Modbus/BACnet IP Gateway
GT200-BM-RS

User Manual

REV 1.3

SST Automation

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Catalog

1 Product Overview

1.1 Product Function

GT200-BM-RS is a gateway which can exchange data between Modbus serial protocol to the BACnet IP protocol. The gateway acts as the slave at the BACnet IP side and the master at the Modbus side.

1.2 Product Features

- Redundant power supply;
- One independent RS485 interfaces or RS232 interfaces with 1KV optical isolation;
- Ethernet 10/100M adaptive;
- Network security settings;
- Provides online scanning and configuration;
- Modbus command has auto demotion function and error handling functions;
- Easy-to-use configuration software SST-BM-CFG.

1.3 Technical Specifications

[1] The gateway can achieve the communication between BACnet and Modbus;

[2] Ethernet 10/100M adaptive;

[3] Supports up to 500 BACnet BIs, 300 BOs, 300 BVs, 500 AIs, 300AOs, 300 AVs, 500 MSIs and 100MSOs;

[4] Supports the following BACnet IP services: Who Is, I Am, Who Has, I Have, Read Property, Write Property, Read Property Multiple;

[5] Each serial port can support up to 100 Modbus commands;

[6] Serial interface is RS485 or RS232, half-duplex, and baud rate support: 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 bps; parity support: none, odd, even, mark, space; 1 or 2 stop bits optional;

[7] RS485 interfaces or RS232 interfaces with 1KV optical isolation;

[8] Power supply: 24VDC (11V ~ 30V), 90mA (24VDC);

[9] Operating temp: -4°F to 140°F (-20ºC to 60 ºC), relative humidity: 5% ~ 95% (non-condensing);

[10] External dimension (W*H*D): 1.57 in*4.92 in*4.33 in (40mm*125mm*110mm);

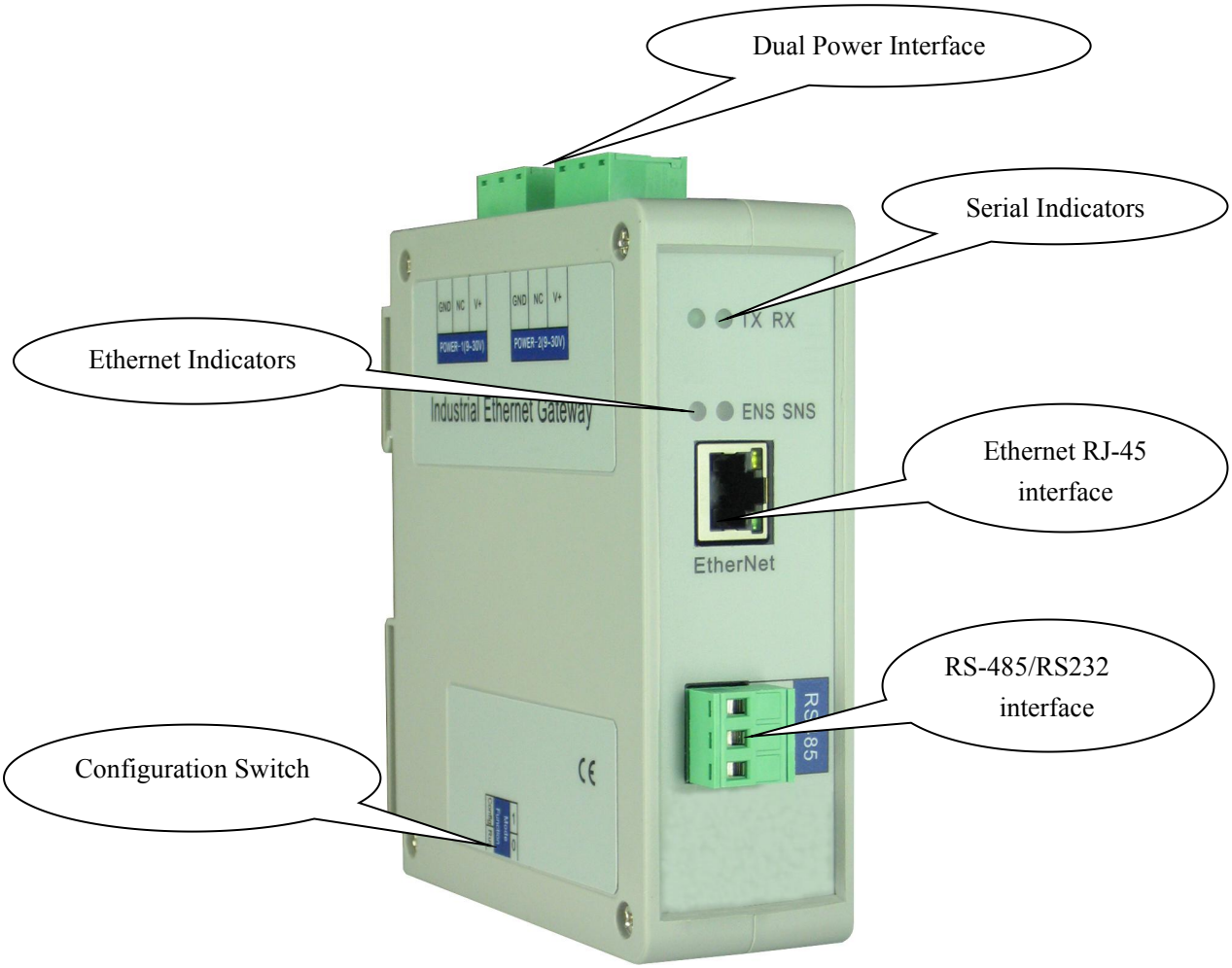
[11] Installation: 35mm DIN rail;

[12] Protection class: IP20;

[13]Test standard: EMC test standards.

2 Hardware Descriptions

2.1 Product Appearance

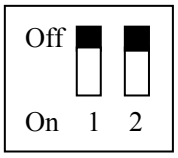


2.2 Indicators

Indicators	State	Description
ENS	Green On	IP address with no confliction
	Red On	IP address with confliction
	Red Blinking	DHCP, BOOTP, IP address conflict detection
SNS	Green On	BACnet IP interface data is received or transmitted
	Green Blinking	BACnet IP interface data is not received or transmitted
ENS (Orange) and SNS (Orange) (Orange: Red and green on at the same time)	Simultaneously On	At the power
	Blink Alternately	Configuration Mode
	Blink Alternately (for 3 seconds)	Use locating function
Serial TX	Green Blinking	Serial data sending
	OFF	No serial data is sending
Serial RX	Green Blinking	Serial data receiving
	OFF	No serial data is receiving

2.3 Configuration Switch

Configuration switch is located on the bottom of the gateway, bit 1 is mode bit, and bit 2 is function bit.



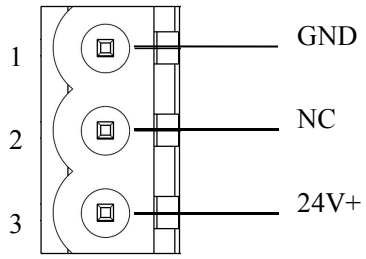
Mode (Bit 1)	Function (Bit 2)	Mode	Description
Off	Off	Run mode	BACnet IP and Modbus RTU data can be exchanged; Allow reading and writing configuration data. After reconfiguring GT200-BM-RS, it needs to restart. Then, the configuration will take effect.
Off	On	Run mode	BACnet IP and Modbus RTU data can be exchanged, prohibit reading and writing configuration data.
On	Off	Configuration Mode	IP address is fixed at 192.168.0.188; this mode can only read and write configuration data but cannot communicate between BACnetIP and Modbus RTU.
On	On	Configuration Mode	IP address is fixed at 192.168.0.188; this mode can only read configuration data but cannot communicate between BACnetIP and Modbus RTU.

Note: Restart GT200-BM-RS (power off and power on) after reconfiguring the configuration and the configuration will take effect!

