EtherNet IP / Modbus Gateway

ENB-302MI

User Manual

REV 1.1

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1 About the Gateway

1.1 Function

Through the conversion between EtherNet IP protocol and Modbus protocol of ENB-302MI, Modbus serial devices can access EtherNet IP network, bi-directional and easily exchange data.

1.2 Feature

♦ Redundant Power Supply

♦ Two independent RS485 interfaces 1KV optical isolation

♦ Ethernet 10/100M adaptive

♦ IP address conflict detection

♦ Modbus network debugging

♦ Easy to use configuration software GT-123

1.3 Technical specification

[1] EtherNet / IP network is independent with two Modbus networks;

[2] Ethernet 10/100M adaptive;

[3] Support IP addresses conflict detection function;

[4] Support the ODVA Standard EtherNet / IP communication protocol;

[5] Two serial RS485 interfaces, half-duplex, and baud rate support: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200; parity mode support: none, odd, even, mark, space; 1 or 2 stop bits;

[6] ENB-302MI act as master at the side of Modbus network and support 01H, 02H, 03H, 04H, 05H, 06H, 0FH, 10H function codes, can be configured up to **48** Modbus commands for each RS485 interface; Modbus function

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codes 03H, 04H, 06H and 10H support "Byte swap" function, and it can help users solve the problem of data

format between two different networks;

[7] Two independent RS485 interfaces 1KV optical isolation;

[8] The maximum number of input and output bytes of EtherNet / IP:

Maximum number of input bytes: 512Bytes

Maximum number of output bytes: 512Bytes

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

[10] Working temperature: -20 ℃ ~ 60 ℃, relative humidity: 5% ~ 95% (no condensation);

[11] Dimensions: 40mm (width) × 125mm (height) × 110mm (depth);

[12] Installation: 35mm rail;

[13] Protection class: IP20;

[14] Test standard: EMC test standards

2 Rapid Application Guide

2.1 Connecting the power

DC 24V power supply, dual power supply interface, a redundant function, users can use one or two power supply.

If you are using two power supply, when the way in which the power fails, the other way you can continue to

supply power to ensure normal operation.

Power supply wiring as shown below:

DC power: +24V Ⅰ   Power interface of ENB-302MI

Must be connected

DC power: +24V Ⅱ   Power interface of ENB-302MI
（the other）

Optionally be connected
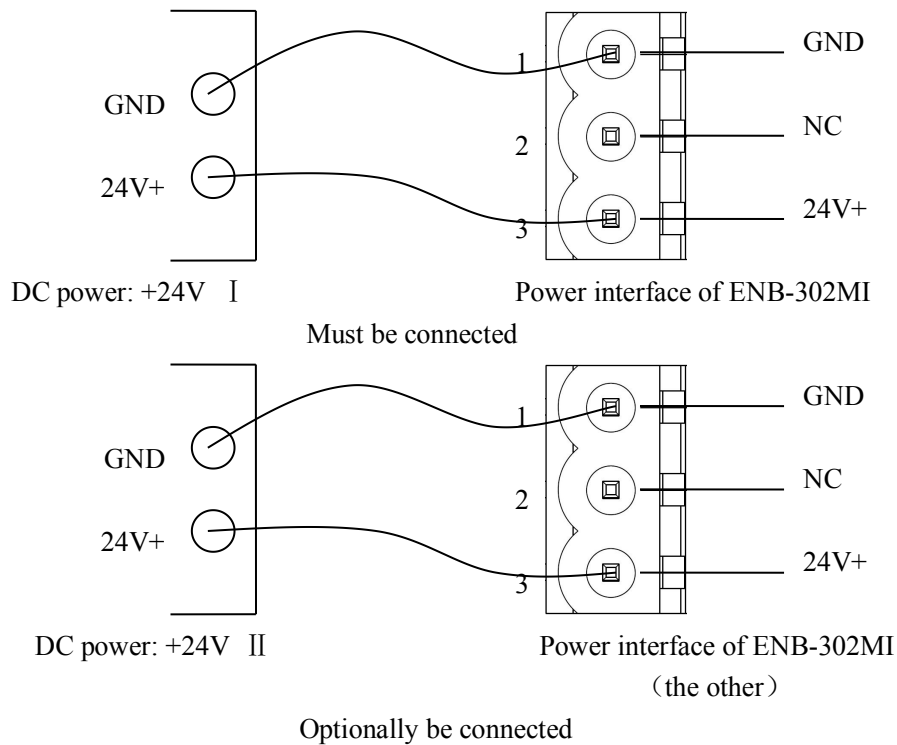
2.2 Connect serial devices

RS485 connection as shown below:
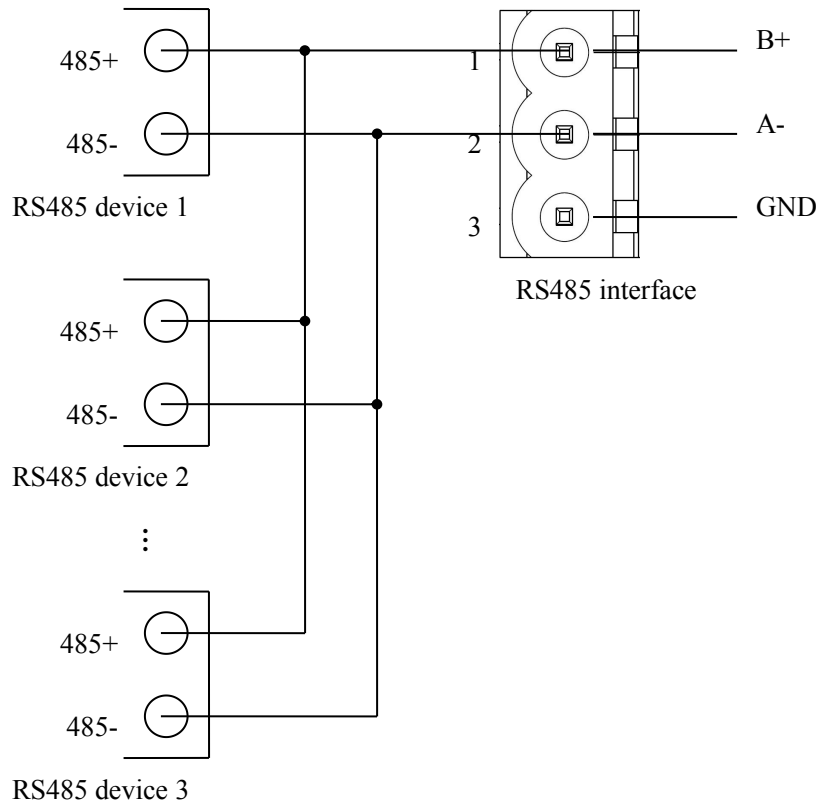
In order to prevent signal reflection and interference in RS485 multipoint communication, adding one terminal resistor at the both farthest ends of the line is necessary, and the argument is 120Ω 1/2W.
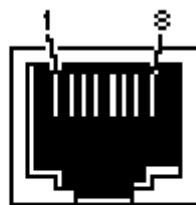
Note: There is no internal termination resistor in the RS485 interface of ENB-302MI.

2.3 Ethernet connection

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

RJ-45 port

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Pin	Signal 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 Configuration Switch

Configuration switches located on the bottom of the gateway, set the mode bit (bit 1) to 0 (Off), and set function bit (bit 2) to 0 (Off), power (or restart) the device to work.

| Mode bit (bit 1)	Function bit (bit 2)	Description
Off	Off	Operation mode, allowing read and write configuration data
Off	On	Operation mode, read and write configuration data against
On	Off or On	Configuration mode, IP address is fixed at 192.168.0.10, this mode can only read and write configuration data, can not communication between EtherNet / IP and Modbus network

2.5 Installing software

Take the product CD into the computer CD drive, open the CD, install the configuration software GT-123. You can easily follow the prompts to complete the installation. Then open the configuration software and finish the configuration of ENB-302MI!

Note: The factory set of ENB-302MI is DHCP, if the network is no DHCP Server, you can set mode bit (bit 1)to 1(On), and restart ENB-302MI, then the fixed IP address of ENB-302MI is 192.168.0.10, mask is 255.255.255.0, gateway address is 192.168.0.1.
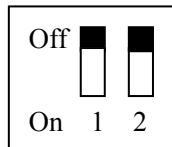
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3 Hardware Description

