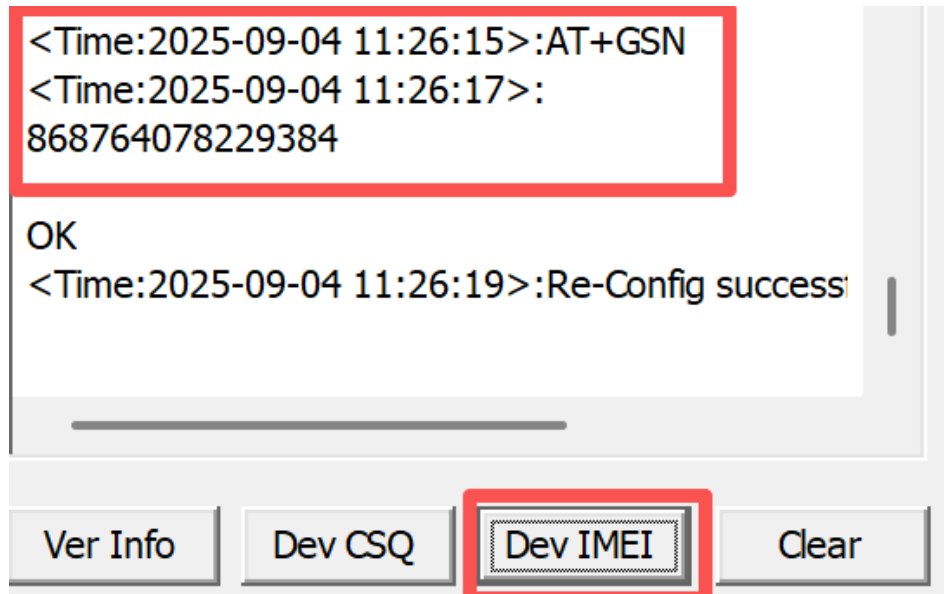


- **Dev CSQ:** Check the network signal strength of TY511. In this case, “21” is the RSSI(Received Signal Strength Indication).



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.

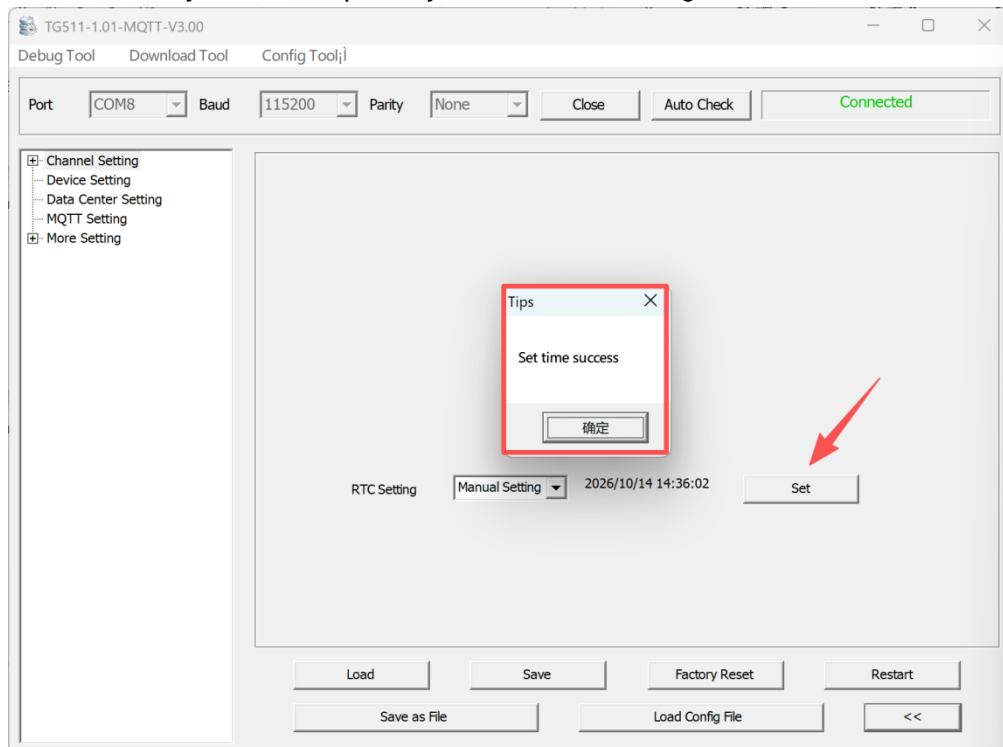


- **Clear:** Clear all output information in the box.

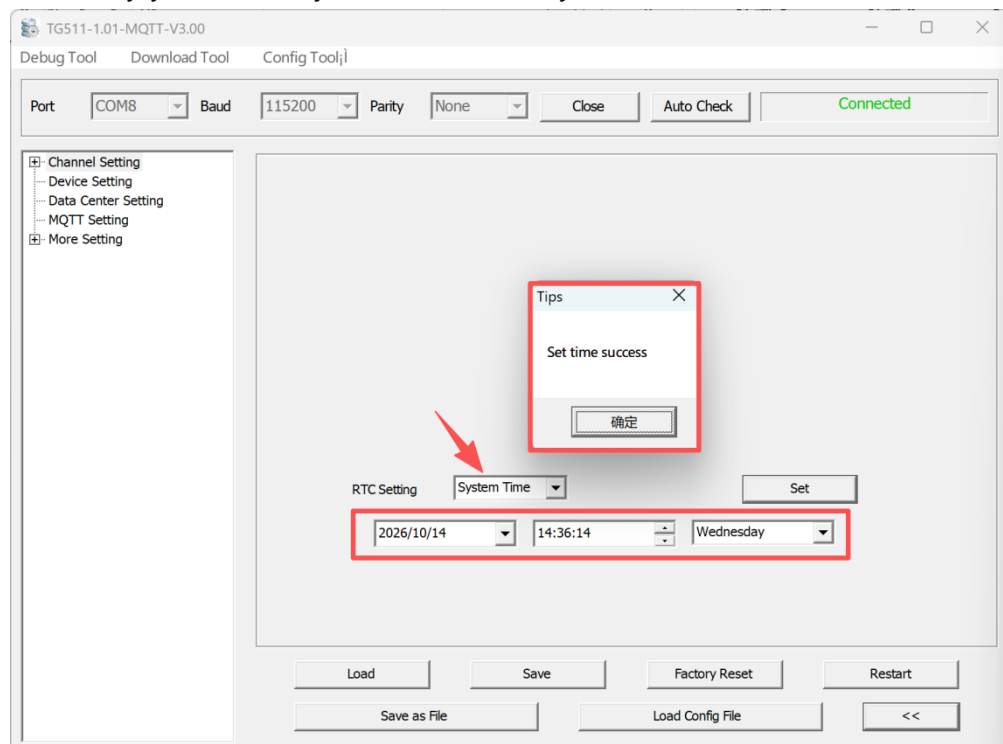


3.4.4 RTC Setting

The TY511 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.

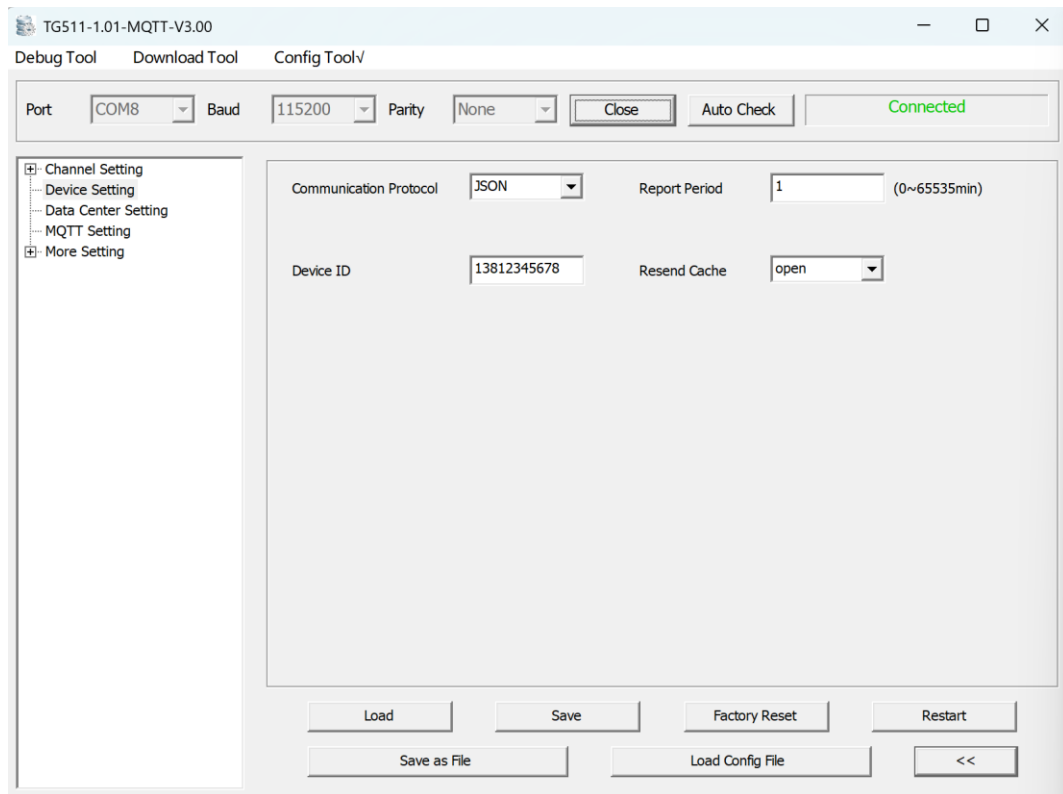


In another way, you can set system time manually.



3.4.5 Device Setting

User can set basic parameters in the Device Setting.

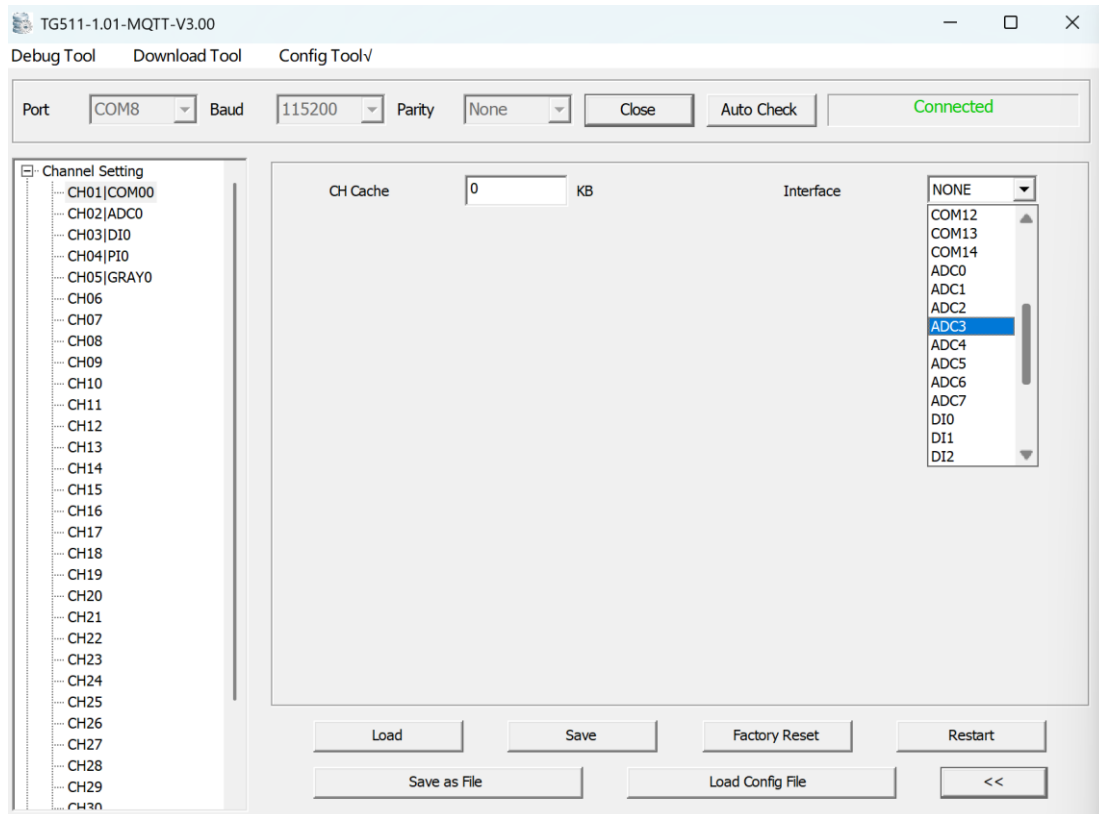


Parameter Name	Description
Device ID	Setting the TY511 device ID, it is used for recognizing the device during register and keep alive with server.
Communication Protocol	Data encapsulation type, JSON is the default data format.
Report Period	Time interval for reporting data to the server regularly(0~65535min).
Resend Cache	Open or Close, when the device disconnects network or server connection, TY511 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.

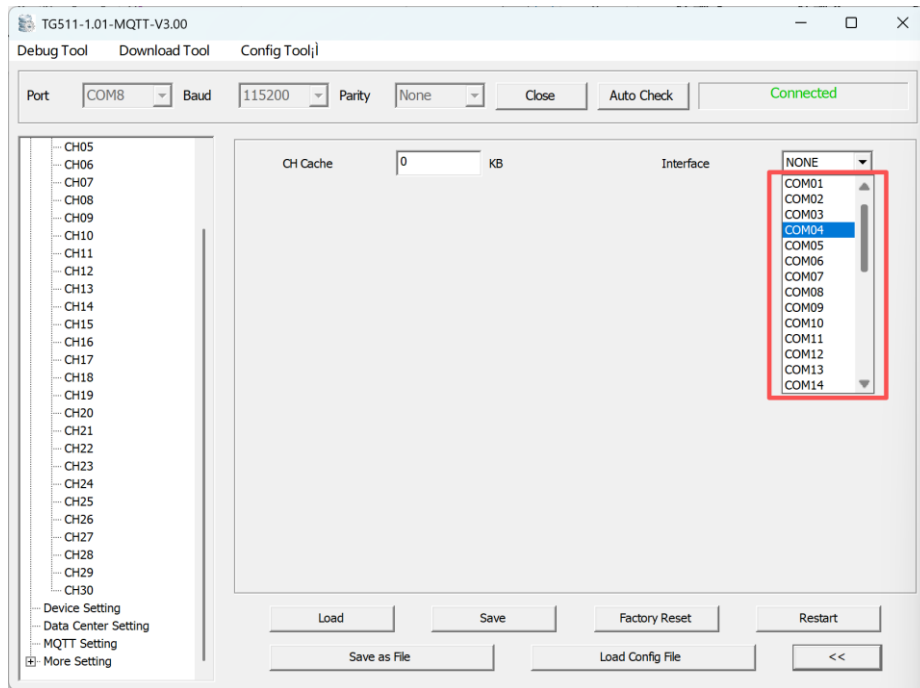
3.4.6 Channel Setting

The standard TY511 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.

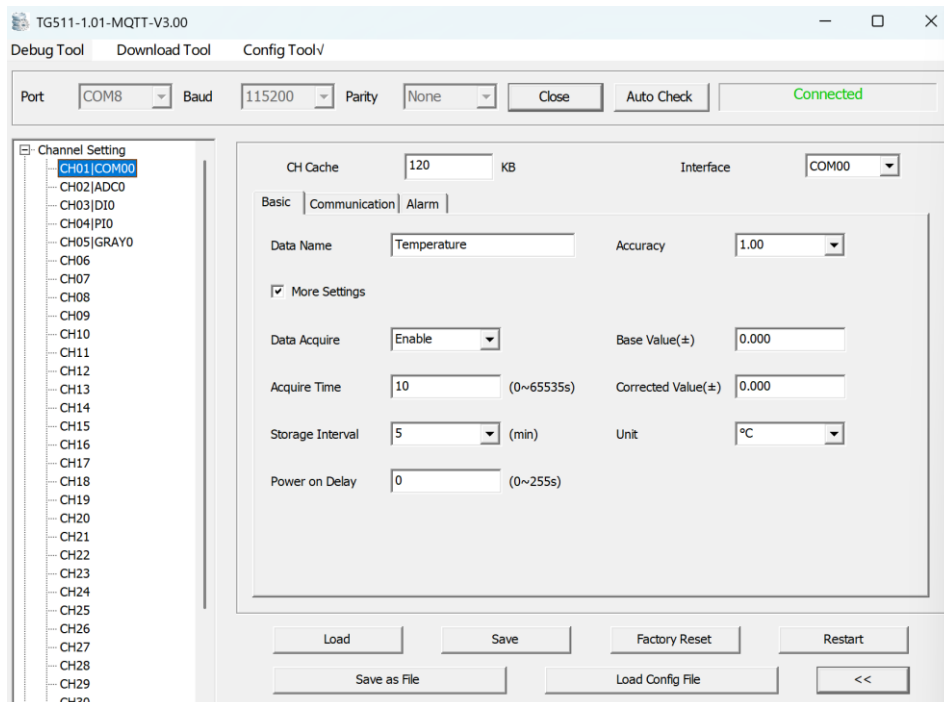


(1) COM Setting

There are 15 COM interfaces(COM00~COM14) which can use to collect serial data. On the standard TY511, there are 2-RS232(RS232-0 for debug, RS232-1 for communication) and 2-RS485. If you need to collect Modbus RTU data([Scenario 1: Modbus RTU Data Collection](#)), you have to add COM channel. Below are the description of COM parameters:



- Basic

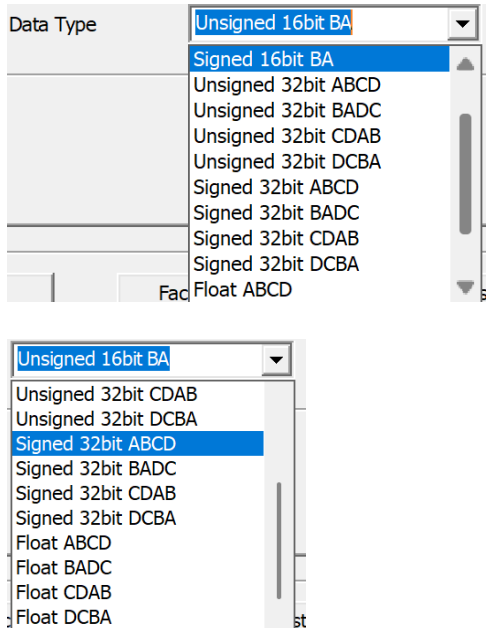


Parameter Name	Description
Data Name	Data factor name
Accuracy	Data accuracy, when you need to collect decimal data, you can change the accuracy. If set as "1.00", the collected data will be multiplied by 1.00, which means two decimal values will be retained.
Data Acquire	Enable or Disable, enable to 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**

Parameter Name	Description
COM Type	Select which COM for collecting data, there is only RS232-1 and RS485-0/RS485-1 is available in standard TY511.
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.