2.4 Interface

2.4.1 Power Interface

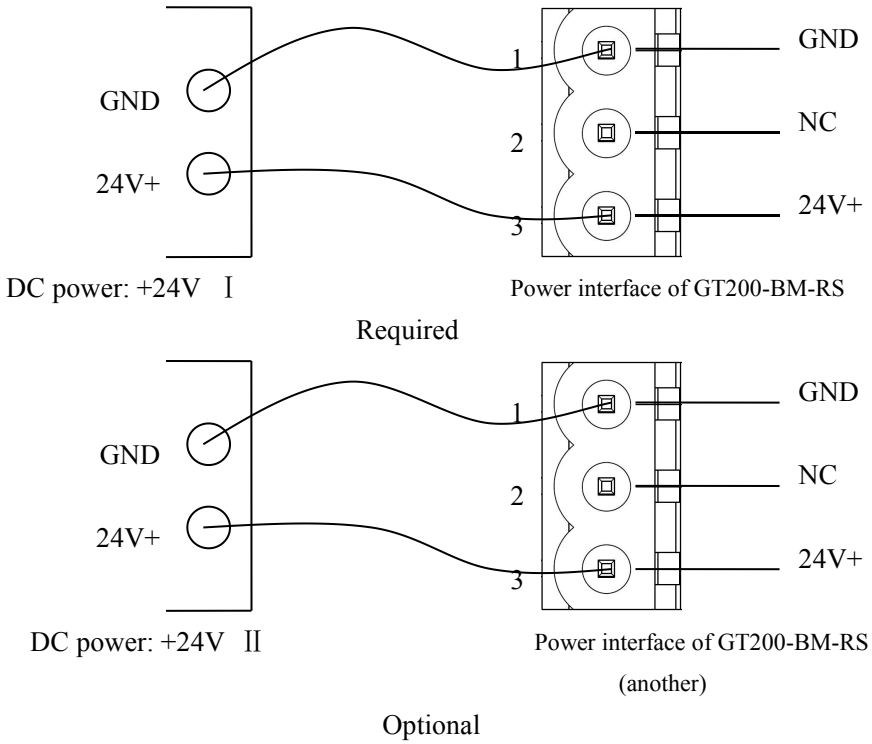
GT200-BM-RS uses a 24V DC power supply; it has two power interfaces with redundancy function. Users can use one or two power supply.



Pin	Function
1	GND
2	NC (Not Connected)
3	24V+, DC

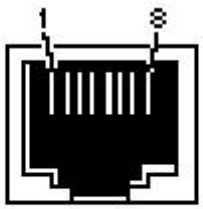
If users need to use one power supply for backup, when one supply fails, another power can continue to supply power to ensure the normal operation of the equipment.

Power wiring is shown as below:



2.4.2 Ethernet Interface

Ethernet interface uses RJ-45 connector, 10/100M adaptive. The pin definition (standard Ethernet signal) is shown as below:

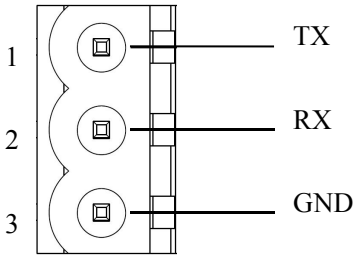


RJ-45 port

Pin	Description
S1	TXD+, Tranceive Data+, Output
S2	TXD-, Tranceive Data-, Output
S3	RXD+, Receive Data+, Input
S4	Bi-Directional Data+
S5	Bi-Directional Data-
S6	RXD-, Receive Data-, Input
S7	Bi-Directional Data+
S8	Bi-Directional Data-

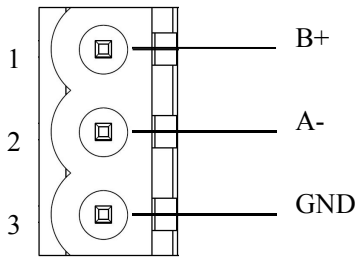
2.4.3 RS-232/RS-485 Interface

GT200-BM-RS supports one port RS232 or RS-485. RS232 interface pins are defined as follows:



Pin	Function
1	TX, connect with TX of user device
2	RX, connect with RX of user device
3	GND

RS485 interface pins are defined as follows:



Pin	Function
1	B+, RS485
2	A-, RS485
3	GND

The RS-485 interface of GT200-BM-RS is a standard one, and the RS-485 characteristics of the product are shown as follows:

1. The basic characteristics of RS-485 transmission technology

①Network topology: Linear bus, there are active bus terminal resistors at both sides.

②Transmission rate: 1200 bps~115.2Kbps.

③Media: Shielded twisted-pair cable and also can cancel the shielding, depending on environmental conditions (EMC).

④Site number: 32 stations per subsection (without repeater), and can increase up to 127 stations (with repeater).

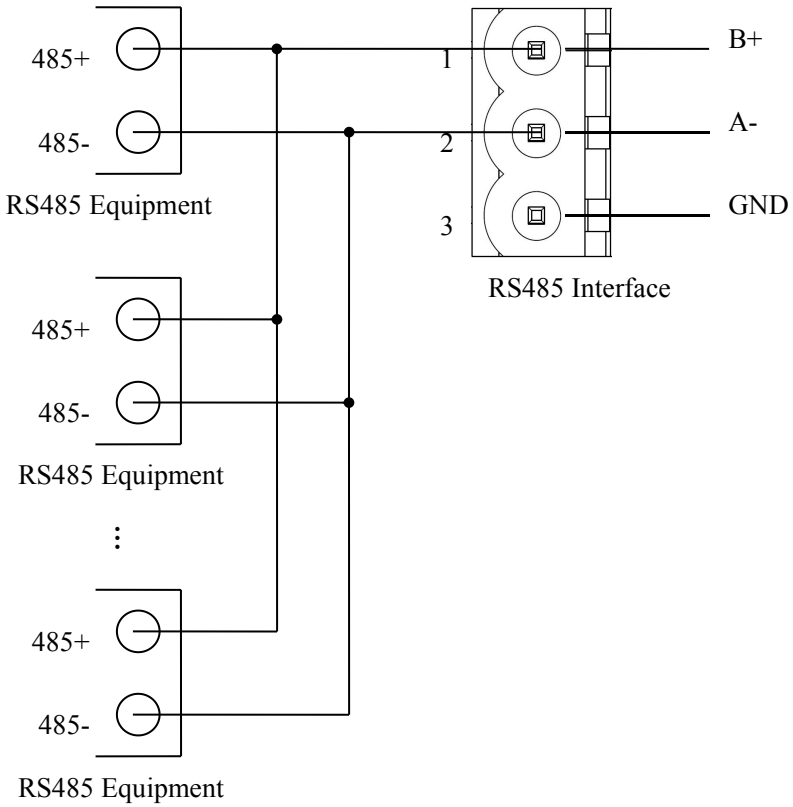
⑤Plug connection: 3-pin pluggable terminal.

2. The main points on the installation of RS-485 transmission equipment

①All the equipment are connected with RS-485 bus;

②Each Subsection can be connected up to 32 sites;

③The farthest two end of the bus has a terminal resistor - 120Ω 1/2W to ensure reliable operation of the network.



When RS485 communicates under the point-to-multipoint mode, in order to prevent the reflection and interference of the signal, it requires connecting a terminal resistor in the farthest two ends of the each line; the parameter is 120Ω 1/2W. There are no parallel terminal resistors at the serial port side of GT200-BM-RS.

3 Software Instructions

Double click the software application and install the configuration software SST-BM-CFG. You can easily follow the prompts to complete the installation, then open the installed configuration software and begin to configure the GT200-BM-RS.

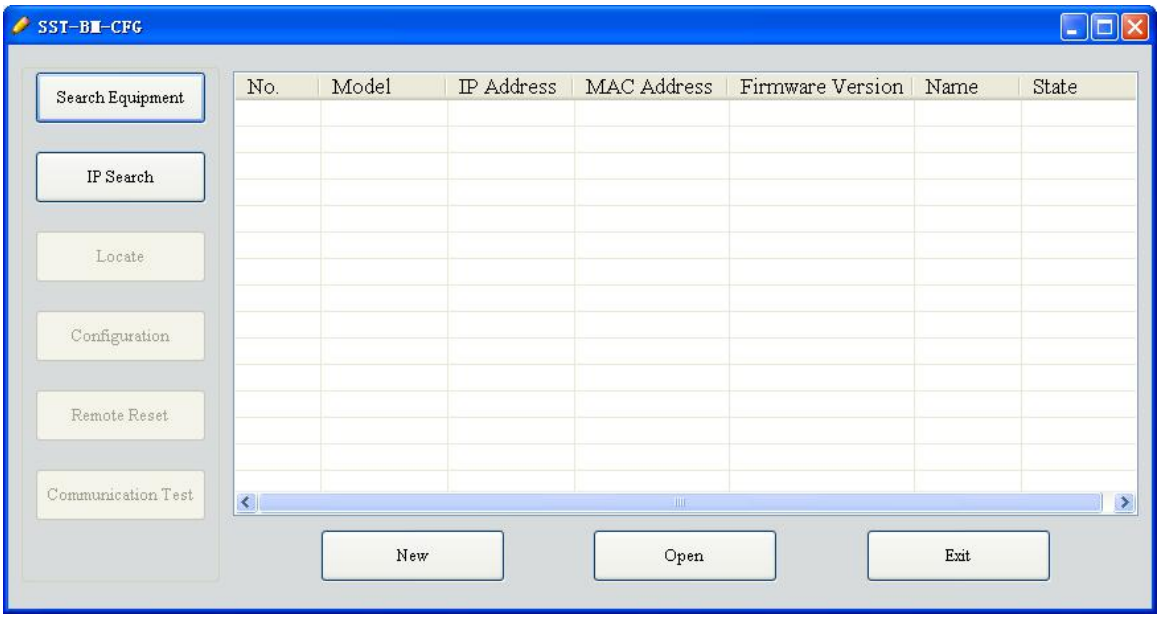
Notes: The factory network setting of GT200-BM-RS is DHCP. If the network does not have the DHCP server, the configuration switch (bit 1) should be in the configuration state (on), restart GT200-BM-RS gateway to let the settings take effect. The IP address of GT200-BM-RS is fixed 192.168.0.188, subnet mask is 255.255.255.0 and gateway address is 192.168.0.1.

