Modbus / BACnet IP Gateway
GT200-BM-RS/2RS

User Manual

V 1.5

SST Automation

Email: support@sstautomation.com

www.sstautomation.com

Important Information

Warning

The data and examples in this manual cannot be copied without authorization. SST Automation reserves the right to upgrade the product without notifying users.

The product has many applications. The users must make sure that all operations and results are in accordance with the safety of relevant fields, and the safety includes laws, rules, codes and standards.

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Technical Support Contact Information

www.sstautomation.com

E-mail: support@sstautomation.com

Catalog

1 Product Overview 1
1.1 Product Function 1
1.2 Product Features 1
1.3 Technical Specifications 1
1.4 Revision History 2
2 Hardware Descriptions 3
2.1 Product Appearance 3
2.2 LED Indicators 4
2.3 Configuration Switch 4
2.4 Interfaces 5
2.4.1 Power Interface 5
2.4.2 Ethernet Interface 5
2.4.3 RS-485 Interface 6
3 Hardware Installation 7
3.1 Mechanical Dimension 7
3.2 Installation Method 9
4 How to Start 10
4.1 Hardware Connection 10
4.2 Software Configuration 11
5 Software Instructions 12
5.1 Notes before Configuration 12
5.2 Search Equipment 13
5.2.1 Search All Equipment of Ethernet 13
5.2.2 IP Search 13
5.3 Configuration 14
5.3.1 Configure Ethernet Parameters 15
5.3.2 Configure Serial and Modbus Parameters 16
5.3.3 Command Configuration 18
5.4 Locate 20
5.5 Remote Reset 21
5.6 Open and Save Configuration 22
6 Typical Application 24

1 Product Overview

1.1 Product Function

GT200-BM Series gateways can exchange data between Modbus RTU to the BACnet IP. The GT200-BM series gateways act as the server at BACnet IP side and the master at Modbus side.

GT200-BM Series include two gateways:

SKU	Number of Serial Interfaces
GT200-BM-RS	One RS-485 interface
GT200-BM-2RS	Two RS-485 interfaces

Note: This manual applies to GT200-BM-2RS of V1.4/1.5 and GT200-BM-RS of V1.4/1.5.

1.2 Product Features

- Redundant power supply.
- RS485 interface(s) with 1KV optical isolation.
- Ethernet 10/100M adaptive.
- Network security settings.
- Network scanning and online/offline configuration.
- Modbus command has auto demotion function and error handling functions.
- Easy-to-use configuration software SST-BM-CFG.

1.3 Technical Specifications

[1] Data communication between BACnet IP and Modbus RTU.

[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, and maximum number of BACnet IP objects is 1264.

[4] Supported BACnet IP services: Who Is, I Am, Who Has, I Have, Read Property, Write Property, Read Property Multiple.

[5] Supports up to 100 Modbus commands in each serial interface. Supported Modbus function code: 01, 02, 03, 04, 05, 06, 15, 16.

[6] RS-485 serial interface(s) of half-duplex. Supported baud rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 bps. Parity: none, odd, even, mark, space. Stop bits: 1 or 2.

[7] 1KV optical isolation on each RS-485 interface.

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

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

[10] External dimension (W*H*D):

GT200-BM-2RS: 1.33in*4.56in*4.21in (34mm*116mm*107mm).

GT200-BM-RS: 1.6 in*5.0in*4.4in (40 mm*125mm*110mm).

[11] Installation: 35mm DIN rail.

[12] Protection class: IP20.

[13] Test standard: EMC test standards.

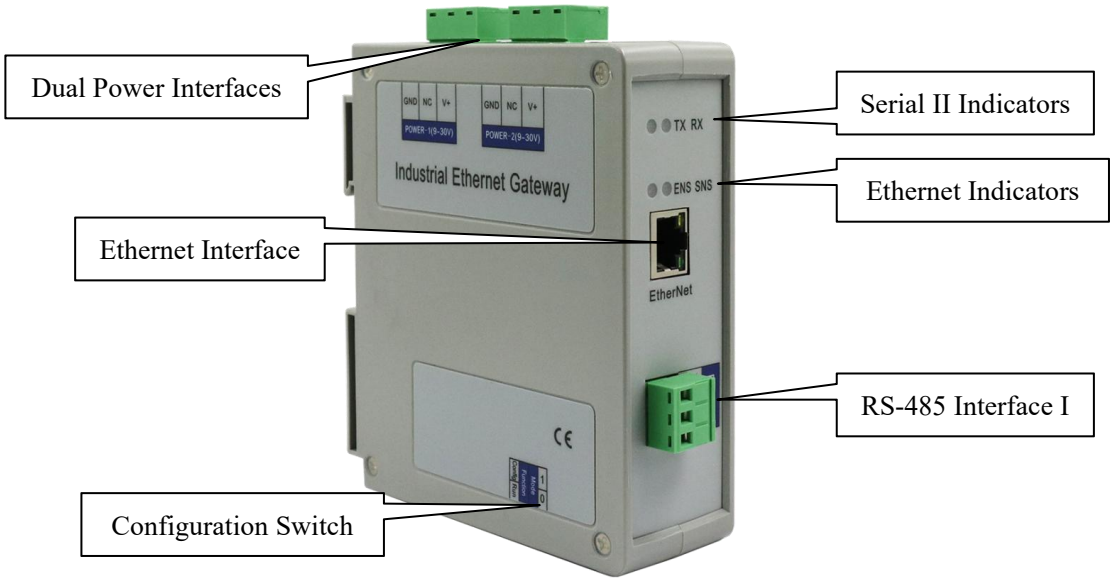
1.4 Revision History

Revision	Date	Chapter	Description
V1.5	8/2/2021	All	New release as universal manual for GT200-BM-RS and GT200-BM-2RS.

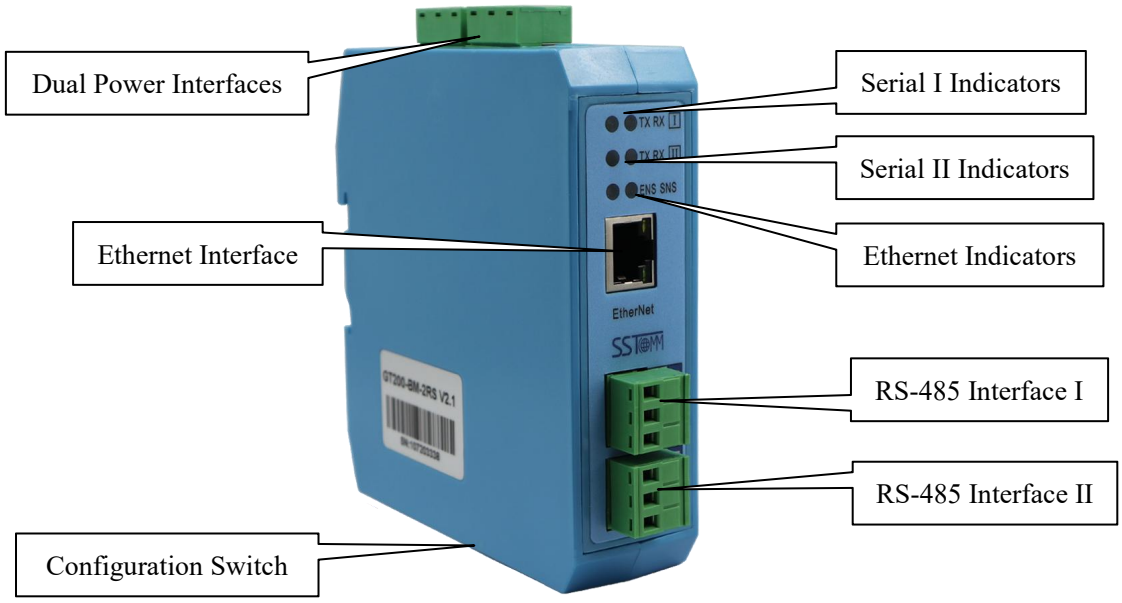
2 Hardware Descriptions

2.1 Product Appearance

GT200-BM-RS



GT200-BM-2RS



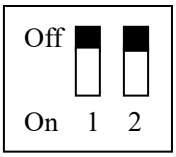
Note: This picture is for reference only. The product appearance is subject to the actual product.

2.2 LED 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&SNS (Orange)	Simultaneously On	At the power
	Blink Alternately	Configuration Mode
	Blink Alternately (for 3 seconds)	Use locating function
Serial I/II TX	Green Blinking	Serial data sending
	OFF	No serial data is sending
Serial I/II 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.