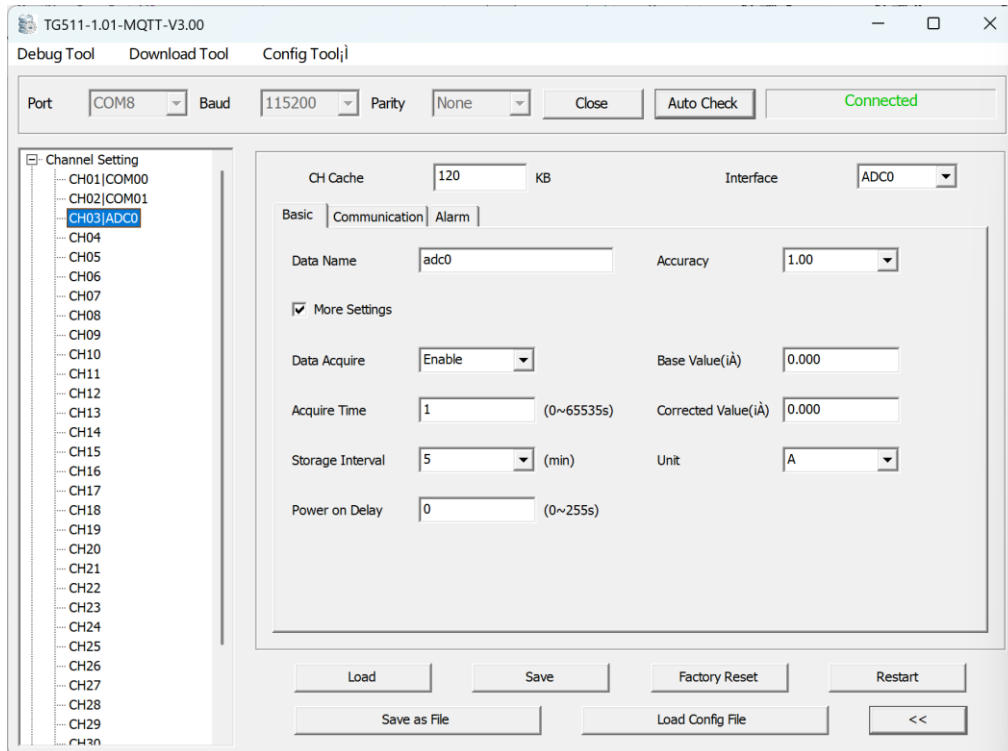
Sensor Type	Communication protocol of your sensor or slave device, normally is Modbus RTU or other customized protocol.
Slave ID	Modbus device ID or your sensor or slave.
Function Code	Function code for reading different registers.
Register Address	Modbus register start address.
Register Number	Modbus 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

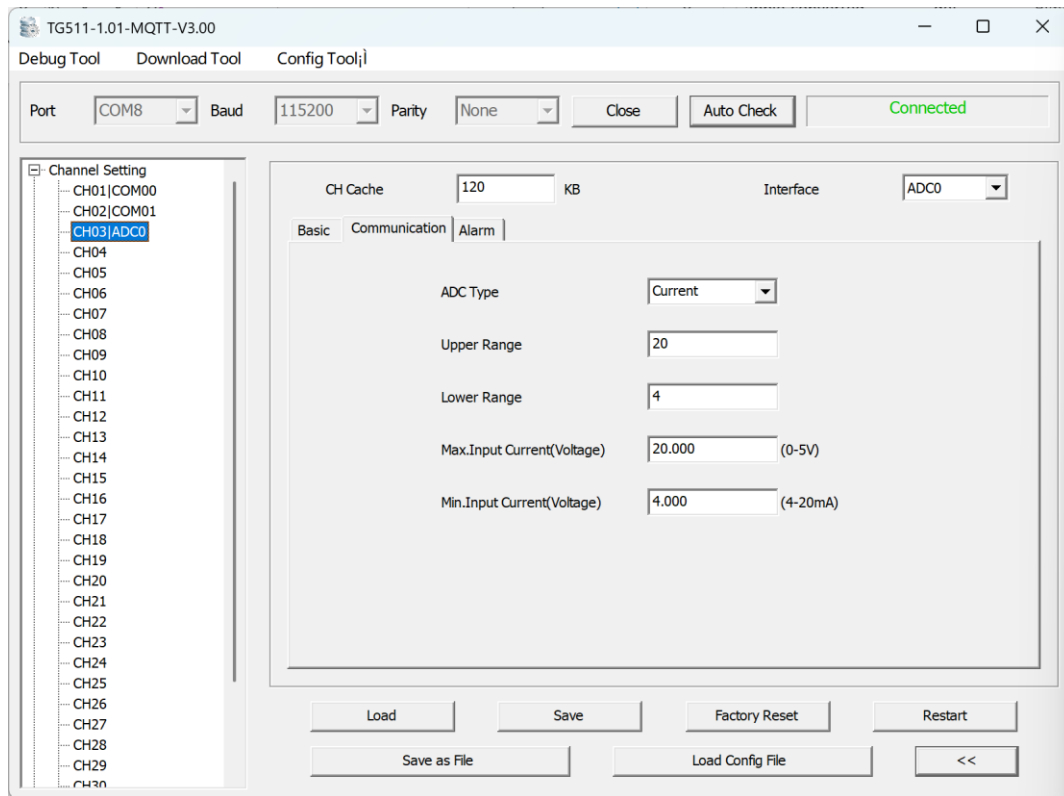
In the standard TY511, There are 8-ADC interfaces(ADC0~ADC7) which can use to detect current or voltage. Below are the description of ADC parameters:

- **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/m ³ /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

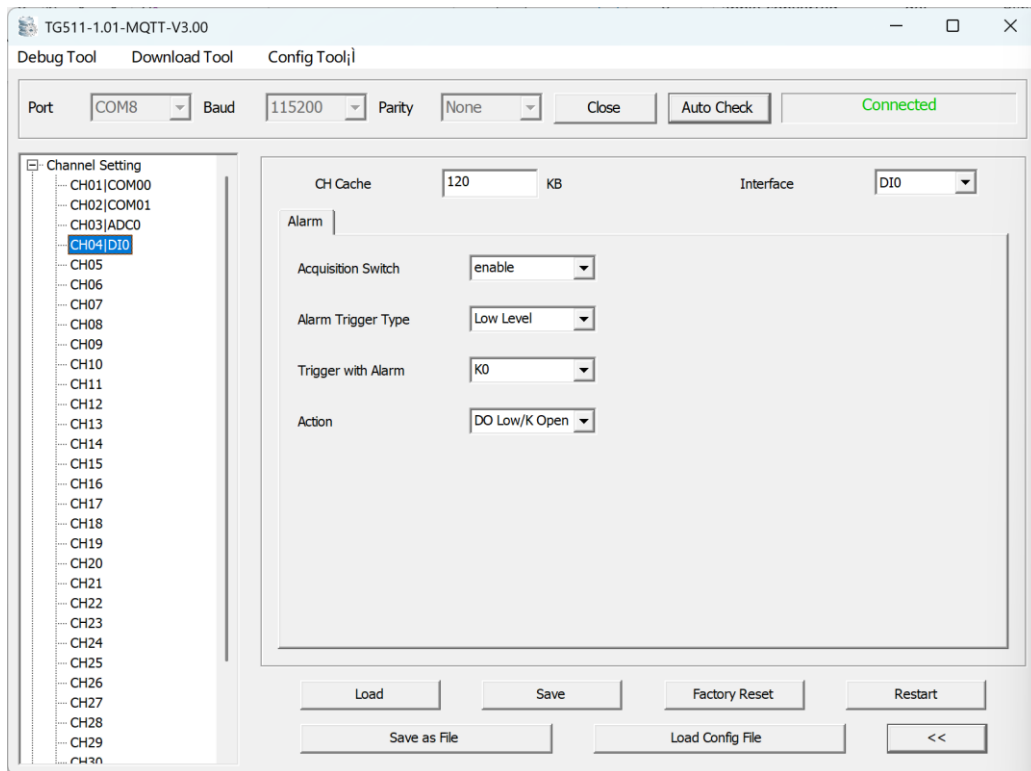
In the standard TY511, there are 8-DI interfaces(DI0-DI7) which can support dry contact or wet contact(optional).

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:

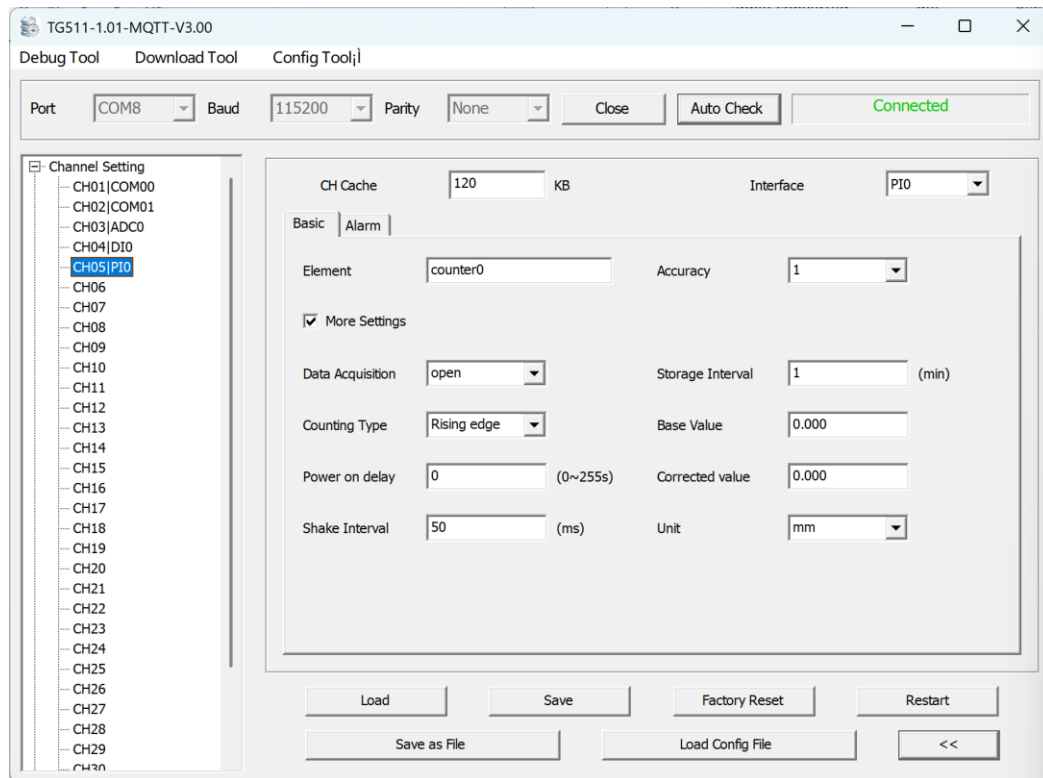


Parameter Name	Description
Acquisition Switch	Enable or Disable, enable data acquisition for this DI channel. Need to enable when you need to read DI data.
Alarm Trigger Type	High level or Low level or No.
Trigger with Alarm	D00/D01 or K0~K7.
Action	Set alarm operation, Digital output value or relay status. When the value or status changes, it'll trigger alarm.

(4) PI Setting

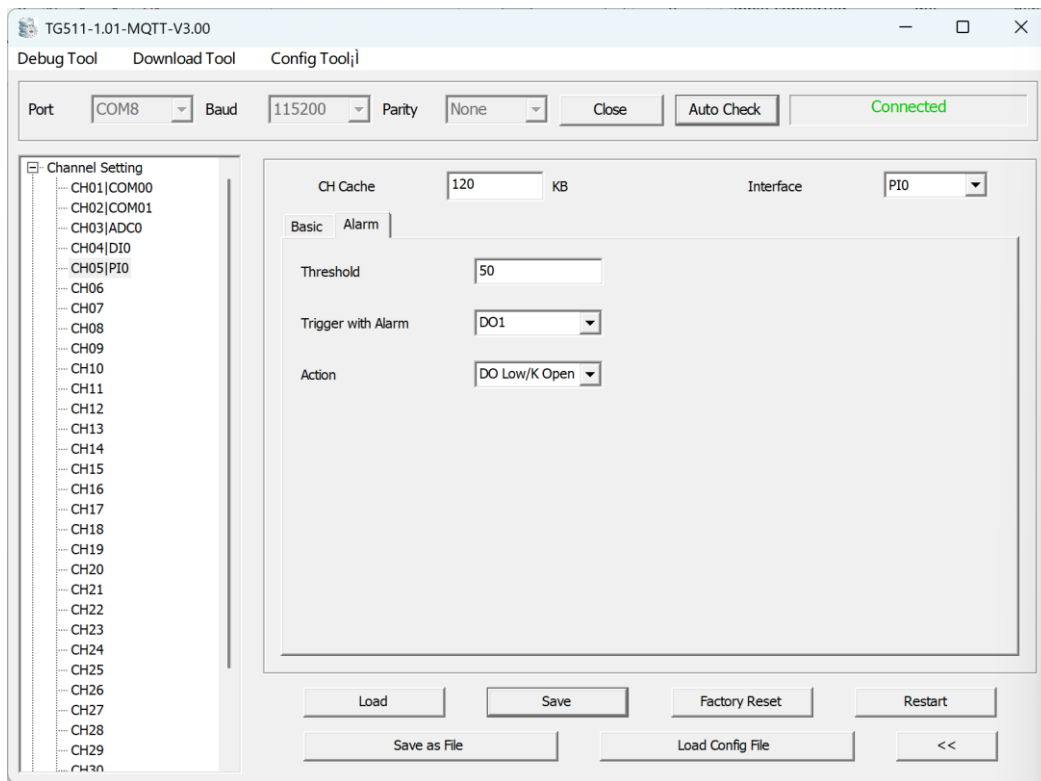
In the standard TY511, there are 2-PI interfaces(P10 and PI1) which can use to detect pulse input signal. Below are the description of PI parameters:

- **Basic**



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.

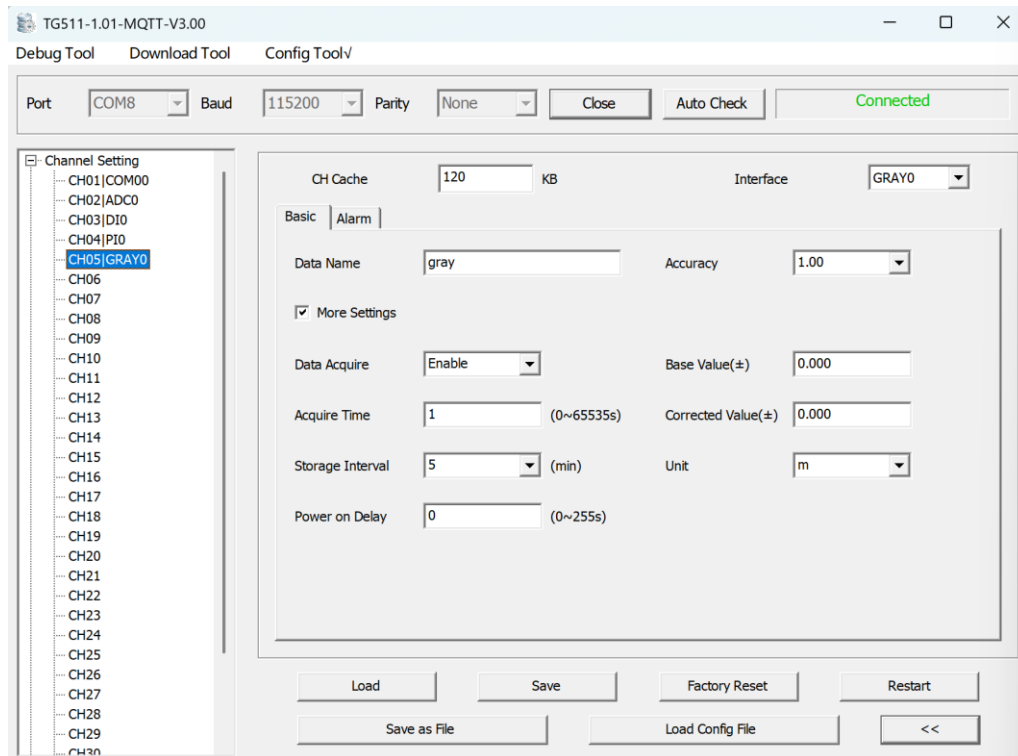
- Alarm



Parameter Name	Description
Threshold	Send an alarm message when the difference between two collected data exceeds the alarm threshold.
Trigger with Alarm	DO0/DO1 or K0~K7.
Action	Set alarm operation, Digital output value or relay status. When the value or status changes, it'll trigger alarm.

(5) GRAY Setting

In the standard TY511, there is reserved 1-Gray code interface, but the hardware is not disabled by default. If you need to enable this interface, please contact our sales team. Below are the description of GRAY parameters:



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.

3.4.7 Data Center Setting

Data center is used to receive the data transmitted 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. Below 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 TY511 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: TY511 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 TY511 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 TY511 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.

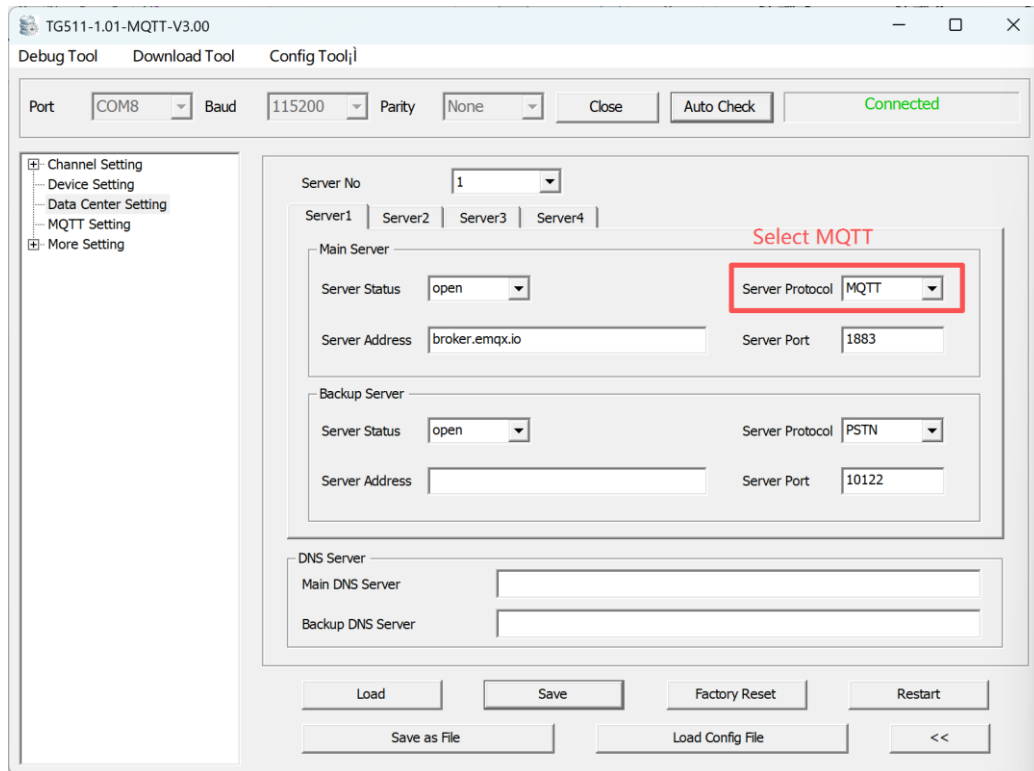
Common Issues:

- 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.

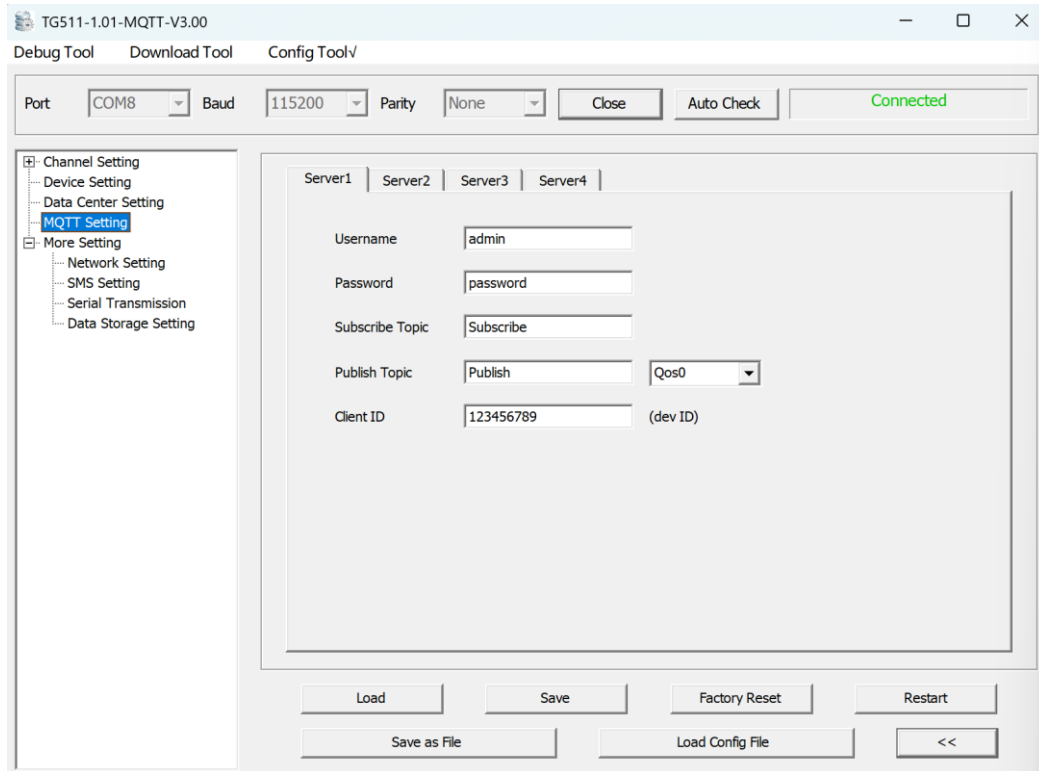
3.4.8 MQTT Setting

TY511 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 TY511. 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.