3.1 Appearance
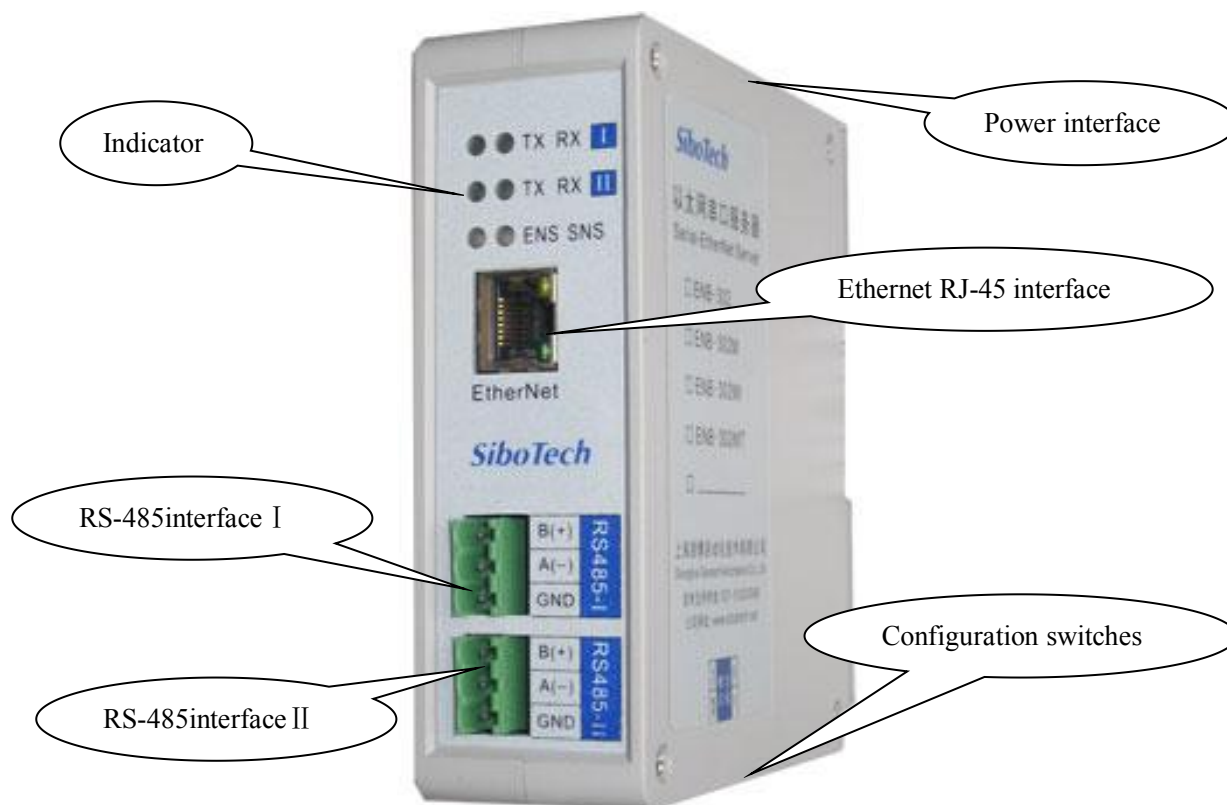
3.2 Indicators

Indicator	Status	Description
ENS	Always green	EtherNet / IP connection is established
	Green flashing	EtherNet / IP connection is not established
	Always red	IP address indicates a conflict
	Red flashing	EtherNet / IP connection timed out; DHCP, BOOTP , IP address conflict detection
SNS	Always green	Modbus Communication normal
	Always red	At least one Modbus network response timeout, exception or error

	Alternately flashing red and green light	At least part of one Modbus network timeout, an exception or error
ENS orange light and SNS orange light （orange light: Red and green light at one time）	Light at one time	Start status
	Flash alternately	Configuration mode

3.3 Configuration switches

Configuration switch locate on the bottom, bit 1 is mode select bit, bit 2 is function set bit.

```
Off  ■  ■
On   1  2
```

Mode bit (bit 1)	Function bit (bit 2)	Description
Off	Off	Operation mode, allowing read and write configuration data
Off	On	Operation mode, read and write configuration data against
On	Off or On	Configuration mode, IP address is fixed at 192.168.0.10, this mode can only read and write configuration data, can not communication between EtherNet / IP and Modbus network

Note: Restart ENB-302MI after resetting the configuration and the configuration can take effect!
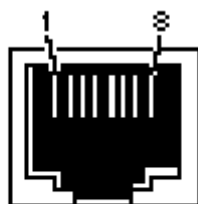
3.4 Interface

3.4.1 Power interface

ENB-302MI has two power interfaces, with power redundancy function, when one the way to power failure, power can continue to supply the other way.
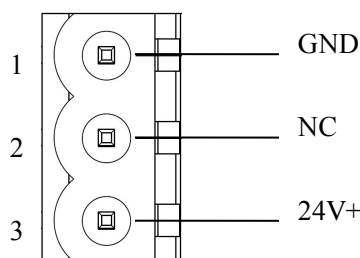
引脚	功能
1	GND,
2	NC, no connection
3	24V+ , DC

3.4.2 Ethernet interface

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

RJ-45 port

Pin	Signal 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-

3.4.3 RS-485 interface

The RS-485 interface of ENB-302MI is standard, and the RS-485 characteristics of the product are shown as follows:

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1. The basic characteristics of RS-485 transmission technology

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

② Transfer rate: 300 bps~115.2Kbps.

③ Media: 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 up to 127 stations (with RS485 repeater).

⑤Plug connection: 3-pin pluggable terminal.

2. The main points on RS-485 transmission equipments installation

①All the equipments be connected with RS-485 bus;

②Subsection can be connected up to 32 sites;

③The farthest end of each bus has a termination resistor—120Ω 1/2W to ensure reliable operation of the network.

Serial interface uses 3-pin pluggable terminal and users can wire it according to the wiring instructions on the panel.
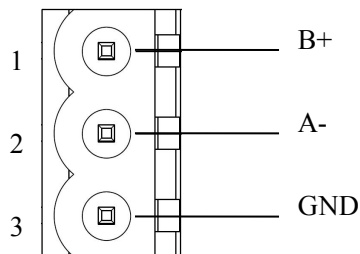
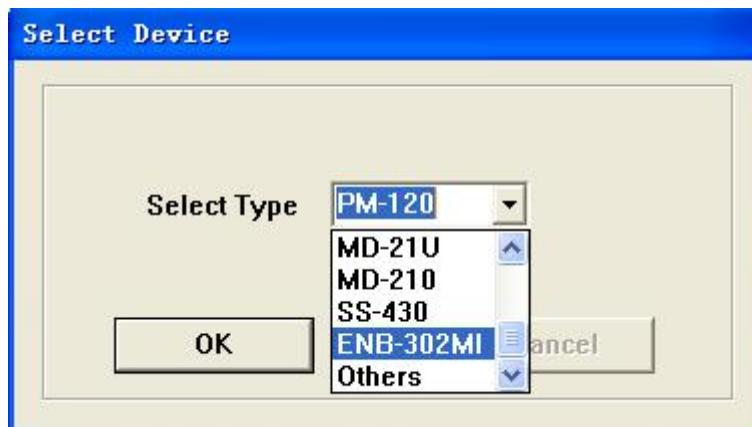| Pin	Function
1	B+，RS485
2	A-，RS485
3	GND

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4 Instructions of Configuration Software

4.1 Notes before configurating

GT-123 is a product based on Windows platform, and used to configurate a variety of fieldbus gateway devices, including PM-120, MD-21, SS-430, PM-160, ENB-302MI and other products. It can set related parameters and commands of Modbus and other bus.

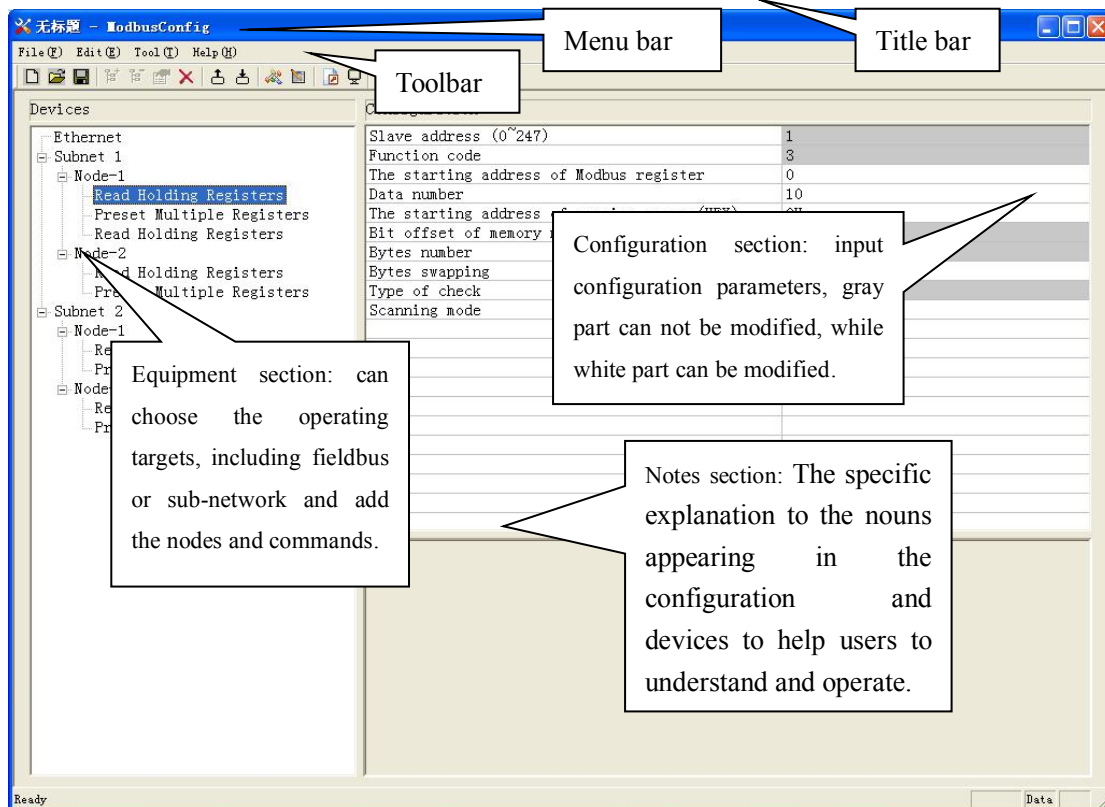The document mainly introduces the use method of ENB-302MI.

Double-click the icon to enter the main interface of the software:

Choose "ENB-302MI" to enter configuration interface:

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4.2 User interface

GT-123 interface include: title bar, menu bar, toolbar, status bar, equipment section, configuration section and notes section.

Note: All the gray part in the software can not be changed.

Toolbar is shown as below:

Functions separately from left to right are: new, open, save, add nodes, delete nodes, add commands, delete commands, upload configuration, download configuration, conflict detect, output Excel configuration document and debug.

New: Create a new configuration project

Open: Open a configuration project

Save: Save the current configuration

Add nodes: Add a Modbus slave node

Delete nodes: Delete a Modbus slave node

Add commands: Add a Modbus command

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✖Delete commands: Delete a Modbus command

⬆Upload configuration: Read the configuration from the module and show it in the software

⬇Download configuration: Download the configuration from the software to the module

⚒Conflict Detect: Detect whether there is conflict in memory data buffer of the gateway

📄Output Excel document: Output the current configuration to local hard disk and save it as .xls file

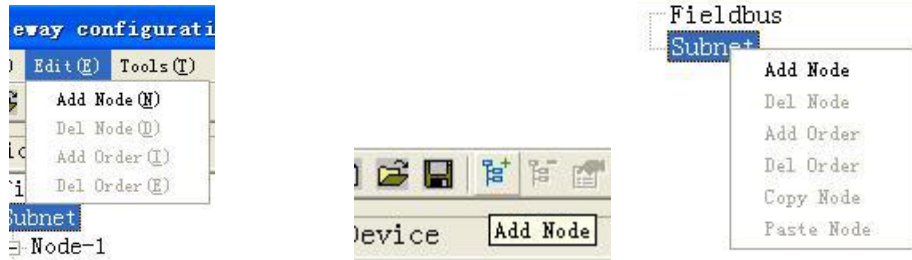🖥Debug: For debugging Modbus communications, and defining the network fault.