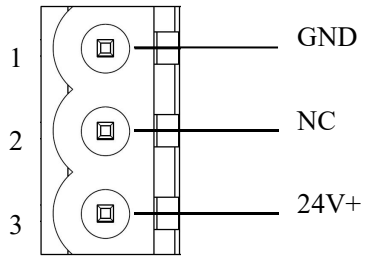
Mode (Bit 1)	Function (Bit 2)	Mode	Description
Off	Off	Run mode	Allows configuration and communication.
Off	On	Run mode	Allows communication. Prohibit configuration.
On	Off or On	Configuration mode	IP address is fixed at 192.168.0.188. Allows configuration. Prohibit communication.

Note: To apply mode switching, please restart the gateway.

2.4 Interfaces

2.4.1 Power Interface

Two power interfaces with a power redundancy function. When one of the power supplies lose power, the other power supply will continuously power the gateway.



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

Notes: Connecting the second power supply is optional as it offers redundancy.

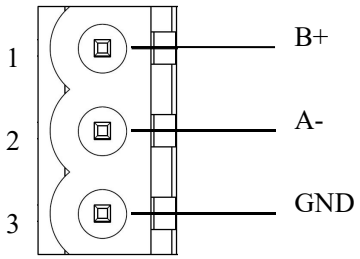
2.4.2 Ethernet Interface

Ethernet interface is a RJ-45 connector, 10/100M adaptive.

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-485 Interface

GT200-BM series support standard RS-485 interface



Pin	Description
1	B+, connected to RS-485 D+
2	A-, connected to RS-485 D-
3	GND

Note:

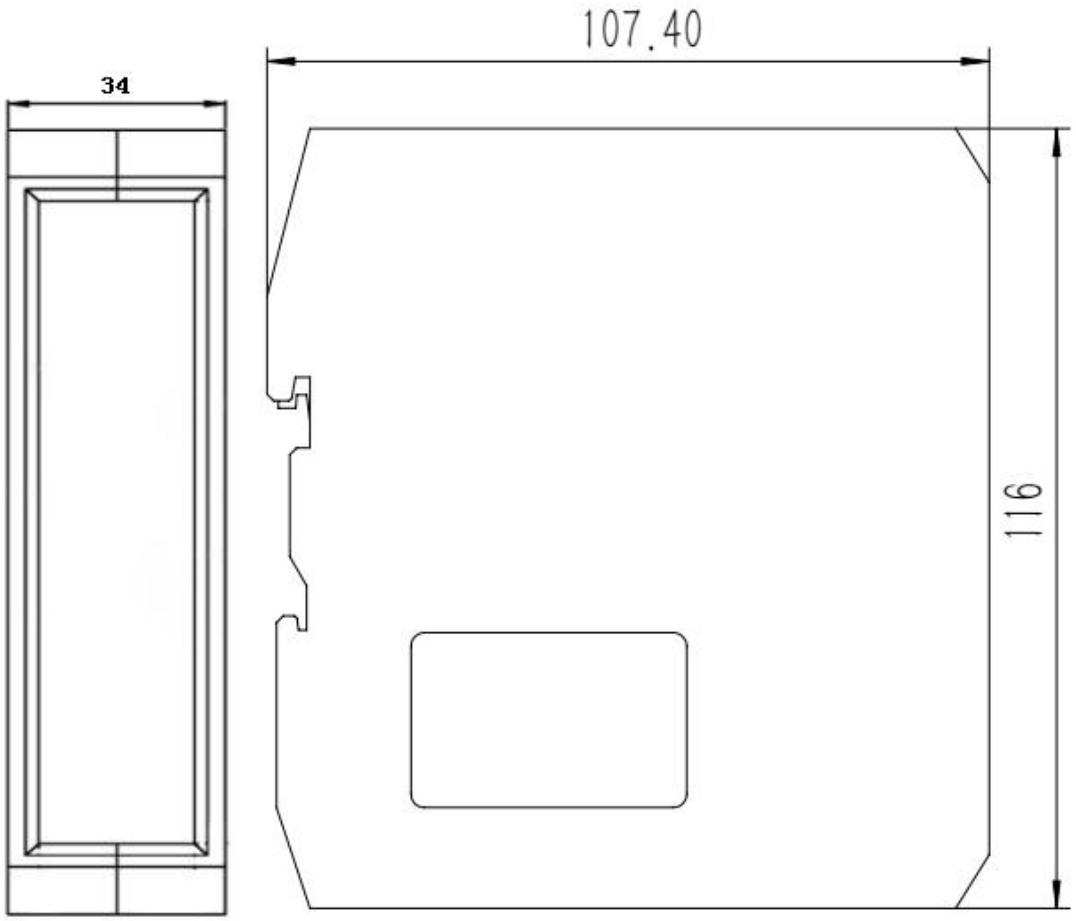
When communicating in RS485 interfaces, in order to prevent the reflection and interference of the signal, it's recommended to connect a terminal resistor (120Ohm, 1/2W) parallel with the communication wires at both farthest ends of the network. The GT200-BM series gateways do not have the terminal resistor.

3 Hardware Installation

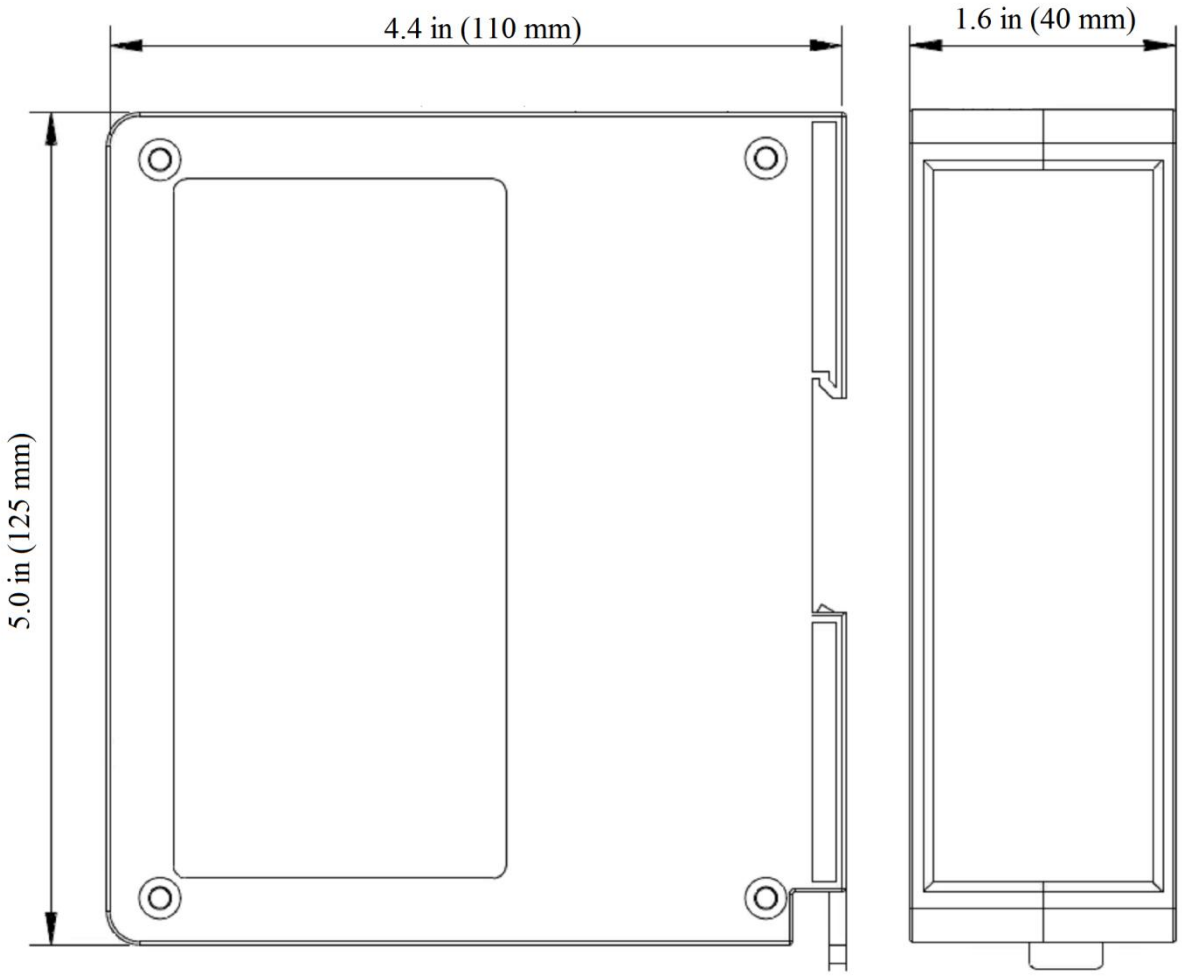
3.1 Mechanical Dimension

Size (width * height * depth):