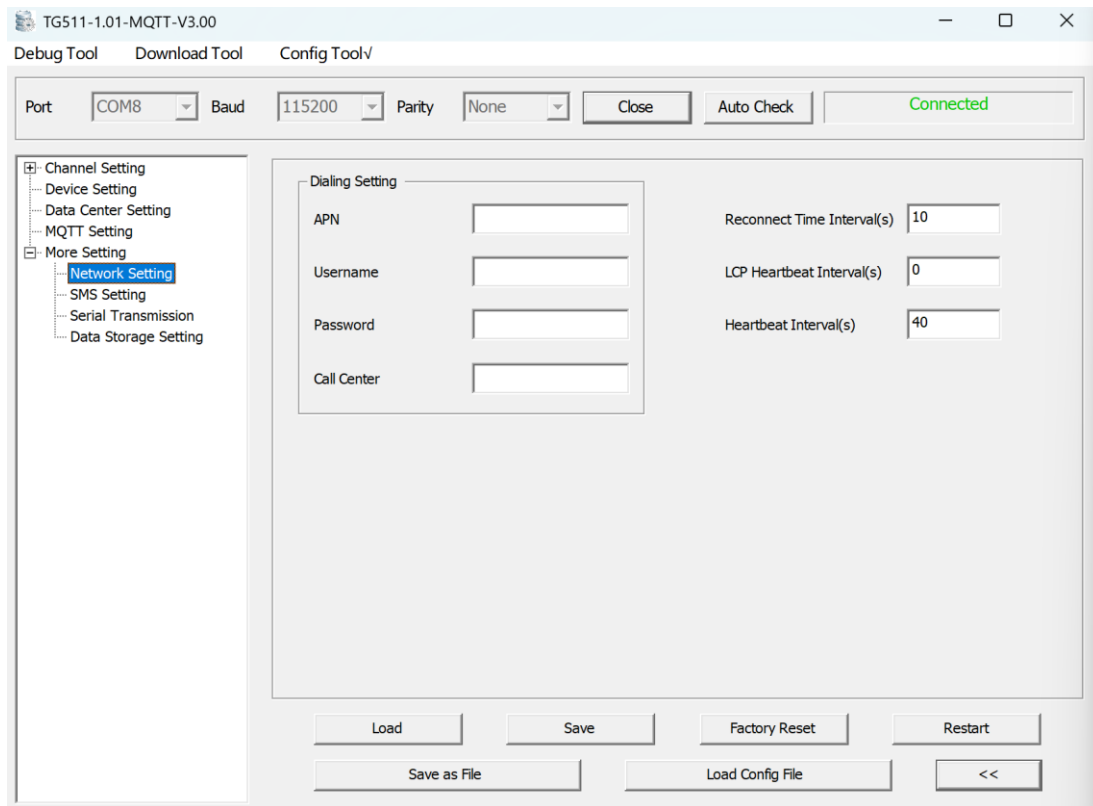
Below is the description of MQTT Setting:



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 TY511 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:

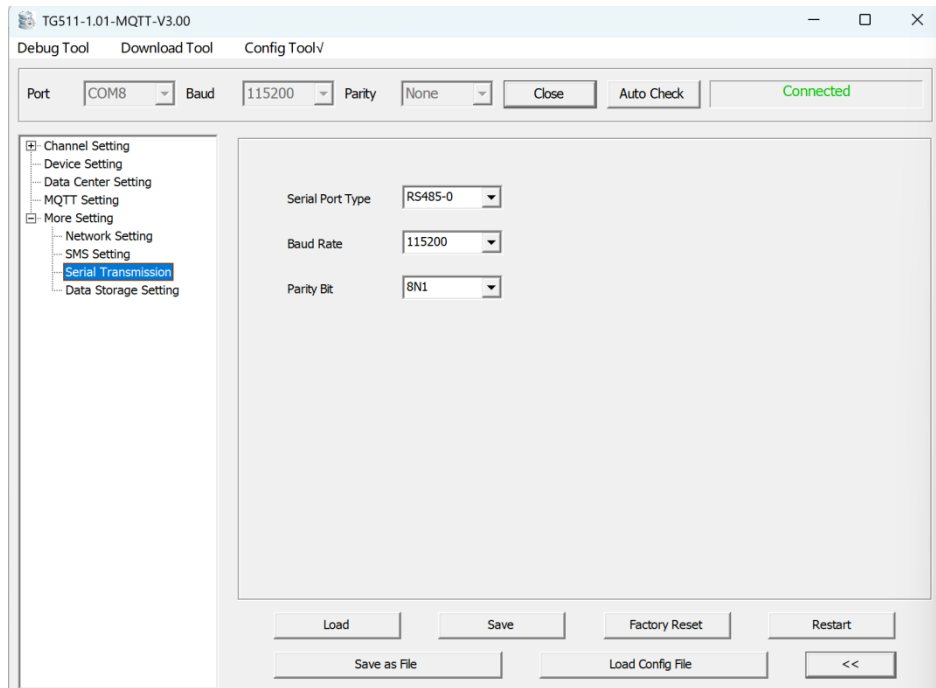
- SIM card inserted and LTE antenna also connected, but device can't be online: Please check if your SIM card requires APN authentication. If you SIM card is private network, you may need to obtain the APN parameters from the SIM operator. Set the correct APN parameters, then check network connection 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

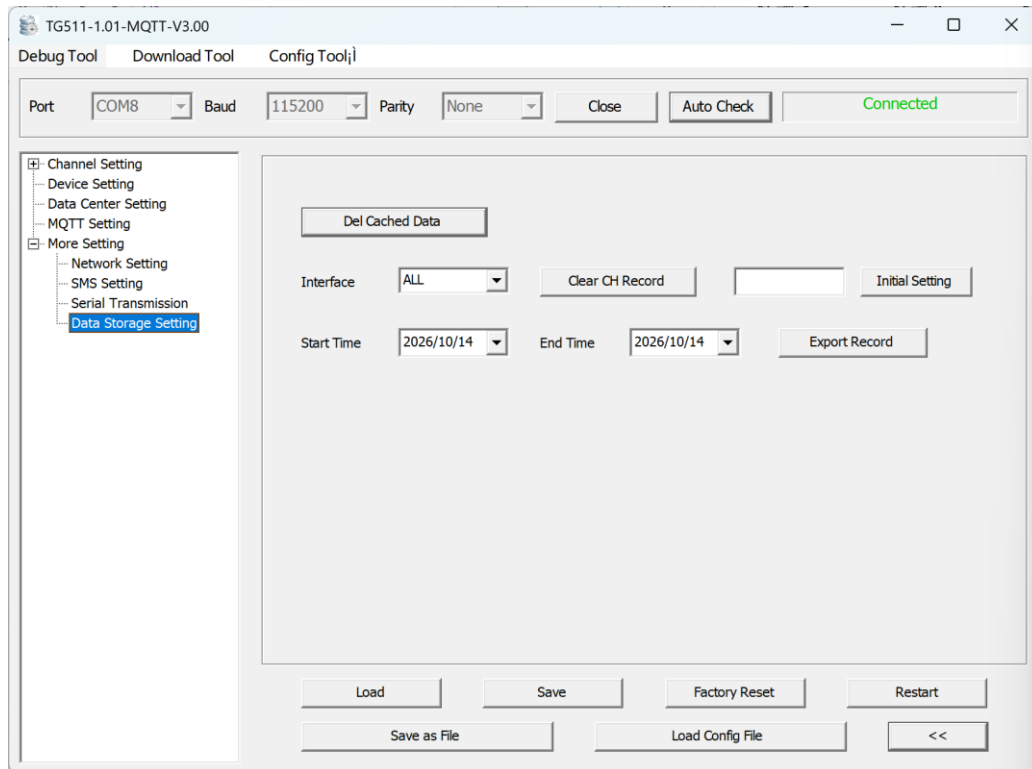
In the standard TY511, there are 2- RS232(RS232-0 for debug, RS232-1 for communication) and 2-RS485. If you need to collect Modbus data, you have to select which COM for communication. Below are the description of serial parameters:



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

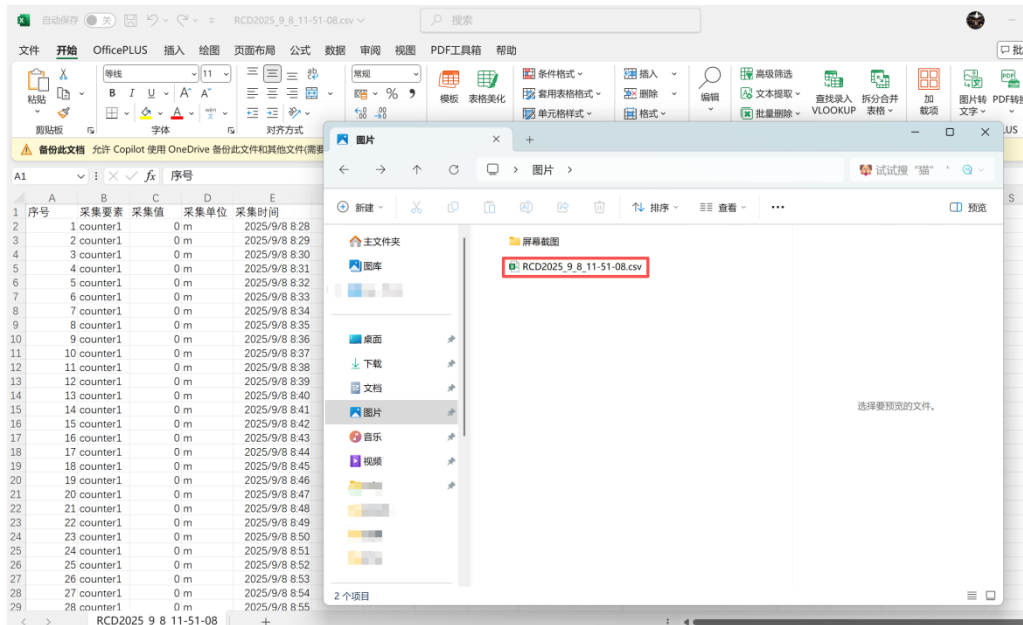
TY511 can store cache data when network or server disconnected, and resend data after connection recovered. Below are the description of data storage parameters:



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:



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); TY511 and sensor are powered on; TY511-B config tool(TG511-1.01-MQTT-EN-V3.00); Firmware version(TG511B1-EQS010-18.0.bin).

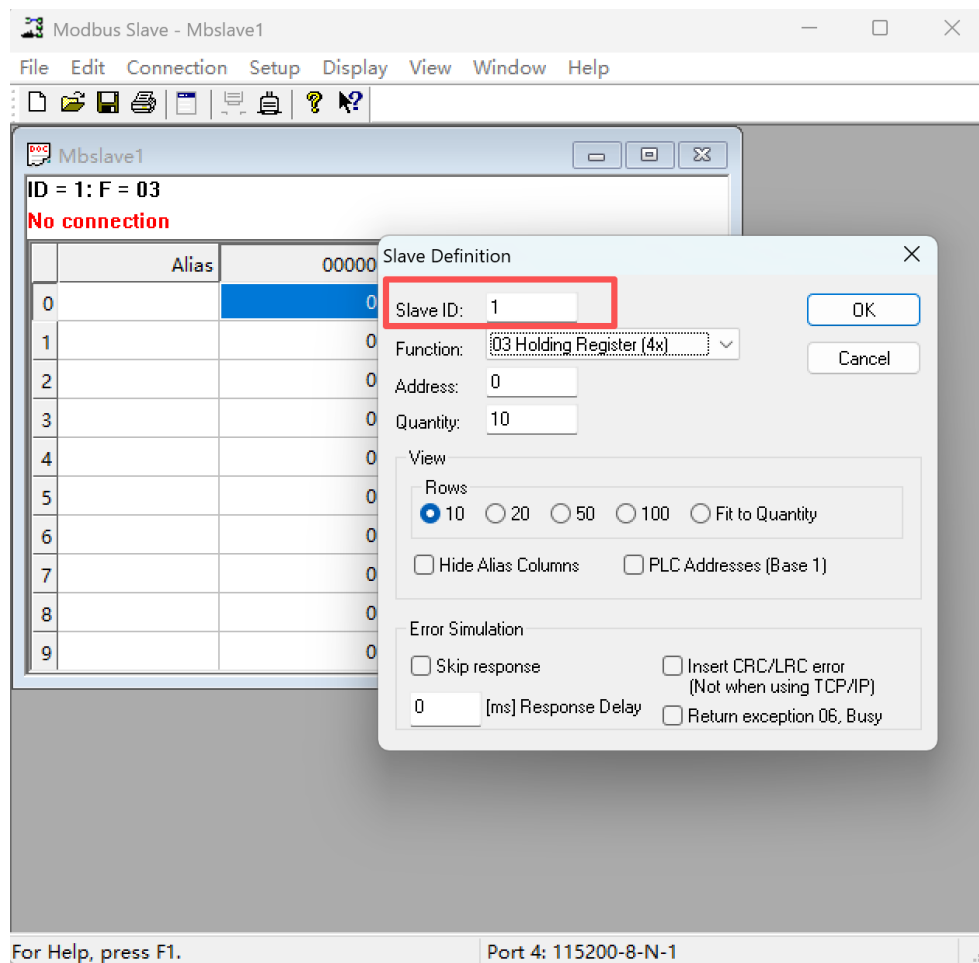
Configuration Steps:

In this demo case, I'm going to use software "**Mbslave**" to simulate a Modbus slave. TY511 acts as a Modbus master, and connect with my computer for reading Modbus RTU data from Mbslave.

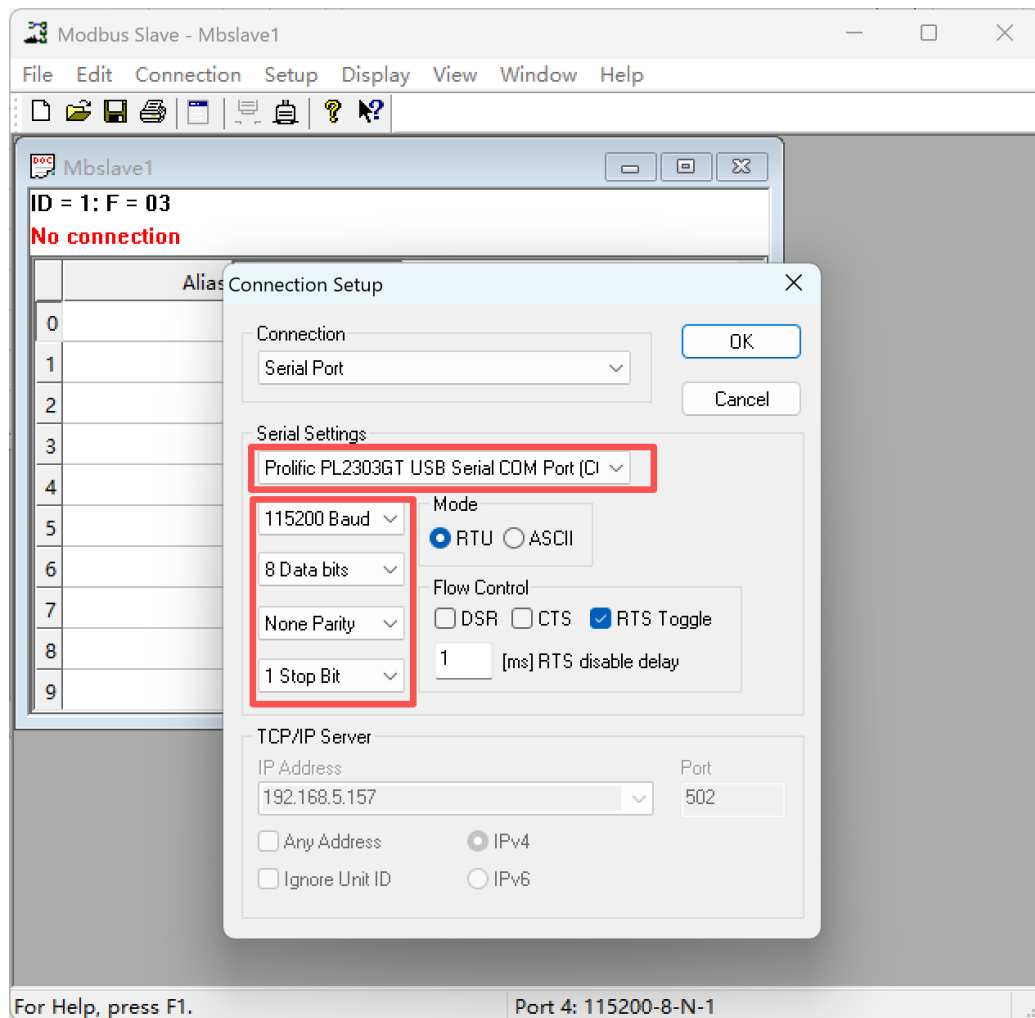
1. Select one of the communication COMs(**RS232-1** or **RS485-0**) for TY511, in this case, RS232-1 is the target COM. Then connect RS232-1 to computer through a USB to Serial converter.



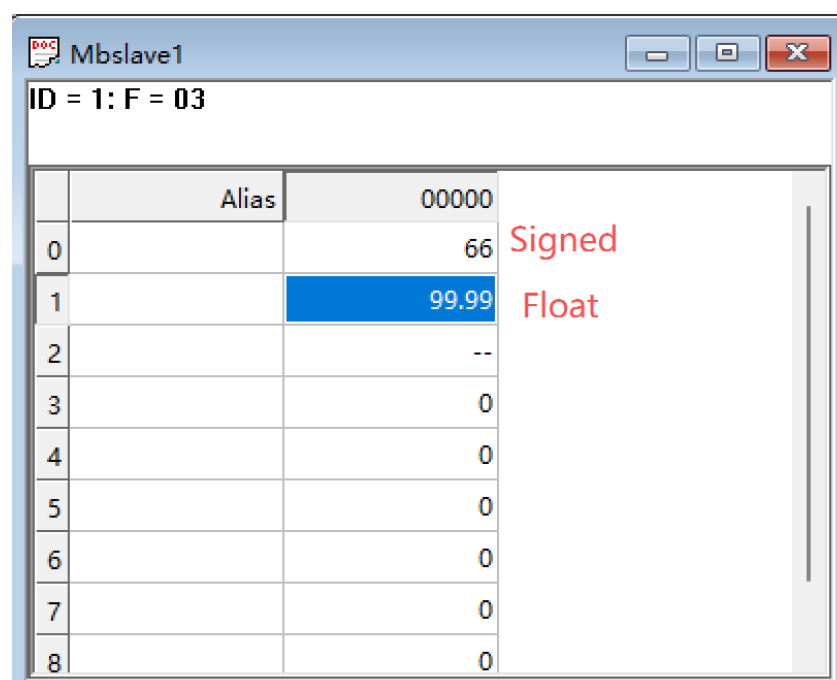
2. Open the “Mbslave” software, set a Slave ID, select function code as “03” for holding register.