3.1 Notes before Configuration

SST-BM-CFG is a product based on Windows platform, and used to configure parameters of GT200-BM-RS.

Please make sure the user's computer and the GT200-BM-RS which need to be configured are in the same network before you run the software.

Double click the icon to access the main interface:



3.2 Quick Start Guide

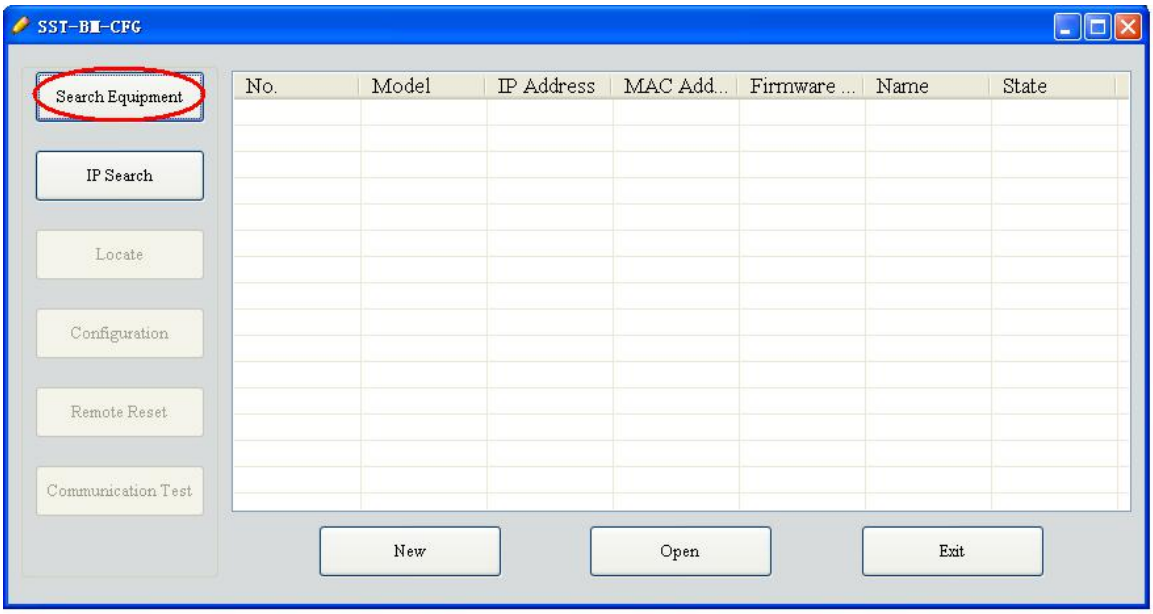
- Correctly wire the power line, network cable and RS485 cable;
- Power on the GT200-BM-RS gateway;
- According to actual field condition of your Modbus slave device, modify the GT200-BM-RS configuration according to this manual and download the configuration to the gateway;
- Connect with the Modbus slave devices;
- Connect with the BACnet IP master;

3.3 Scan Equipment

Before configuring parameters of GT200-BM-RS, the user need search the gateway using the software. The software provides two ways to search the gateway for the user.

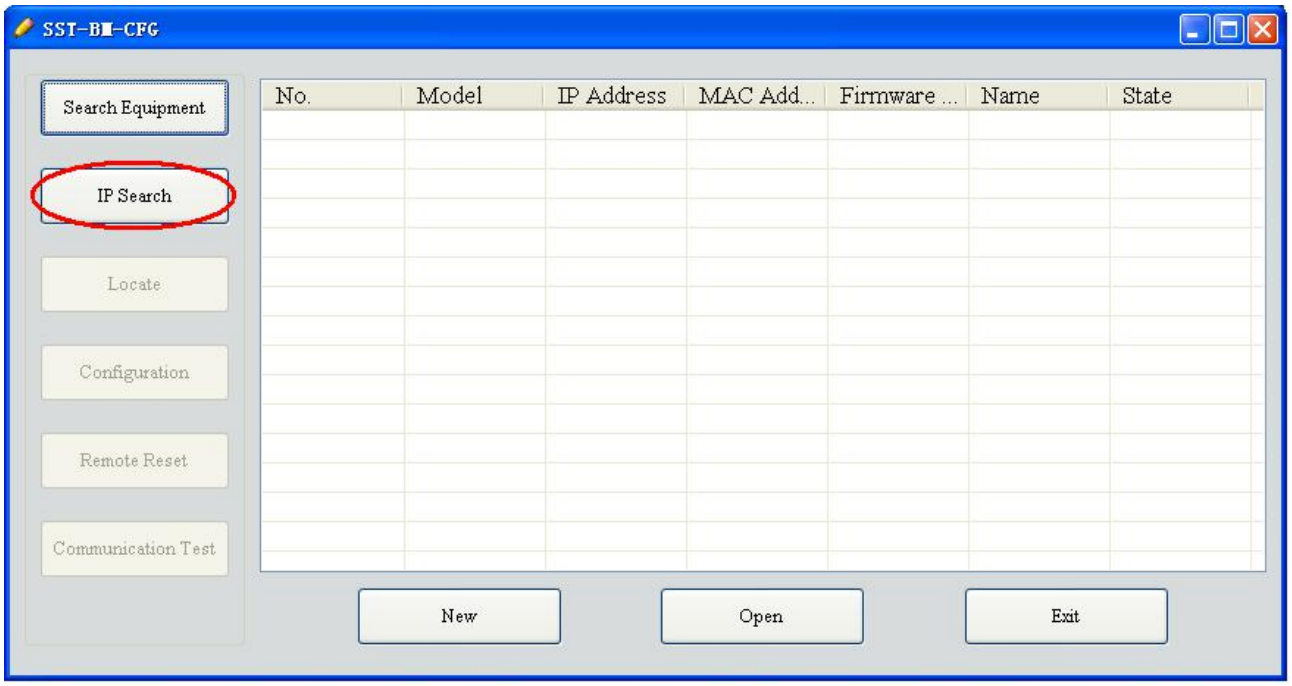
3.3.1 Scan All Equipment of Ethernet

Click "Search equipment" button of the main interface, the software will search all of the available GT200-BM-RS equipment and list them in the main interface.

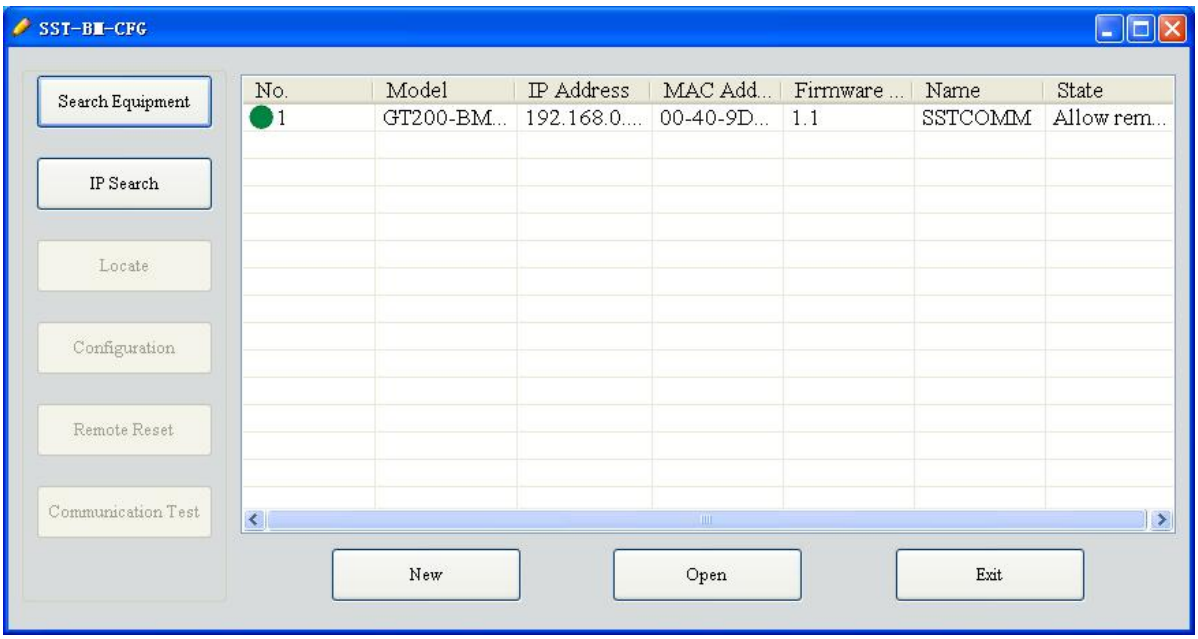


3.3.2 IP Search

Click "IP Search" button of the main interface will pop up a dialog box, and user need to enter the IP address of the equipment.