GT200-BM-2RS Size: 1.33in * 4.56in * 4.21in (34mm * 116mm * 107.4mm)



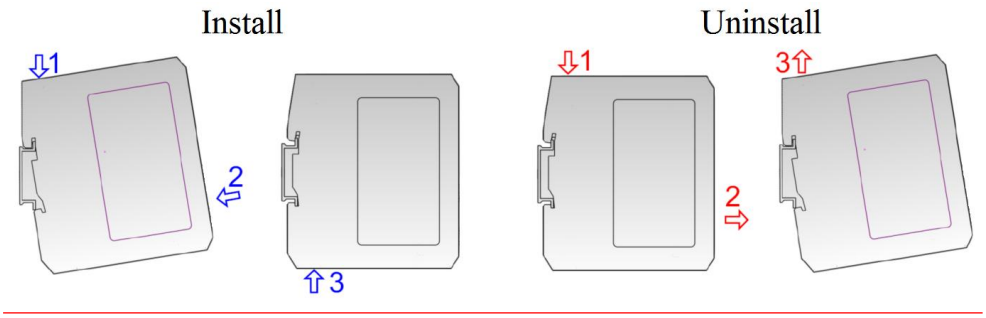
GT200-BM-RS size: 1.6 in * 5.0 in * 4.4 in (40 mm * 125 mm * 110 mm)



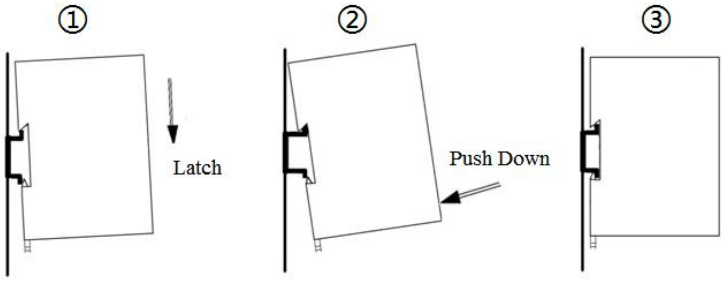
3.2 Installation Method

Using 1.38 in (35 mm) DIN RAIL.

Install and uninstall the gateway (GT200-BM-2RS)

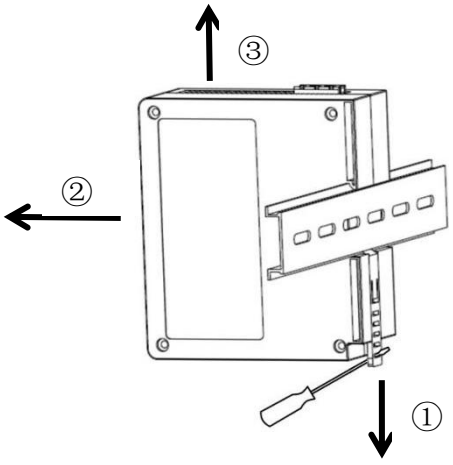


Install the gateway (GT200-BM-RS)



Uninstall the gateway (GT200-BM-RS)

1. Use a screwdriver to pass through the DIN RAIL bar, pull down and hold.
2. Pull out the gateway.
3. Lift up the gateway.

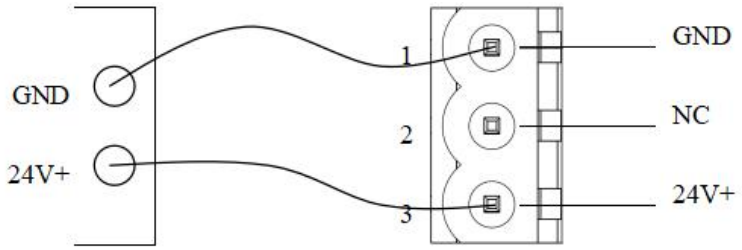


4 How to Start

4.1 Hardware Connection

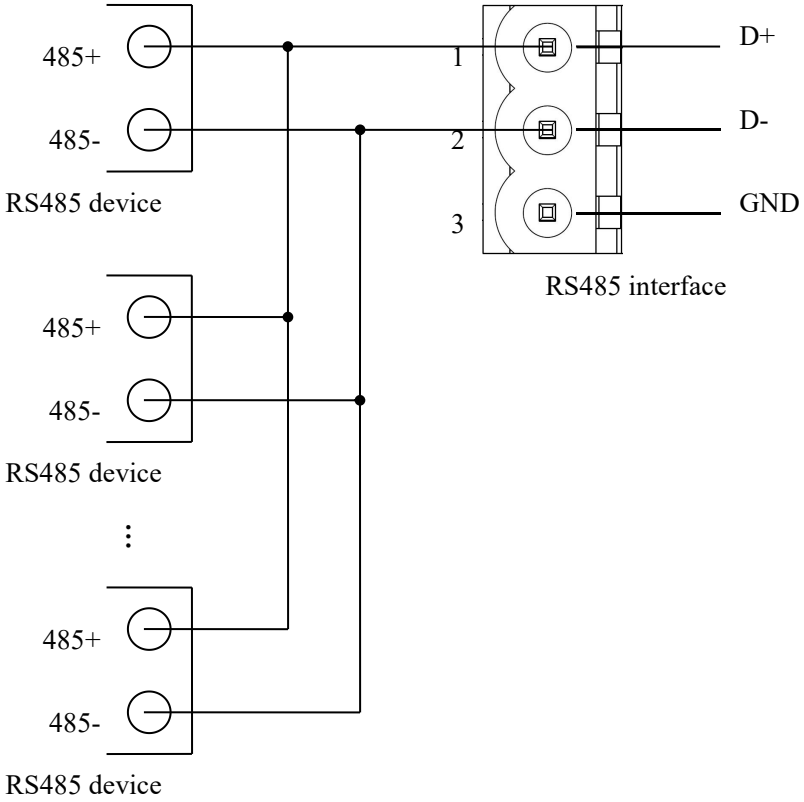
1. Connect the power to the power supply.

   Please do not power on the devices before finishing and confirming all the connections.



   Optional: Connect power supply II for backup redundancy.

2. Connect Modbus serial devices using the RS-485 interfaces.



3. Connect the GT200-BM series gateway with your computer via Ethernet cable.

4. With the configuration switches located on the bottom of the gateway, set both Bit 1 and Bit 2 to 0 (OFF).
5. Power on the GT200-BM gateway.

4.2 Software Configuration

Download, install, and run the configuration software, SST-BM-CFG. For more details, see *Chapter 5* of the manual.

1. Upload the setting from the gateway by clicking “Search Equipment” on the left. Find the GT200-BM gateway on the list, click it and click “Configuration” on the left.

   Note: If you cannot find the GT200-BM gateway, check your Hardware configuration or your network configuration, referring to the note How to Use the Ping Command.

   This is a default configuration created by SST Automation. If you would like to create a configuration from the beginning simply click “New”.
2. Click “BACnet IP Server” under the Device Window and configure the settings to your needs under the Configuration Window.
3. Click the"Modbus Master” of choice under the Device window to configure the Modbus Master. (User Manual 5.3.2)
4. To add a node, right click the Modbus Master you wish to add the node to and proceed to click the “Add Node” operation.

   Then configure the node. (User Manual 5.3.3)
5. To add a command, right click the node you wish to add the command to and proceed to click the “Add Command” operation. Double click on the commands you wish to add to the Node.

   Configure the command (User Manual 5.3.3)
6. Once configuration is complete, click “Download” to download your configuration into GT200-BM gateway.

   Note: To reset GT200-BM gateway, you can either disconnect it from power or remotely reset it in the SST-BM-CFG software: select it, and select Remote Reset.
7. Test the communication.

5 Software Instructions

Double click the software application and install the configuration software SST-BM-CFG. Follow the prompts to complete the installation, then open the installed configuration software and begin to configure the GT200-BM gateway.