4.3 Operation of equipment view

4.3.1 Equipment view interface
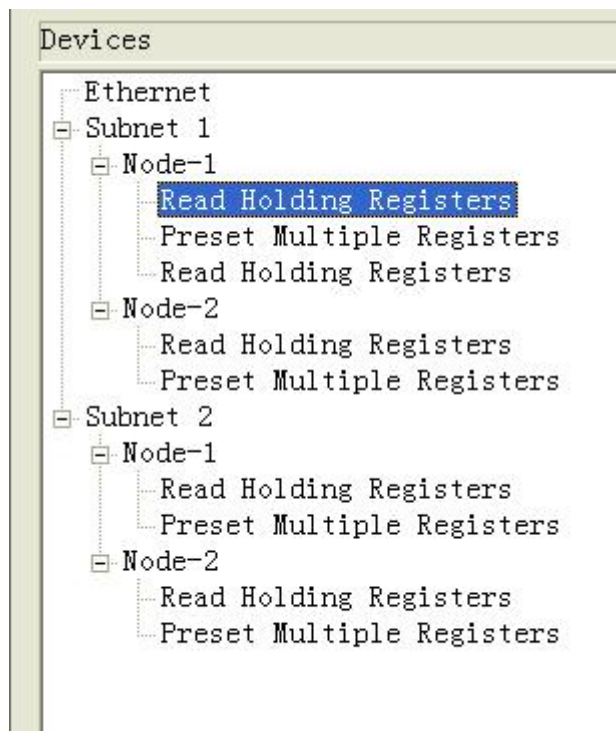
4.3.2 Operation mode of equipment view

The equipment view supports three types of operation: Edit Menu, Edit Toolbar and Right click edit Menu.

4.3.3 Operation types of equipment view

1 Add nodes: Right click on subnet or existing nodes, and then perform the operation of adding a new node. Then there is a new node named "new node" under subnet.

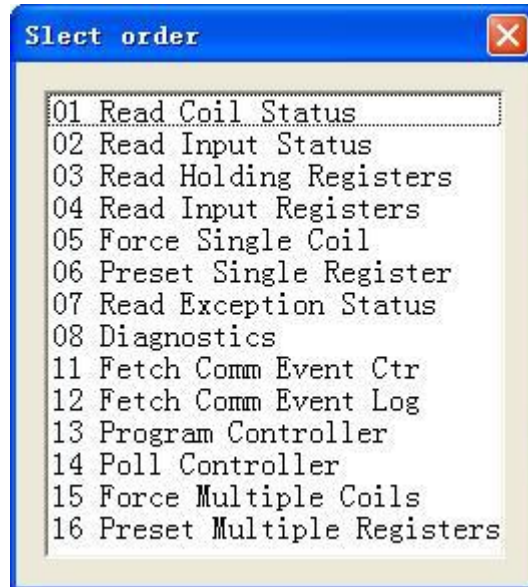2 Delete nodes: Right click on the node to be deleted, and then perform the operation of deleting the node. The node and its all commands will be deleted.

3 Add commands: Right click on the node, and then perform the operation of adding command to add a command for the node. The dialog box will be shown as follow:

Currently, it supports the commands: 01, 02, 03, 04, 05, 06, 15 and 16.

Select the command: Double click the command

4 Delete commands: Right-click on the command and then perform the operation of deleting the command.

5 Rename nodes: Left click on the node to be renamed, and then the edit status will be shown and you can rename it.

4.4 The operation of configuration view

4.4.1 Interface of Ethernet configuration view

In the interface of device view, click Ethernet, and then the configuration view is shown as follows:

Configurable items include: IP setting method, IP address, subnet mask, gateway address, DNS1, DNS2.

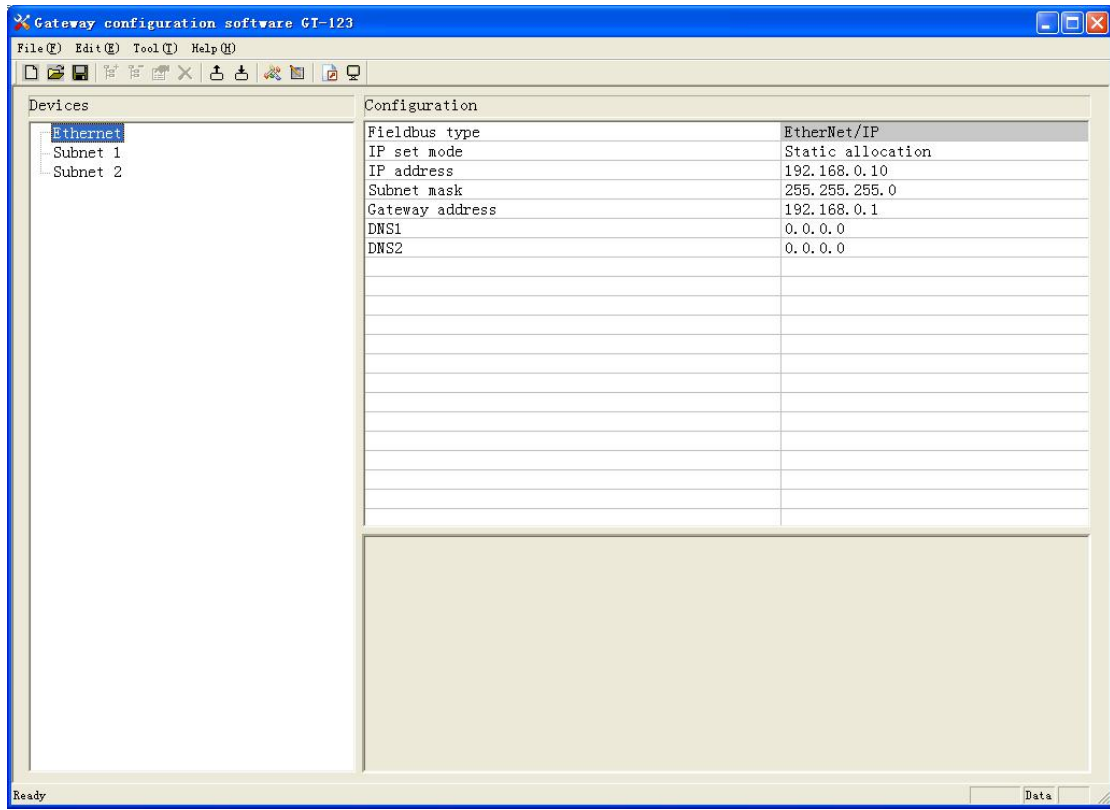IP setting method: static configuration, BOOTP, DHCP can be selected.

IP Address: Set the device IP address.

Subnet Mask: Set subnet mask of the device.

Gateway Address: Set gateway address.

DNS1: Set the device DNS1 address.

DNS2: Set the device DNS2 address.

## 4.4.2 Interface of subnet configuration view

Protocol is Modbus master

Configurable parameters are shown as follows:

Modbus communication baud rate, Data bits, Parity check mode, Stop bit, Transmission mode, Response timeout, Delay between polls, Polling mode of outputting commands, Time between two continuous pluses (the polling mode of outputting commands is pulse output), Scanning ratio

Interface of configuration view is shown as follow:
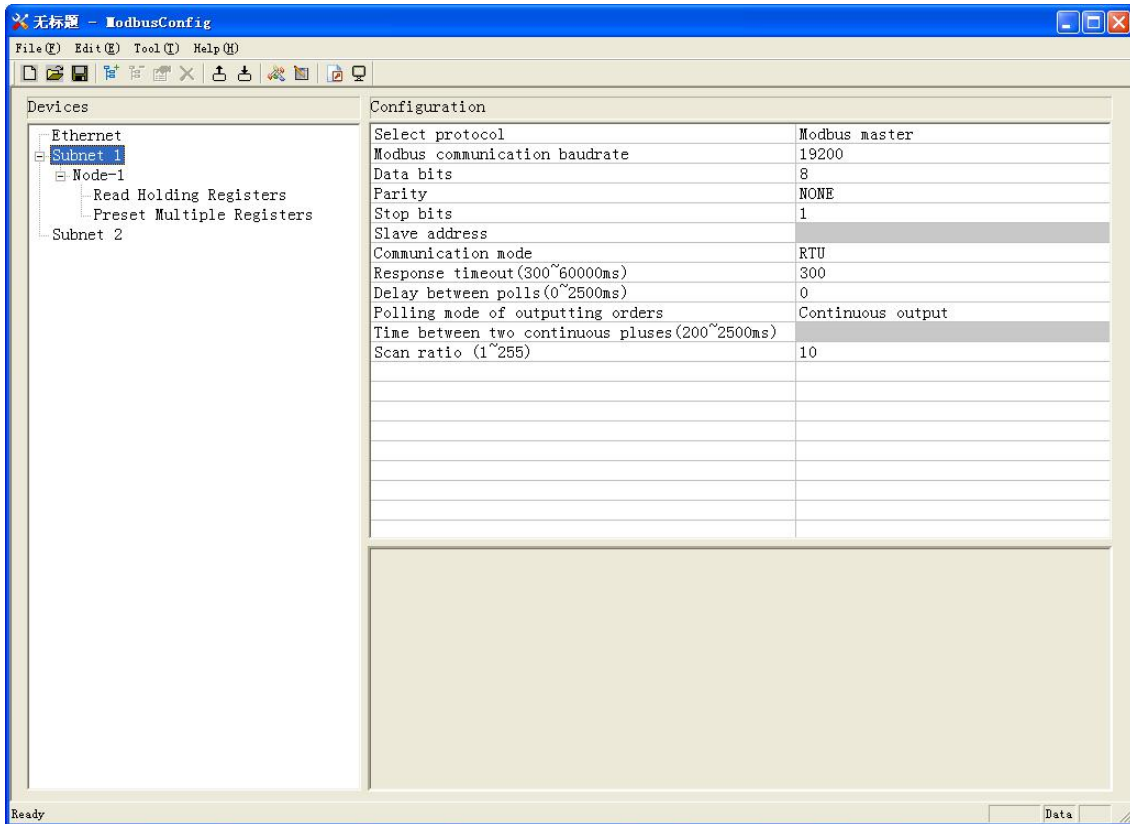
Modbus communication baud rate: There are 300, 600, 1200, 2400, 9600, 19200, 38400, 57600 and 115200bps to be selected.