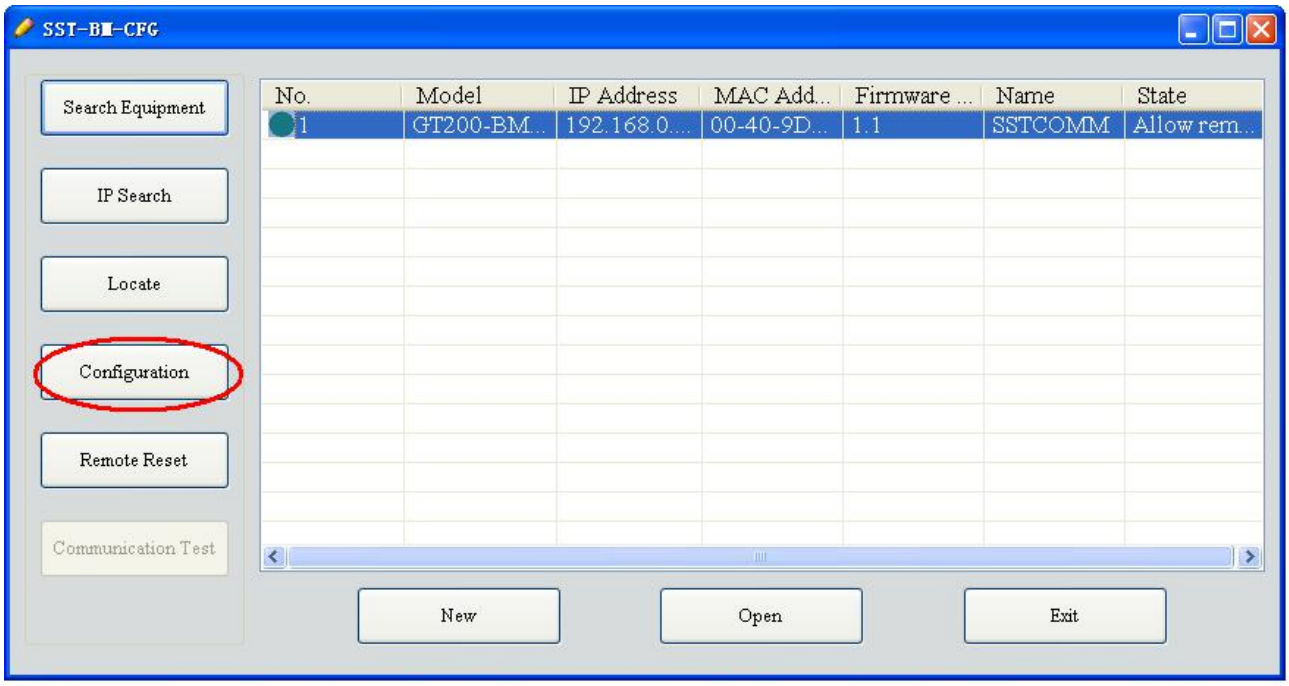
After entering the correct IP address, the software will search GT200-BM-RS with this IP address in the network, and list the information of the equipment in the main interface.



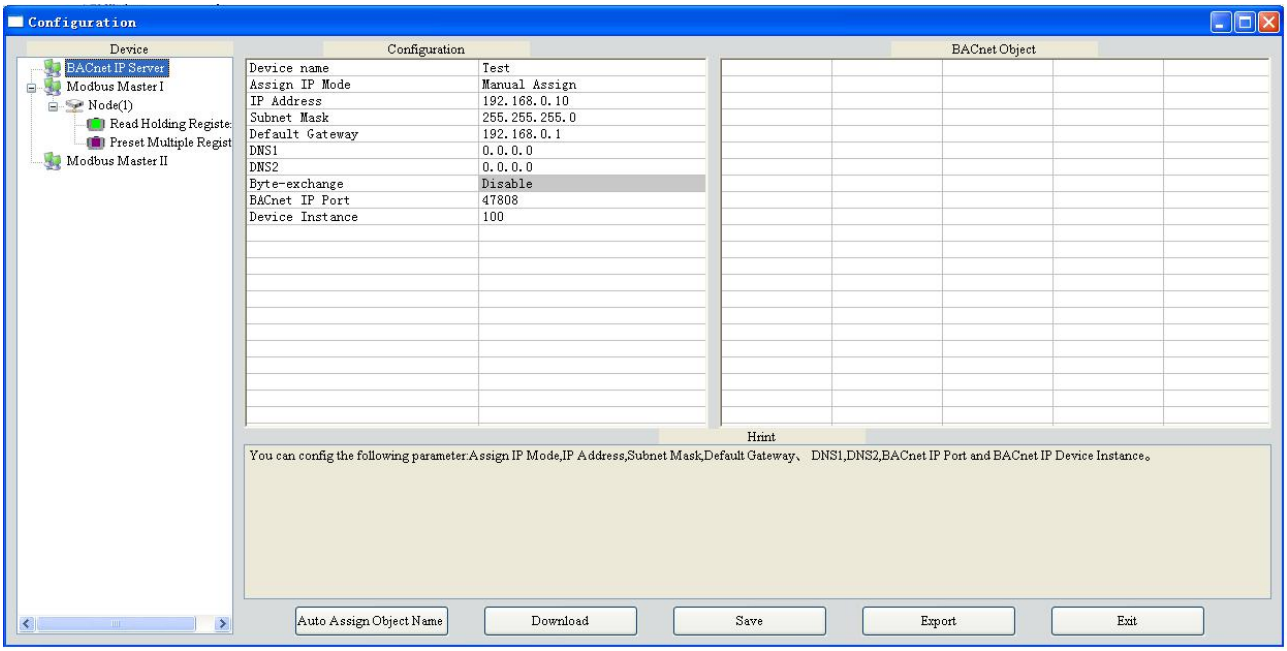
Note: If the users select the "IP search", users need to enter correct IP address or it will not search equipment.

3.4 Configuration

Select the equipment to be configured in the list, and the function like "Locate", "Configuration", "Remote Reset", "Import" and "Export" will become available:

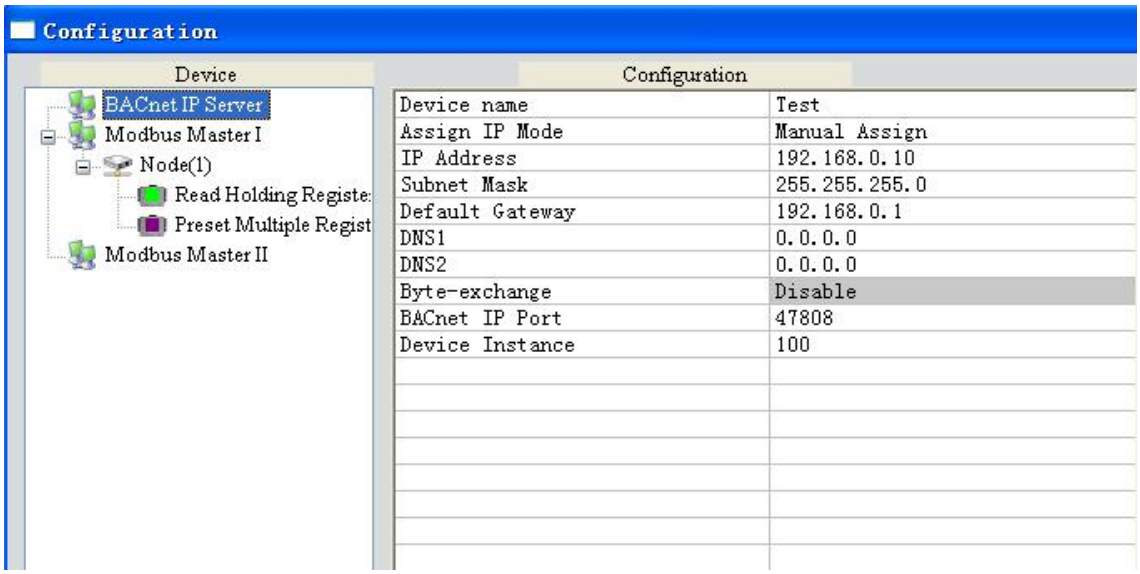


Click "Configuration" button will pop up the window:



3.4.1 Configure Ethernet Parameters

Ethernet parameters include: "Device name", "Assign IP mode", "IP Address", "Subnet mask", "Default Gateway", "DNS1", "DNS2".