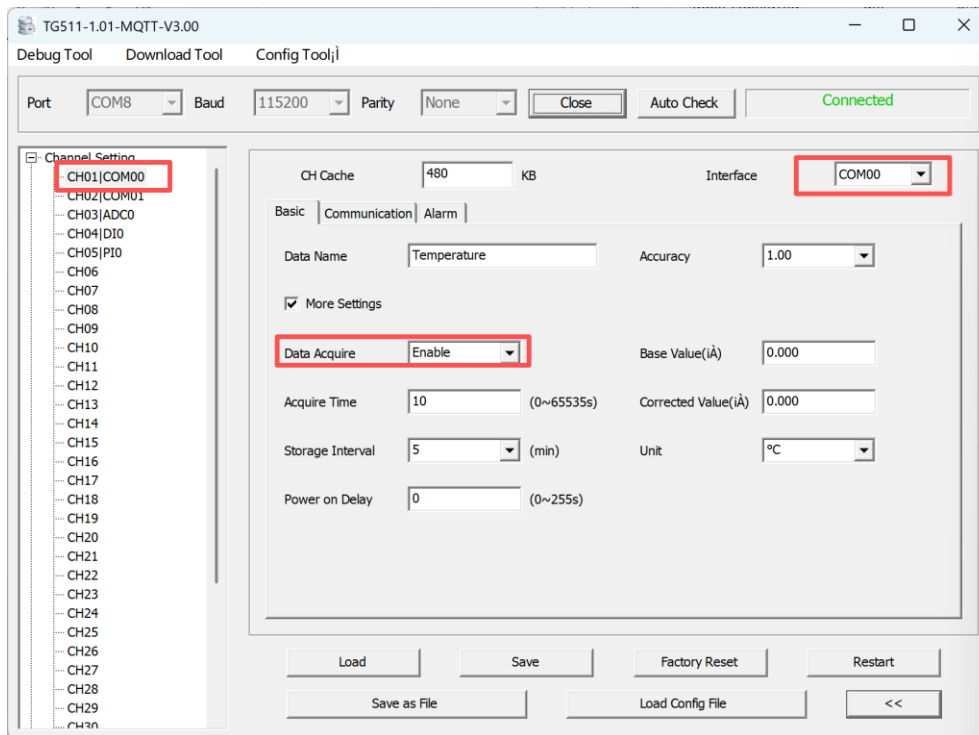
Set COM parameters and connect to this COM.



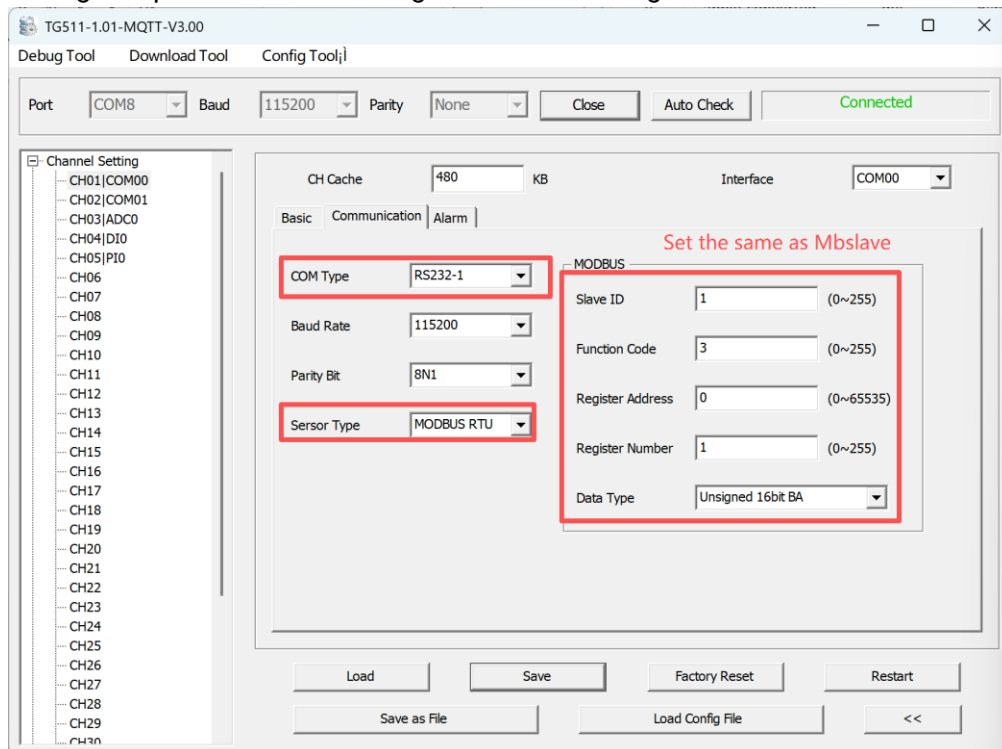
3. Select data format, then edit register value.



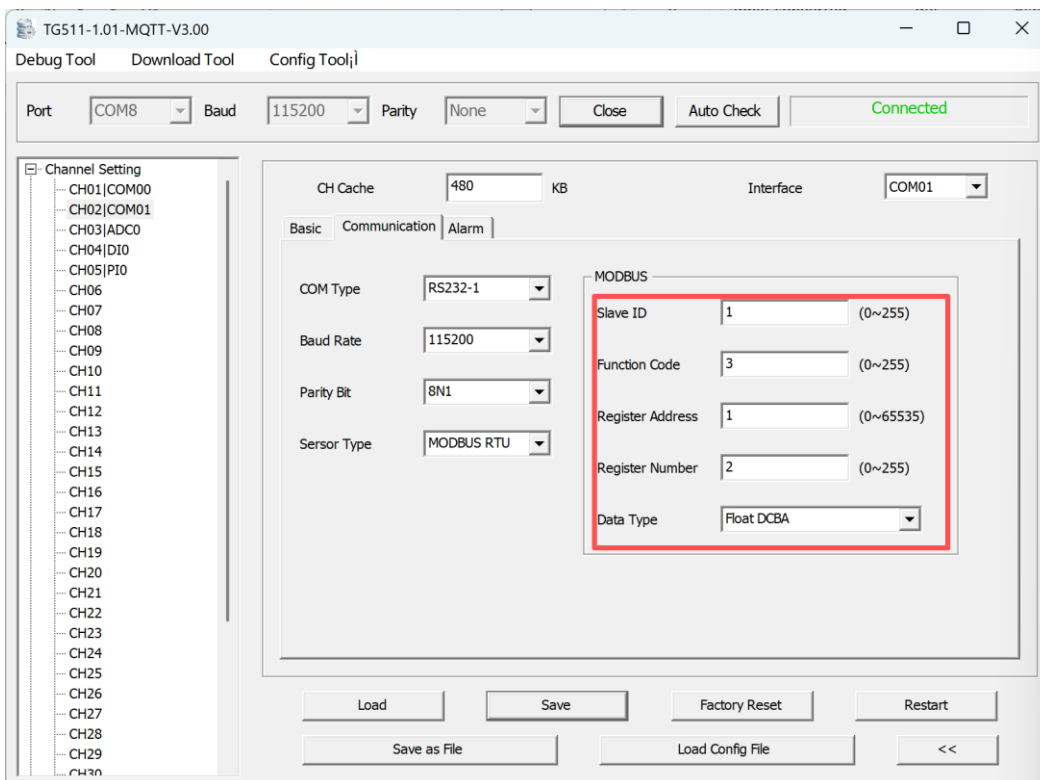
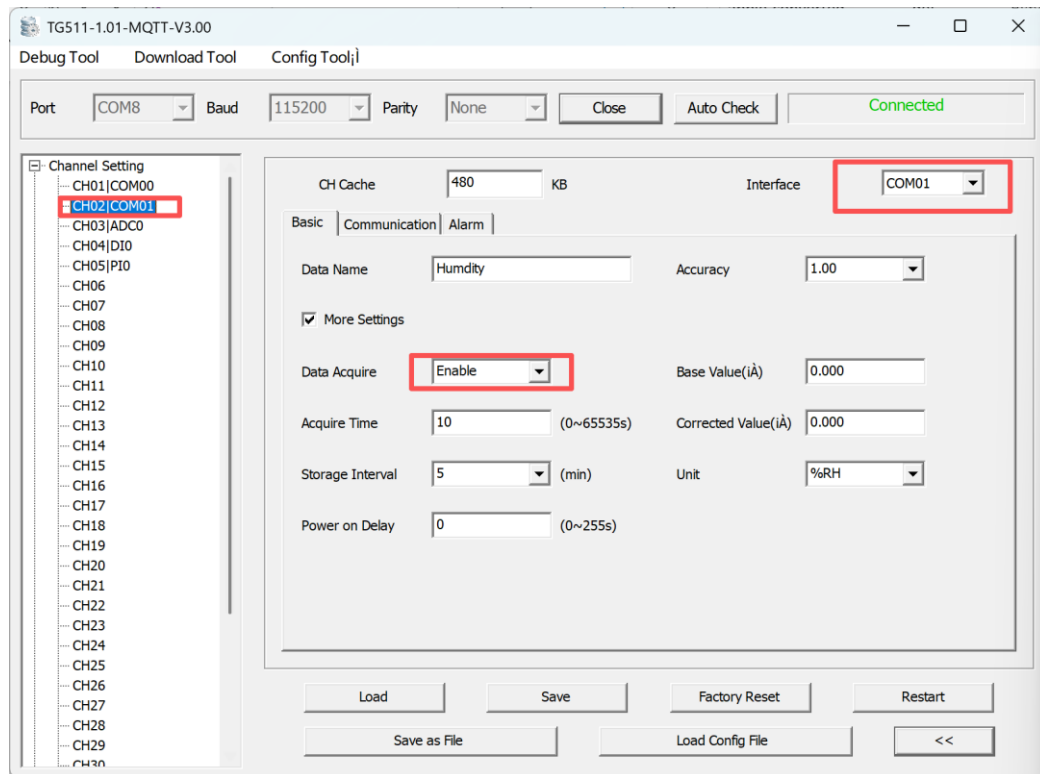
- Go to Config tool -> Channel Setting, add new channel and COM interface. Enable COM00 for channel 01. For the parameter descriptions, you can check [COM Setting](#) for more details.



“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.

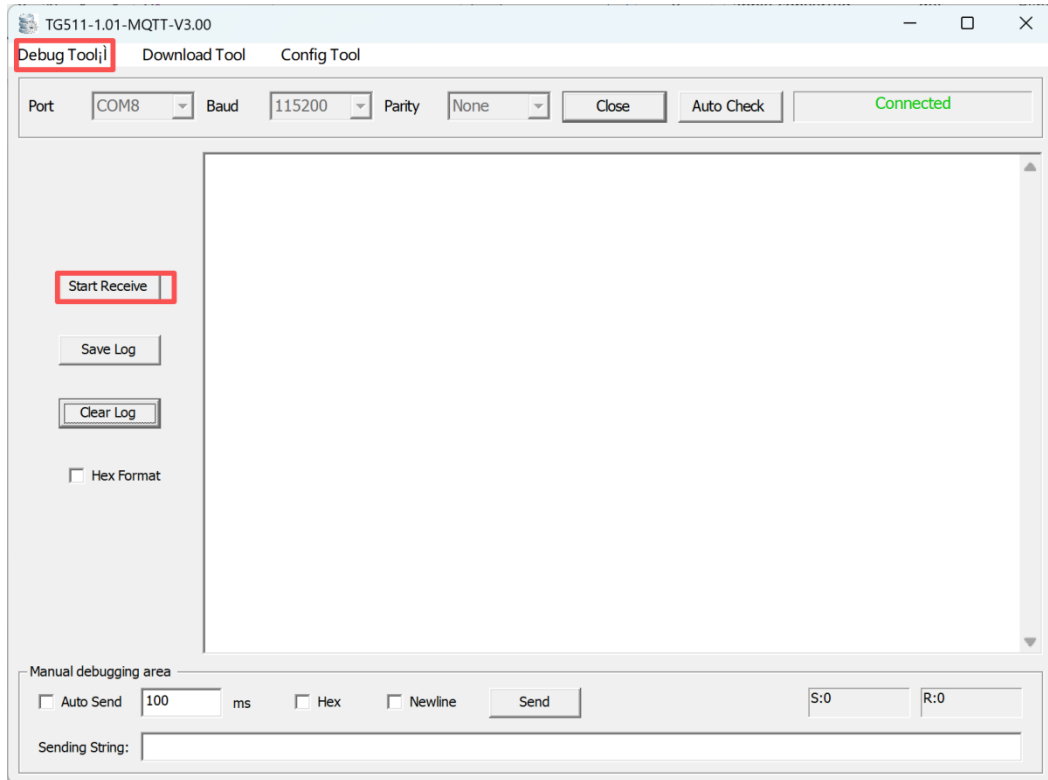


NOTE: Each channel corresponds to a unique COM interface, one COM cannot be configured by 2 channels. Besides, only one Modbus factor can be configured per channel, if you need to collect more Modbus registers, you have to add multiple channels.

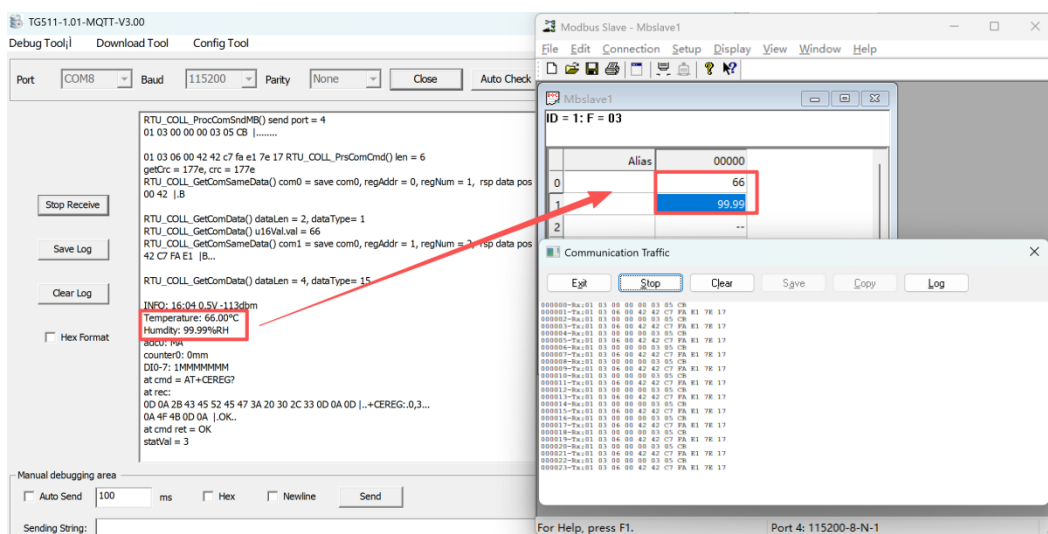
- Click "Save" button after setup all parameters, then click "Load" button to apply the new configuration.

Verification Method:

- Go to **Debug Tool**, then click "Start Receive", it'll output the system log for TY511.



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



Scenario 2: Monitor Real-time Data on LCD Screen

Objective: Displaying collected data on TY511 screen

Prerequisites: Collected Modbus data, you have to finish the first step [Scenario 1: Modbus RTU Data Collection](#); Or collected I/O data, you can follow step [Scenario 5: DI/PI and ADC Configuration](#); TY511 and sensor are powered on; SIM card inserted and can connect to Internet; MQTT broker; MQTT client tool(MQTTX or MQTT.fx); TY511-B config tool(TG511-1.01-MQTT-EN-V3.00); Firmware version(TG511B1-EQS010-18.0.bin).

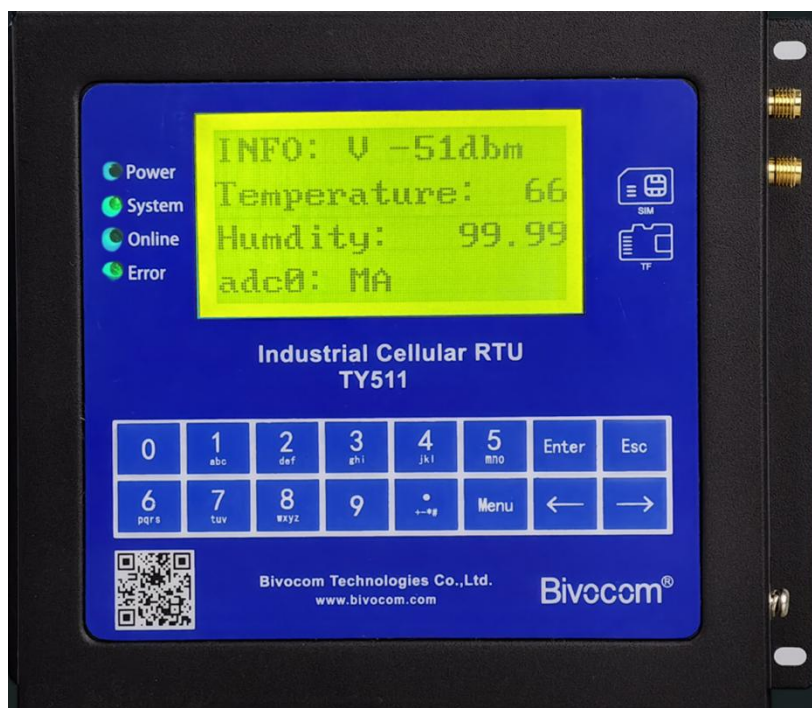
NOTE: Displaying data is a standard feature on TY511, it requires a special firmware(TG511B1-EQS010-18.0.bin). If you don't have the firmware, you can contact Bivocom technical team, team will share the correct firmware with you.

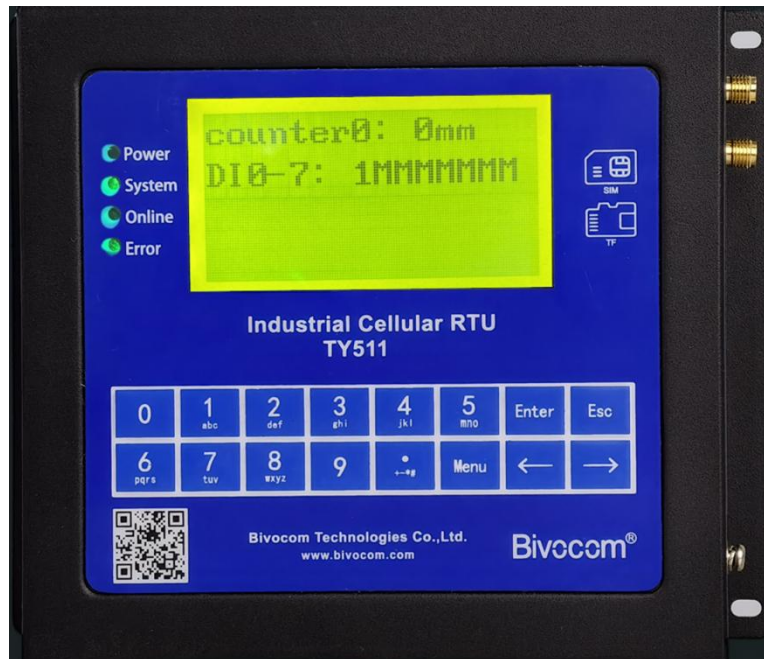
Configuration Steps:

1. Follow the step [Scenario 1: Modbus RTU Data Collection](#) or [Scenario 5: DI/PI and ADC Configuration](#) to collect Modbus RTU or I/O data.
2. Ensure all data has been collected correctly and can be read via TY511.