Data bits: 8 bits

Parity check mode: There are none, odd, even, mark and space to be selected.

Stop bits: There are 1 and 2 to be selected.

Transmission mode: There are RTU and ASCII to be selected.

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 an command of Modbus having been sent and having received correct response, the time before next command being sent, the range is: 0 ~ 2500ms.

Polling mode of outputting command:

Modbus writing command (output command) has 4 kinds of outputting modes: Continuous output, 0utput disable, Change-of–state output, Pulse output, Communication port

Continuous output: The same with Modbus read command, and output according to the scanning ratio.

0utput disable: Prohibit outputting Modbus write command.

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

Pulse output: Output the write command according to the pulse period.

Scan ratio: Ratio of slow-scan and quick-scan. If the quick-scan command sends 10 times, slow-scan command sends 1 time.

4.4.3 Interface of node configuration view

In the interface of device view, left click a node and then configuration interface is shown as follow:
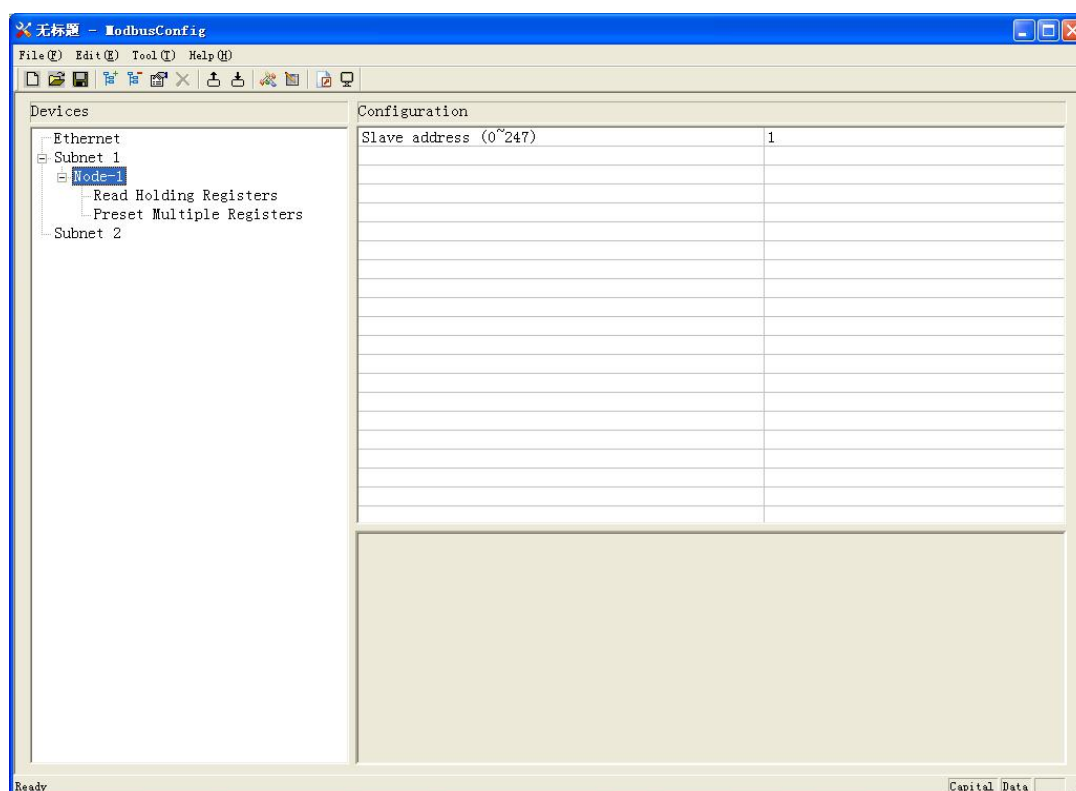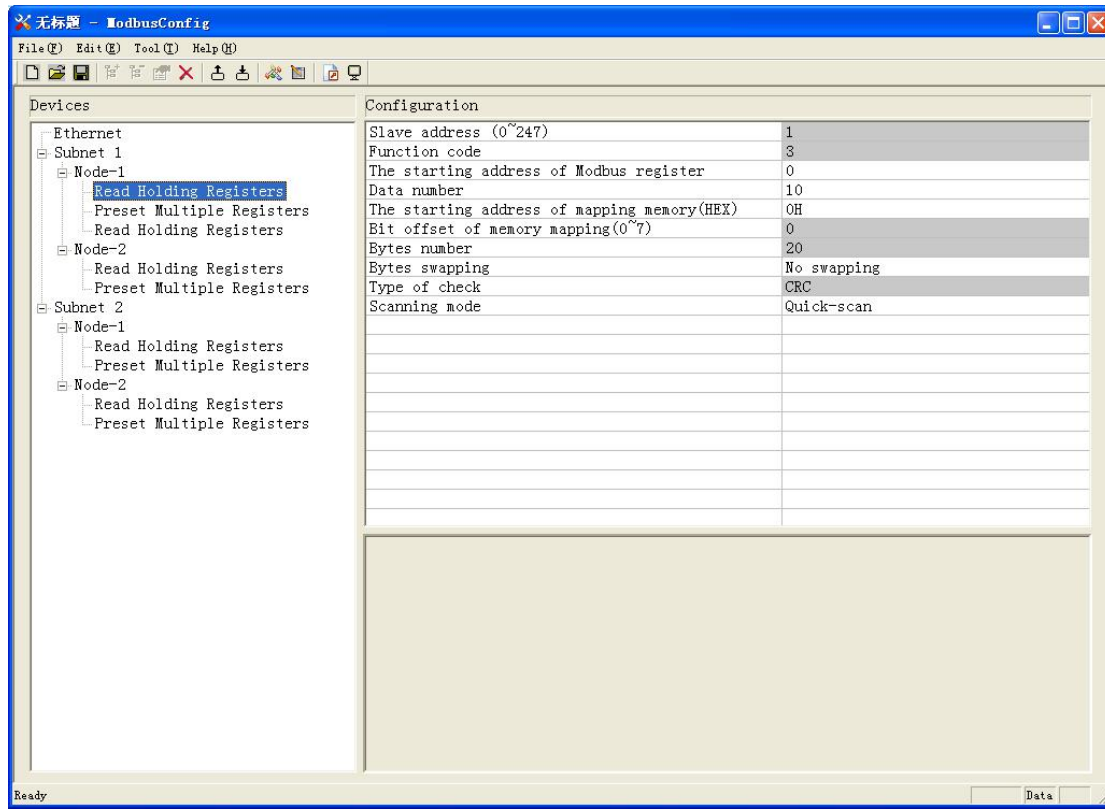

4.4.4 Interface of command configuration view

In the interface of device view, left click a command and then configuration interface is shown as follow:

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The starting address of Modbus register: The starting address of register or switching value or loop and so on in Modbus slave and the range is 0~65535.

Data number: The length of data. Two bytes are one data length.

The starting address of memory mapping (hexadecimal): The starting address of data in memory buffer of the module.

The address range of data mapping in the module memory:

Read command: 0x0000~ 0x01FF

Write command: 0x4000 ~ 0x41FF

When write command is used exchanging locally, it also can use: 0x0000 ~ 0x01FF

Bit offset of memory mapping (0 ~ 7): For the bit operation commands, the position range of start-bit byte is 0 ~ 7.

Bytes swap: There are three kinds of type, No swapping, two bytes swapping, four bytes swapping. The byte display order of Modbus and Profibus-DP is MSB being preferential; the byte display order of DeviceNet is LSB

being preferential. Users can exchange the byte display order to get correct value.

Scanning mode: There are two kinds of scanning mode: quick-scan and slow-scan. It is fit for requests of user about quick-scan or slow-scan of different commands. Slow-scan is equal to quick-scan being multiplied by scan ratio. (Configure it in the interface of subnet configuration interface)
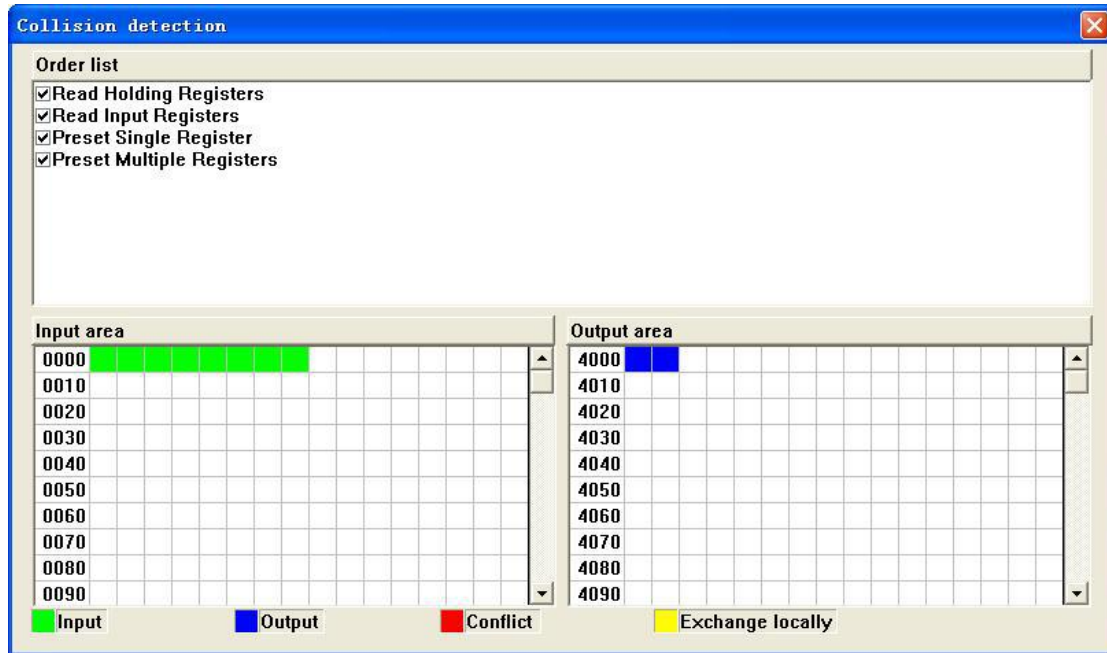
4.4.5 Notes View