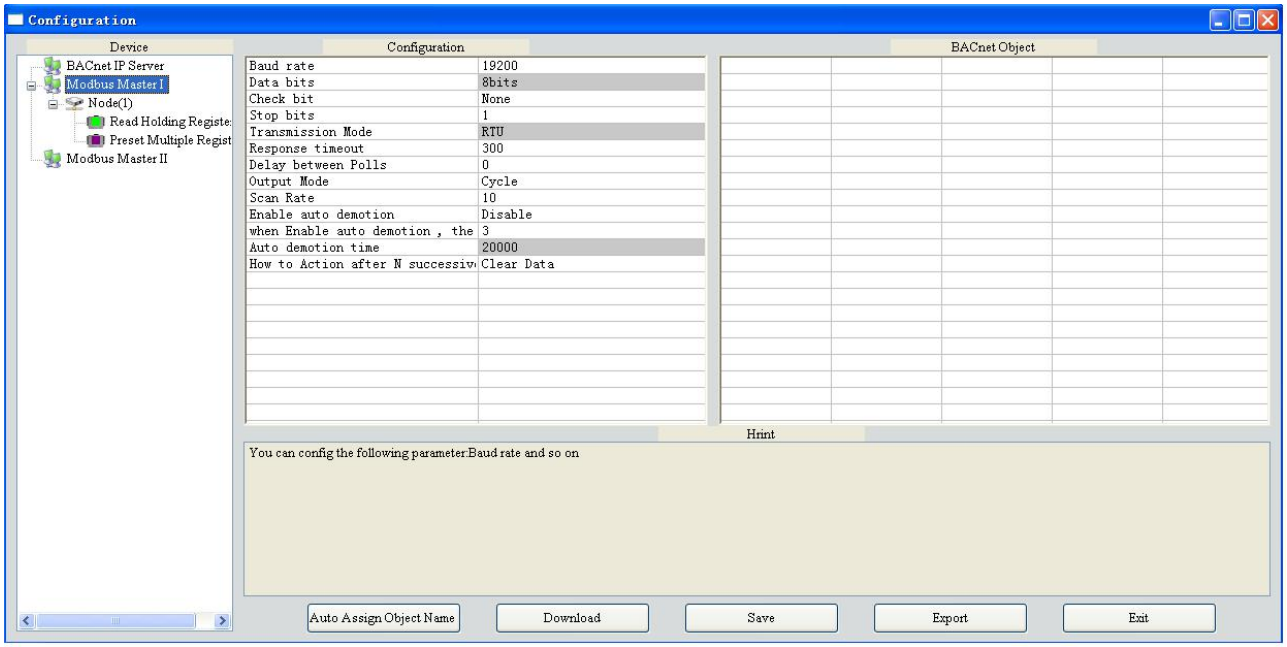
- Custom Name - Enter a name used to identify the device in order to distinguish from other devices;

  Note: The name cannot have spaces, up to 16 characters.

- Assign IP Mode - Set the IP address assign mode of the device;
- IP address - Set the IP address of the device;
- Subnet Mask - Set the subnet mask of the device;
- Default Gateway - Set the gateway address for the device;
- DNS1 - The first domain name server (LAN cannot set);
- DNS2 - Standby domain name server;
- Byte swap - Does not currently support;
- BACnet IP port - Set the BACnet IP port number of GT200-BM-RS;
- Device instance - Set device instance number GT200-BM-RS.

3.4.2 Configure Serial and Modbus Parameters

Serial parameters include: "Baud rate", "Parity", "Stop bits" and "Data bits" etc.



- Baud rate - 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400;
- Data bits - 8 (currently only support 8 data bits);
- Parity - None, Odd, Even, Mark, Space;
- Stop bit - 1, 2;
- Transmission mode -RTU;
- Response timeout - When the Modbus master send commands, the time waiting for response from the slave, the range is 300~60000ms;
- Delay between polls - After one Modbus command has been sent and has received correct response, the delay time before next command being sent, the range is: 0 ~ 2500ms;
- Output Mode - Modbus write command (command output) has two output modes: cycle and change of value output;

  Change of value: When the output data has changed, it outputs the write command and stop outputting after receiving correct response;

  Cycle: the same with Modbus read command output mode, and output according to the scan rate;
- Scan rate - Ratio of slow scan cycle to fast scan cycle;
- Automatic demotion – After n times Modbus command response failure to automatically degrade to slow scan;

- Enter automatic Demotion after N times commands failure - set the Modbus command times which need to be resent with no response;

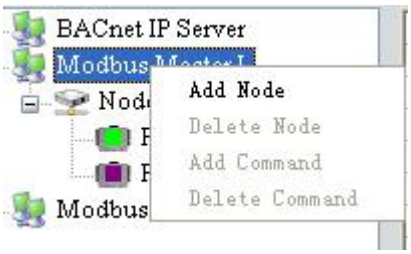
  Automatic demotion time - A fast scan command degrades to a slow scan command time, after which automatically restore to fast scan;

  How to action with Read command failure – After Modbus read command fails, how the gateway deal with BACnet input object: hold and clear; Hold is to keep the last correctly read values; clear is that the corresponding BACnet input object is cleared.

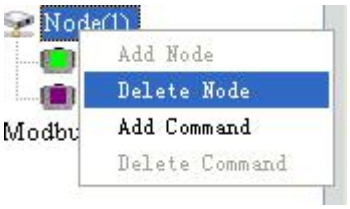
Note: The gray parts cannot be changed.

3.4.3 Configuration Commands

1. Increase and delete nodes. Right-click the "Modbus Master I", choose "Add Node".

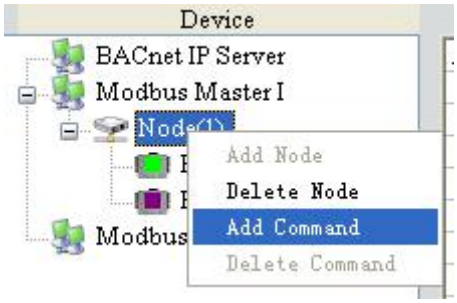


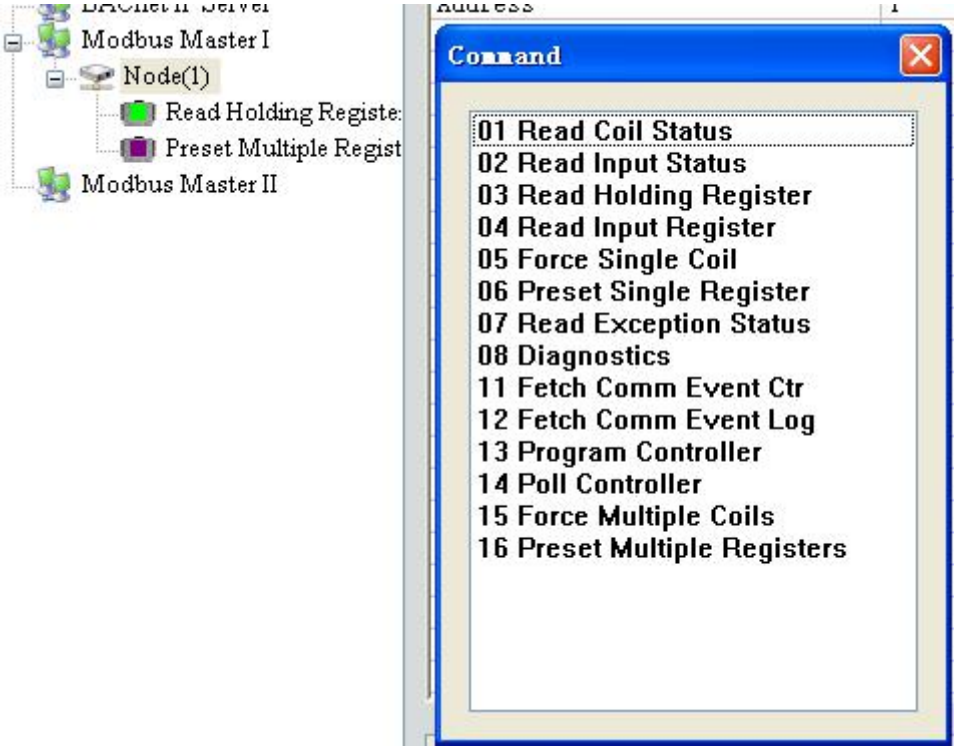
Right click the node and select "Delete Node".