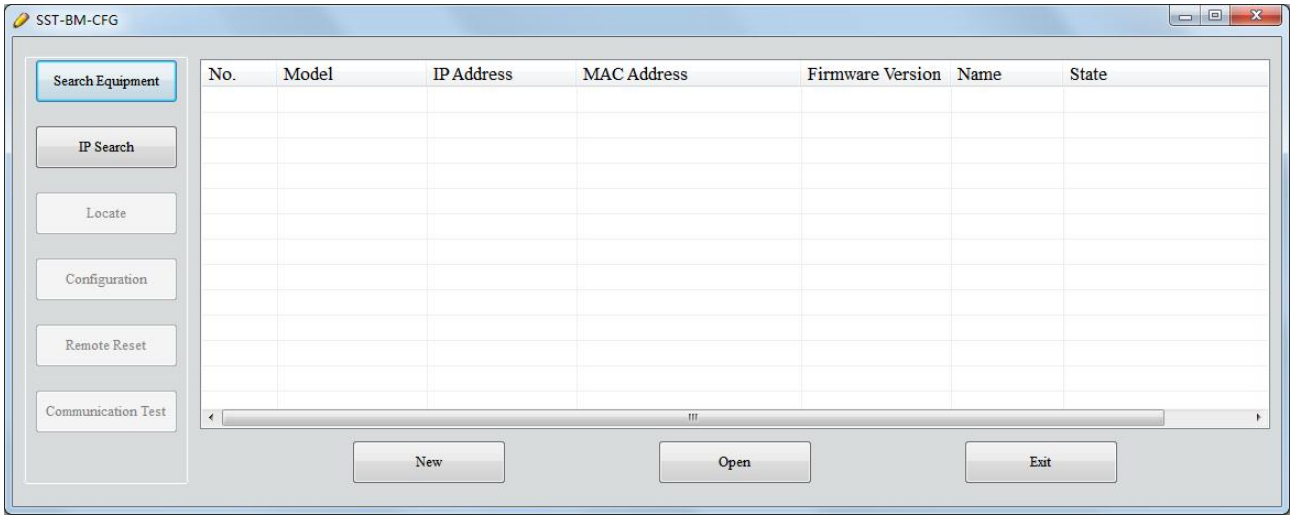
Note: The factory network setting of GT200-BM gateway is DHCP. If your network does not have the DHCP server, the configuration switch (Bit 1) should be set to configuration mode (1-ON) and restart GT200-BM gateway. Then the IP address of GT200-BM gateway is fixed at 192.168.0.188, the subnet mask is 255.255.255.0 and the gateway address is 192.168.0.1.

5.1 Notes before Configuration

SST-BM-CFG is a product based on Windows platform, and used to configure parameters of GT200-BM-RS and GT200-BM-2RS gateways.

Please make sure the user's computer and the GT200-BM gateways are in the same network segment before you run the software.

Double click the icon to access the main interface:

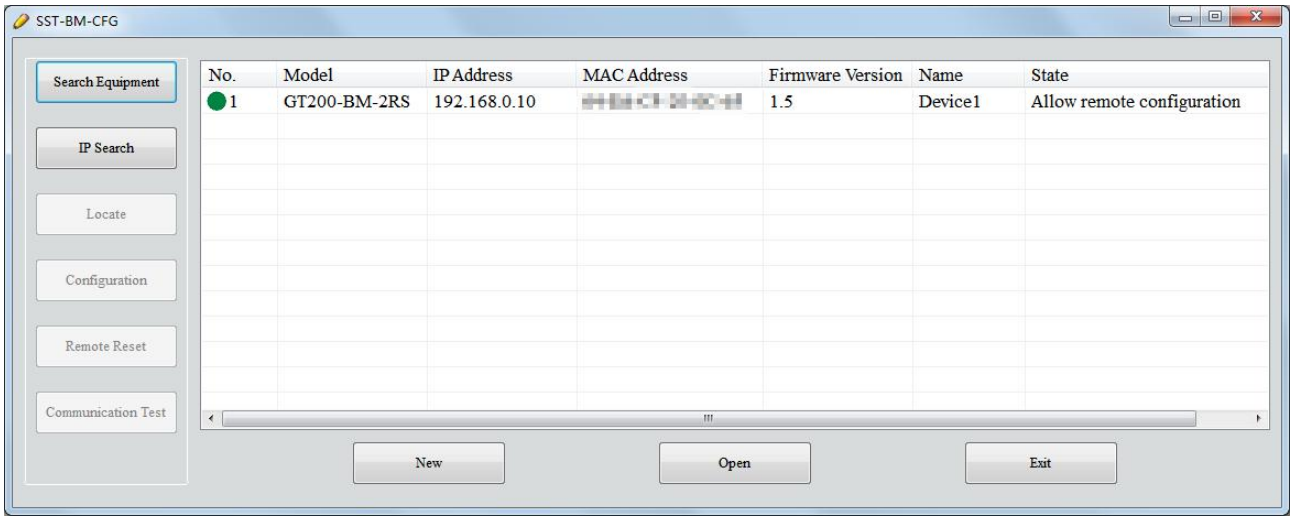


5.2 Search Equipment

Before configuring parameters, the user will need to search for the gateway using the software. The software provides two ways to search the gateway for the user.

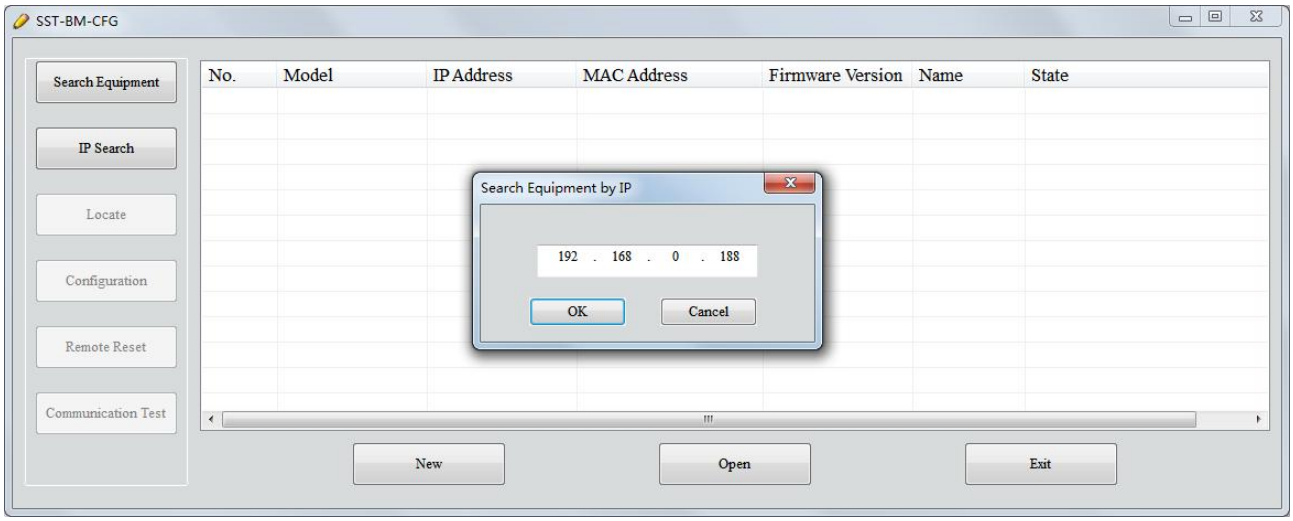
5.2.1 Search All Equipment of Ethernet

Click "Search equipment" button of the main interface and the software will search all of the available devices and list them in the main interface.