Verification Method:

1. Check the LCD screen displaying on TY511.





Scenario 3: Upload Modbus RTU data to MQTT

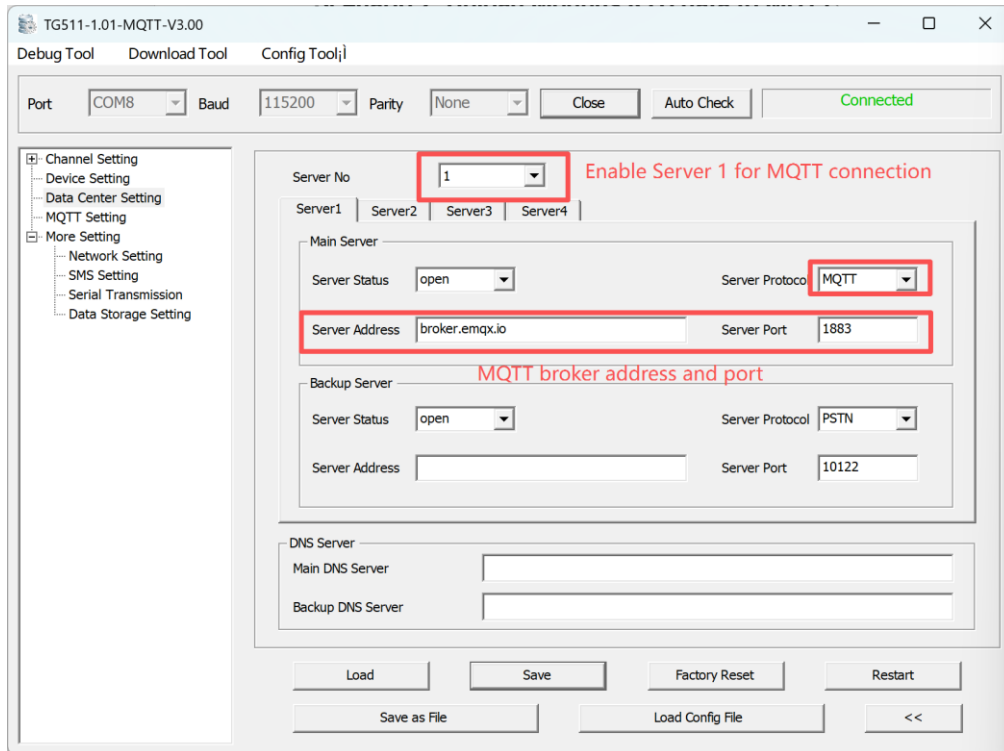
Objective: Upload Modbus data to MQTT broker.

Prerequisites: Collected Modbus data, you have to finish the first step [Scenario 1: Modbus RTU Data Collection](#); TY511 and sensor are powered on; SIM card inserted and can connect to Internet; MQTT broker; MQTT client tool(MQTTX or MQTT.fx); TY511-B config tool(TG511-1.01-MQTT-EN-V3.00); Firmware version(TG511B1-EQS010-18.0.bin).

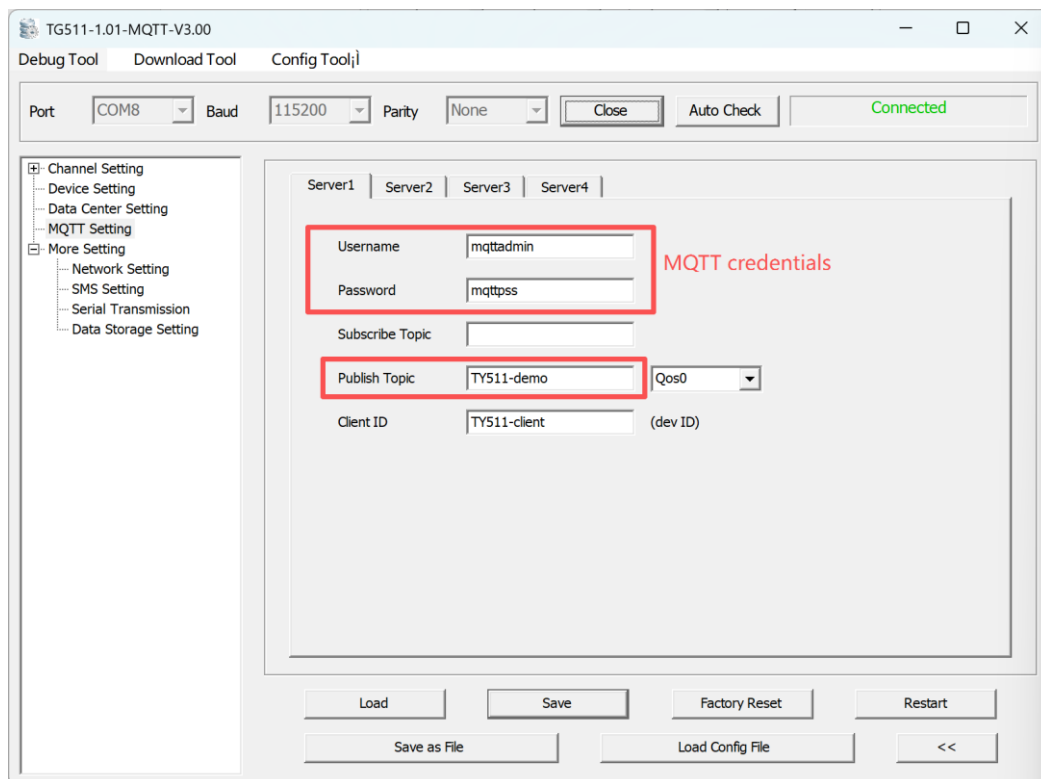
Configuration Steps:

In this demo case, I'm going to use **MQTTX** to subscribe topic, and receive Modbus data published from TY511.

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.



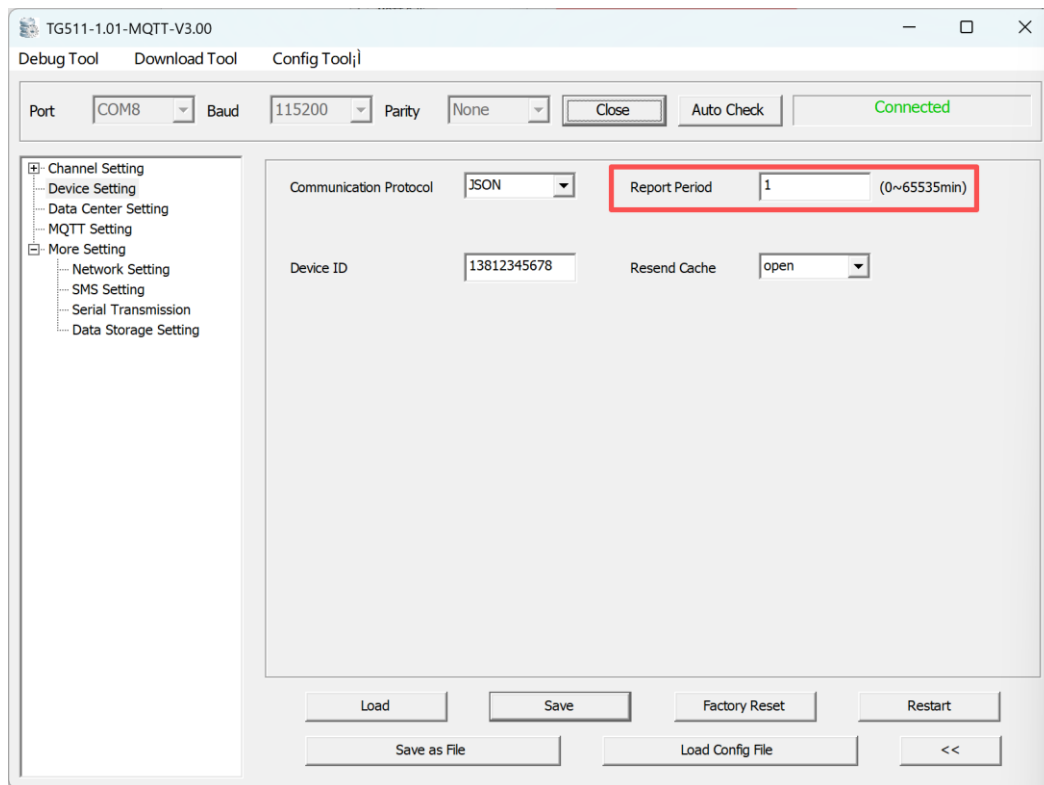
2. Go to **MQTT Setting**, configure the MQTT credentials the same as your MQTT broker. Then set a "Publish Topic", and define a unique "Client ID".



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

3. Go to **Device Setting**, here you can set the MQTT report period. In this setting, TY511

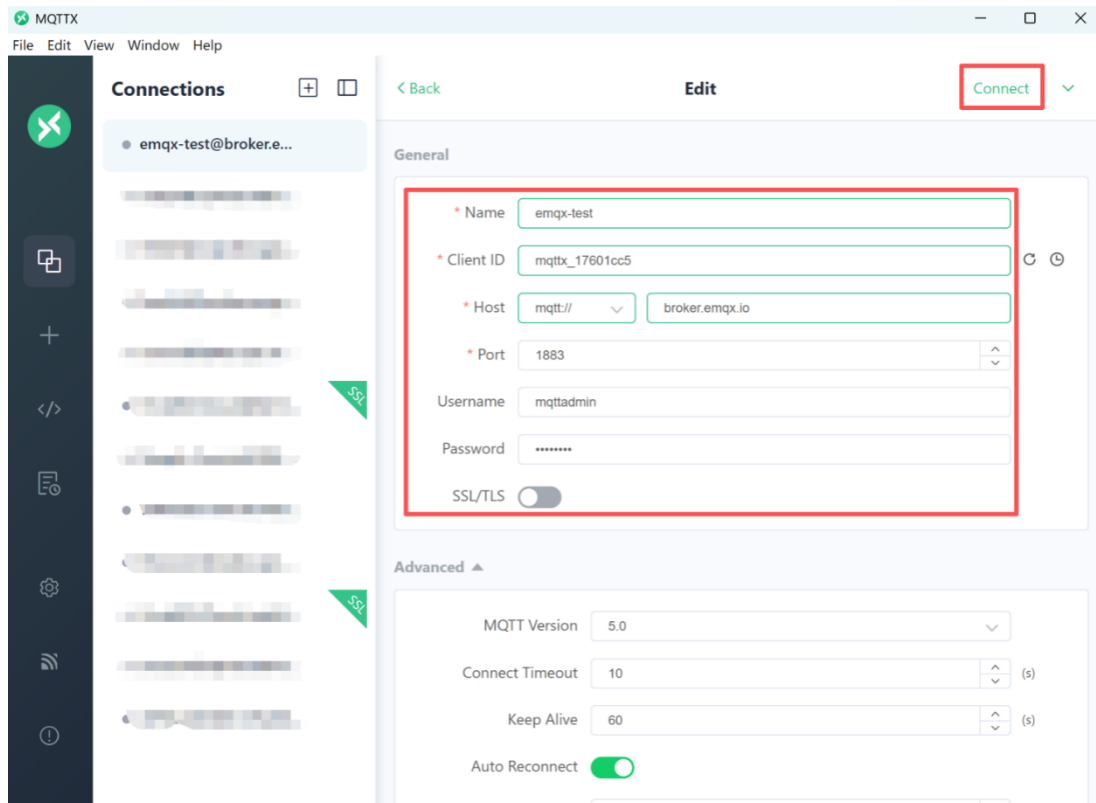
will publish topic every 1 min.



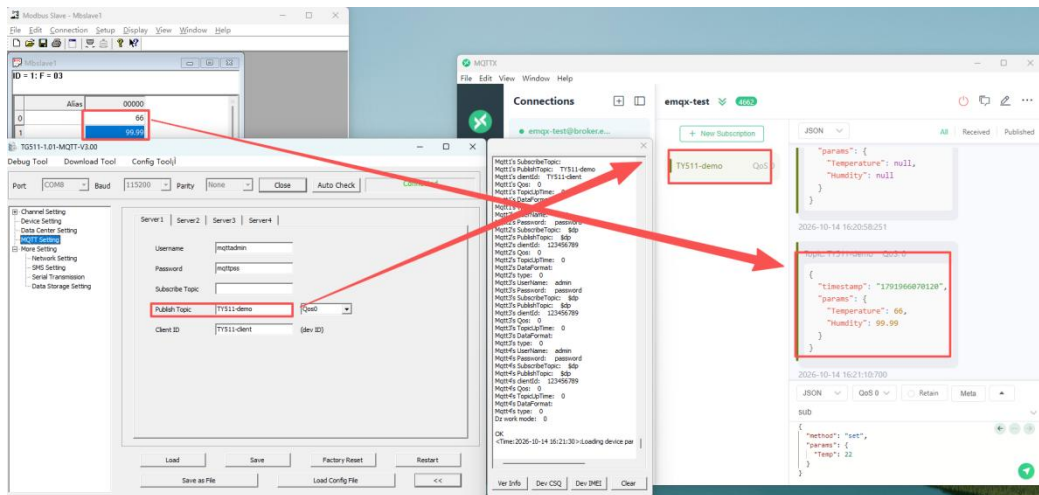
4. Click "Save" button after setup all MQTT parameters, then click "Load" button to apply the new configuration.

Verification Method:

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



2. Subscribe the specific topic setup in TY511, then Modbus RTU data(Mbslave) will be received in MQTTX with JSON format.



Common Issues:

- Data Center and MQTT Setting are configured, but TY511 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 4: Upload Modbus RTU data to TCP Server

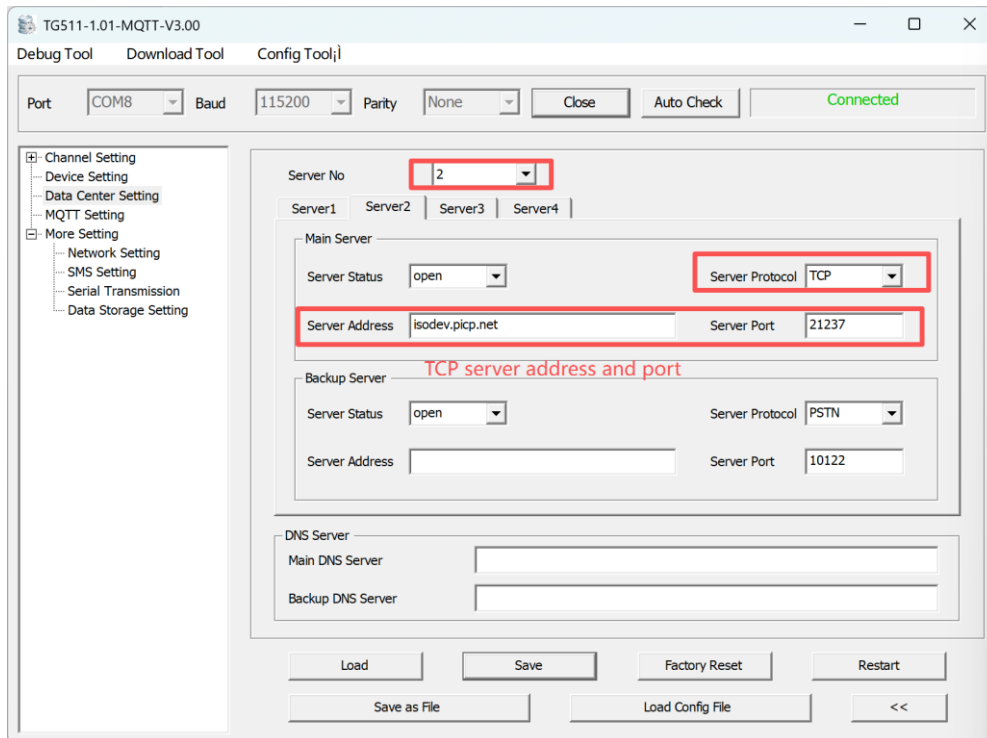
Objective: Upload Modbus data to TCP Server.

Prerequisites: Collected Modbus data, you have to finish the first step [Scenario 1: Modbus RTU Data Collection](#); TY511 and sensor are powered on; SIM card inserted and can connect to Internet; TCP Server(Net Assistant); TY511-B config tool(TG511-1.01-MQTT-EN-V3.00); Firmware version(TG511B1-EQS010-18.0.bin).

Configuration Steps:

In this demo case, I going to connect TY511 to a remote server, the server address is bonded to a specific public domain.

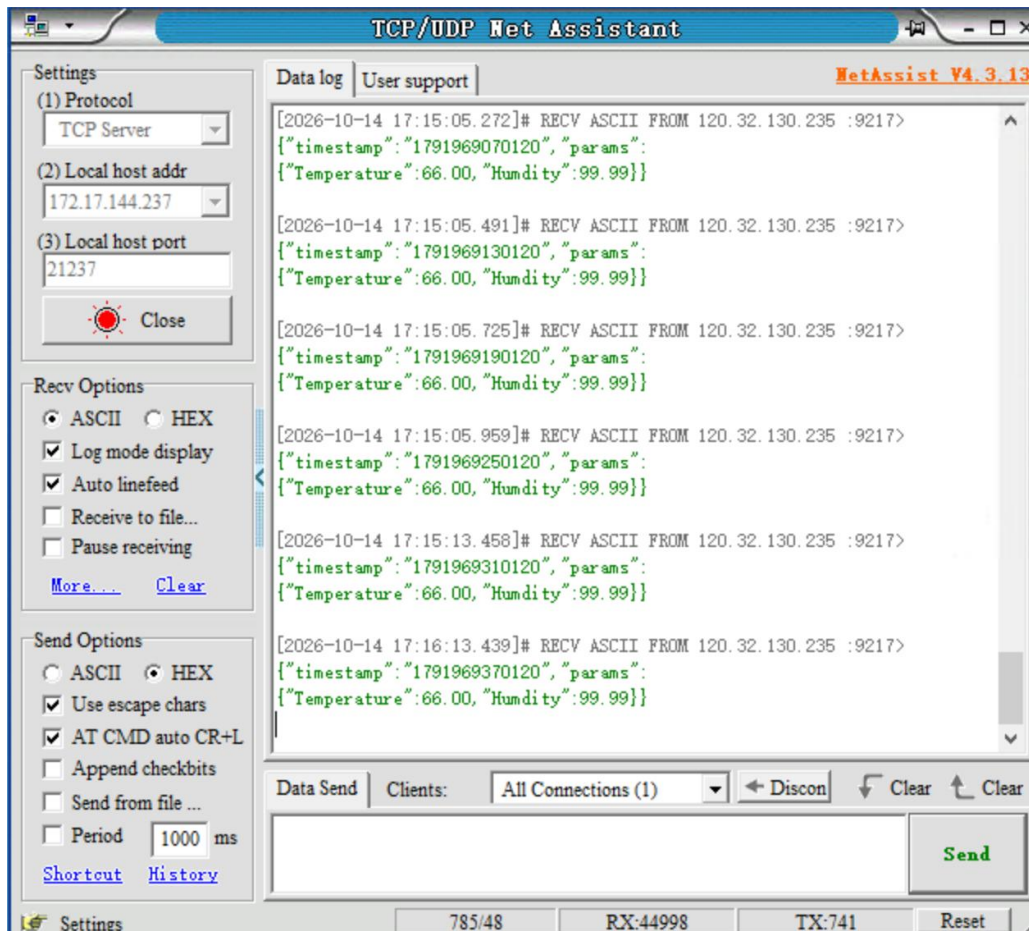
1. Go to **Config Tool -> Data Center Setting**, enable Server 2 for TCP connection. "Server No" should be 2, "Server Protocol" is TCP. Then configure your TCP address and port.