2. Add command

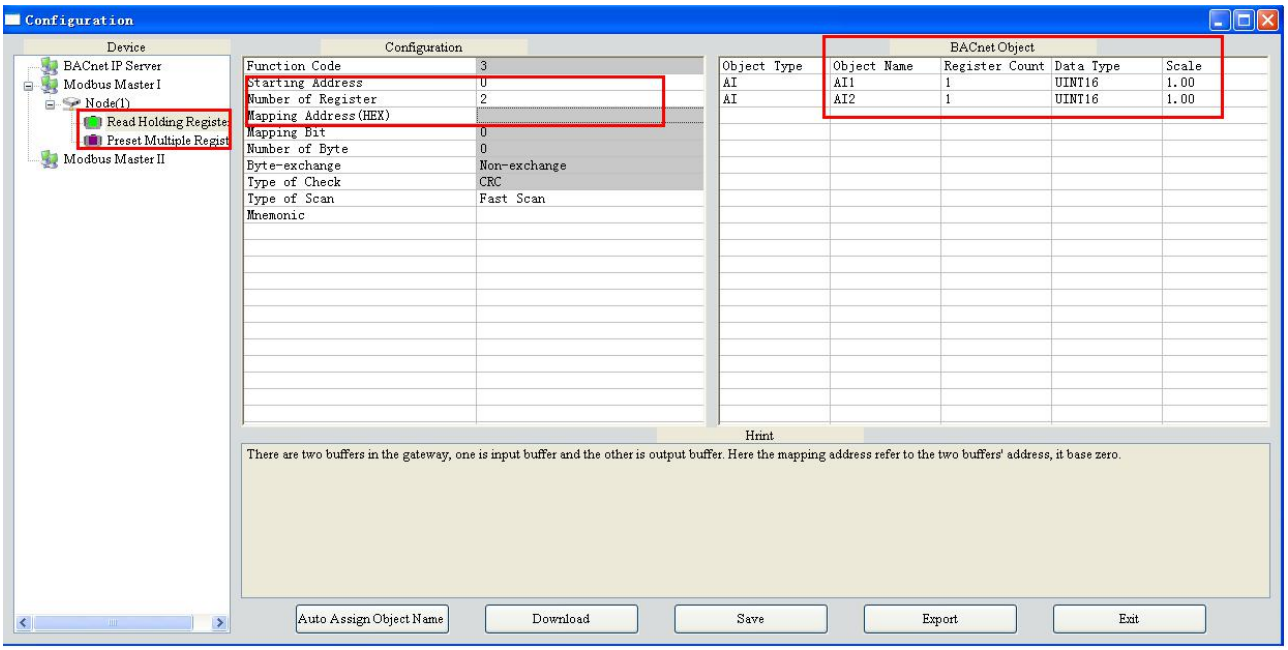
Right click "Node (x)" and select "Add Command".





Select one command; double click to add the command;

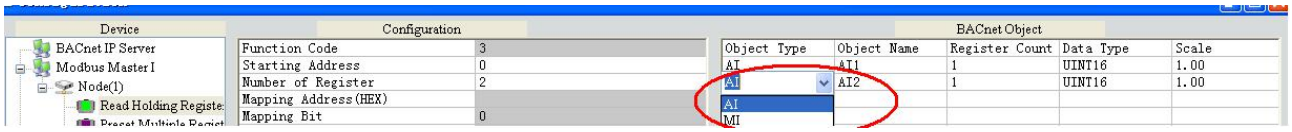
For each Modbus commands' setting, SST-BM-CFG will automatically map the Modbus commands to the corresponding BACnet objects after configuring.



Read coil Status - fill in the number of data, automatically mapped to BACnet BI (binary input). Take above picture as an example;

Read input status - mapped to BACnet BI (binary input);

Read Holding Registers - mapped to BACnet AI (analog input) or MI (multistate input); as is shown below, left click the "AI" will pop up the drop-down the menu.



See picture above:

- Object type: AI and MI optional, default is AI;
- Object Name: Editable, the maximum data length it supports is 12;
- Register Count: 1 and 2 optional, default is 1 (Map one Modbus register to a BACnet object);
- Data Types : BOOL, INT16 (signed 16-bit integer data), UINT16 (unsigned 16-bit integer data), INT32 (signed 32-bit integer data), INT32V (INT32 Inverse, contrary to high and low word INT32), UINT32 (unsigned 32-bit integer data), UINT32V (UINT32 Inverse, contrary to high and low word of UINT32), Float, and FloatV (Float Inverse, contrary to high and low word of Float) optional (different display for different types of BACnet object);
- Scaling: You can edit , range: 0.01 to 100, default: 1.0

Read Input Register - mapped to BACnet BO (binary output) or MI (multistate input), Optional;

Write Single Coil -mapped to BACnet BO (binary output) or BV (binary value), Optional;

Write Single Register -mapped to BACnet AO (analog output), AV (analog value) or MO (multistate output), Optional;

Write Multiple Coils - mapped to BACnet BO (binary output) or BV (binary value), Optional;

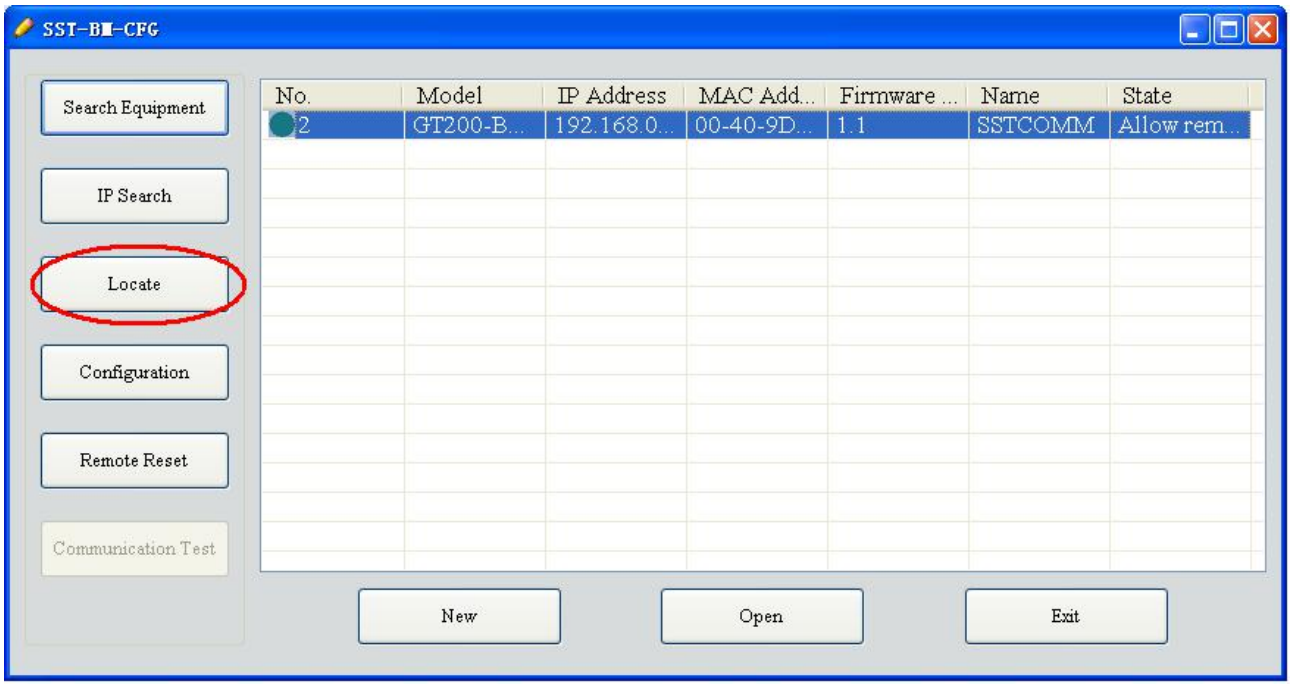
Preset Multiple Registers - mapped to BACnet AO (analog output), AV (analog value) or MO (multistate output), Optional;

3.5 Locate

When users manage multiple GT200-BM-RS gateways, the "locate" function can be used to determine which device you are configuring.