Notes view displays the explanation of configuration. The notes that show how to configurate the starting address of memory mapping is shown as follow:
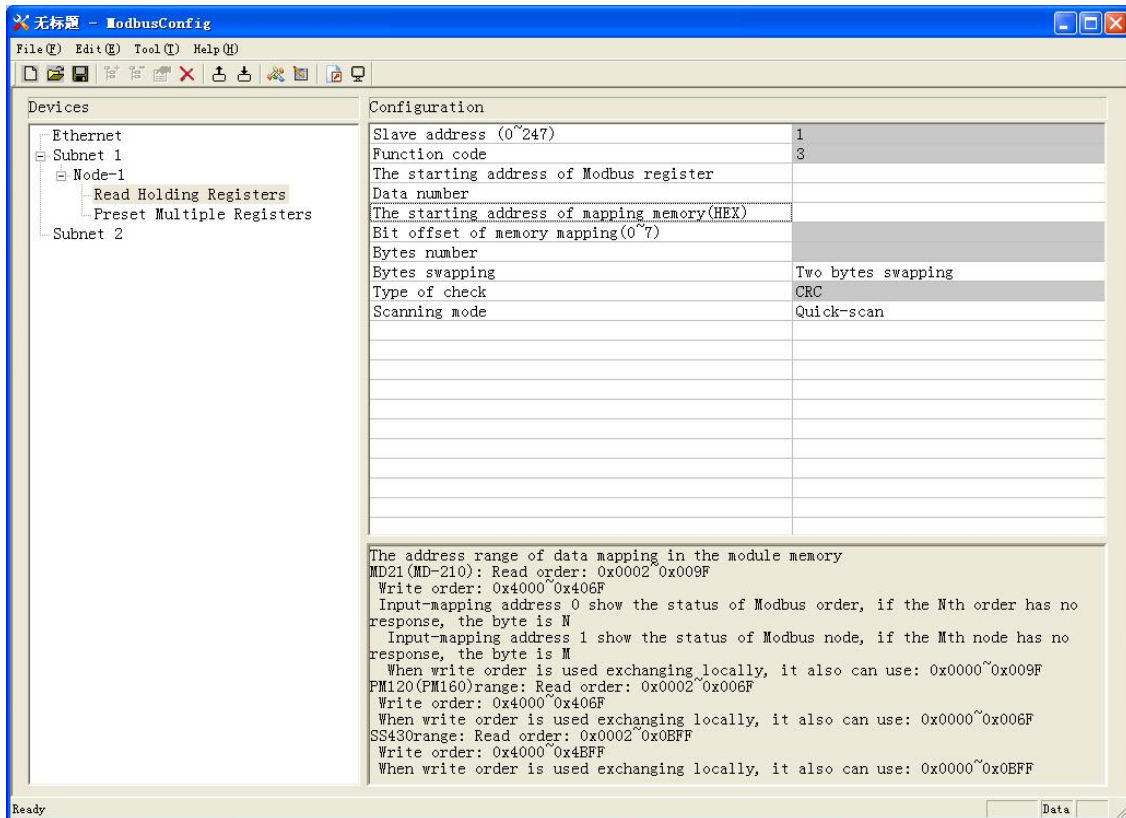
4.5 Conflict detect

For the detection of whether there is conflict of "the starting address of memory mapping", if conflict it can adjust in time. The interface is shown as follow:

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4.5.1 Operation of command list

All the configuration commands can be shown at the command list. Each select box before command is used for checking the memory-mapping location of that command. Click on the command can select the check box, and in the memory-mapping area it can show the corresponding share of spatial location. Click the command again will remove the selected box and it doesn't show the mapping location. The function can be used to conflict detect of memory-mapping area.

4.5.2 Operation of memory mapping area

Memory mapping area is divided two parts: input area and output area.

Input-mapping address: 0x0000 ~ 0x3FFF;

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Output-mapping address: 0x4000 ~ 0x7FFF.

Each box represents a byte address.

Green: Read command show in the input-mapping area; no conflict;

Yellow: Write command show when the mapping addresses in the input area; no conflict;

Blue: When the address mapping area is located in the output area; no conflict.

Red: Output area or input area, different commands occupy the same byte address, the byte is shown as red.
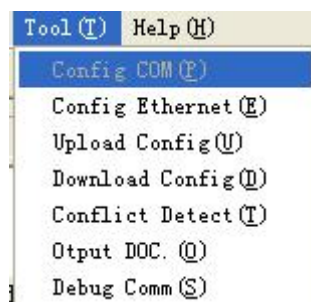
For bit operation commands, the meanings of above shows are also applicable.

Click the input-output regional grid, whether the grid is occupied or not is shown as follows:
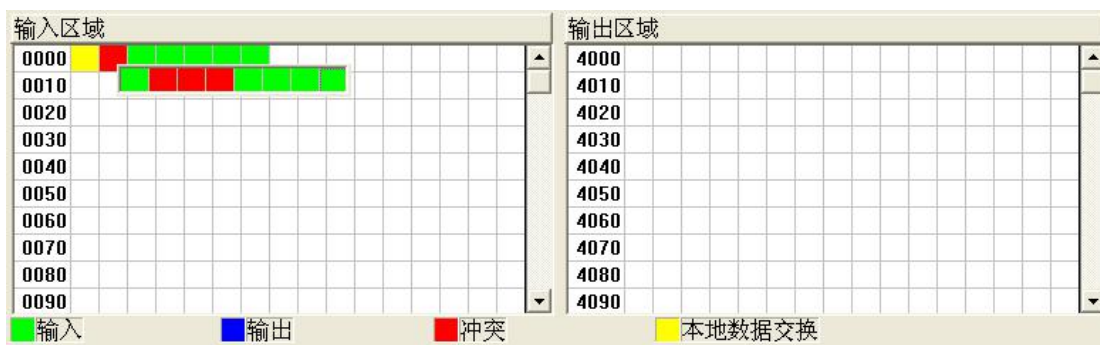
4.6 Hardware communication

Hardware communications' menu items are shown as follow:

4.6.1 Ethernet configuration

Users can choose whether to use the search function. When users use the search feature, upload or download

configuration when you can search for all Ethernet equipment ENB302-MI; when the user does not use the search feature, users must specify their own devices to connect to, in the configuration when the upload or download only lists the devices.

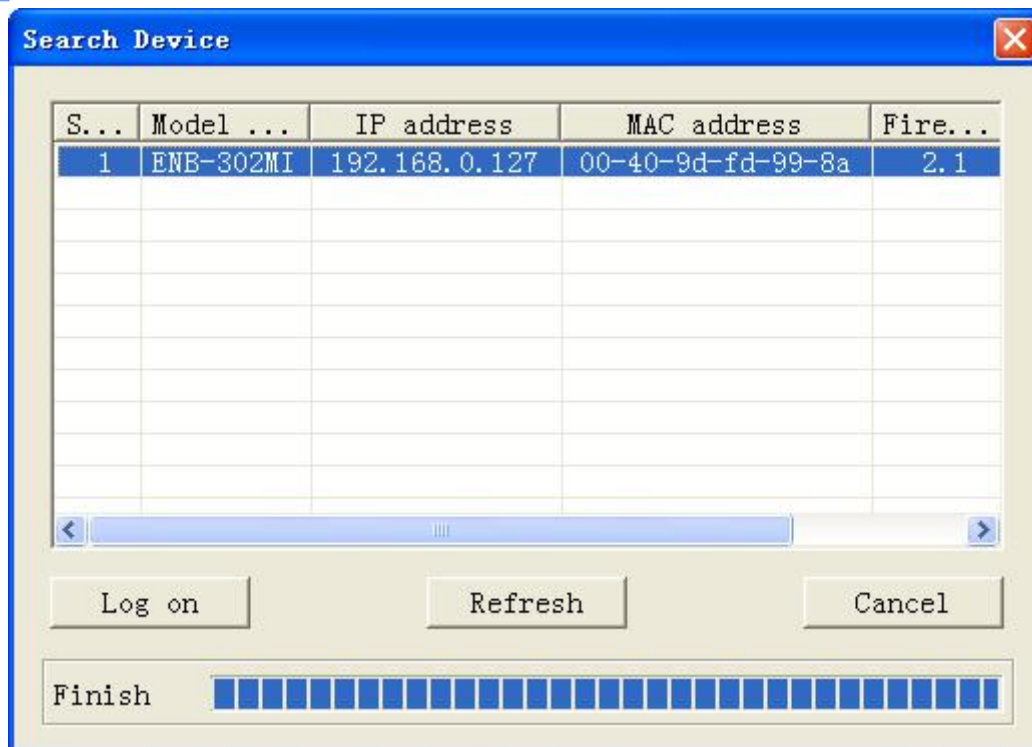Note: Please click "OK" button to confirm, click "Cancel" button will be enabled as a search function.
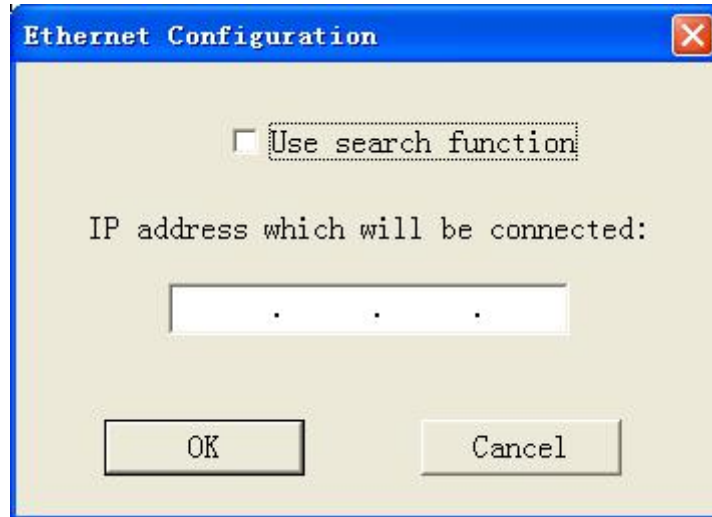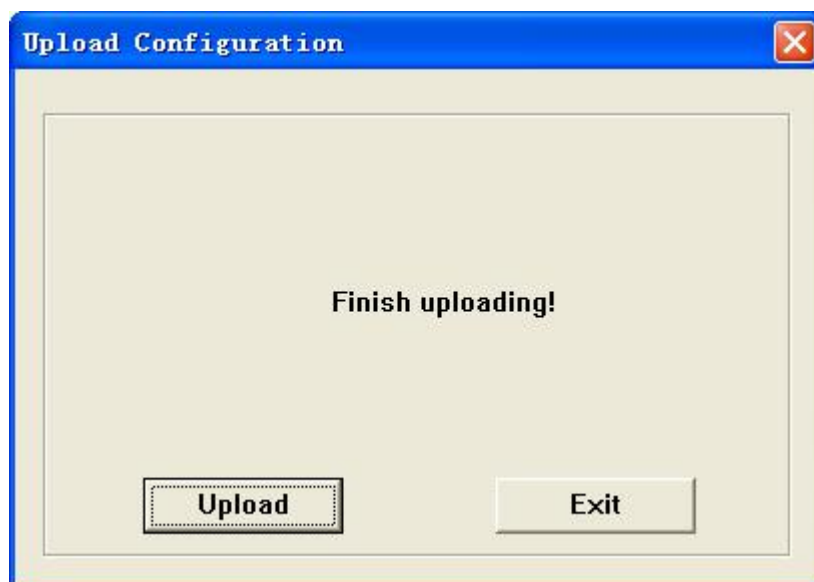