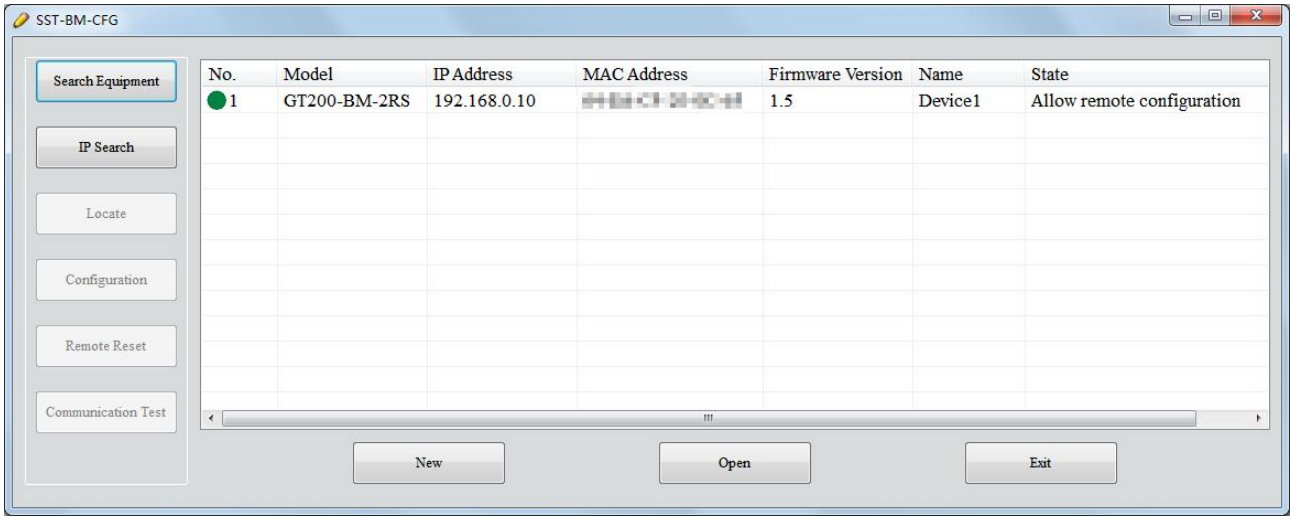


5.2.2 IP Search

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.



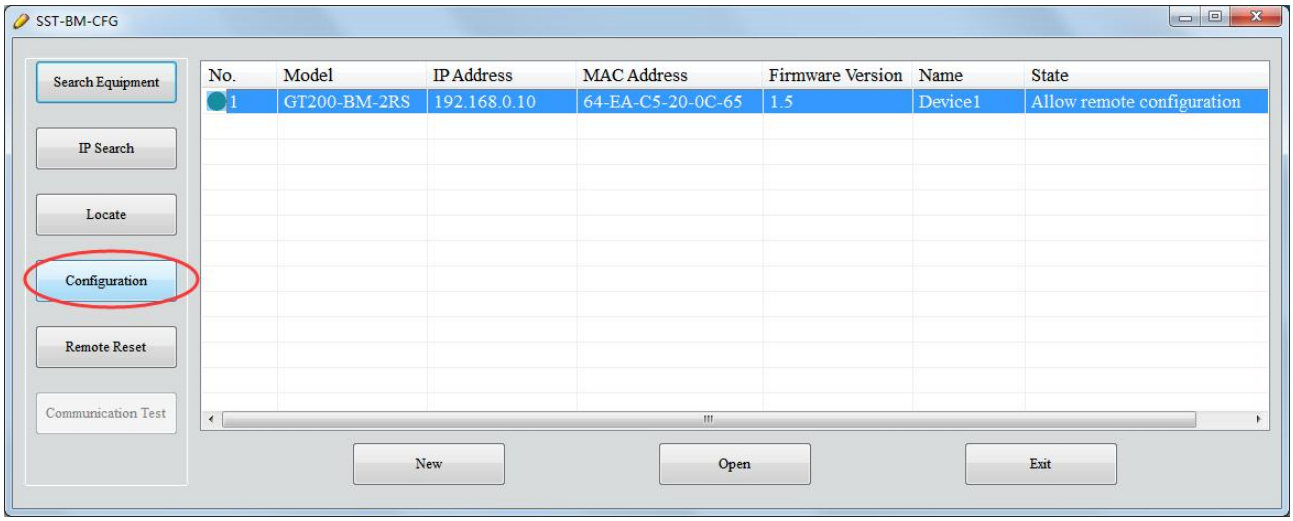
After entering the correct IP address, the software will search GT200-BM gateway with this IP address in the network, and list the information of the equipment in the main interface.



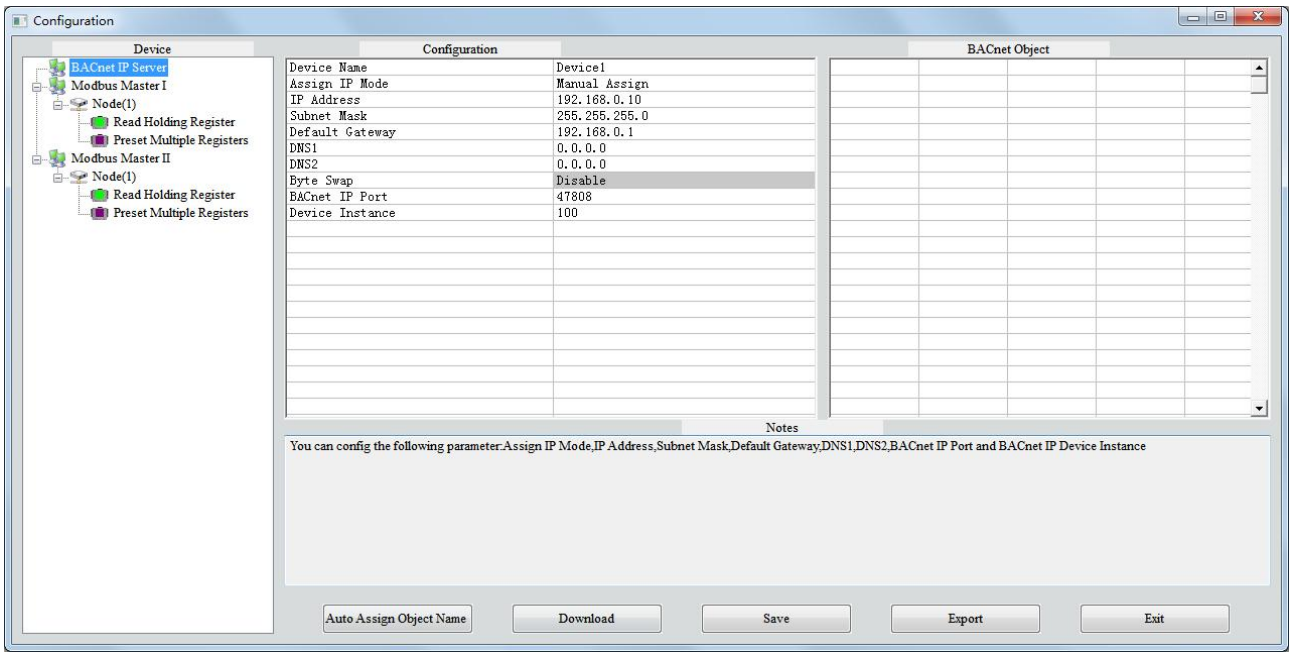
Note: If the users select the "IP search", users need to enter correct IP address or it will not get any devices.

5.3 Configuration

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



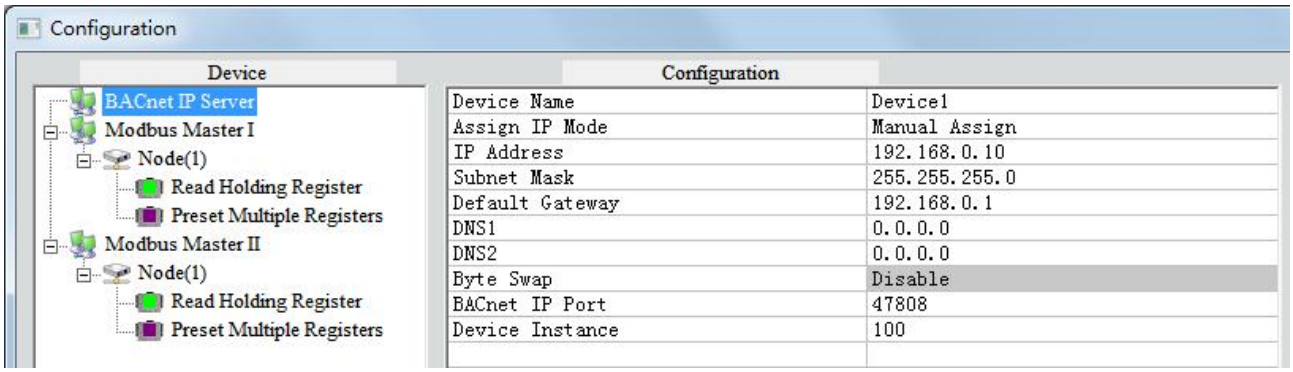
Click "Configuration" button will pop up the window:



5.3.1 Configure Ethernet Parameters

Note: The gray parts cannot be changed.

Ethernet parameters include: "Device Name", "Assign IP Mode", "IP Address", "Subnet Mask", "Default Gateway", "DNS1", "DNS2".



Device 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.

