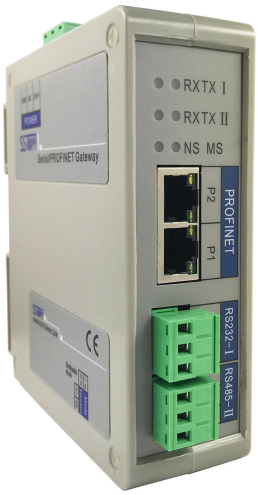
Universal Serial/PROFINET IO Gateway

GT200-PN-RS

User Manual

V 1.0

REV A



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Catalog

1 Product Overview

1.1 Product Function

GT200-PN-RS is a gateway which can provide a seamless connection between PROFINET network and Modbus. It can connect 2 devices with RS-232 or devices with RS-485 interface to PROFINET network.

1.2 Product Features

- Wide application: Any devices with RS-232/RS-485 interface can use this gateway to realize exchanging data. For example, Such as frequency converters with Modbus protocol interface, motor startup protection devices, intelligent high and low voltage electrical appliances, power measuring devices, transmitters, intelligent field measuring equipment and instruments etc.
- Easy configuration: Users don't need to know the technical details of Modbus, but refer to this manual and the application cases provided, complete configuration according to the gateway configuration software SST-TS-CFG without complex programming and implement the communication in a short time.

1.3 Technical Specification

[1] At PROFINET side GT200-PN-RS is PROFINET slave and acts as Modbus master or Modbus slave at serial side;
[2] Supports standard PROFINET I/O protocol;
[3] PROFINET: supports up to 32 slots, input/output data buffer is up to 384 bytes (the length uses can use is limited to specific PLC and PDU size of communication module), the length of input/output bytes can be set by the host computer software such as STEP7 or TIA Portal.;
[4] Supports the following module types:

- **Input 001 byte**
- **Input 002 bytes**
- **Input 004 bytes**
- **Input 008 bytes**
- **Input 016 bytes**
- **Input 032 bytes**
- **Input 064 bytes**

- **Input 128 bytes**
- **Output 001 byte**
- **Output 002 bytes**
- **Output 004 bytes**
- **Output 008 bytes**
- **Output 016 bytes**
- **Output 032 bytes**
- **Output 064 bytes**
- **Output 128 bytes**
- **Input / Output 001 byte**
- **Input / Output 002 bytes**
- **Input / Output 004 bytes**
- **Input / Output 008bytes**
- **Input / Output 016 bytes**
- **Input / Output 032 bytes**
- **Input / Output 064 bytes**
- **Input / Output 128 bytes**

[5] With 2 serial ports, serial I support RS-232,serial II support RS-485,Two serial ports can be used as communication ports, and they can communicate at the same time.

[6] The protocol type serial ports support: Modbus master, Modbus slave, self-defined protocol, User Config;

[7] Serial port parameters:

- Operation mode: Half-duplex;
- Baud rate: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 bps optional;
- Data bits:7, 8;
- Parity: None, Odd, Even, Mark and space optional;
- Stop bits: 1,2 optional;

[8] Modbus master:

- Function code: 01H, 02H, 03H, 04H, 05H, 06H, 0FH and 10H;
- Format: RTU and ASCII;
- Function: Cycle output, forbidden output and change of value output of write command;
- Each master can configure up to 48 Modbus commands;
- When serial port 1 (RS232 serial port) and serial port 2 (RS485 serial port) simultaneously connect the slave

equipment as the Modbus master, Serial port 1 supports connection of 1 Modbus slave device, and serial port 2 can configure up to 3 nodes. When configuring serial port 2 as the Modbus master independently, it can configure up to 4 nodes.

[9] Modbus slave:

- Function code: 03H, 04H, 06H and 10H;
- Format: RTU and ASCII

[10] Power supply: 24VDC (11V~30V);

[11] Operation temp: -4℉~140℉(-20℃~60℃), Humidity: 5%~ 95% (non-condensing);

[12] Built-in electrostatic protection: 15 KV ESD; Communication interface isolation: 3KV;

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

[14] Protection level: IP20.

1.4 Related Products

The related products include:

GT200-DN-RS: Modbus/DeviceNet Gateway

GT200-DP-RS: Universal Serial/PROFIBUS DP Gateway

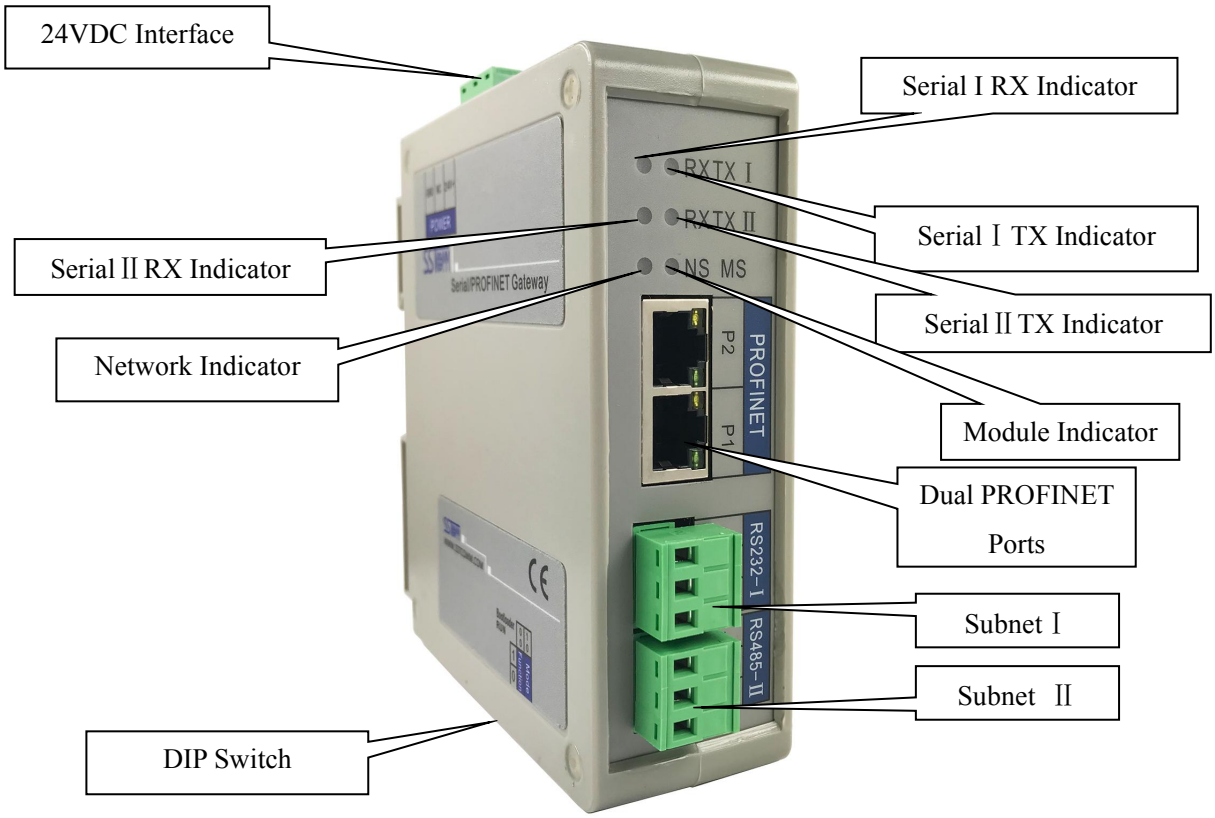
If you want to get more information about related products, please visit SSTCOMM website: http://www.sstcomm.com.

1.5 Revision History

Revision	Date	Chapter	Description
REV A	2/22/2018	All	New release

2 Hardware Descriptions

2.1 Product Appearance



Note: This picture is for reference only. Product appearance should refer to the real object.

2.2Indicators

Indicators	State	Description
Serial Ⅰ TX	Green Blinking	Serial port data sending
	OFF	No data is sending
Serial Ⅰ RX	Green Blinking	Serial port data receiving
	OFF	No data is receiving
Serial Ⅱ TX	Green Blinking	Serial port data sending

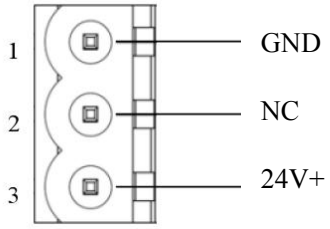
	OFF	No data is sending
Serial Ⅱ RX	Green Blinking	Serial port data receiving
	OFF	No data is receiving
MS	See below table	
NS	See below table	

Module indicator and network indicator:

Module indicator state MS	Network indicator state NS	Description
OFF	Red blinking	Start-up state, waiting to initialize
Green on	Red blinking	Initialize complete, no connection with PLC
Green on	Green on	PLC has connected
Other	Other	Undefined state

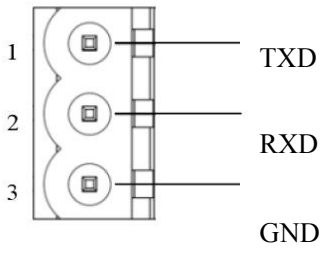
2.3 Interface

2.3.1 Power Interface



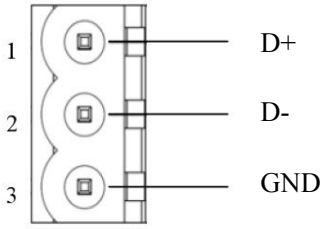
Pin	Function
1	Power GND
2	NC, Not connected
3	24V+, DC Positive 24V, range 9~30V

2.3.2 Serial Ⅰ-RS232



Pin	Function
1	TXD, RS-232 data sending, Connect RXD of user device
2	RXD, RS-232 data receiving, Connect TXD of user device
3	GND

2.3.3 Serial II-RS485



Pin	Function
1	D+, RS-485 Data Positive, connect Data Positive of user device
2	D-, RS-485 Data Negative, connect Data Negative of user device
3	GND

2.3.4 Standard RS-485 Characteristics

The basic characteristics of RS-485 transmission technology:

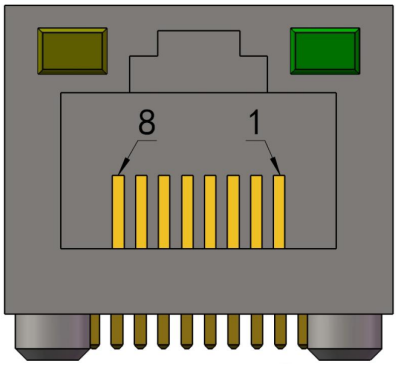
- Network topology: Linear bus, there are active bus terminal resistors at both sides.
- Transmission rate: 1200 bps~115.2Kbps.
- Media: Shielded twisted-pair cable and also can cancel the shielding, depending on environmental conditions (EMC).
- Site number: 32 stations per subsection (without repeater), and can increase up to 127 stations (with repeater). When serial port 1 and serial port 2 simultaneously connect the slave equipment as the Modbus master or User config, serial port 2 can configure up to 3 nodes. When configuring serial port 2 as the Modbus master independently, it can configure up to 4 nodes.
- Plug connection: 5-pin pluggable terminal.