4.6.2 Upload configuration

Choose to upload configuration dialog box will pop up the search appliance:
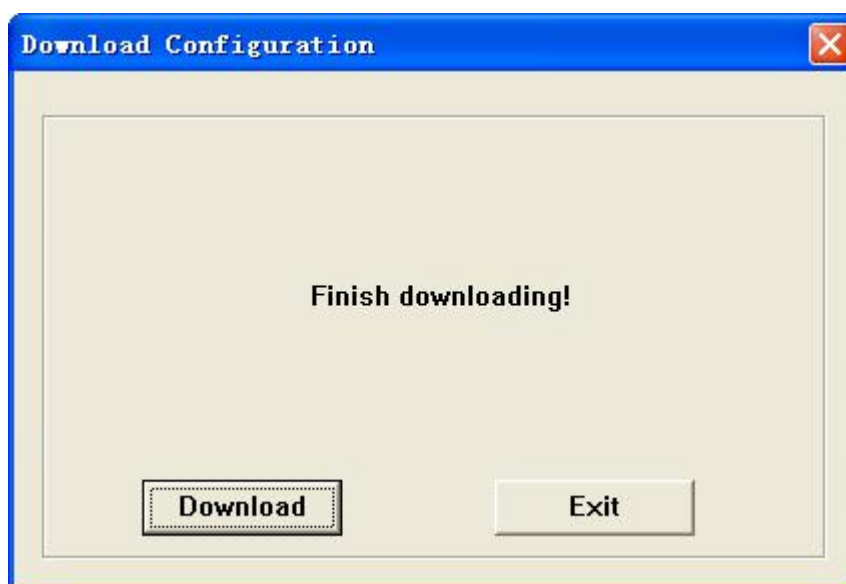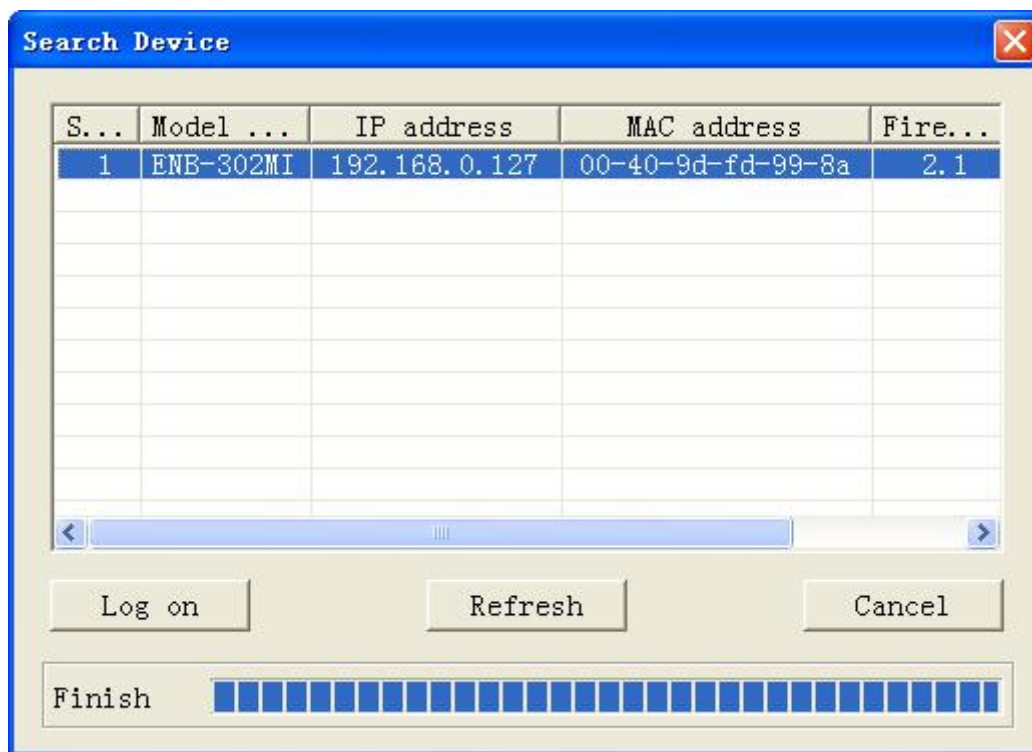
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Select the device you want to configure and click "Log on", then enter the upload dialog box. Gateway

configuration information will be uploaded to the software from the device; the display interface is as follows:

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4.6.3 Download configuration
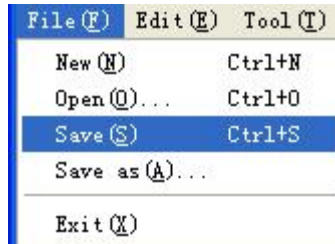
Download configuration and upload configuration similarly:

Note: Before downloading, make sure all the configuration has been completed and correct.

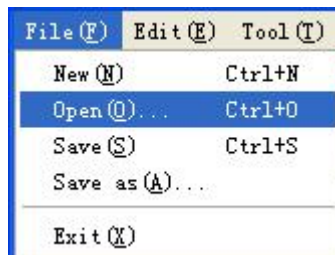**SiboTech**

4.7 Load and save configuration

4.7.1 Save the configuration project

Select "Save" can save the project:

4.7.2 Load the configuration project

Select "Open" and then you can open a project:

4.8 Output excel document

Excel document helps users to examine the configuration related.

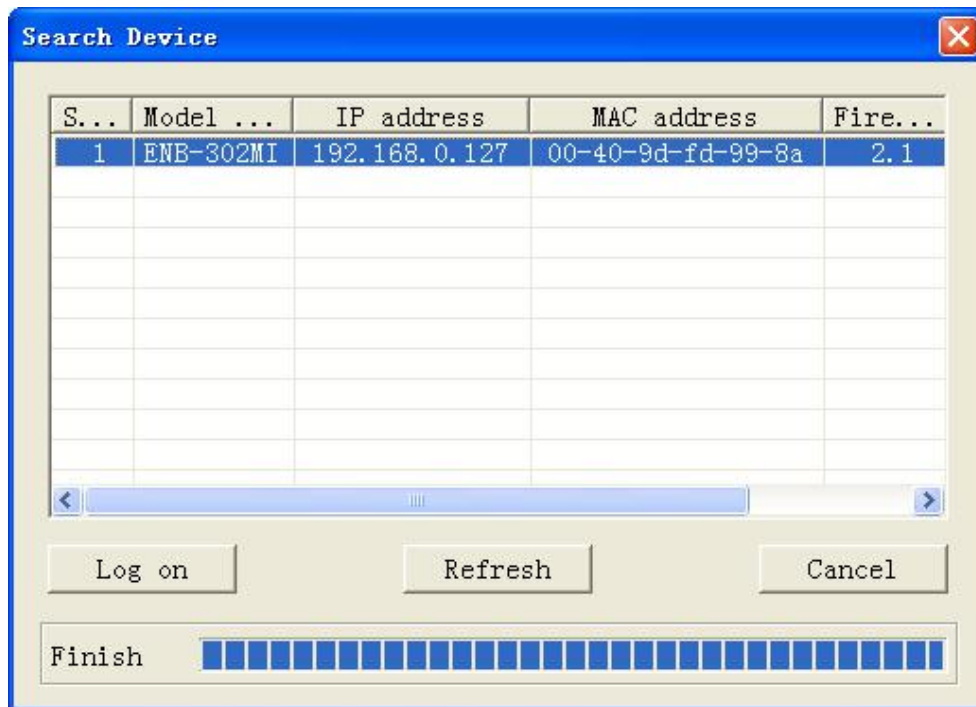Choose the icon , save the configuration as excel document and choose the right path.