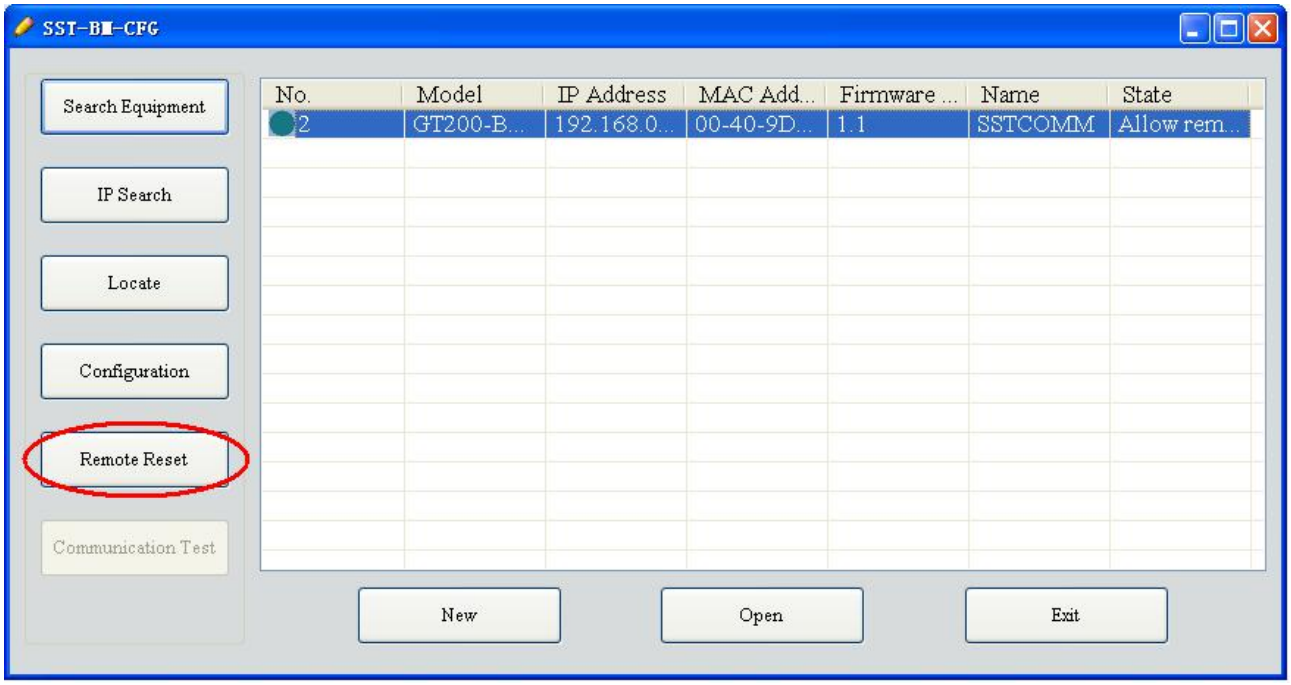
Users click on the "locate" button and the device is still in the network, two orange indicator of the device

alternately blinks a few seconds in order to find the device.



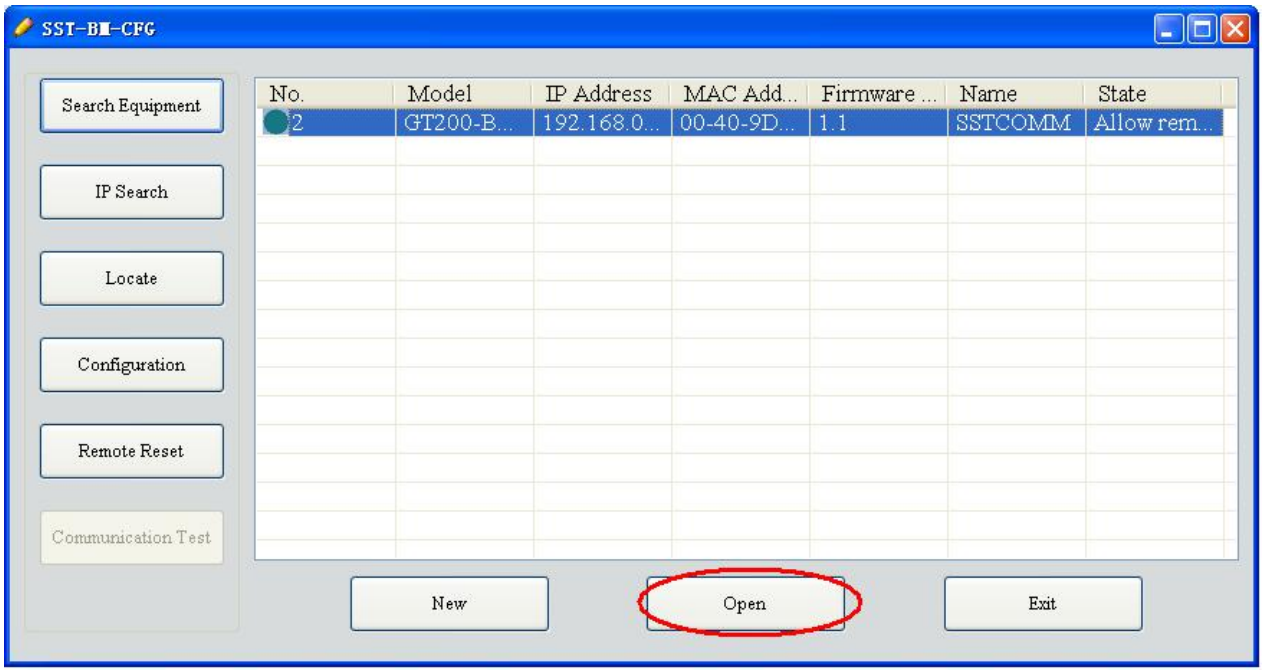
3.6 Remote Reset

The function of "remote reset" is restarting the selected device. Select the equipment in the list first, click "Remote reset" button, it will pop up a confirmation dialog, then click "OK" to complete the operation.

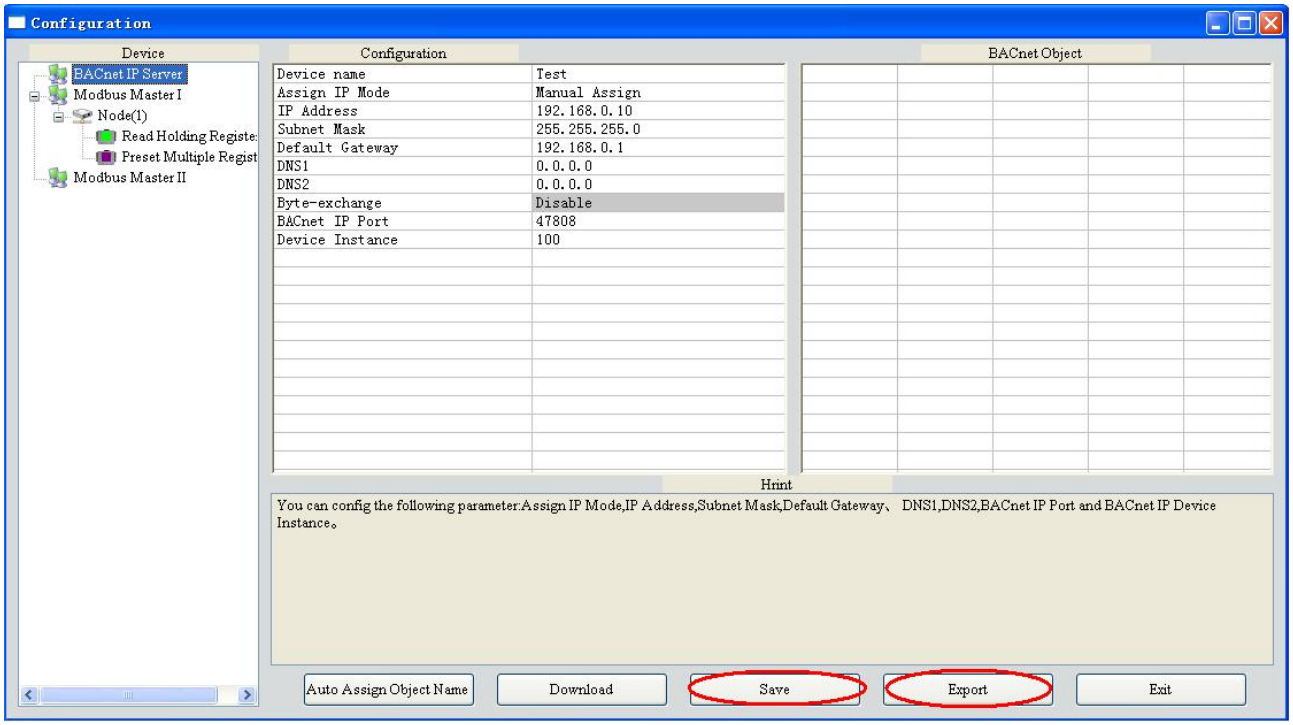


3.7 Open Configuration/Save Configuration

- Open the configuration - open and display the configuration data which is saved on the computer;

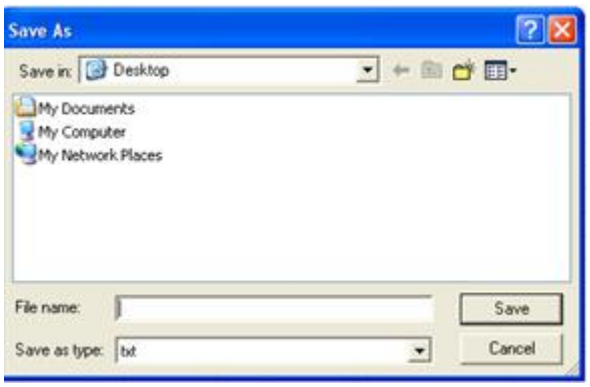


- Export to Excel - the configuration parameters are saved to the computer (xls), one-to-one mapping relationship of each Modbus command and BACnet objects. They can easily be seen from the export of Excel;
- Save - save the configuration parameters to a computer (. chg), for later viewing, attention to save this file;
- Select the device in the list, click on the "save" or "Export" button and select the path to complete the operation.