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

- All the equipment are connected with RS-485 bus;
- The farthest two end of the bus has a terminal resistor—120Ω 1/2W to ensure reliable operation of the network.

- Serial interface uses 5-pin pluggable open terminal and user can wire it according to the wiring instructions on the panel.

2.3.5 Ethernet Interface



Ethernet interface uses RJ-45 plug-in; its pin (standard Ethernet signal) is defined as below:

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-
S7	Bi-directional Data+
S8	Bi-directional Data-

3 Quick Start Guide

3.1 Gateway Configuration

Configuring GT200-PN-RS needs the following steps:

a) Connect the power properly connect,GT200-PN-RS and PC through Ethernet cable and power on the gateway;

b) Configure in the SST-TS-CFG according to users requirements;

c) Click "Download " button on the toolbar to download the configuration to the gateway;

d) When downloading is complete, it will give hints "whether to restart the gateway ", click "Yes ";

e) Configure some relevant modeling in STEP7, including module, IP address of target device and device name;

f) Download the STEP7 modeling configuration to the PLC;

g) Waiting for about 10s, GT200-PN-RS will establish PROFINET connection with the PLC. At this time, NS green on, MS green on.

Notes: How to find out how many GT200-PN-RS devices are in the LAN, including MAC address, IP address and name of devices. Users can see chapter 3.4 Change Device IP and Name for help.

There are 3 necessary conditions which need to happen simultaneously when PROFINET device of SSTCOMM is communicating with PLC:

a) The PROFINET device name must be the same as that of device in PLC modeling.

b) The PROFINET device IP address must be the same as that of device in PLC modeling.

c) The configuring module of PROFINET device (configuring through SST-TS-CFG) must be the same as that in PLC modeling.

Note: The device name of GT200-PN-RS,which supports only a combination of lowercase letters and numbers, and must begin with a lowercase letter.

The following are legal names: dut28 dut28nn32

The following are illegal names: 28dut、dut28$、dut28+uu

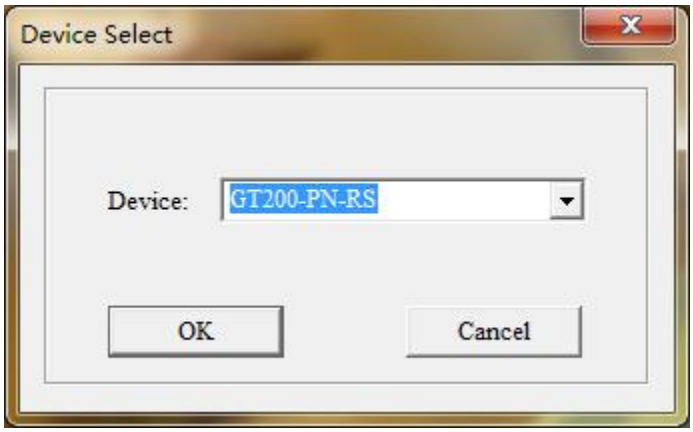
3.2 Software Instructions

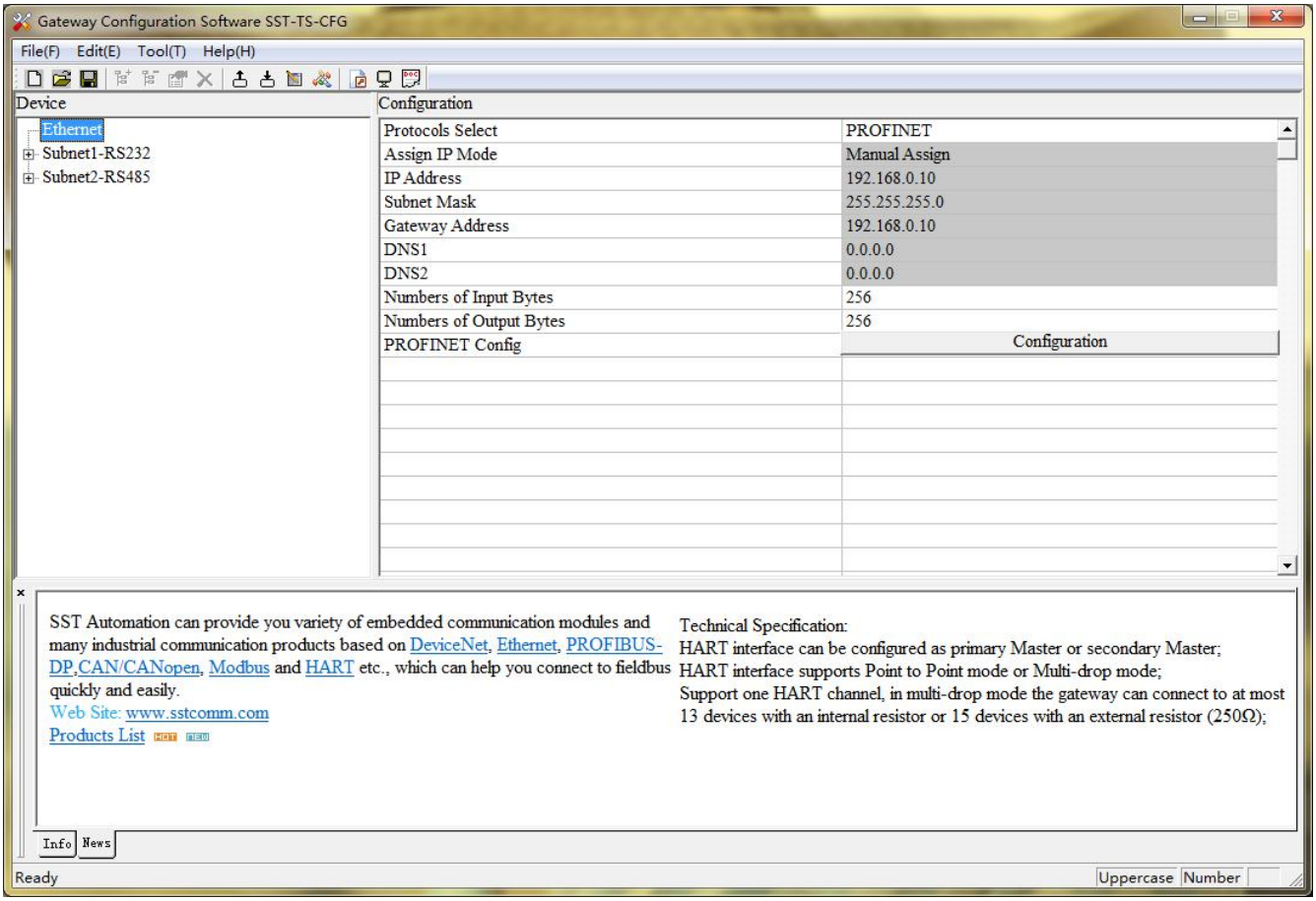
Users need to install the gateway software SST-TS-CFG when configuring the gateway.

Users can use SST-TS-CFG to finish configuring GT200-PN-RS easily, including IP address, subnet mask,

gateway address, device name, baud rate of serial port, parity, stop bits, communication protocol selection and protocol parameters. Also, users can choose to conduct the conflict detection to memory mapping data of the gateway.

After installation, double click the software icon to enter into the main interface of the software:





See chapter 4 for the detailed using method of the gateway configuration software SST-TS-CFG.

3.3 Run

3.3.1 Data Exchange

The data conversion between PROFINET network and serial of GT200-PN-RS is established by "mapping". GT200-PN-RS has two data buffers, one is input buffer (1K bytes) with address range 0x0000-0x03FF; the other is output buffer (1K bytes) with address range 0x4000-0x43FF.

3.3.1.1 PROFINET Slave

Presuming the input data length users have configured is N1, output data length is N2. GT200-PN-RS will periodically send the data within the address range of [0x0000, N1] to PROFINET network; When receiving data from PROFINET network, GT200-PN-RS will write the data to the address range of [0x4000, 0x4000+N2].

3.3.1.2 Modbus Master

When one serial runs Modbus master protocol, for all write registers, write coils command GT200-PN-RS supports, GT200-PN-RS can get data from address range 0x0000-0x03FF, 0x4000-0x43FF and send them to the Modbus slave. For all read registers, read coils command, GT200-PN-RS can write the data returned from Modbus slave to address range 0x0000-0x03FF.

Notes: Each Modbus master can configure 48 commands, and every command can get one continuous Modbus register.

3.3.1.3 Modbus Slave

When one serial runs Modbus slave protocol, for No. 03 commands master sent, GT200-PN-RS will get data from address range 0x0000-0x03FF. For No. 04 commands, it will get data from 0x4000-0x43FF and return them to the Modbus master. For No. 06, 16 command, it will write the Modbus master data to the address range of 0x0000-0x03FF.