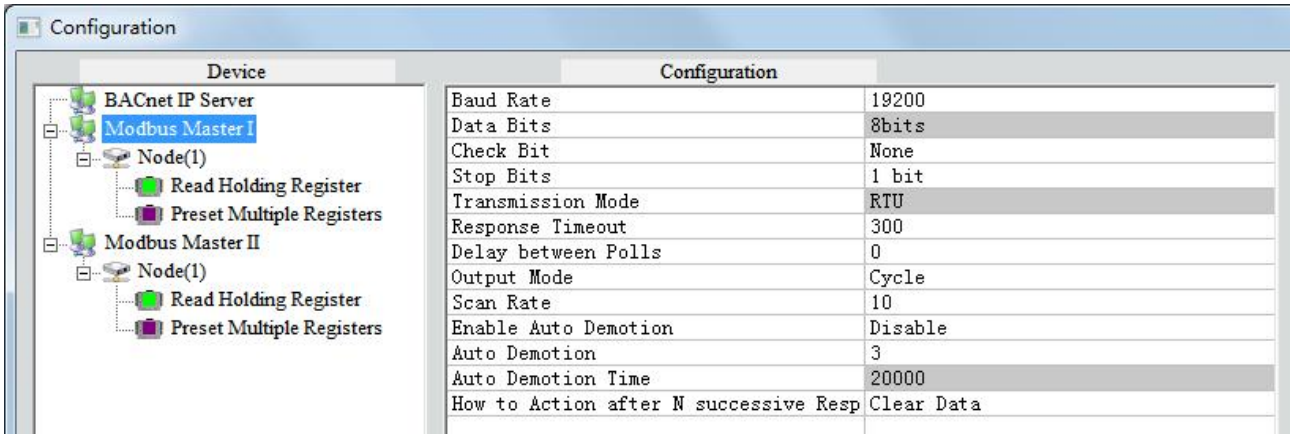
Byte Swap: Currently not supported.

BACnet IP port: Set the BACnet IP port number of GT200-BM gateway.

Device Instance: Set device instance number GT200-BM gateway.

5.3.2 Configure Serial and Modbus Parameters

Serial parameters include: "Baud Rate", "Check Bit", "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).

Check Bit: None, Odd, Even, Mark, Space.

Stop Bits: 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.

Enable Auto Demotion: Default value is Disable. When Enable Auto Demotion and a command is a fast scan command without correct response for N times, then the command will demote a slow scan command. This parameter is valid for Modbus reading command and cycle writing command.

Auto demotion: After n times Modbus command response failure to automatically degrade to slow scan.

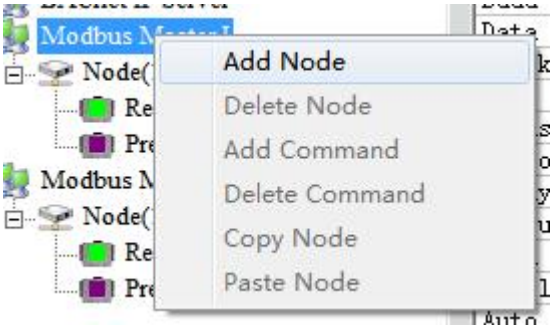
Auto Demotion Time: When the Demotion Time timeout the command will promote a fast command. The range of the parameter value is 3000 to 600000ms.

How to action after N successive response timeout: Clear Data. Hold Data

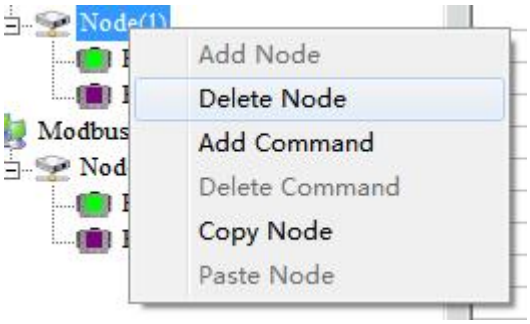
5.3.3 Command Configuration

1. Add and delete nodes.

   (1) Right-click the "Modbus Master I", choose "Add Node".

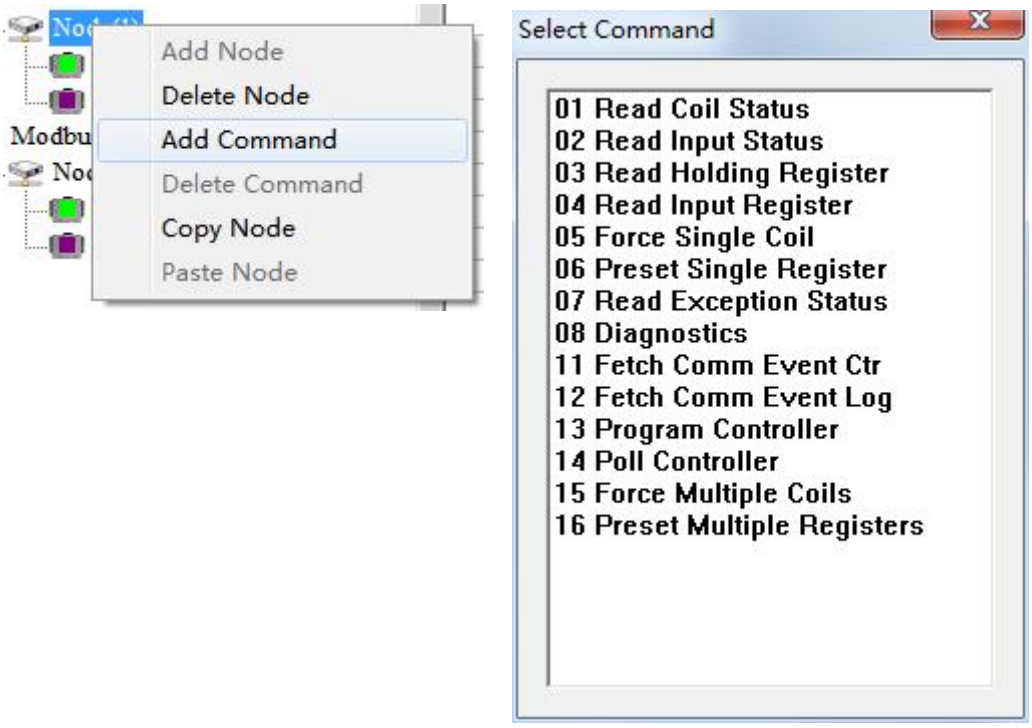


   (2) Right click the node and select "Delete Node".

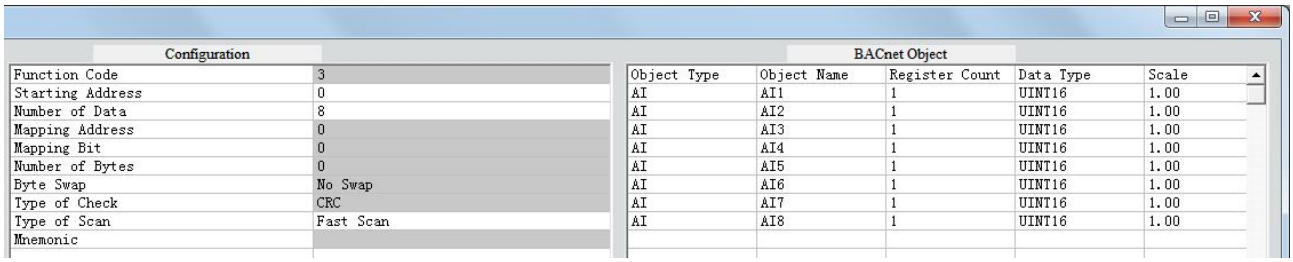


2. Add command

   (1) 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.



Configuration

Function Code	3
Starting Address	0
Number of Data	8
Mapping Address	0
Mapping Bit	0
Number of Bytes	0
Byte Swap	No Swap
Type of Check	CRC
Type of Scan	Fast Scan
Mnemonic	

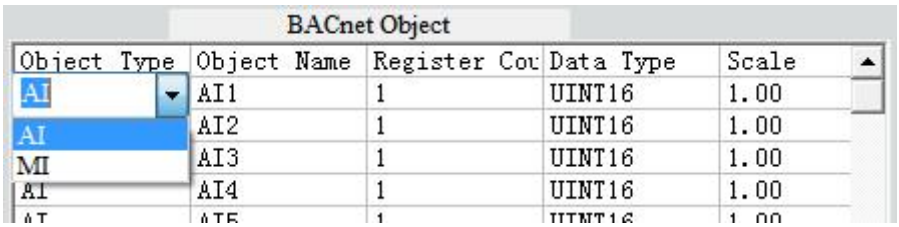
BACnet Object

Object Type	Object Name	Register Count	Data Type	Scale
AI	AI1	1	UINT16	1.00
AI	AI2	1	UINT16	1.00
AI	AI3	1	UINT16	1.00
AI	AI4	1	UINT16	1.00
AI	AI5	1	UINT16	1.00
AI	AI6	1	UINT16	1.00
AI	AI7	1	UINT16	1.00
AI	AI8	1	UINT16	1.00

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.