Note: The parameters are saved in the document, you can make changes to the data inside but please ensure correctness of the data, or incorrect data will be processed in accordance with the default values. Do not change the data keyword, and do not add spaces.

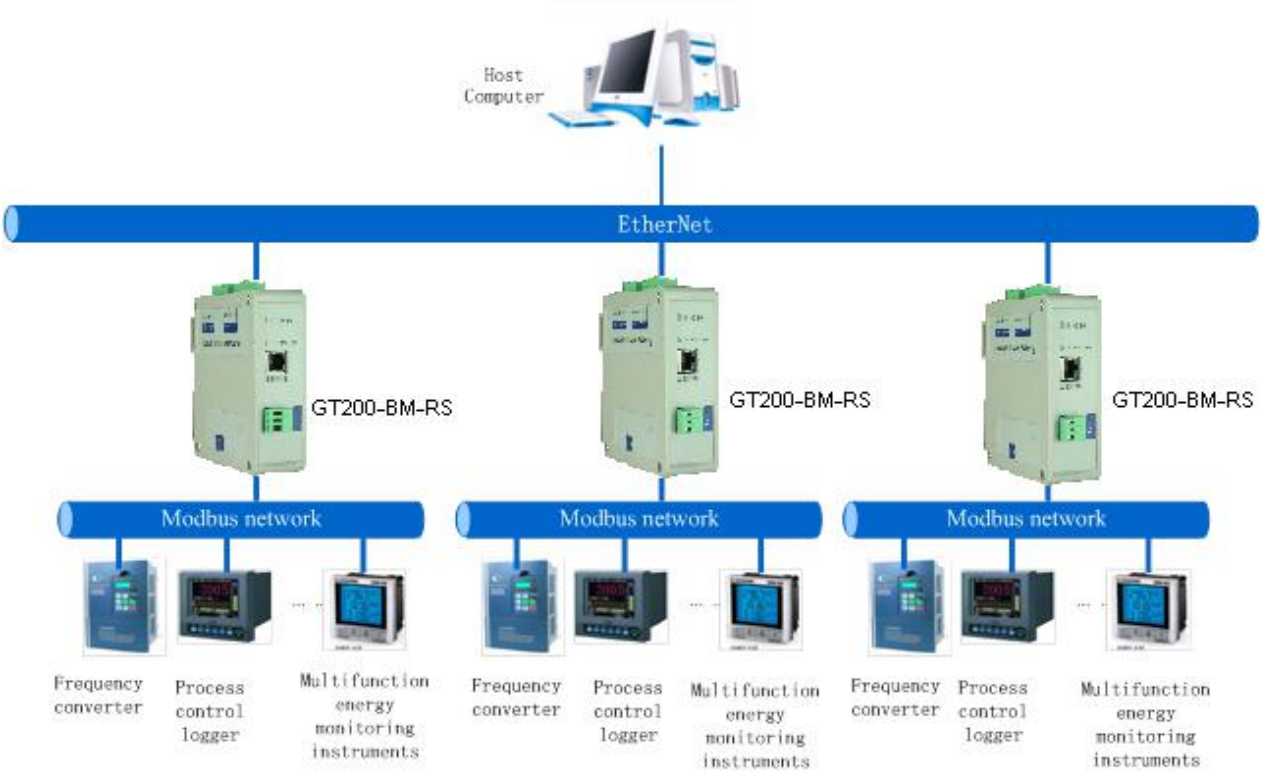
Do not change the keyword of data, and do not add spaces.



4 Typical Application

GT200-BM-RS can connect Modbus slave devices to Ethernet bus. GT200-BM-RS is a bridge in the communication, and completes the conversation between BACnet and Modbus RTU.

The following is the typical application of GT200-BM-RS.

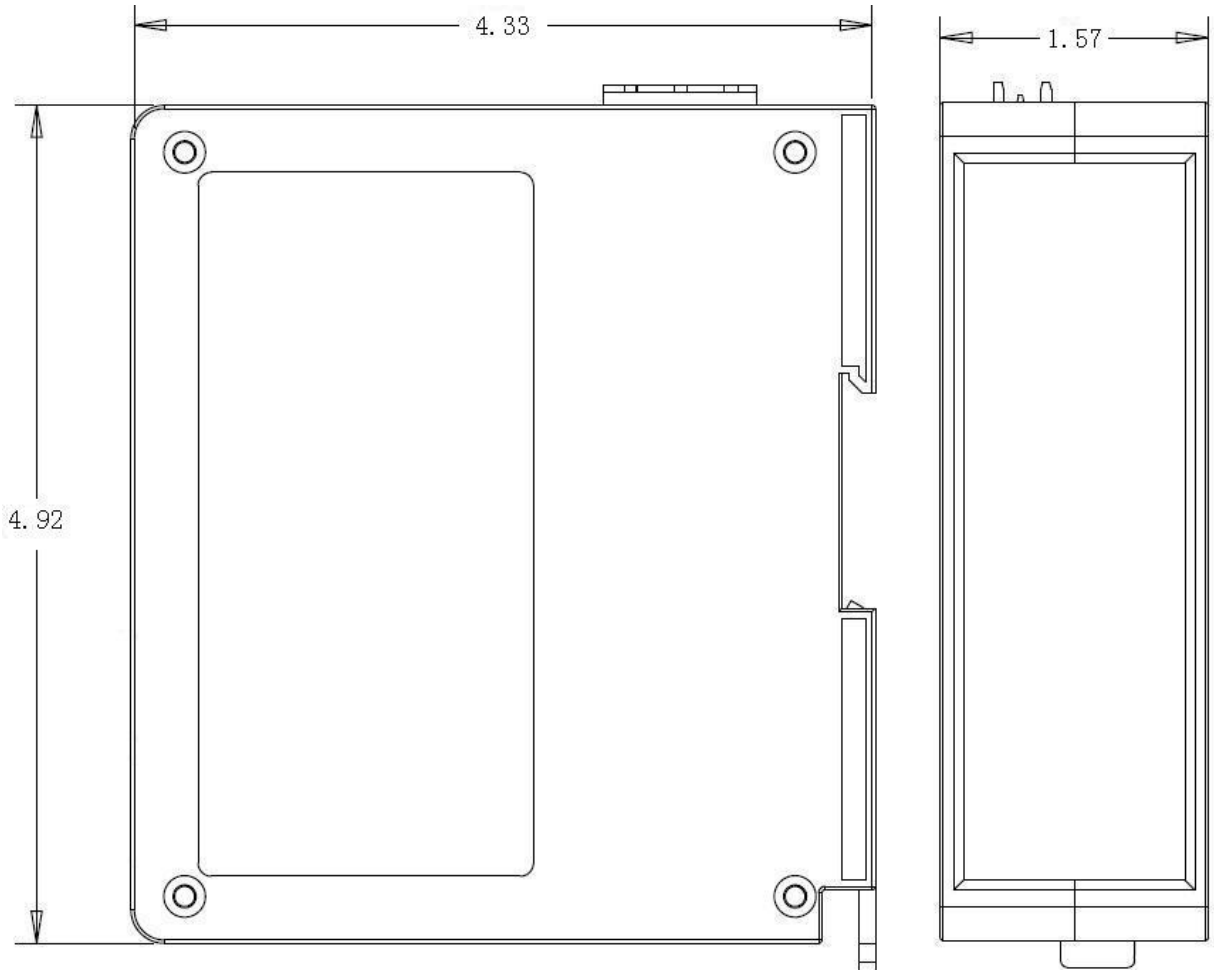


For example: The above chart multifunction energy monitoring instrument is a current measuring meter with Modbus slave station interface, the measurement of the current value is stored in the address 40001. In the SST-BM-CFG, configure the No.03 function code, start address is 0 (corresponds to the Modbus register 40001 address), and then the SST-BM-CFG will be automatically mapped to the BACnet object AnalogInput (analog input). On the BACnet master PC, the current value can be observed through corresponding AnalogInput.

5 Installation

5.1 Machine Dimension

Size: 1.57 in (width)*4.92 in (height)*4.33 in (depth)



5.2 Installation Method

Using 35mm DIN rail