3.3.1.4 Self-defined Protocol

When one serial runs self-defined protocol, users' serial device can read/write data to any address of two buffers of 0x0000-0x03FF and 0x4000-0x43FF.

3.3.1.5 User Config-Poll

When one serial runs universal mode-ask and answer, request part of command can get data from any address of

buffer 0x0000-0x03FF and 0x4000-0x43FF and send data to the serial slave device. When serial slave devices didn't give any response (if they did), if there exists data in response, GT200-PN-RS will write them to the address range of 0x0000-0x03FF. The specific data size will depend on users' configuration.

3.3.1.6 User Config-Receiving Only

When one serial runs universal mode-receive, it will receive data sent from serial master device and don't give any response. In this way, GT200-PN-RS will write the data which it received to some address areas of 0x0000-0x03FF.

3.3.1.7 Command Output Mode

Note: the content of this section is only applicable to MODBUS master protocol and User Config-POLL protocol.

Write command: The request frame contains commands for memory mapping area data of GT200-PN-RS.For example, the 5, 6, 15 and 16 function codes of MODBUS master protocol are written commands. The command with "data" field in the request frame of User Config-POLL is written command.

Read command: The command that is not written is read.

Command execution process:

1. The number of timeout retransmission is set to 0.
2. Request frame for sending commands. After sending, the response timeout timer begins.
3. Wait for the command response frame.
4. If a response frame is received within the response timeout period, a response is considered. Whether the response is correct depends on the specific response frame format. If the response frame is correct, the execution of the command ends, If a response frame is not received within the response timeout period, the response timeout is considered. Response error and response timeout, enter 5.
5. Determine whether the number of retransmission is 3.If 3, the execution of the command ends. Otherwise, the timeout retransmission times add 1,enter 2.

- Cycle output mode

In the Master protocol, each command has a unique command index in each subnet.

The Master protocol works in Cycle output mode and is executed as follows:

1. Execute the command N.
2. Wait for "command delay time", N plus 1. If N is greater than the number of command, N is 0. Execute order N.

- Change of Value output mode

  The Master protocol works in Change of Value output mode and is executed as follows:

  1. If command N is read, execute command N. Otherwise, check whether the memory mapping data contained in the request frame of command N is changed. If there is a change, execute the command N.

  2. Wait for "command delay time", N plus 1. If N is greater than the number of command, N is 0. Execute order N.

- Quick output mode

  Note: Quick output is valid only if "Output Command Polling Mode" in the subnet is "Change of Value" and only for write commands.

  When the system is initialized, if a Quick output command is found under the subnet, all commands under the subnet will be divided into two queues. Queue 1 is a Quick output command queue, and queue 2 is an normal command queue.

  The Master protocol works in Quick output mode and is executed as follows:

  1. Check the commands in the “Quick Output Command” queue one by one, and execute the command if the data of a command changes. Until the data of all commands in the queue did not change.

  2. Execute a command in the normal queue. An execution index in a normal queue plus one. If the number of commands in a normal queue is exceeded, the index value is 0. Enter 1.

  As you can see from the above execution, Quick output is preferred to write commands, which is of great benefit to the transmission of control information as soon as possible at some low baud rates (<= 19200), but this advantage is small for high baud rates.

3.3.1.8 Byte-swap

There are four types: no swap, double-byte swap, four-byte register swap and Four-Byte Big-endian and Little-endian Swap.

- double-byte swap

  When using double-byte swap, the number of bytes exchanged must be 2 times integer.

  Double-byte swap is 2 bytes for unit exchange, and the exchange mode is shown in the following table:

Before exchange		After exchange	
Byte index	Byte value	Byte index	Byte value
0	0x12	0	0x34
1	0x34	1	0x12

- four-byte register swap

When using four-byte register swap, the number of bytes exchanged must be 4 times integer.

Four-byte register swap is 2 registers for unit exchange, and the exchange mode is shown in the following table:

Before exchange		After exchange	
Byte index	Byte value	Byte index	Byte value
0	0x12	0	0x56
1	0x34	1	0x78
2	0x56	2	0x12
3	0x78	3	0x34

- Four-Byte Big-endian and Little-endian Swap

When using Four-Byte Big-endian and Little-endian Swap, the number of bytes exchanged must be 4 times integer.

Four-Byte Big-endian and Little-endian Swap is 4 bytes for unit exchange, and the exchange mode is shown in the following table:

Before exchange		After exchange	
Byte index	Byte value	Byte index	Byte value
0	0x12	0	0x78
1	0x34	1	0x56
2	0x56	2	0x34
3	0x78	3	0x12

3.3.1.9 Bytes Exchange Way in Various Protocols

The schematic diagram is as follows:

As you can see from the figure, the byte-exchange program is only a process between the buffer and the request or response frame of the command, without changing the length of the total data, only changes the organization way of the data.

Command execution mode:

1. Read a certain length of data from the buffer (input or output) and put it in the frame buffer of the command. Then, send the command.

2. When the command has a response, the data is separated from the response frame of the command and copied to the buffer

After adding byte swap processing:

1. Read a certain length of data from the buffer (input or output), byte swap processing, then put it in the frame buffer of the command, and finally send the command

2. When the command has a response, the data is separated from the response frame of the command ,byte swap processing, then copied to the buffer

Note: When the byte swapping process is performed, the data to be processed is divided according to a specific length. For example, when 2 bytes are exchanged, data is processed in units of 2 bytes. When 4 bytes are exchanged, data is processed in units of 4 bytes.

3.3.1.10 IO Status Word

In order to easily obtain the state of the execution of each command under each master station, the IO state word is introduced

- MODBUS master protocol and User Config-POLL protocol

Both of these protocols are the master protocol and are also based on command. We use a bit to indicate whether the execution of each command is successful or not. When the command execution is successful, the corresponding bit is set to 1, otherwise it is set to 0.When a subnet is configured as a master protocol, the number of bytes occupied by the IO status word of the subnet is calculated using the following formula:

The number of bytes in IO status word = ((integer, Discard decimal part) (command bar number under subnet + 15) / 16) * 2

For example:

MODBUS master station protocol is configured in subnet 1, with a total of 15 commands, according to the calculation formula above:

(15 + 15) / 16 = 1, 1*2 = 2 (bytes)

So the IO status of these 15 commands takes up 2 bytes. The specific IO status indication information is as follows:

	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Byte 0	Command 7 indicate	Command 6 indicate	Command 5 indicate	Command 4 indicate	Command 3 indicate	Command 2 indicate	Command 1 indicate	Command 0 indicate

	bit	bit	bit	bit	bit	bit	bit	bit
Byte 1		Command 14 indicate bit	Command 13 indicate bit	Command 12 indicate bit	Command 11 indicate bit	Command 10 indicate bit	Command 9 indicate bit	Command 8 indicate bit

- MODBUS slave protocol and Self-defined protocol

The two protocols are slave protocols. Their IO status word is used to indicate the running state of the protocol by a 16-bit integer change. Every time a correct request frame is received from the slave. The value is automatically added 1.

The 16-bit integer is represented in a Little-endian, where the low address represents the low byte of the 16-bit integer and the high address represents the high byte of the 16-bit integer

3.3.1.11 Response Timeout Handling for Master Protocol

The specific application scene is like this: After the master sends the request frame, it will wait for the response of the slave device within the limited time. If the slave does not respond within a limited time, the master protocol will trigger the response timeout processing. How to deal with this?

If the command is successfully executed the previous time, it will be reissued three times (a total of four times), In the process of retransmission, if any response is given from the slave, it will stop repeating and transferred to the next command. If the slave still has no response after three retransmission, the processing method given in the response timeout handling option is executed. Namely: Clear or Hold. It should be noted that the clear or hold here is for the data part of the slave response frame. Because GT200-PN-RS transformation between protocols is achieved by mapping, so the data part of each command's response frame will have a mapping area in the input buffer of GT200-PN-RS.Our "clear or hold" is for this mapped data area. Specifically, if "clear" is selected, all data in the map area will be set to 0 after the response timeout; if " hold", the content of the map data area will not be changed after the response timeout.

If the command is unsuccessfully executed the previous time, re-transmission is not executed.

3.3.2 Self-defined Protocol

3.3.2.1 Definition

User device acts as initiator, send output data in the request frame.

GT200-PN-RS acts as responder which sends input data in the response frame.

Communication way is point to point.

Time interval between bytes in request frame should be less than 50ms, or GT200-PN-RS will dispose this frame data.

For every valid request frame, GT200-PN-RS should make response in 200ms.

Supports communication baud rate range 300~115200 bps, 8 data bits, parity (None, Odd, Even, Mark, Space) and 1 or 2 stop bits.

3.3.2.2 Communication Message Format

3.3.2.2.1 Request Frame Message

[Output data length] [High byte of output data start address] [Low byte of output data start address] [Input data length] [High byte of input data start address] [Low byte of input data start address] [Output data 1]…… [Output data n] [Parity]

Notes: Output means the data that users device writes to GT200-PN-RS, input means the data that users device gets from GT200-PN-RS.

Data number n equals output data length.

Output data address range: 0x0000-0x03FF, 0x4000-0x43FF;

Input data address range: 0x0000-0x03FF, 0x4000-0x43FF;

3.3.2.2.2 Response Frame Message

Correct response:

[Input data length] [High byte of input data start address] [Low byte of input data start address] [Input data 1]…… [Input data n] [Parity]

Data number n equals input data length.

Wrong response:

[0x00] [0xFF] [0xFF] [error code] [parity]

3.3.2.3 Parity

Accumulated sum of 8 bits of all data, ignore the flow bit. That is:

[Message parity code] = [output data length] + [high byte of output data start address] + [low byte of output data start address] + [input data length] + [high byte of input data start address] + [low byte of input data start address] + [output data 1] +……+ [output data n].