2. 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 5: DI/PI and ADC Configuration

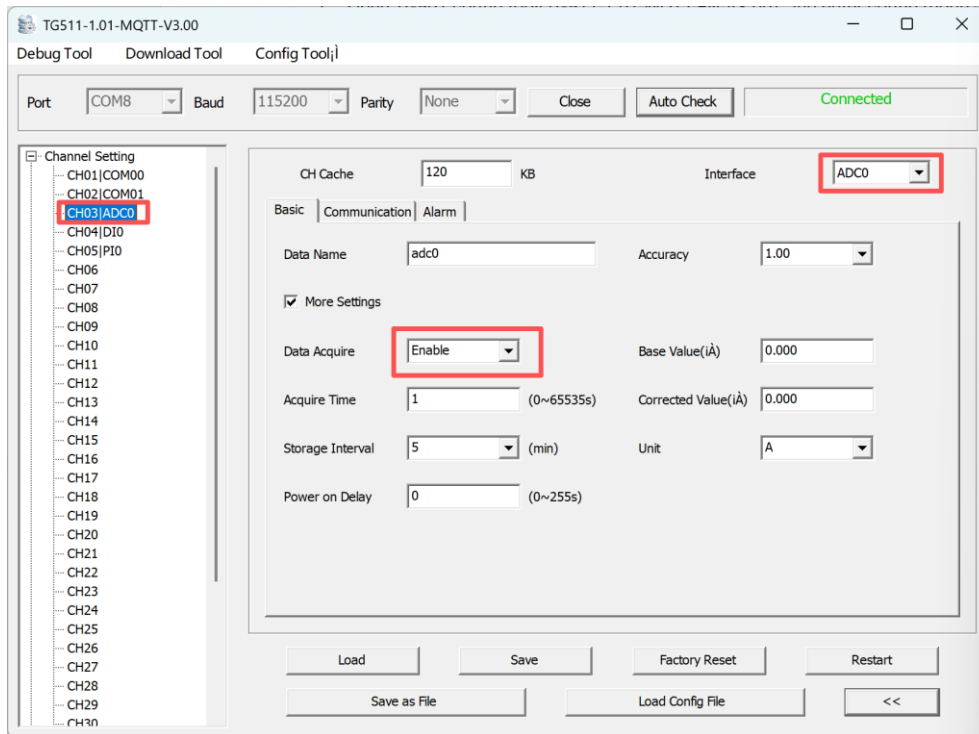
Objective: Enable data acquisition for DI, PI and ADC, and upload data to MQTT.

Prerequisites: TY511 and sensor are powered on; SIM card inserted and can connect to Internet; MQTT broker; MQTT client tool(MQTTX or MQTT.fx); TY511 config tool(TG511-1.01-MQTT-EN-V3.00); Firmware version(TG511B1-EQS010-18.0.bin).

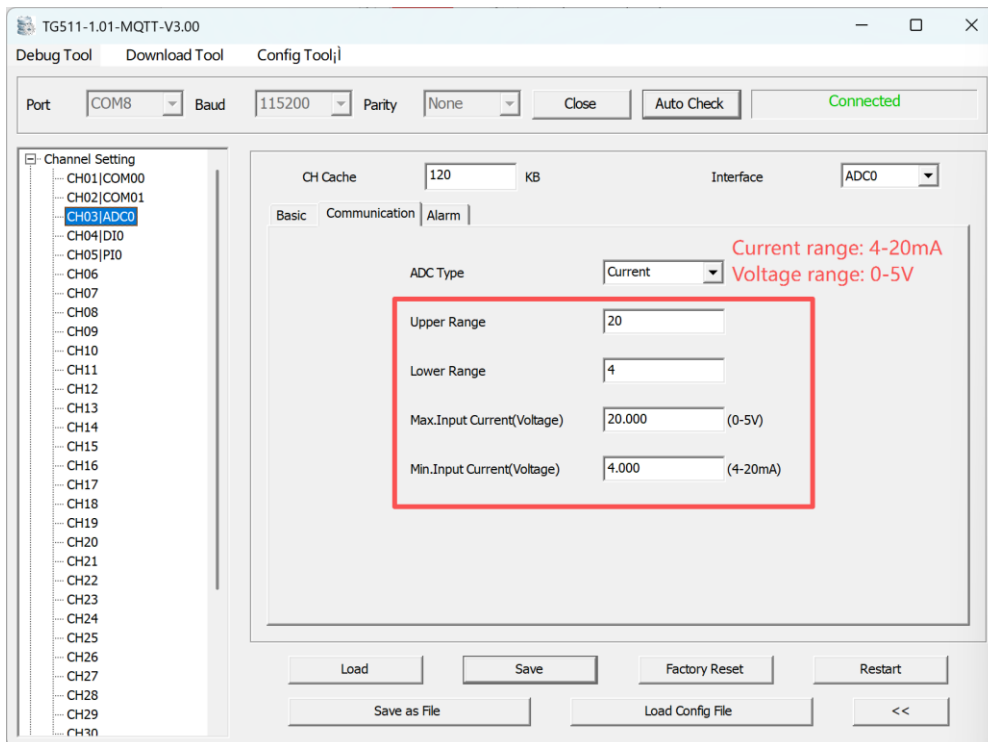
Configuration Steps:

In this demo case, I going to collect DI, PI and ADC data using TY511, and upload data to MQTT.

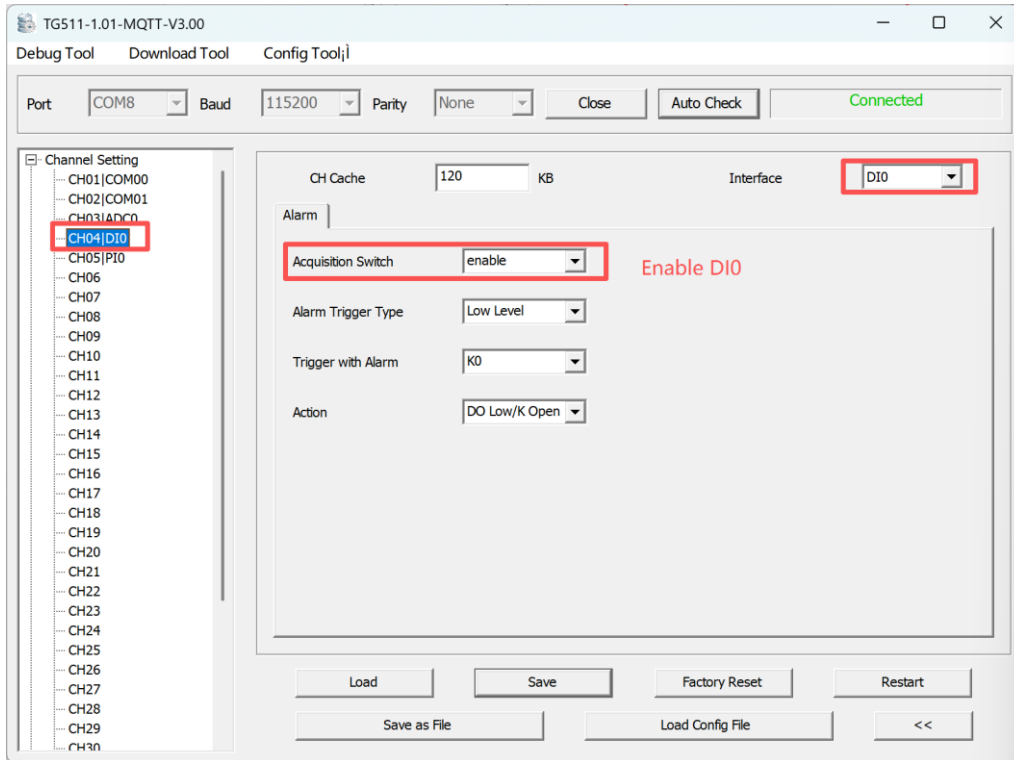
1. Open TY511 config tool(TG511-1.01-MQTT-EN-V3.00), and enter config mode.
2. Go to **Channel Setting**, add new channels for ADC, DI and PI separately.
 - ADC channel



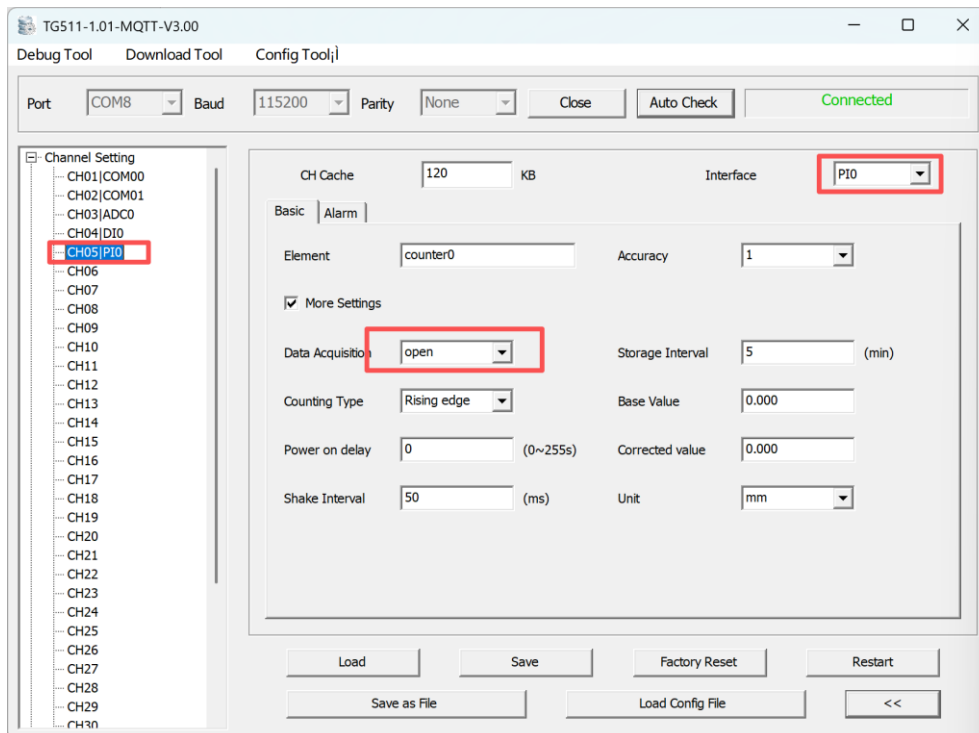
NOTE: Default ADC is current type, if you require voltage type, you have to contact Bivocom sales team before purchasing the RTU.



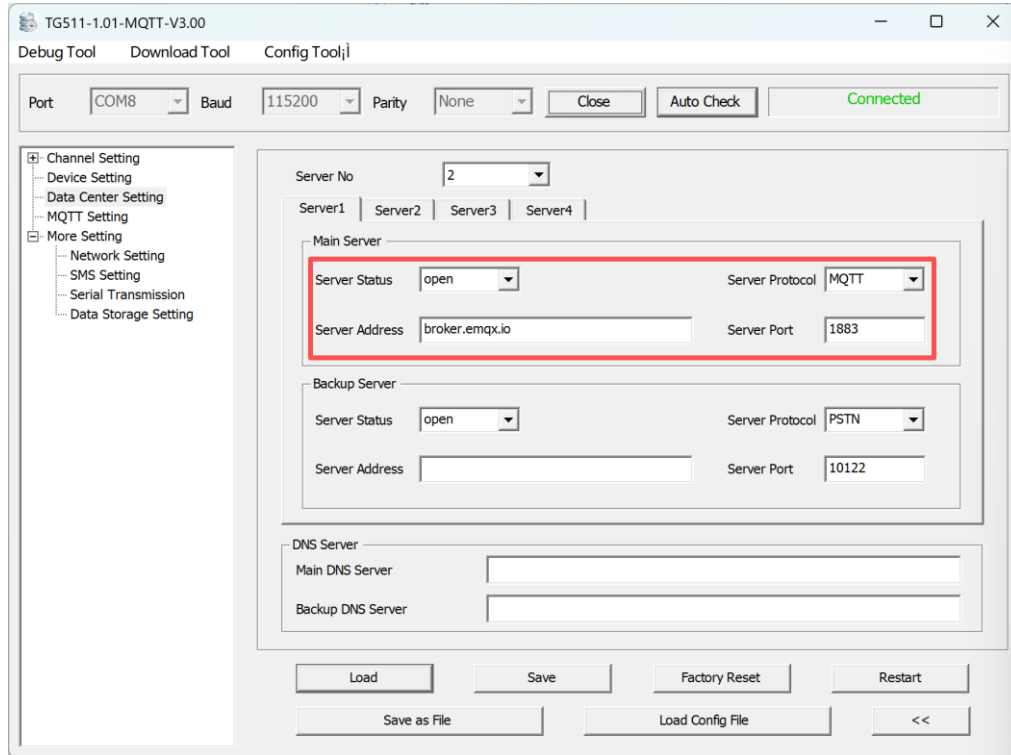
- DI channel



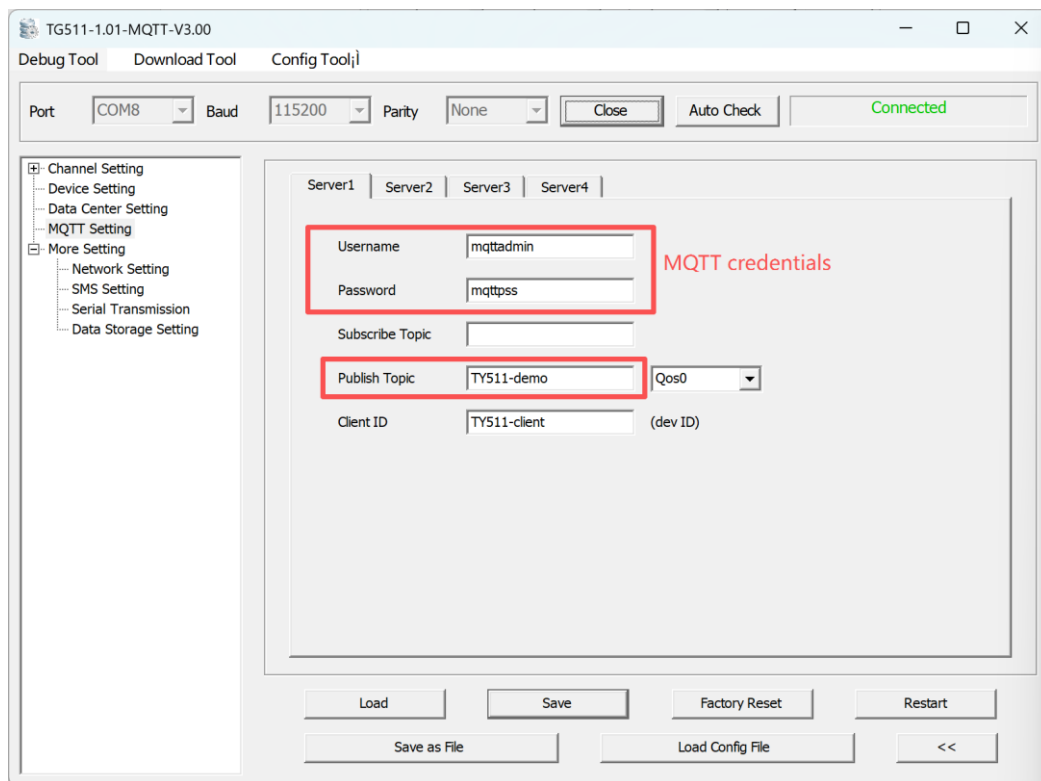
- PI channel



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

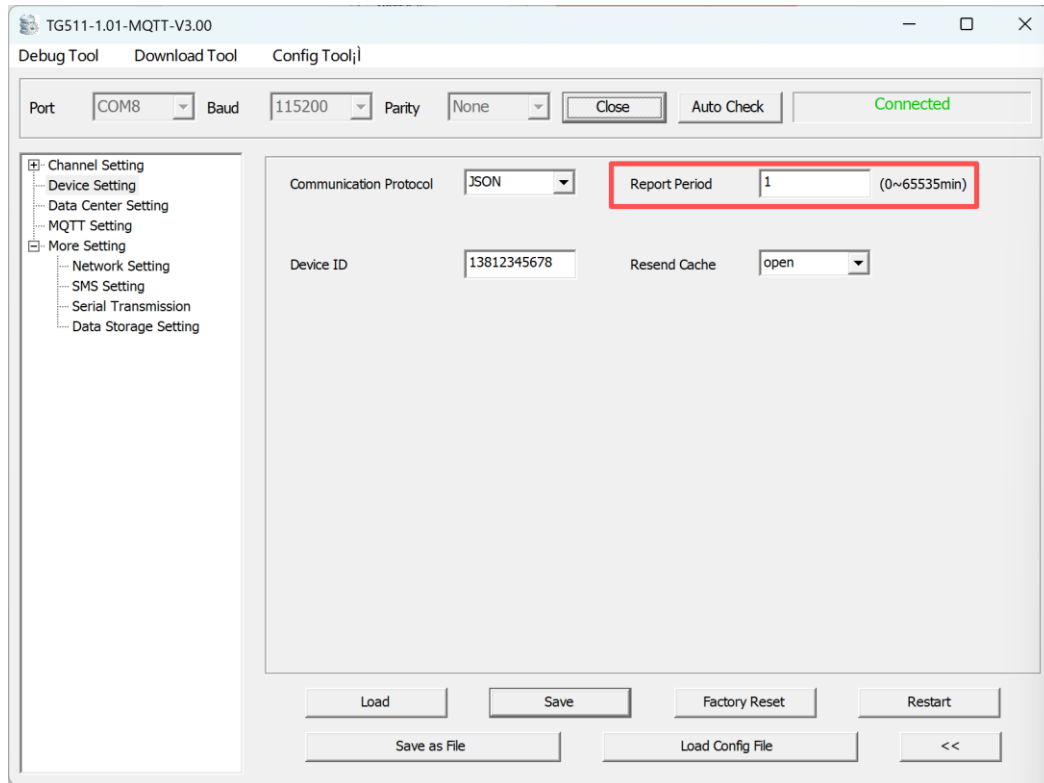


- Go to **MQTT Setting**, configure the MQTT credentials the same as your MQTT broker. Then set a “Publish Topic”, and define a unique “Client ID”.



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

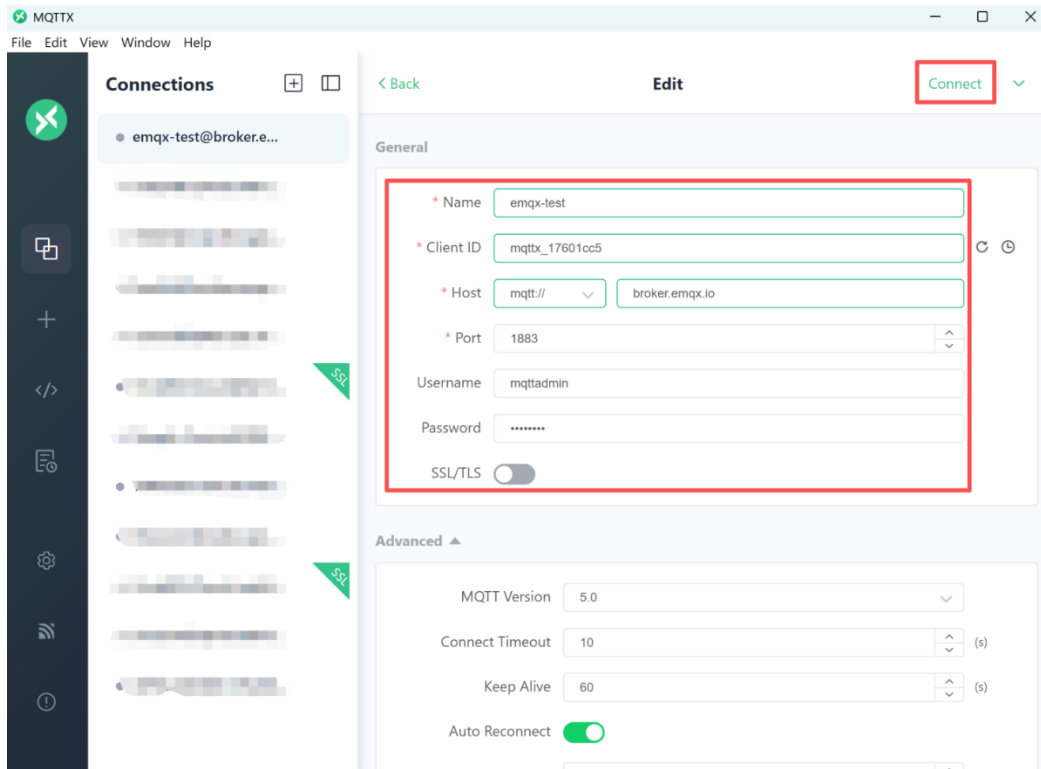
- Go to **Device Setting**, here you can set the MQTT report period. In this setting, TY511 will publish topic every 1 min.