BACnet Object

Object Type	Object Name	Register Cou	Data Type	Scale
AI	AI1	1	UINT16	1.00
AI	AI2	1	UINT16	1.00
MI	AI3	1	UINT16	1.00
AI	AI4	1	UINT16	1.00
AI	AI5	1	UINT16	1.00

Object type: AI and MI optional, default is AI.

Object Name: Editable, the maximum data length supported 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: Mapping to the BACnet AI (analog input) or MI (multistate input), you can choose.

Force Single Coil: Mapping to the BACnet BO(binary output) or BV(binary value) ,you can choose.

Preset Single Register: Mapping to the BACnet AO(analog output), AV(analog value) or MO(multistate output), you can choose.

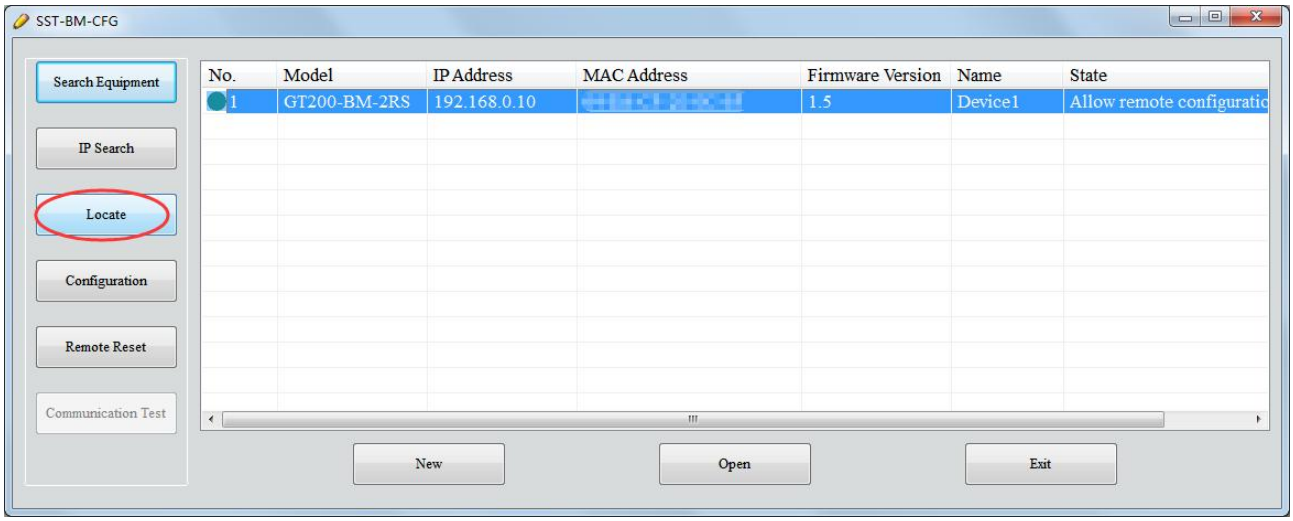
Force Multiple Coils: Mapping to the BACnet BO(binary output) or BV(binary value), you can choose.

Preset Multiple Registers: Mapping to BACnet AO(analog output), AV(analog value) or MO(multistate output), you can choose.

5.4 Locate

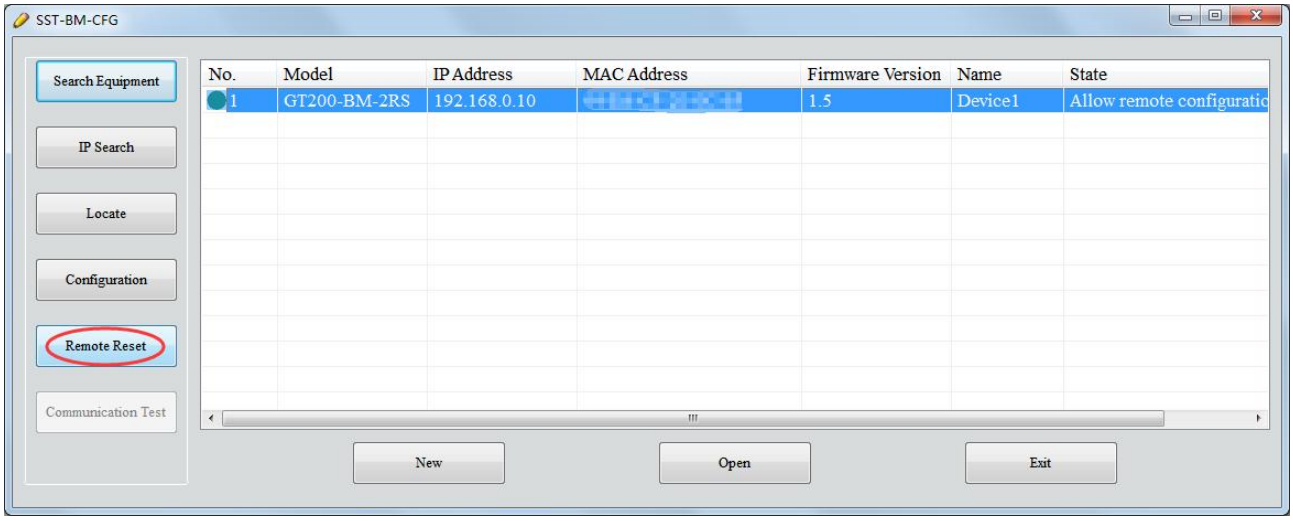
When users manage multiple GT200-BM gateways, the "locate" function can be used to determine which device you are configuring.

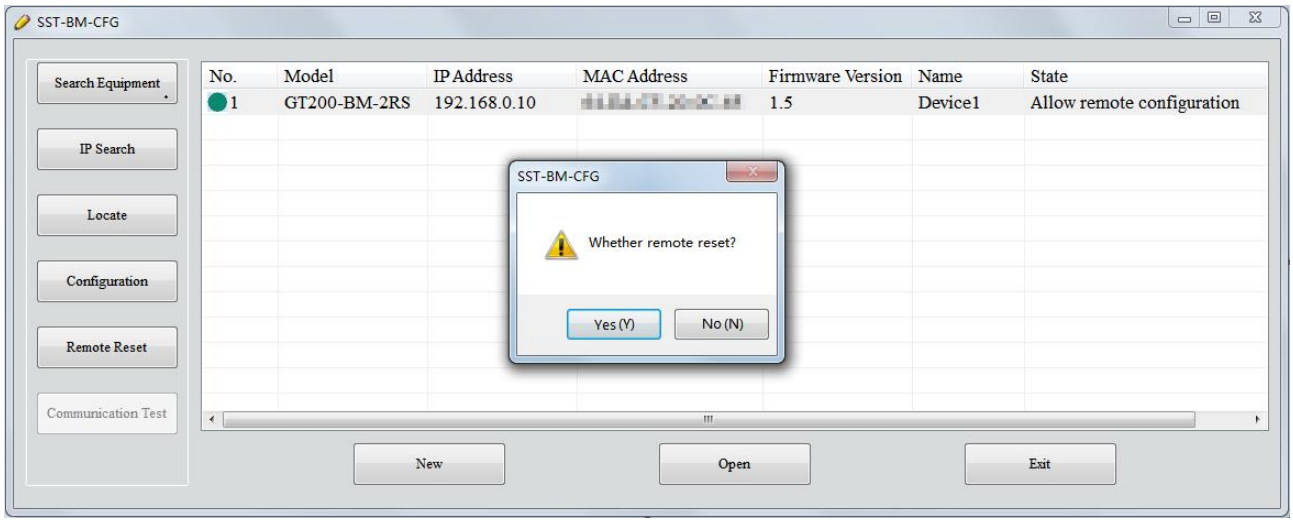
Users click on the "locate" button and the device is still in the network, two orange indicator of the device alternately blinks a few seconds in order to find the device.