[Response parity code] = [input data length] + [high byte of input data start address] + [low byte of input data start address] + [output data 1] +……+ [output data n].

3.3.2.4 Error Code

Error Code	Meaning
0x01	Output data length error
0x02	Accumulated sum parity error
0x03	Output data start address error or illegal output data area
0x04	Input data start address error or illegal input data area

3.3.2.5 Message Examples

If input data number is 50 bytes, output data is 32 bytes.

Now, users want to output all zero data and get all input data, examples are as below:

[The following data format is all HEX]

Request frame message:

[20] [40 00] [32] [00 00] [00……00] [92]

|output data length| output start address| input data length | input start address| 32 output data| parity (accumulated sum) |

Response frame message:

[32] [00 00] [00……00] [92]

|input data length| input start address| 50 output data| parity (accumulated sum) |

Here the output and input address is memory mapping address of GT200-PN-RS.

3.3.3 User Config

3.3.3.1 Definition

Common mode protocol message of GT200-PN-RS can be set freely by users, which solves the communication problem between Modbus standard protocol and Modbus nonstandard protocol devices. There are two operation modes under common mode: POLL and READ. Working principle of POLL is similar with Modbus communication protocol, which uses request and response communication way and every subnet can set 30 commands under common mode; READ only receives stored data and doesn't respond after receiving data, such as bar code scanner and device communication etc.

3.3.3.2 User Config-POLL

Users need to configure request message and response message of User Config-POLL before using it.

Frame header: HEX input, max bytes number: 8

Data: HEX input, every item occupies two bytes

Constant: HEX input, max bytes number: 8

Parity: None, CRC check, LRC check, Sum check

End of Frame: HEX input, max bytes number: 3

Send order in RTU format: header, data, constant, parity and end

Receive order in RTU format: header, data, constant, parity and end

Send order in ASCII format: header, constant, data, parity and end

Receive order in ASCII format: header, constant, data, parity and end

For example, configuring Modbus commands, RTU transmission format:

Request:

Slave address: 01

Function code: 03

Register address H: 00

Register address L: 00

Number of data H: 00

Number of data L: 02

CRC check H: C4

CRC check L: 0B

Message: 01 03 00 00 00 02 C4 0B

Response:

Slave address: 01

Function code: 03

Number of data: 04

Data: 00

Data: 00

Data: 00

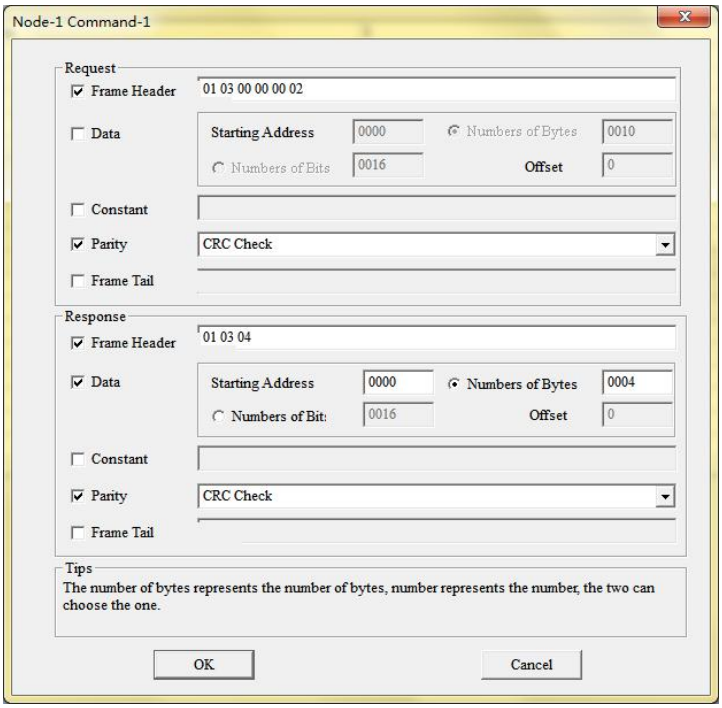
Data: 00

CRC check H: FA

CRC check L: 33

Message: 01 03 04 00 00 00 00 FA 33

Command configuration example is as below:



Notes: Under RTU transmission format, supports following parity: None, CRC check and sum check

For example, configuring Modbus command, ASCII transmission format:

: (3A)

Slave

Function

Number of data

Data 1

……

Data n

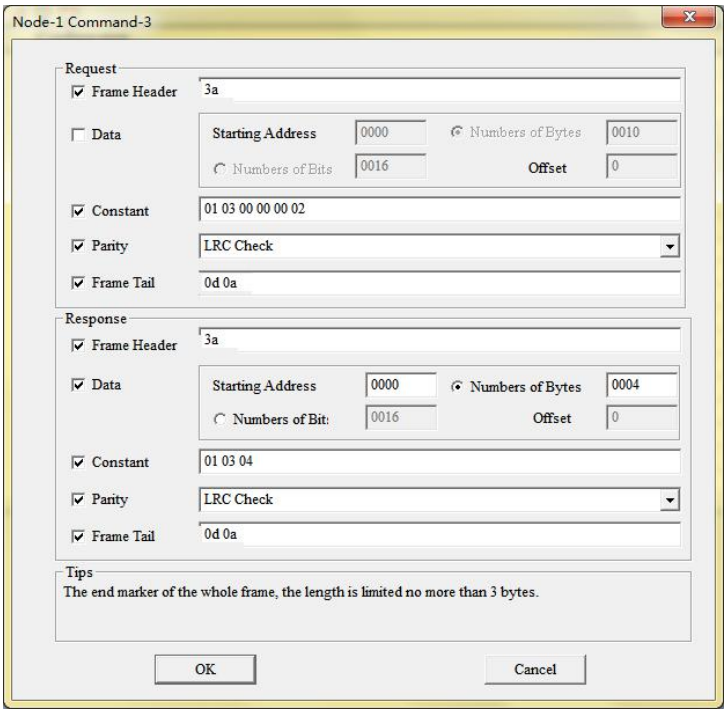
LRC high byte

LRC low byte

CR (0D)

LF (0A)

Command configuration example is as below:



Notes: Under ASCII transmission format, supports parity: None, LRC check and sum check

Note: User Config-POLL in different "communication mode", the frame format is different!!\

RTU frame: header+ data+constant+parity +end

ASCII frame:header+constant(ASCII)+data(ASCII)+parity(ASCII) +end

3.3.3.3 User Config-Receiving only

User Config-Receiving only mode only receives data and doesn't respond. It can be used in receiving data of bar code scanner devices. Each subnet of User Config-Receiving only has 16 group data receiving buffer and receiving data buffer of each group is 128 bytes.

Configuring interface is as below:

Configuration	
Protocols Select	User Config
Baud Rate	19200
Data Bits	8
Parity Check	None
Stop Bits	1
Slave Address	
Transmission Mode	
Response Timeout	
Delay between Polls	
Output Mode	
Output Pulse	
Scan Rate	
Communication Mode	Receiving Only Mode
Time Interval Between Characters	3
Check Mode	None
Memory Mapped Starting Address (Hex)	
Mapping Data Length	

Configurable domain introduction:

"Time interval between characters":In Receiving only Mode, it is maximum time interval between characters and used to decide whether a frame is terminated or not. If the receiving time interval for two consecutive characters is greater than this value, GT200-PN-RS will think it receives two frames.

"Check Mode": There are three checking method: no parity check, CRC check, and sum check. Note that when the GT200-PN-RS transmits data to the PN side, the field will automatically lose the check value according to the check mode. For example, one byte of the end of the frame is discarded when the sum check is performed, and two bytes of the end of the frame are discarded when the CRC check is performed.

"Memory Mapped Starting Address": The address offset in the input buffer, range 0-0x3FF

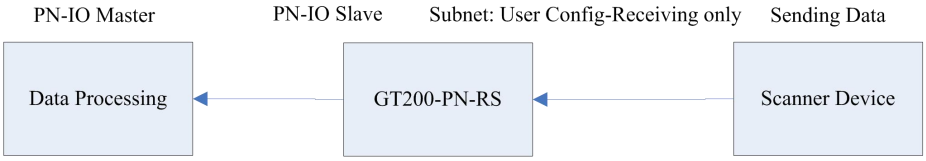
"Mapping Data Length":The number of bytes mapped to the input buffer, range: 2-128

User Config-Receiving only mode ,the format for transferring data to PN is:

0	1	2..N
Transaction No.	Data length(N-2)	N-2 Valid data

Whenever GT200-PN-RS receives a correct User Config-Receiving only frame, the transaction number will automatically add one.