## 4.9 Debug

This function is used to monitor the gateway memory data; Use the feature, the dialog box will pop up the search appliance:

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Note: If the user specified IP address in the "Ethernet Configuration", the search list will only list the devices.

Select the device you want to configure and click "Log on", then enter the debug dialog. Display interface as follows:
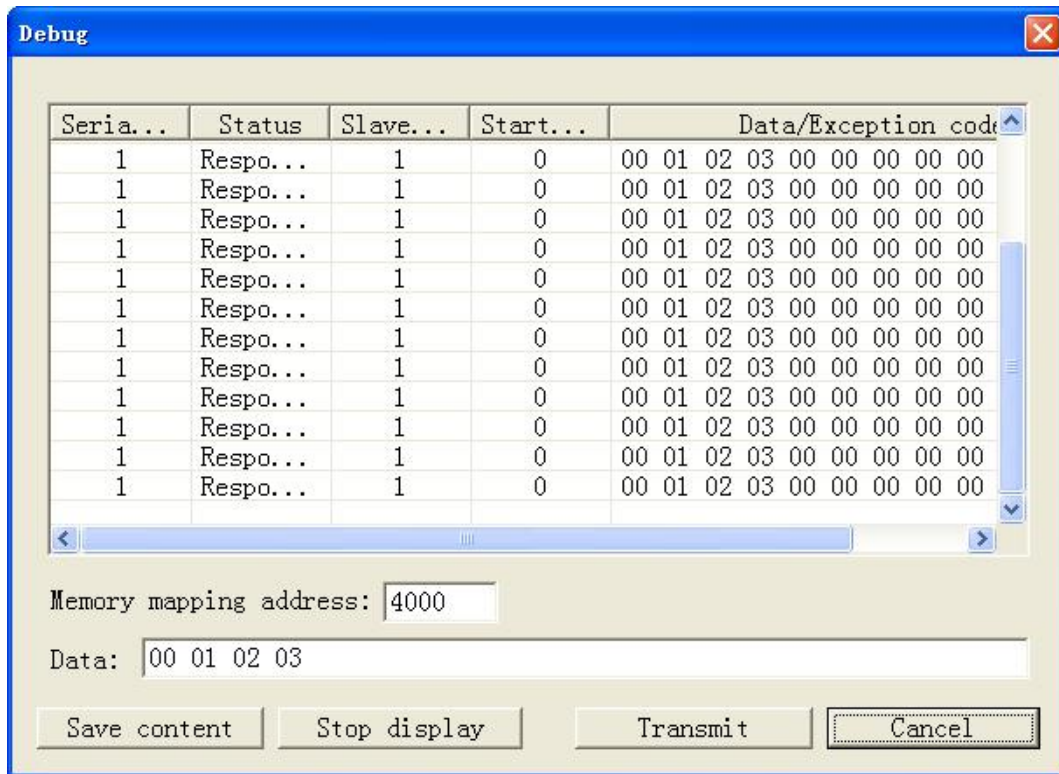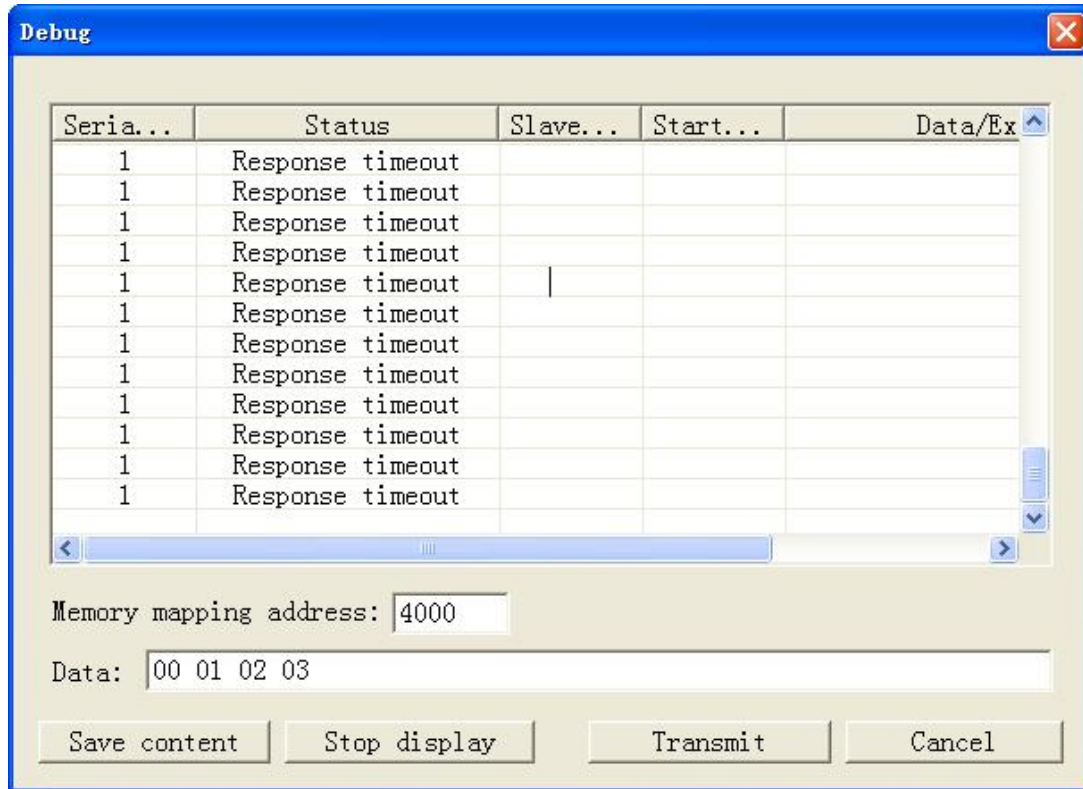

Memory-mapped address: Memory starting address of writing data in the gateway

Data: Data being written to memory of gateway

Users can debug Modbus communication through transmitting data.

When Modbus slave has no response or time-out:

Debug

Seria...	Status	Slave...	Start...	Data/Ex
1	Response timeout			
1	Response timeout			
1	Response timeout			
1	Response timeout			
1	Response timeout			
1	Response timeout			
1	Response timeout			
1	Response timeout			
1	Response timeout			
1	Response timeout			
1	Response timeout			
1	Response timeout			

Memory mapping address: 4000

Data: 00 01 02 03

Save content   Stop display   Transmit   Cancel
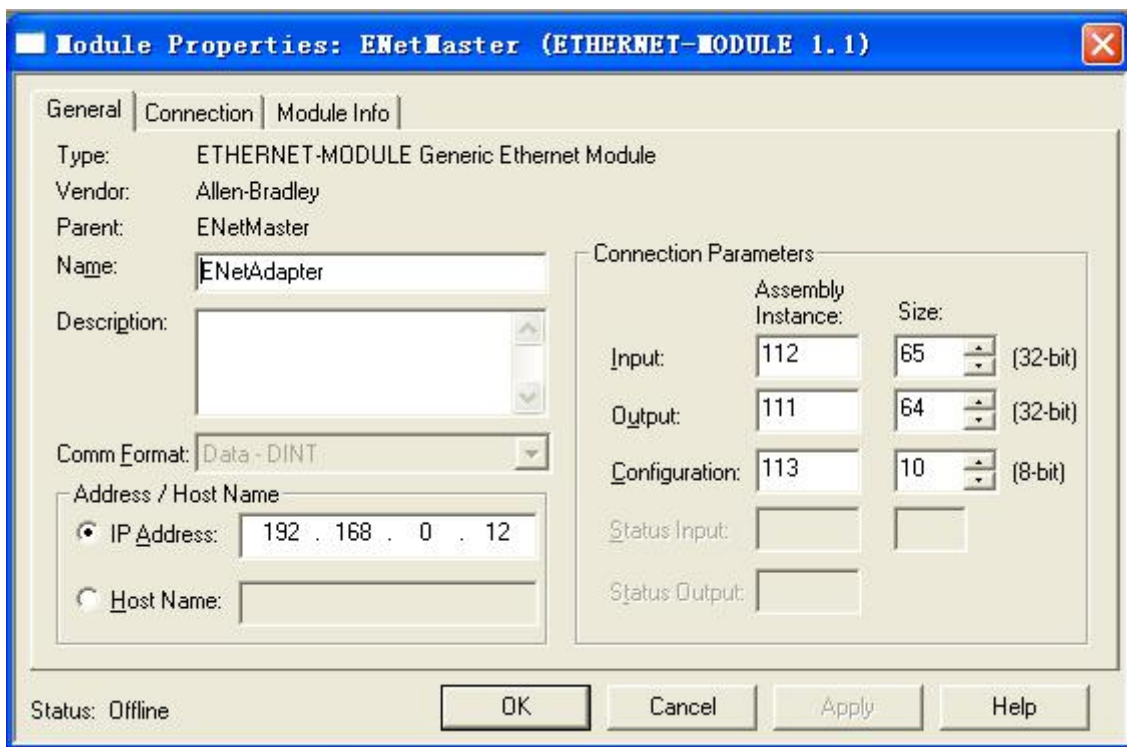
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5 EtherNet/IP Connection Parameters

Gateway provides the connection parameters are as follows:

Input Instance：102（128Bytes），112（256Bytes），122（512Bytes）；

Output Instance：101（128Bytes），111（256Bytes），121（512Bytes）；

Configuration Instance：113（10Bytes）

The parameters being configured in RSLogix5000 below:

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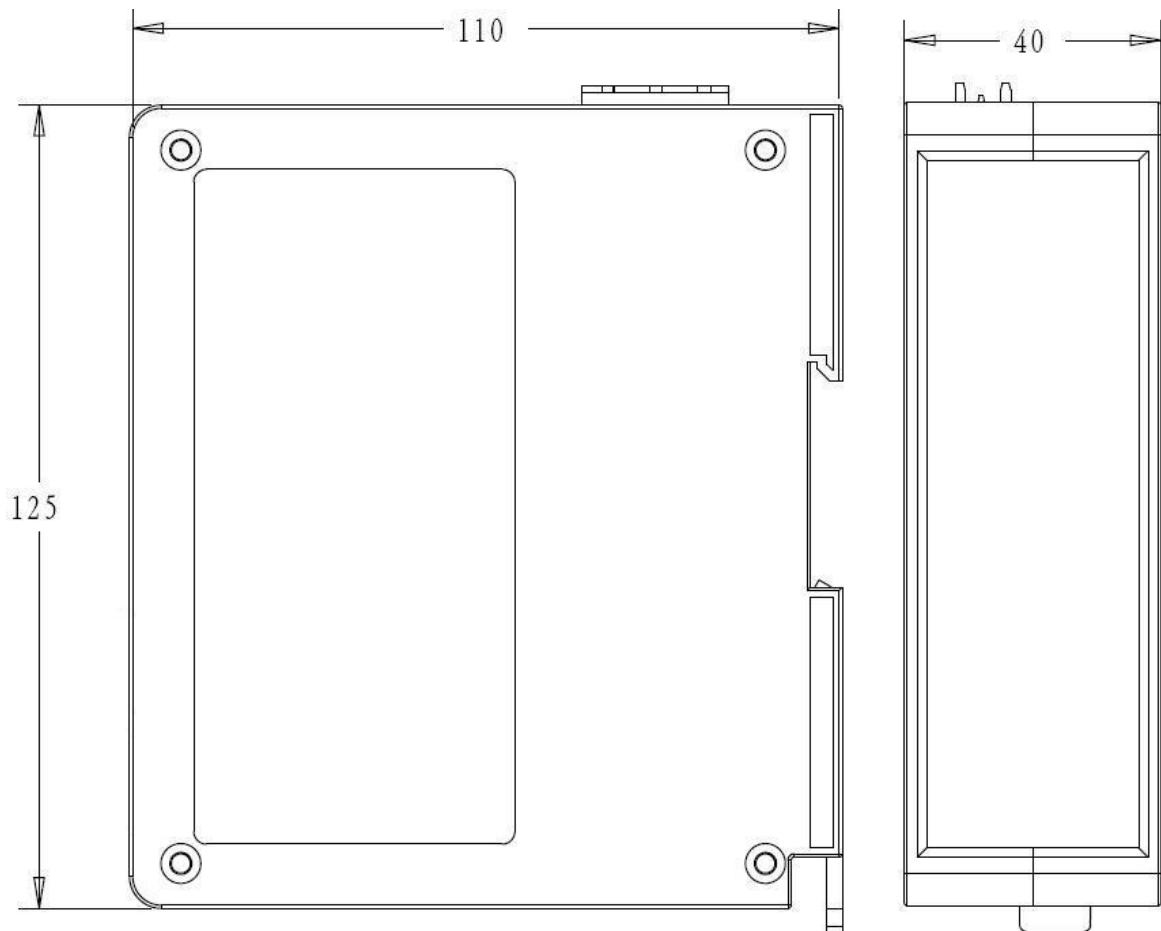SiboTech

6 Typical Application

ENB-302MI can connect Modbus devices to the EtherNet / IP network, and achieve communication between

PLC (or PC) with EtherNet / IP interface and Modbus devices:

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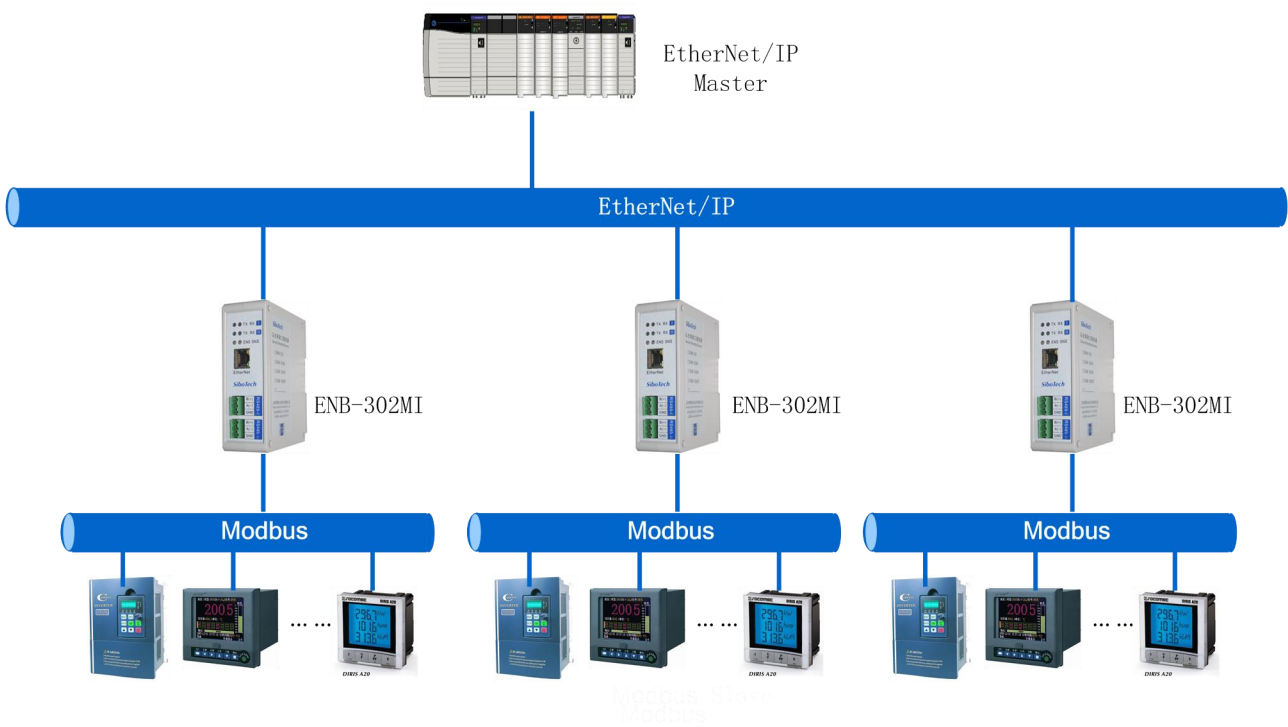
7 Installation

7.1 Mechanical Dimensions

Size: 40mm（width）×125mm（height）×110mm（depth）

7.2 Installation

35mm DIN rail mounting

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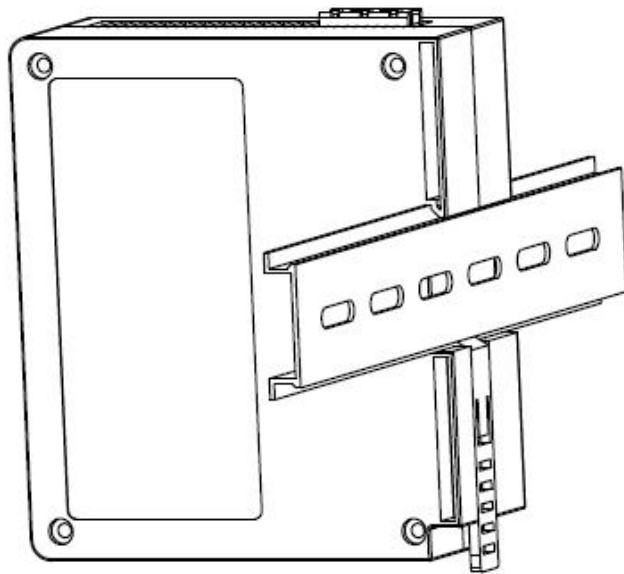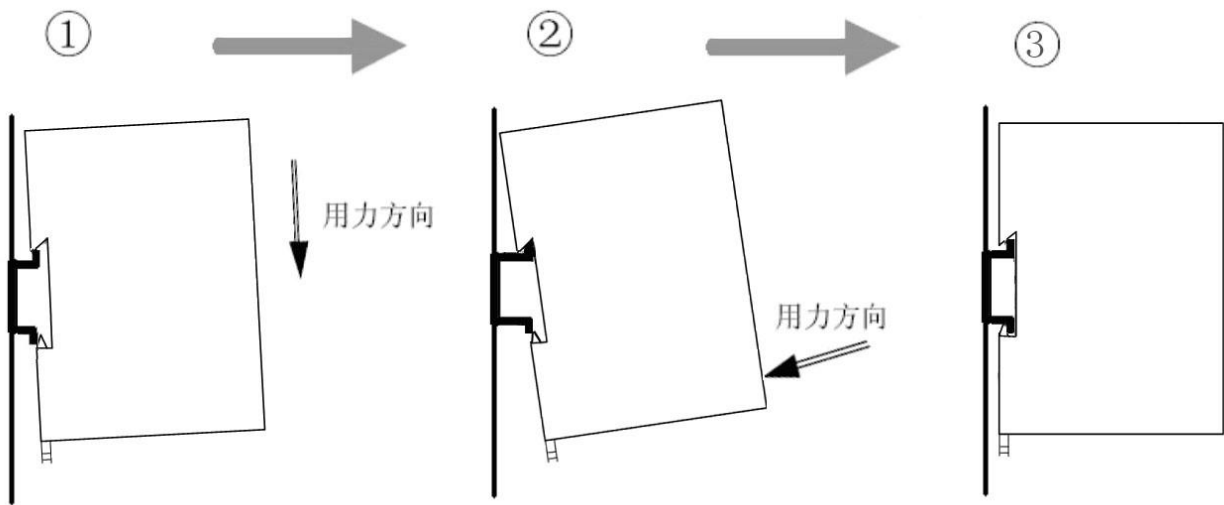
8 Attention

◆   To prevent stress, prevent module panel damage;

◆   To prevent bump, module may damage internal components;

◆   Power supply voltage control in the prospectus, within the scope of the requirements to burn module;

◆   To prevent water, water module will affect the normal work;

◆   Please check the wiring, before any wrong or short circuit.

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9 Copyright Information

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

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10 Related Products

Related products include:

ENB-302MT, PM-160 and so on

More information about these products, please visit: http://www.sibotech.net/En/, or dial technical support line: +86-21-5102 8348

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