5.5 Remote Reset

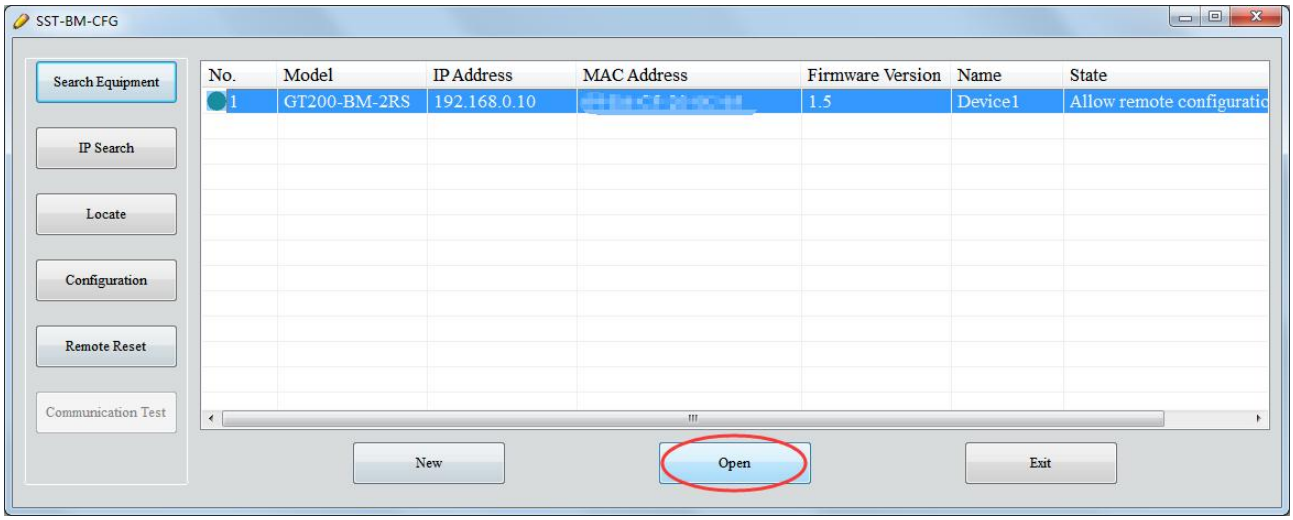
The function of "remote reset" is restarting the selected device. Select the equipment in the list first, click "Remote reset" button, it will pop up a confirmation dialog, then click "OK" to complete the operation.





5.6 Open and Save Configuration

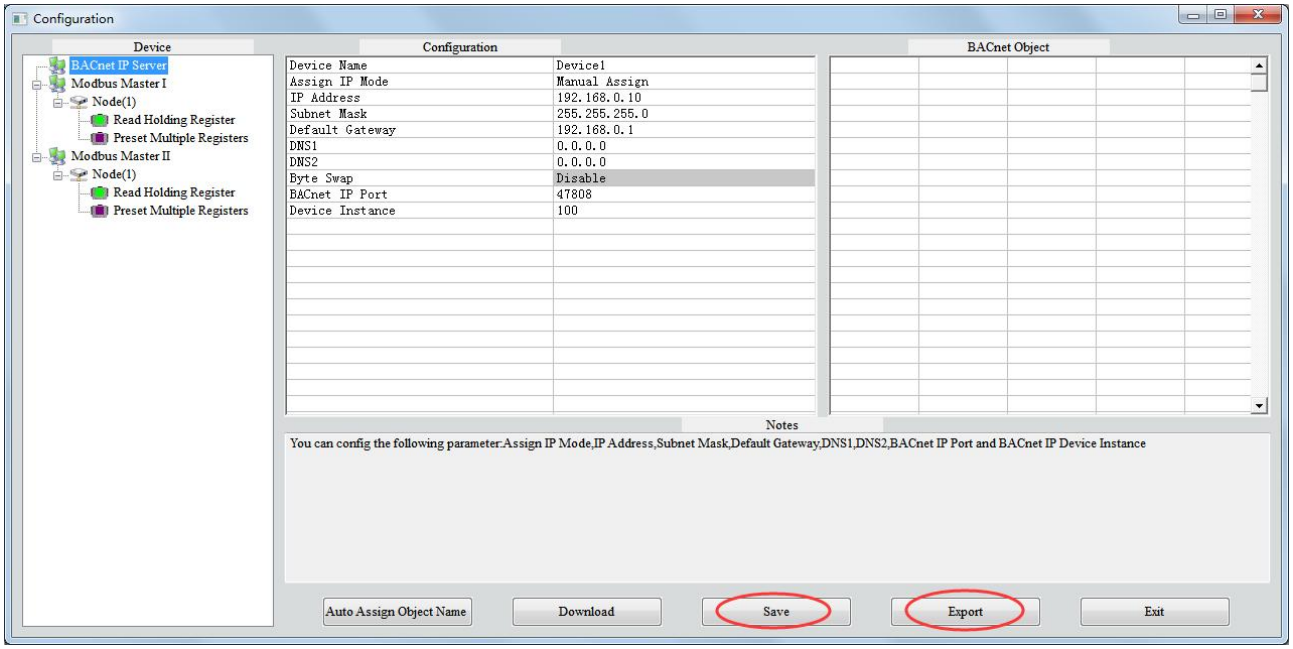
Open the configuration: open and display the configuration data which is saved on the computer.



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.

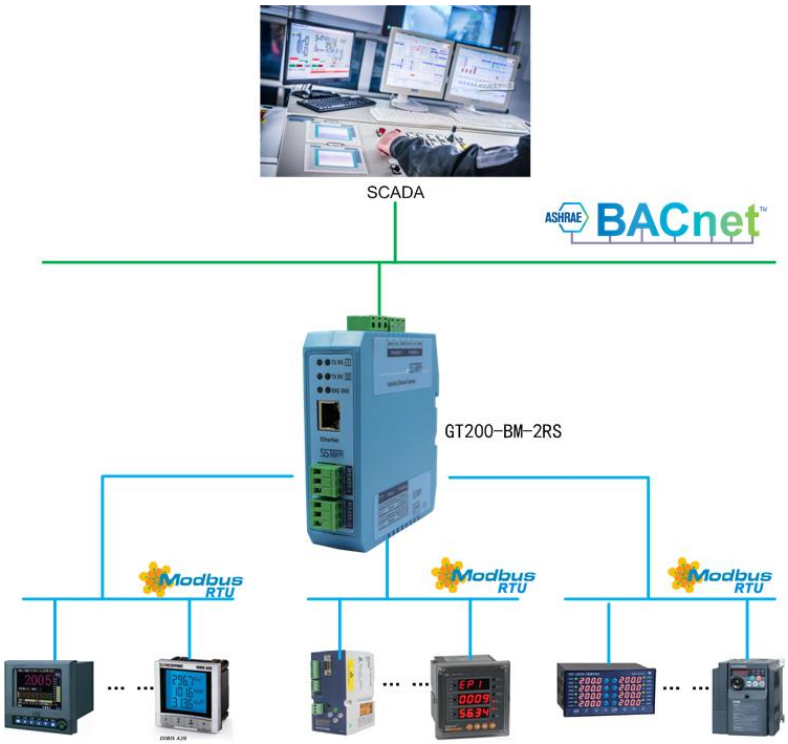
Select the device in the list, click on the "save" or "Export" button and select the path to complete the operation.


Configuration
Device
BACnet IP Server
Modbus Master I
Node(1)
Read Holding Register
Preset Multiple Registers
Modbus Master II
Node(1)
Read Holding Register
Preset Multiple Registers
Configuration
Device Name
Device1
Assign IP Mode
Manual Assign
IP Address
192.168.0.10
Subnet Mask
255.255.255.0
Default Gateway
192.168.0.1
DNS1
0.0.0.0
DNS2
0.0.0.0
Byte Swap
Disable
BACnet IP Port
47808
Device Instance
100
BACnet Object
Notes
You can config the following parameter:Assign IP Mode,IP Address,Subnet Mask,Default Gateway,DNS1,DNS2,BACnet IP Port and BACnet IP Device Instance
Auto Assign Object Name
Download
Save
Export
Exit

6 Typical Application

GT200-BM gateway can connect Modbus slave devices to BACnet IP network. GT200-BM gateway is a bridge in the communication network and implements the conversation between BACnet IP and Modbus RTU.

The following is the typical application of GT200-BM-2RS.



The above chart multi-function 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 holding register 40001), 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.