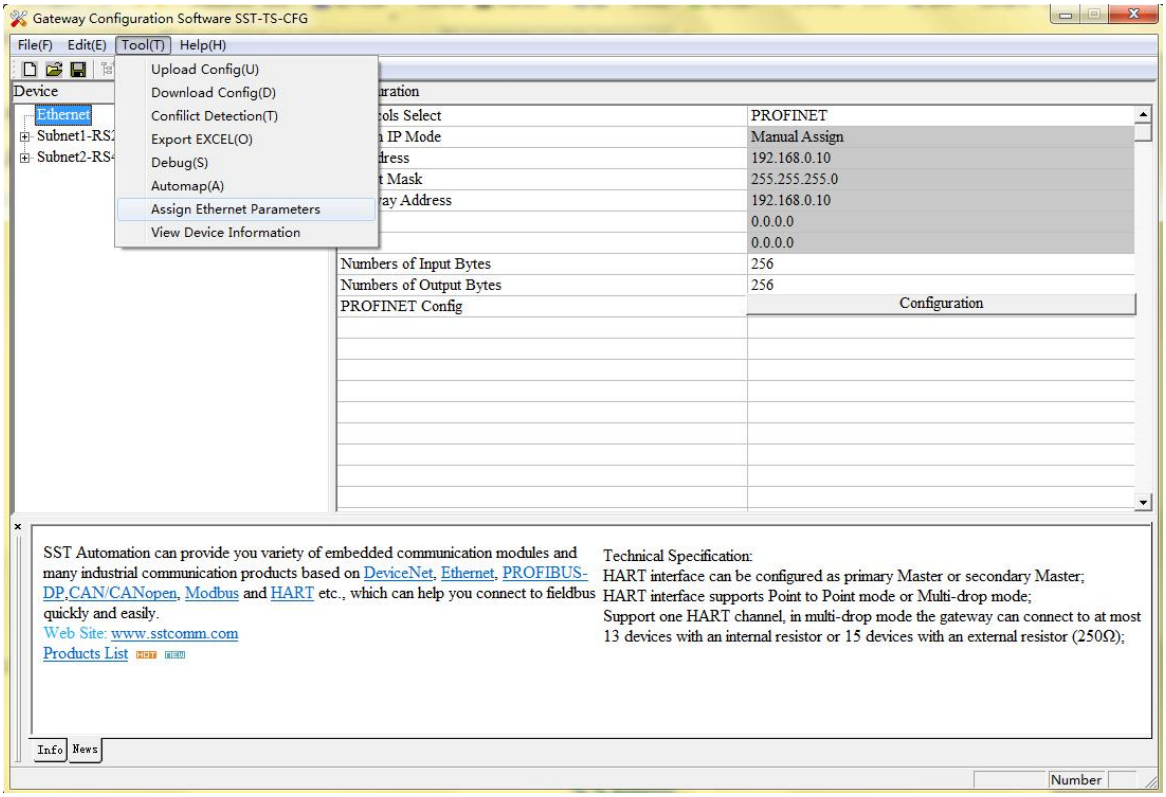
The connection diagram is as follows:



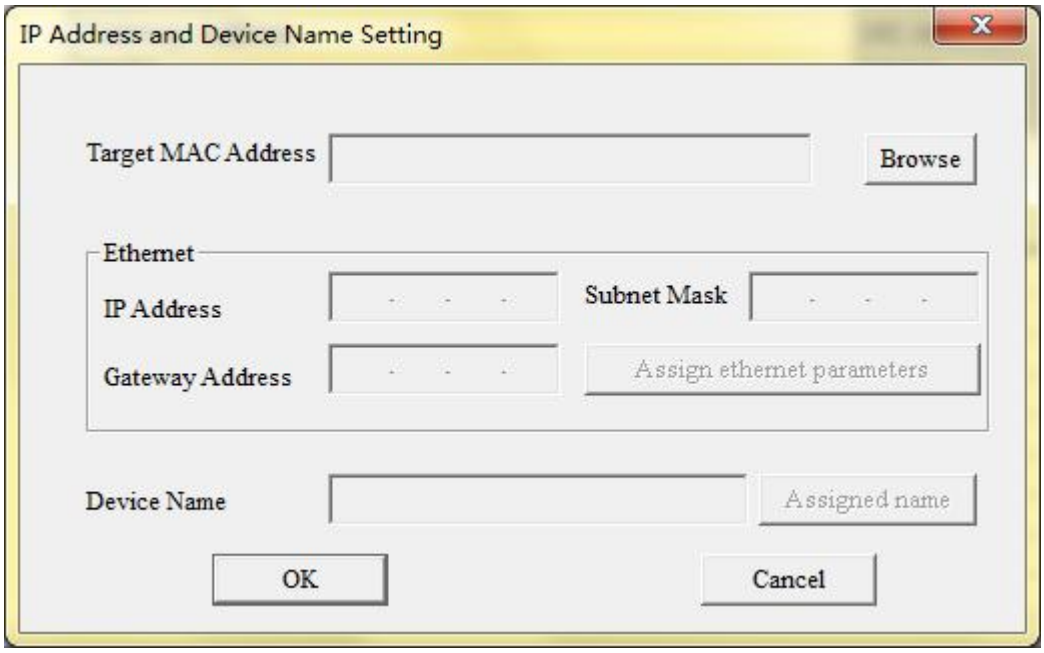
3.4 Change Device IP and Name

3.4.1 Scan Devices on LAN

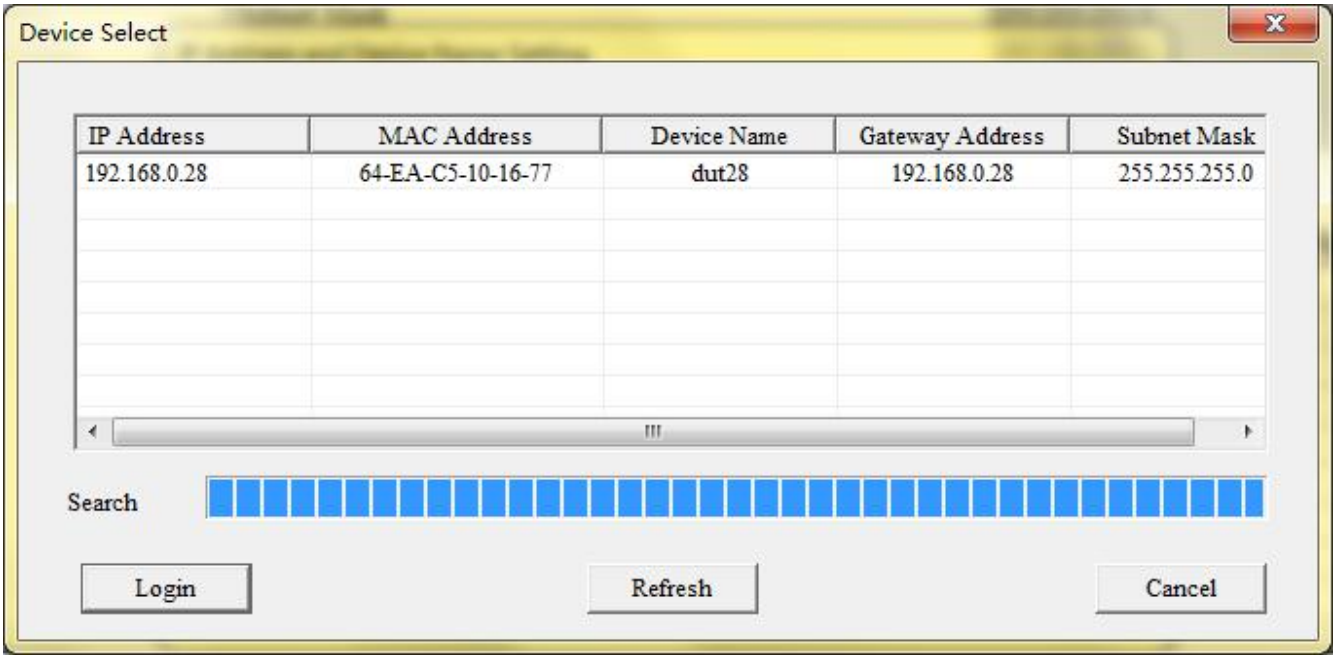
1. Open SST-TS-CFG and click Tools on the menu bar, shown as below:



2. Click "Assign Ethernet Parameters" will pop up below interface:



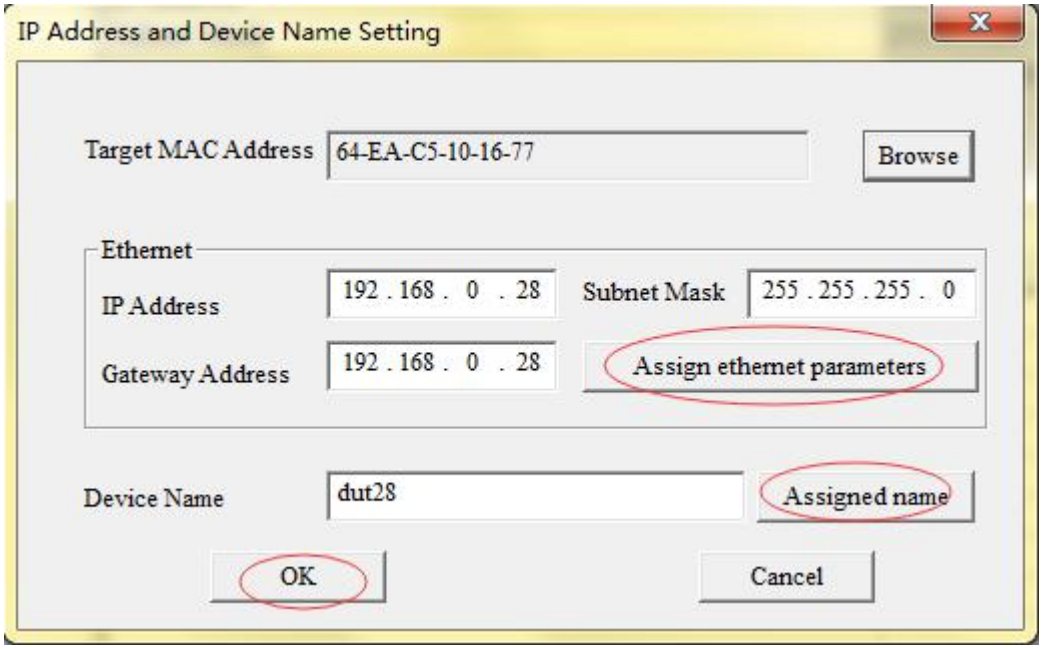
3. Click "Scan", the dialog box will be shown as below:



You can see that GT200-PN-RS device is on the LAN, showing its "IP", "MAC address", "Device Name", "Gateway" and "Subnet".