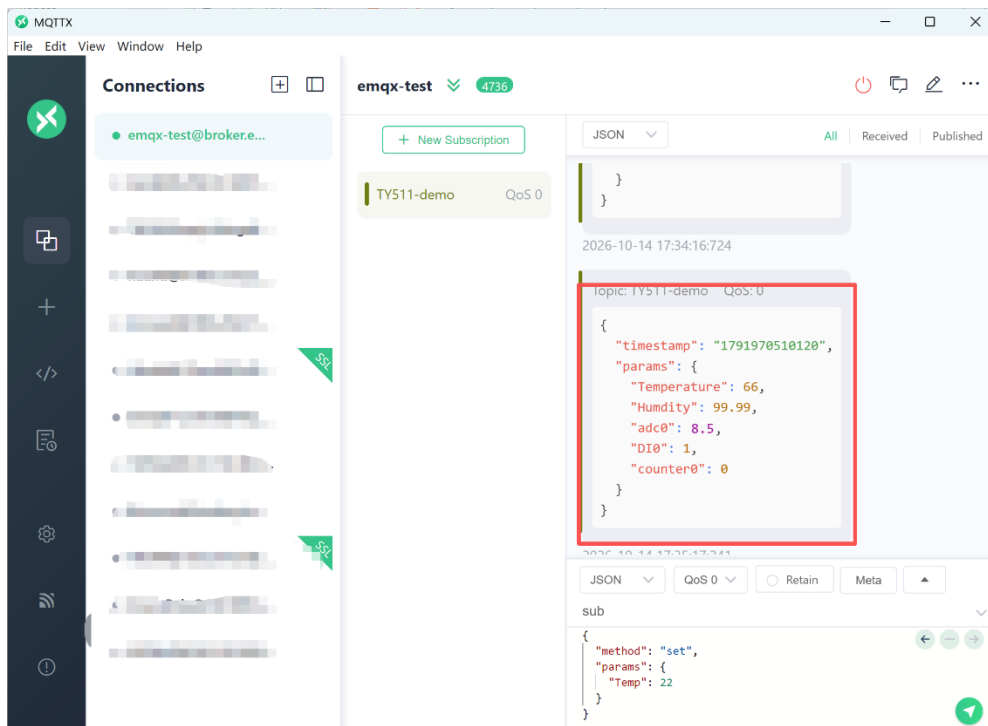
- Click "Save" button after setup all MQTT parameters, then click "Load" button to apply the new configuration.

Verification Method:

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



2. Subscribe the specific topic setup in TY511, then the DI, PI and ADC data will be received in MQTTX with JSON format.

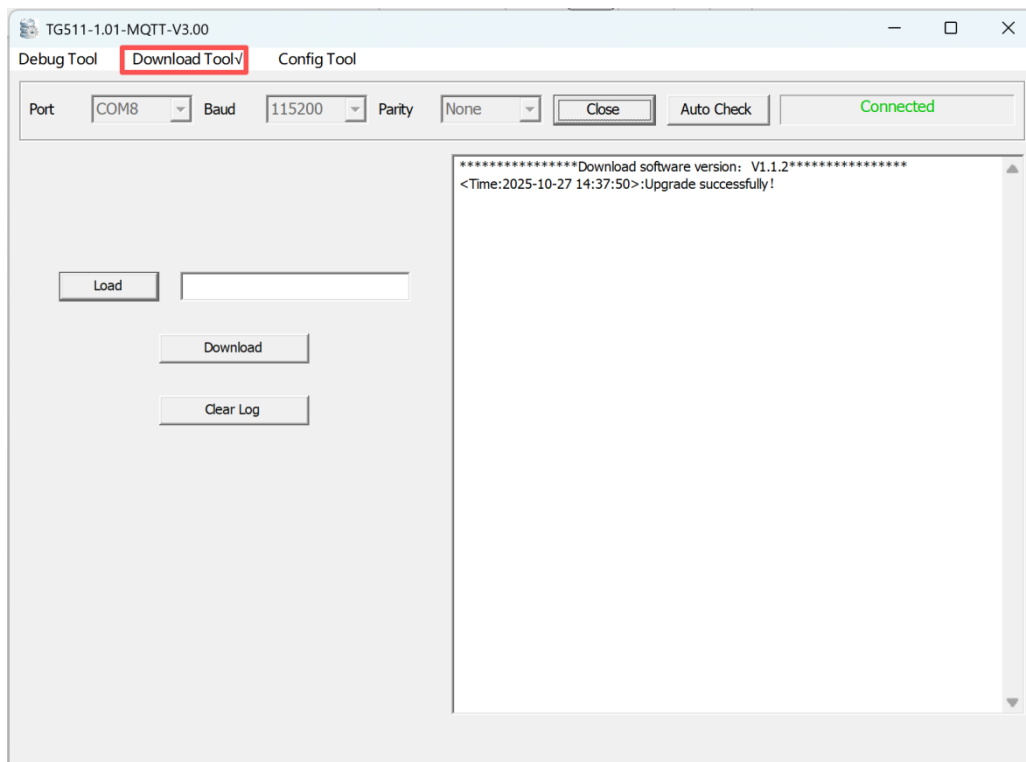


5. Firmware Upgrade

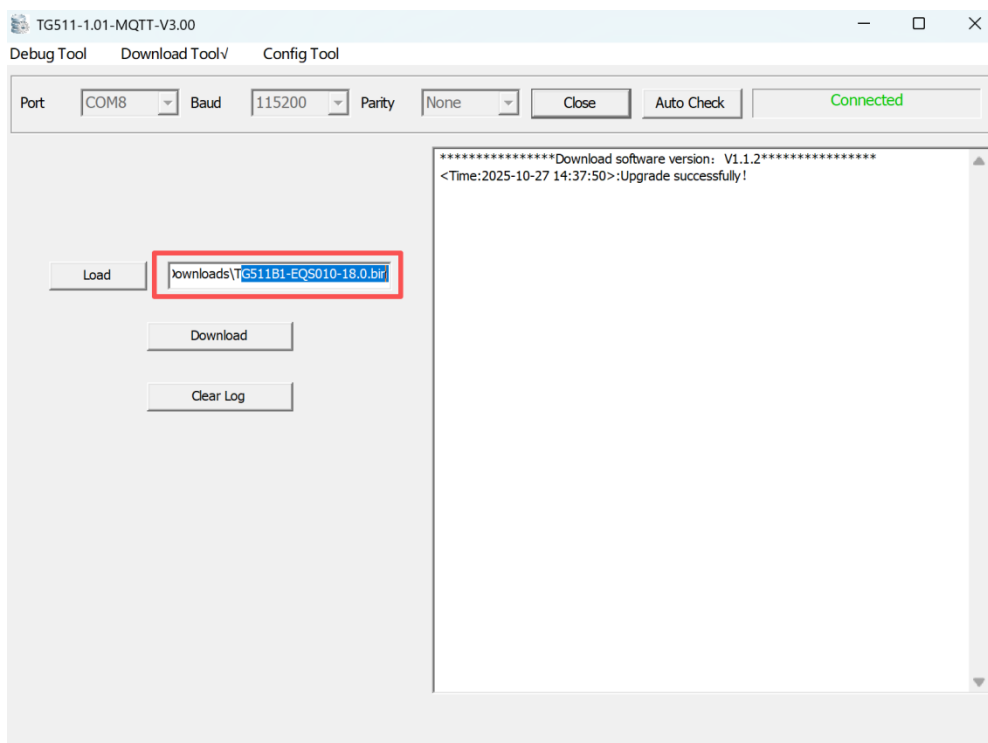
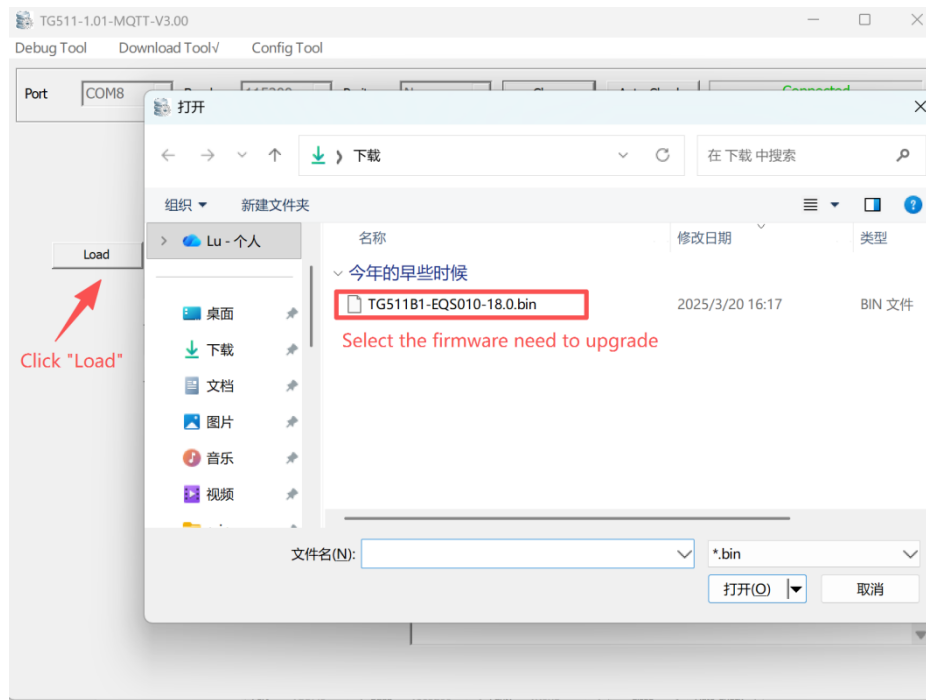
1. Before upgrading firmware, please connect **RS232-0(DEBUG)** to your computer through Serial to USB converter, as shown in the figure below:



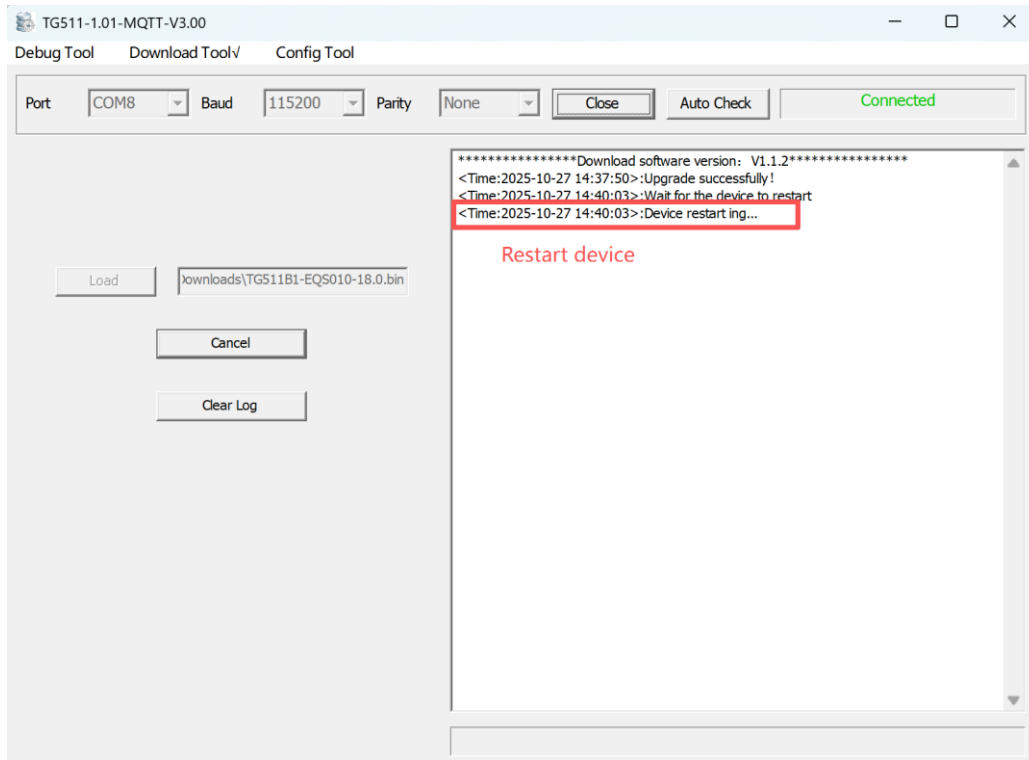
2. Click "Download Tool", it'll be ticked "✓", then it'll automatically enter the download tool.



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

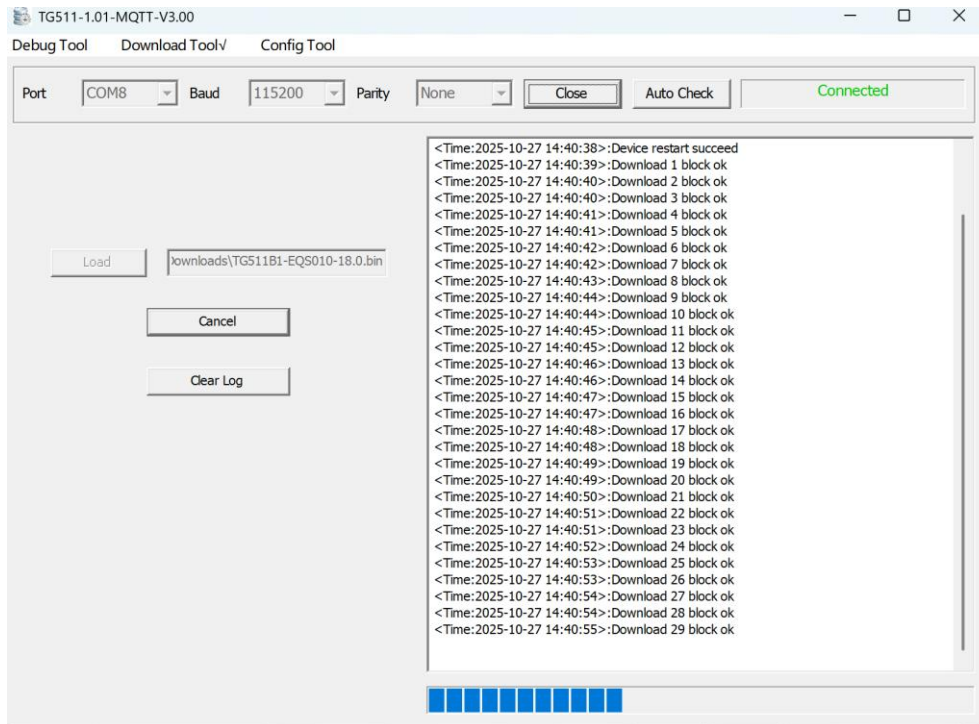


- Click "Download" button to start the firmware upgrade, then you have to restart the device according to the tips.

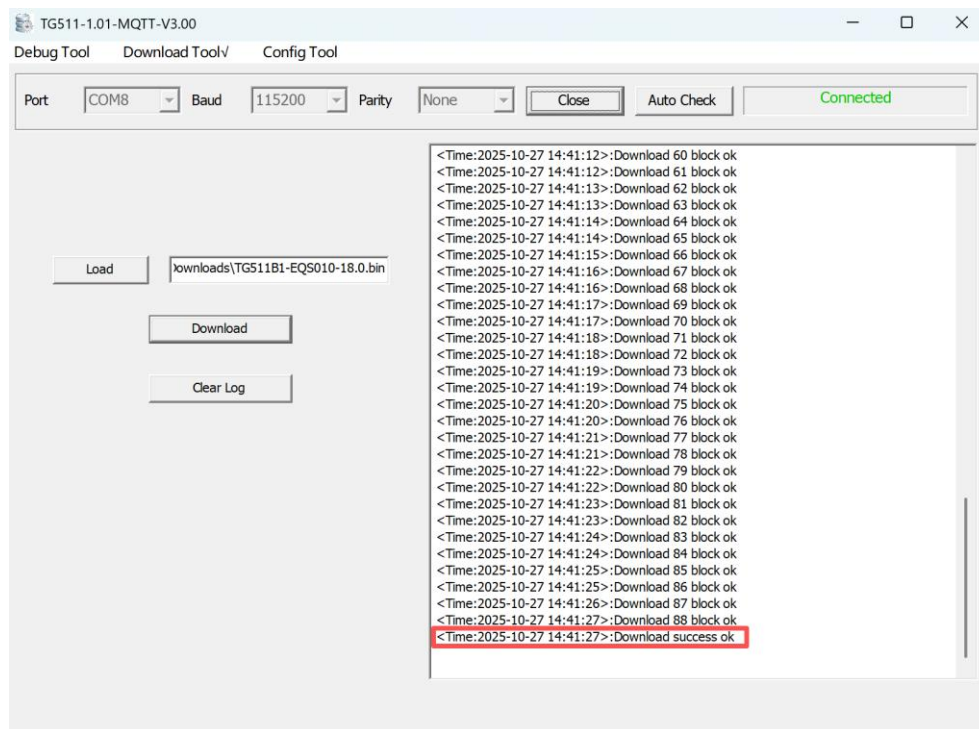


5. After restarted device, it'll start to upgrade the firmware, will take 1-2 mins. Then it'll show **"Download success ok"**, it indicates the firmware has been successfully upgraded.

Firmware upgrading

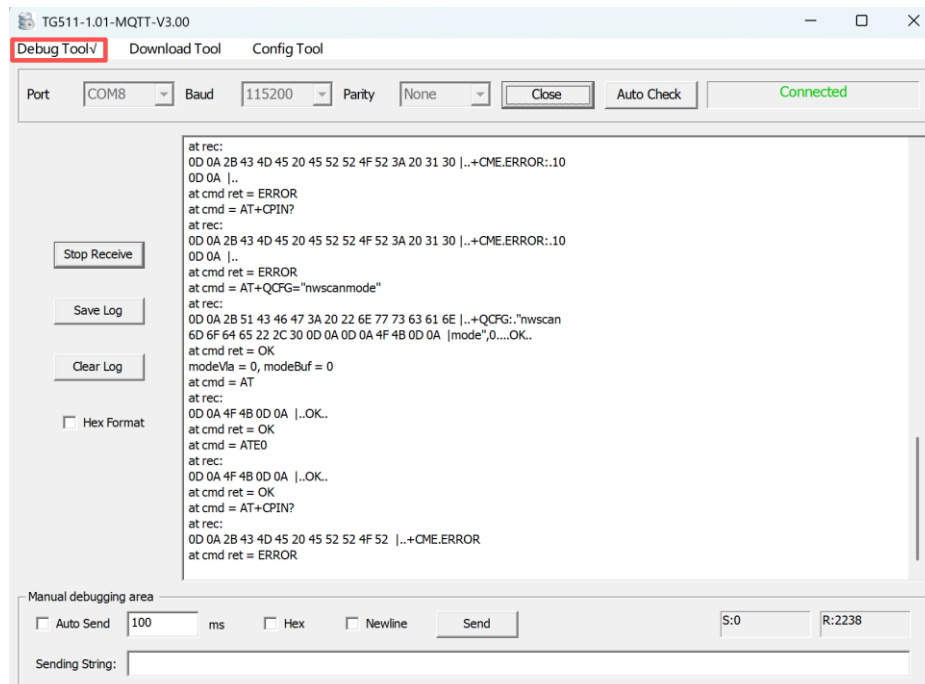


Firmware download complete



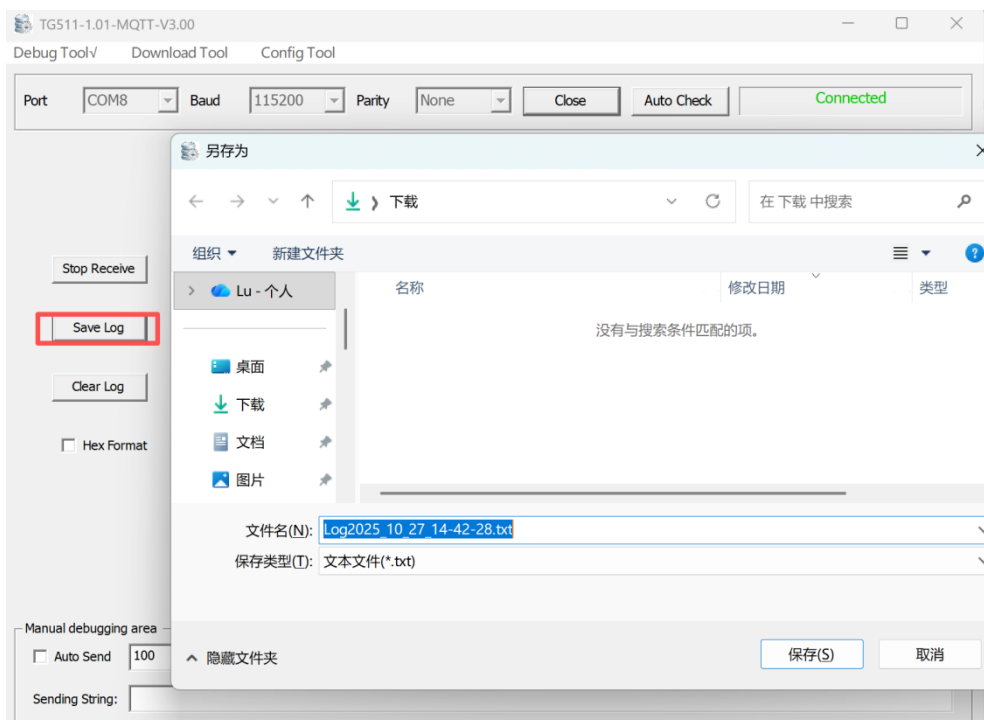
6. Debug Tool

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 TY511.