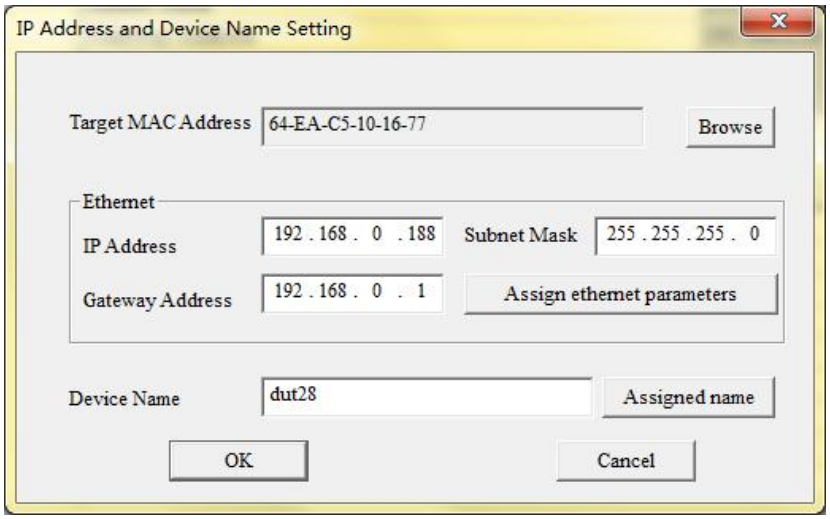
3.4.2 Change IP Info and Name

1. Scan the device according to chapter 3.4.1 and log in the device, the interface is shown as below

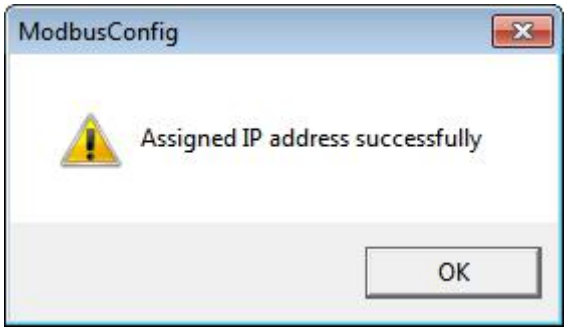


You can see that after log in the device "Target MAC address" shows MAC address of GT200-PN-RS (unmodified).

2. Modify IP address to "192.168.0.188", gateway address to "192.168.0.1" and click "Assign Ethernet Parameters", its operation interface is shown as below:

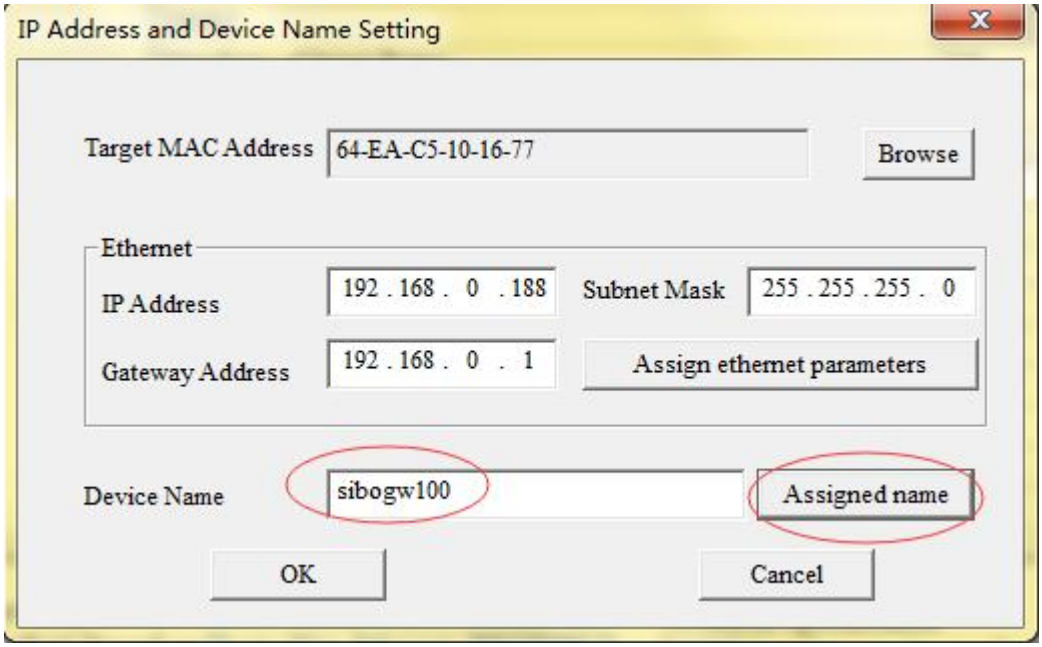


If modification is successful, it will pop up the dialog box below:

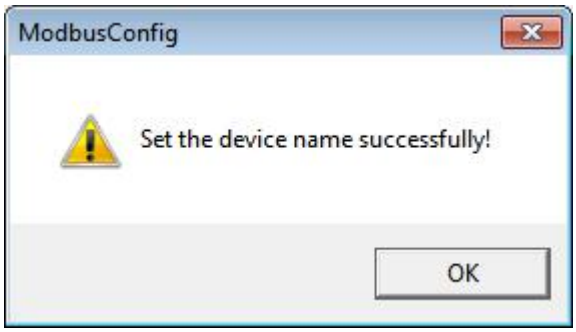


Click "OK".

3. Change device name to "sibogw100" and click "Assign ", shown as below:

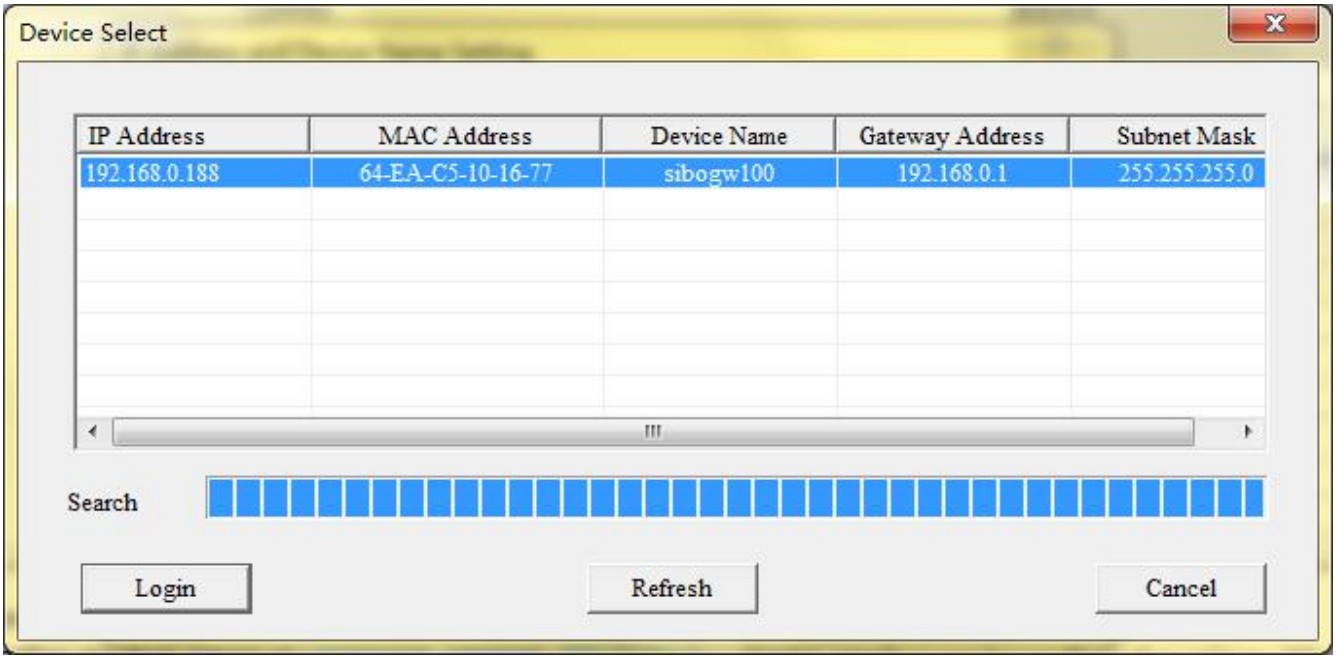


If successful, it will pop up the dialog box as below:



Click "OK".

4. Click again "Scan" will lead to scanning device again. See below:



You can see that IP address has been modified "192.168.0.188", device name is "sibogw100".

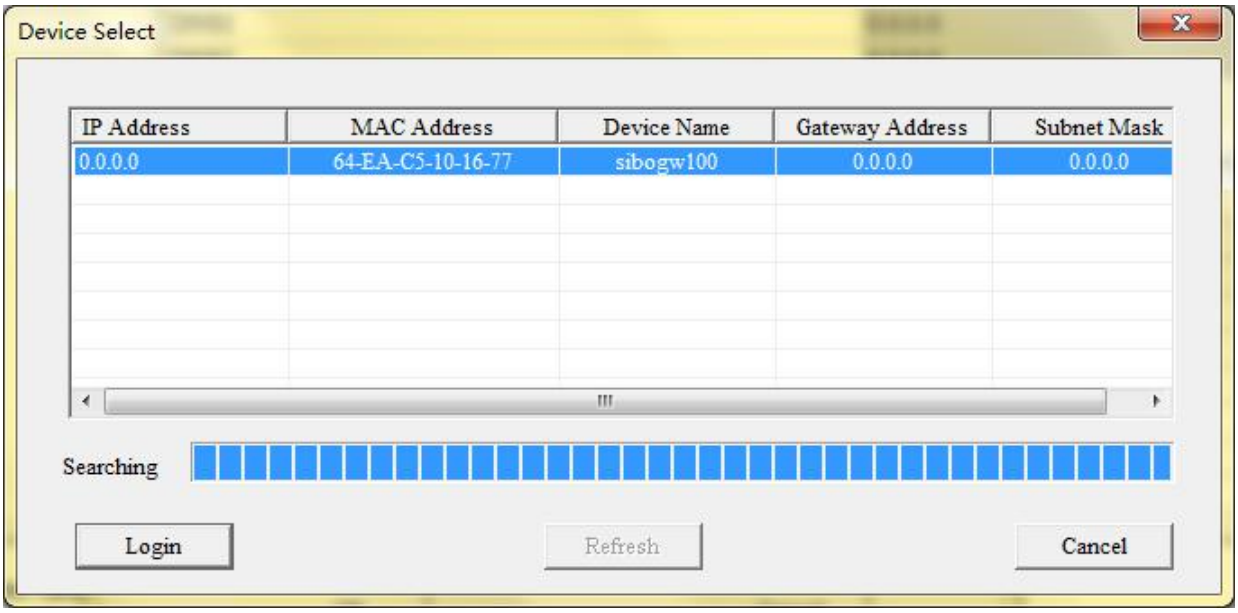
3.5 IP Address Conflict Resolution

According to the specification of PROFINET protocol, acting as a PROFINET slave, GT200-PN-RS must obey the rule that there can't be more than 1 PROFINET device which has the same IP address and name on the same LAN when connecting many GT200-PN-RS devices.

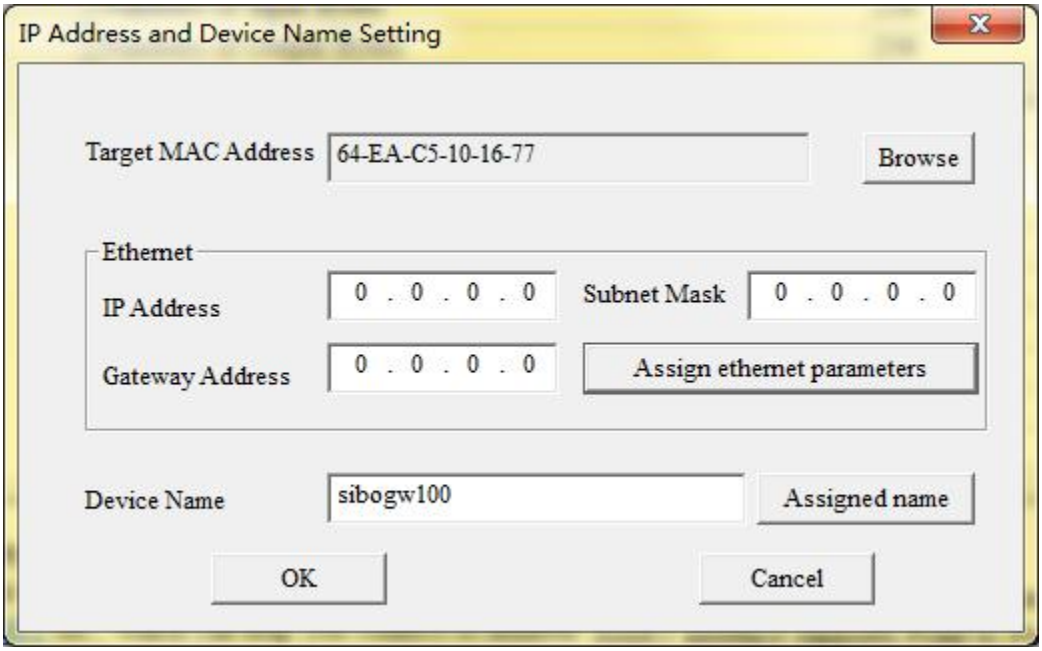
If there exits confliction of IP address and device name, users can change IP address and name of GT200-PN-RS according to chapter "3.4 Change IP Info and Name" and ensure that others IP address and name are different (Notes: after changing is complete, some relevant change should be taken in PLC modeling and users must ensure the IP address and name of GT200-PN-RS is the same with that of PLC modeling).

For example:

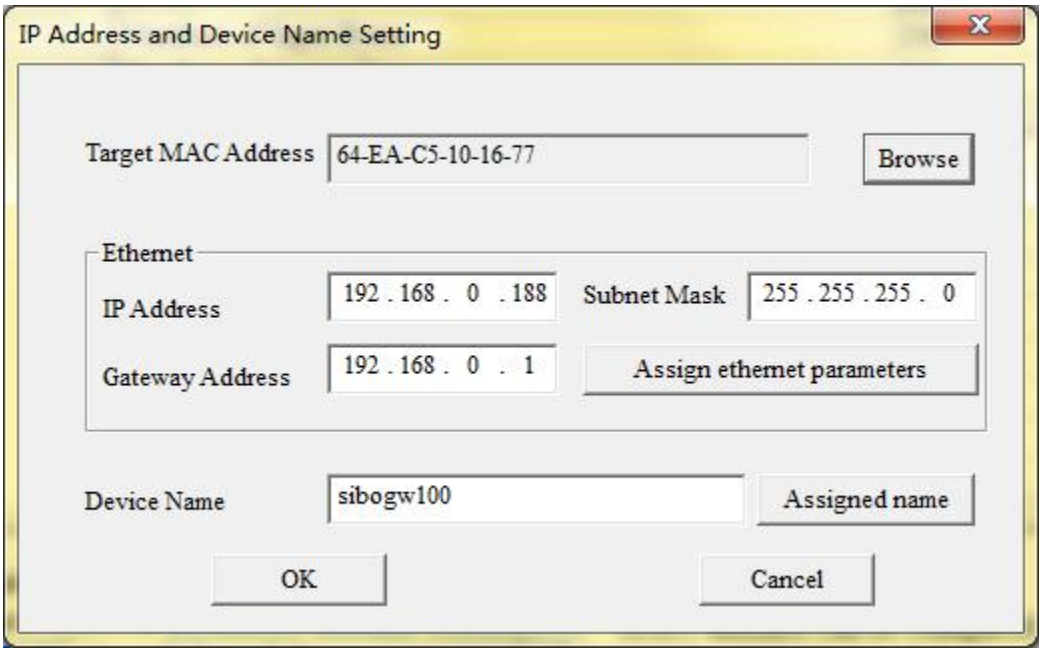
When it happens to IP address confliction, IP address, subnet mask and gateway address of GT200-PN-RS will be reset to "0.0.0.0". Now, users can't use "Upload" or "Download" to scan GT200-PN-RS and only use chapter "3.4.1 Scan Devices on LAN" to scan the device, the scanning result is shown as below:



You can see the IP address is reset to "0.0.0.0", choose the device and log in, the dialog box is shown as below:



Set "IP", "Subnet" and "Gateway" to "192.168.0.188", "255.255.255.0" and "192.168.0.1" and you will see the below picture:



Click "OK".

3.6 Restore to Default Configuration

Under current configuration, the PROFINET configuration of GT200-PN-RS does not support some compound mode. Sometimes it will appear the phenomenon of configuration failure. When that condition happens, the network LED is off, module LED red blinking (the same instruction as system startup). Now, you can't scan GT200-PN-RS through SST-TS-CFG until restoring to the default configuration.

Specific steps are as follows:

a) Power off GT200-PN-RS;

b) Set bit 1 DIP switch to on and bit 2 to off;

c) Power on GT200-PN-RS, waiting TX LED of subnet Ⅰ be green on;

d) Set bit 1 of DIP switch to off in 5s, waiting TX LED be green off;

e) Set bit 1 of DIP switch to on in 5s, waiting TX LED be green on;

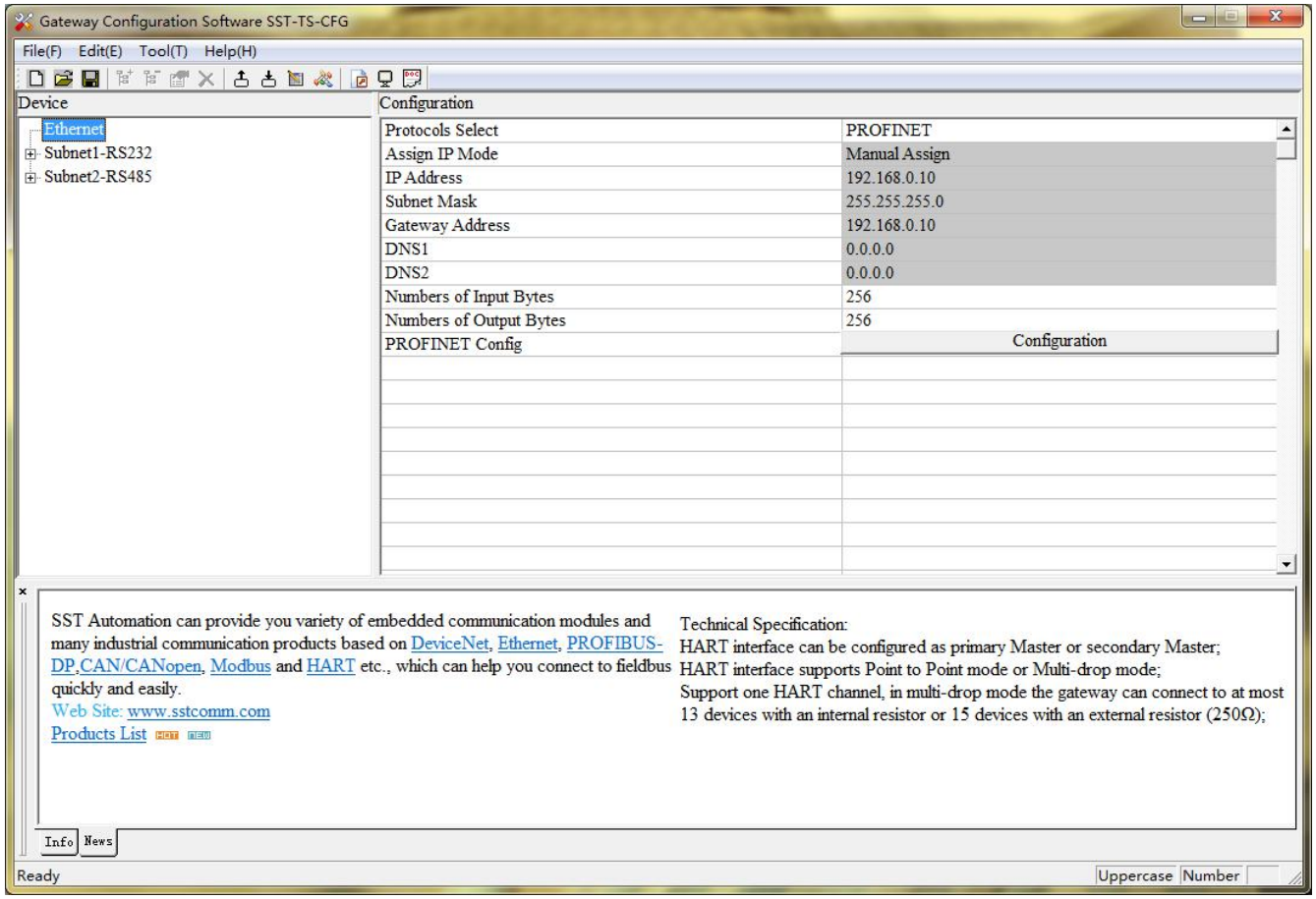
f) Restart GT200-PN-RS (power off and power on), GT200-PN-RS is now in configuration state.