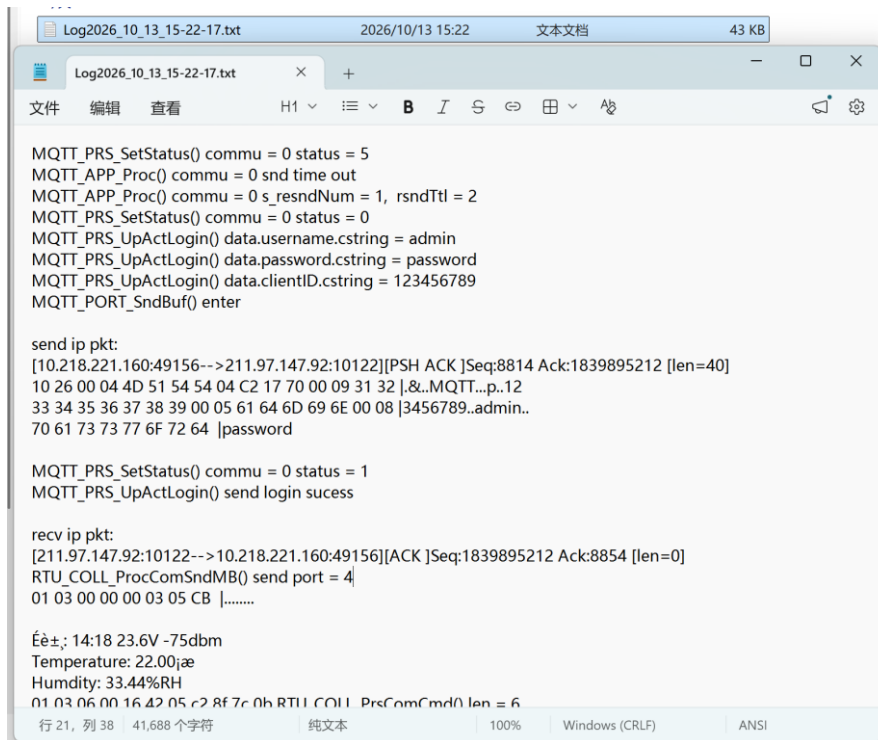
The system log is mainly used for troubleshooting, recording operational status, communication link events(such as network registration, heartbeats, and data transmission/reception), and abnormal errors(e.g., signal loss, connection interruptions or packet verification failures). It provides engineers 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 text inside the editor contains MQTT-related log entries, including status updates, login attempts, and network packet details. The status changes from 5 to 0 and then to 1. Login attempts are shown with username 'admin' and password 'password'. Network packets are displayed in hexadecimal and ASCII formats. The log ends with sensor data: voltage (14.18V), temperature (22.00°C), and humidity (33.44%RH).

```
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

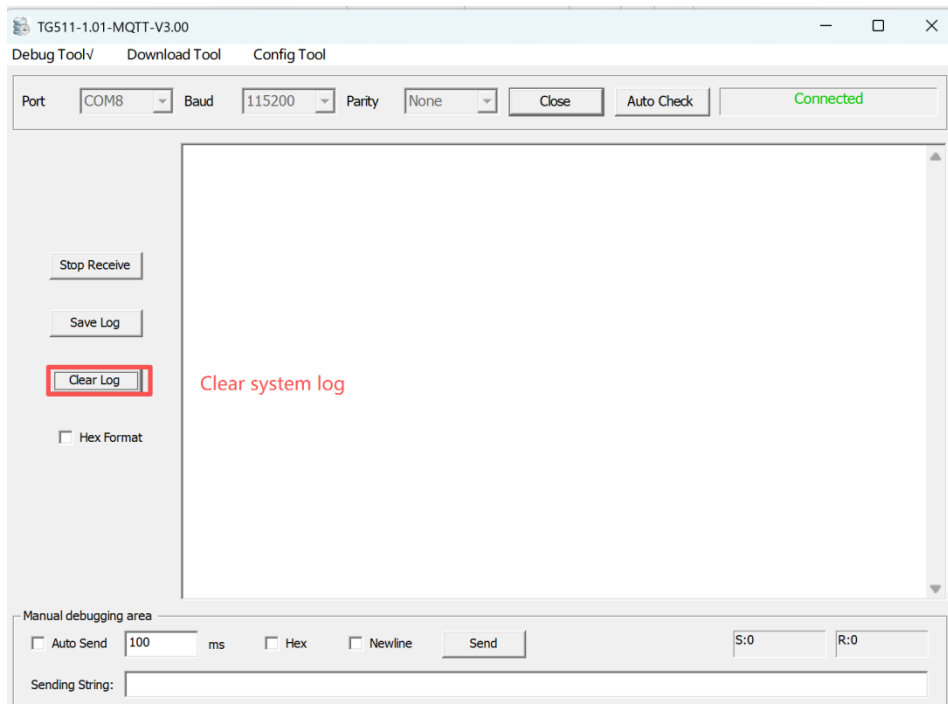
send ip pkt:
[10.218.221.160:49156-->211.97.147.92:10122][PSH ACK]Seq:8814 Ack:1839895212 [len=40]
10 26 00 04 4D 51 54 54 04 C2 17 70 00 09 31 32 |&..MQTT...p..12
33 34 35 36 37 38 39 00 05 61 64 6D 69 6E 00 08 |3456789..admin..
70 61 73 73 77 6F 72 64 |password

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

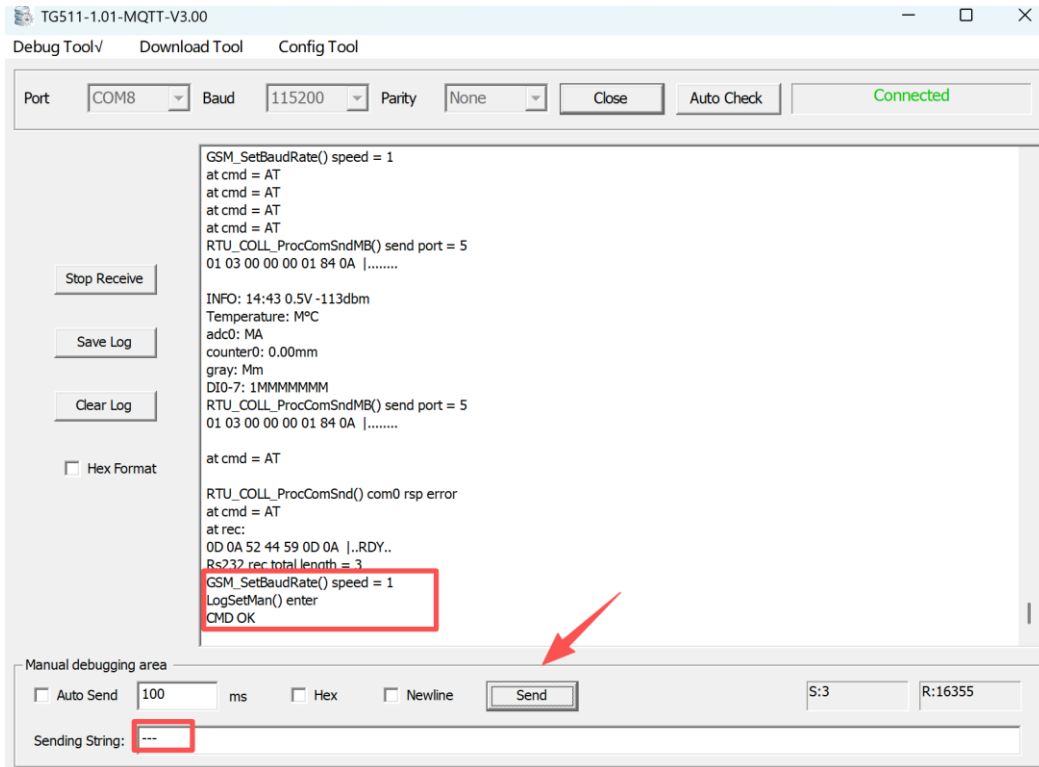
recv ip pkt:
[211.97.147.92:10122-->10.218.221.160:49156][ACK]Seq:1839895212 Ack:8854 [len=0]
RTU_COLL_ProcComSndMB() send port = 4
01 03 00 00 00 03 05 CB |.....

Éè±.: 14:18 23.6V -75dbm
Temperature: 22.00jæ
Humidity: 33.44%RH
01 03 06 00 16 A2 05 c2 8f 7c 0b RTU_COLL_ProcComCmd() len = 6
```

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

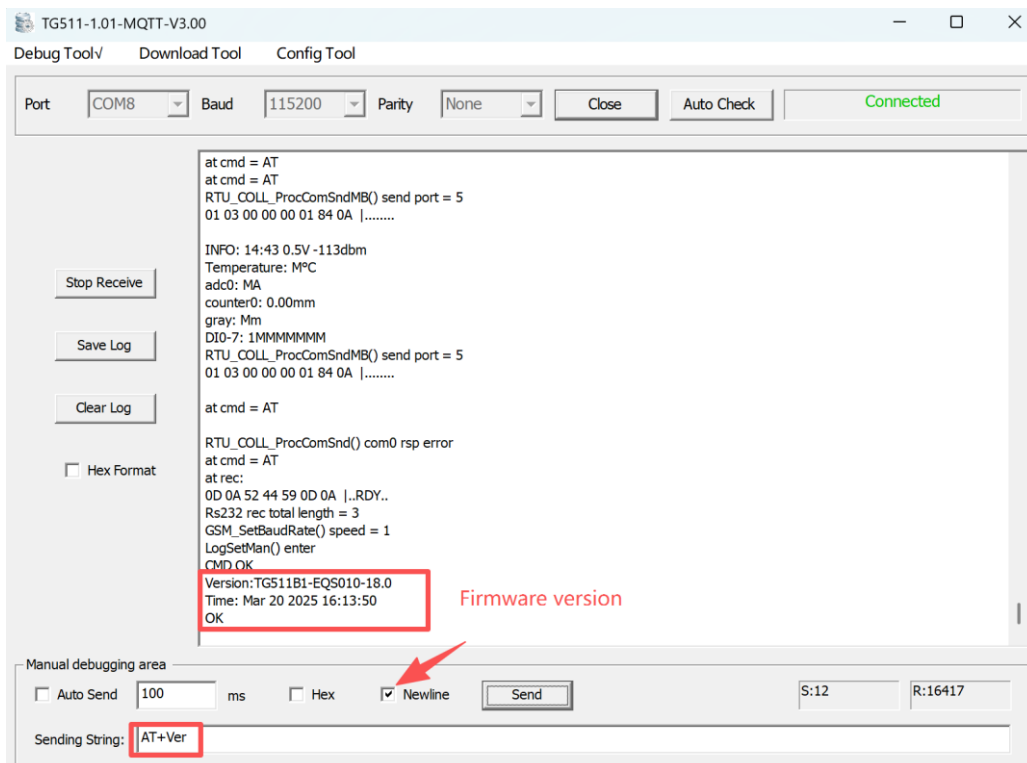


4. You can send AT commands in this command box. Send "---" to enter config mode.

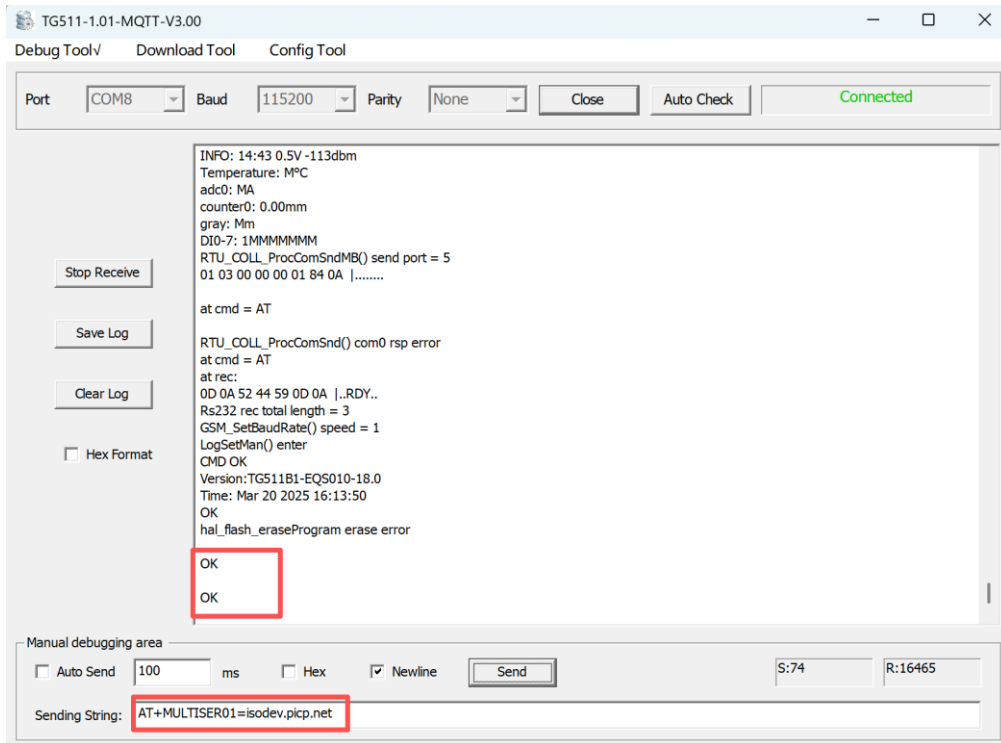


The following are examples of AT commands:

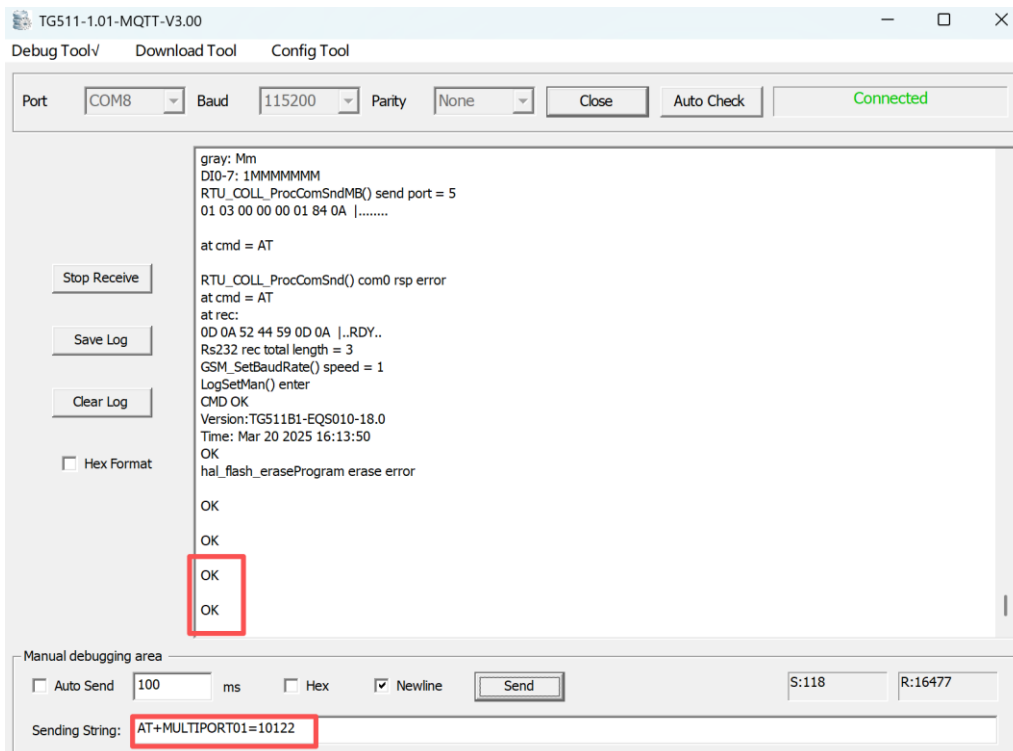
AT+Ver #Firmware version



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 TY511 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

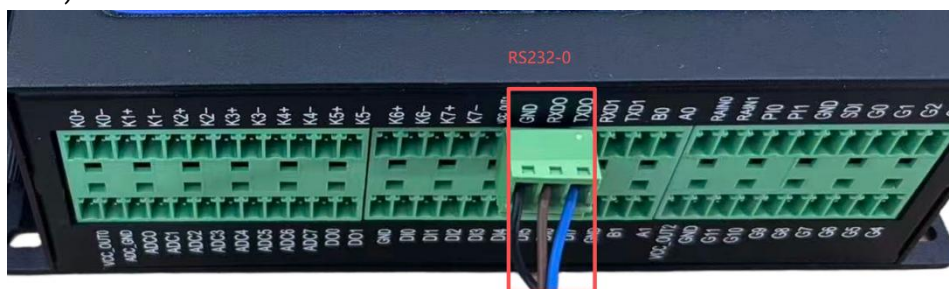
8. FAQ

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 TY511 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 TY511 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. TY511 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.

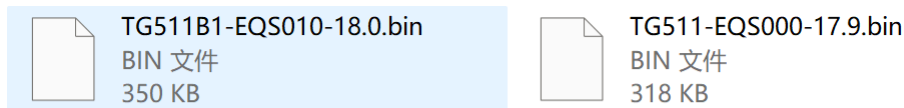
3. Select the correct COM number in your computer, and make sure the COM could be opened in the config tool.
4. Check whether the **baud rate** of TY511 is the same as computer COM. Default baud rate: 115200.

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 TY511-A, TY511-B?

1. TY511-A, TY511-B represents 2 different **hardware versions**.
 - TY511-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. TY511 has added a new PI interface in hardware, while the previous TG50-A did not have it. Besides, TY511-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.



Firmware for TY511-B

Firmware for TY511-A

4. Different hardware has its own independent config tool, you can go to [Bivocom website](https://www.bivocom.com) 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.

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 ftpc 1 CTCP 2 HTCP 3 NUDP 4 CUDP 5 HUDP Example: AT+TRANMODE01=1
Cache	AT+SERSVLENyy=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
APN Password	AT+USERPASSWORD=xx	xx: APN password value 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)	ATADCCURUPyy=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
6	Unsigned 32bit CDAB	Unsigned 32bit integer (4 byte)	Example: 01 03 02 11 22 33 44 C6 C3 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