4 Software Instructions

SST-TS-CFG is configuring software based on Windows platform, and used to configure relevant parameters and commands of GT200-PN-RS.

The following describes how to use the software SST-TS-CFG to configure the product GT200-PN-RS. You may also check the software user manual to get detailed usage

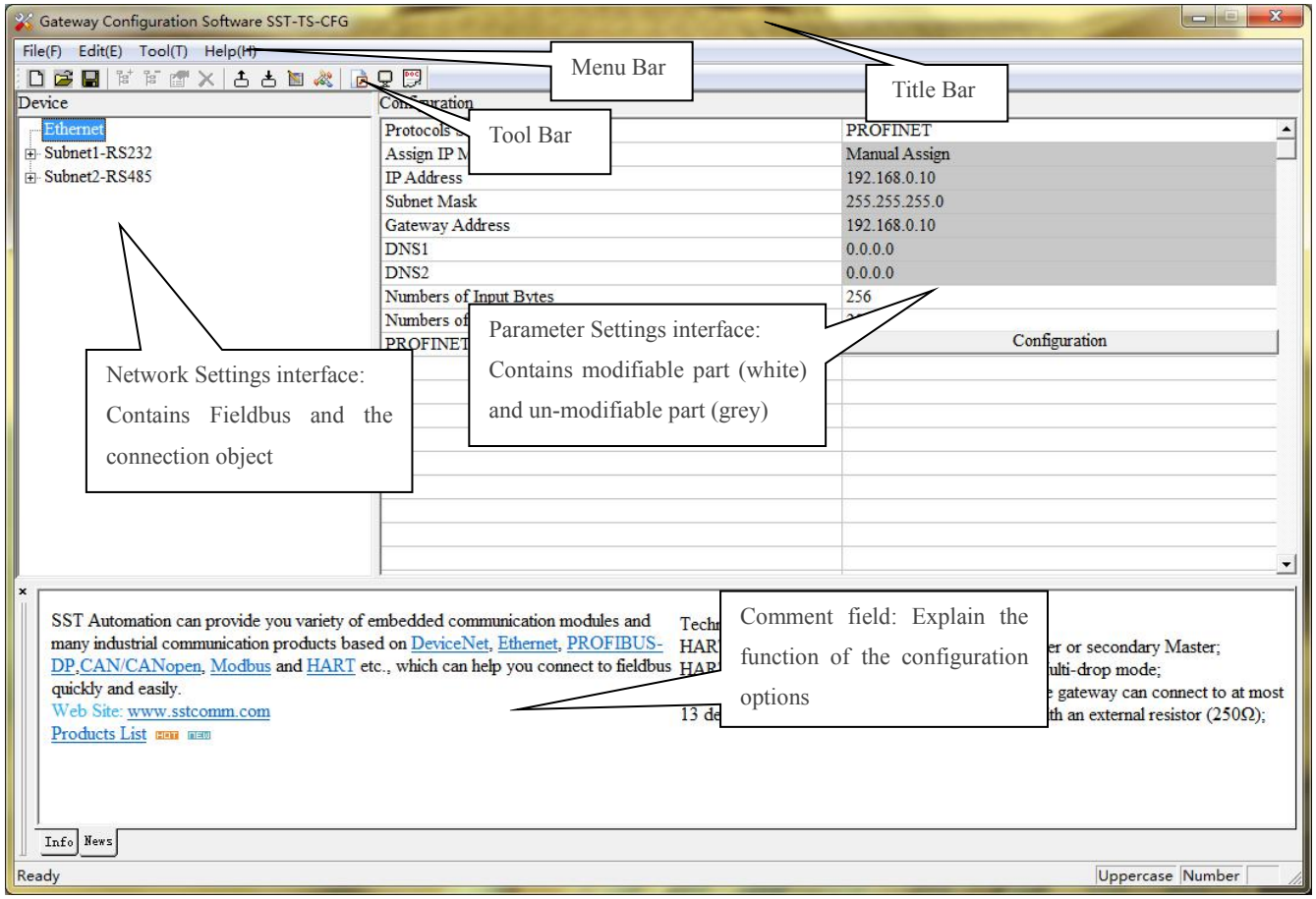
Double click software icon to enter the main interface of software:



4.1 User Interface

The interface of GT200-PN-RS includes: title bar, menu bar, tool bar, state bar, device plate, configuration plate and comment plate.

Remark: in the software, all grey parts cannot be modified.



Tool Bar:

Tool bar interface is shown as below:

The function from left to right is: New, Open, Save, Add Node, Delete Node, Add Command, Delete Command, Upload, Download, AutoMap, Conflict Detection, Export XLS, Debug and Assign Ethernet Parameters.

New: Create a new configuration project

Open: Open the configuration project

Save: Save the configuration project

Add Node: Add a Modbus slave node

Delete Node: Delete a Modbus slave node

Add Command: Add a Modbus command

Delete Command: Delete a Modbus command

Upload: Read the configuration information from the module and shown in the software

Download: Download the configuration file to the gateway

AutoMap: Used to automatically calculate the mapped memory address without confliction by each command

Conflict Detection: To check whether there are conflicts with configured commands in the gateway memory data buffer

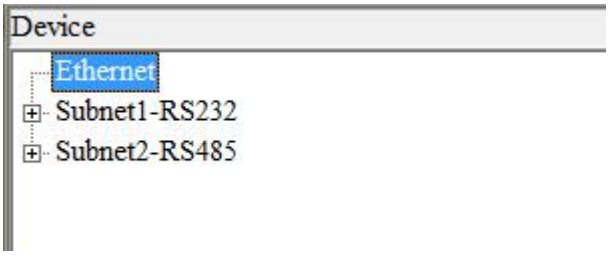
Export EXCEL: Export current configuration to the local hard disk, saved as .xls file

Debug: Monitor or modify the gateway memory buffer data

Assign Ethernet Parameters: Used to assign the IP, subnet and gateway information on the LAN

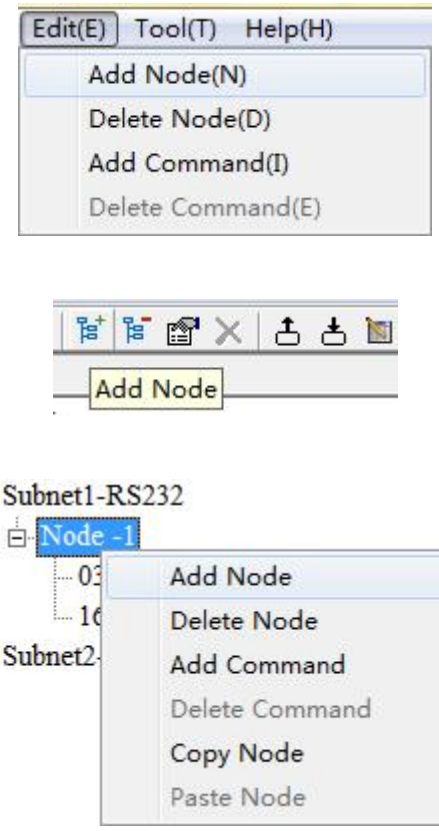
4.2 Device View Operation

4.2.1 Device View Interface



4.2.2 Operation Mode

For device view, the software supports three kinds of operation modes: edit menu, edit toolbar, and right-click edit menu.



4.2.3 Operation Types

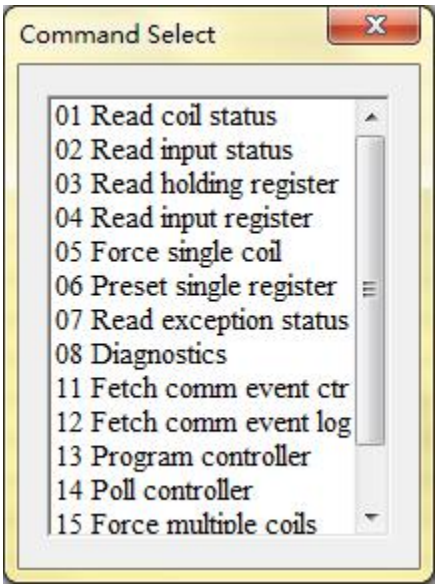
1) **Add node:** Left click on subnet or existing nodes, and then perform the operation of adding a new node. Then there is a new node named "The new node" under subnet.

2) **Delete node:** Left click on the node to be deleted, and then perform the operation of deleting node. The node and all commands will be deleted.

3) **Add commands:** Left click on the node, and then perform the operation of adding command to add a command for the node. It will pop up the command selecting dialog box for users to choose. Shown as below:

Commands No. supported: 01, 02, 03, 04, 05, 06, 15, 16

Select commands: Double click a command



4) **Delete command:** Left click a command and you can delete it.

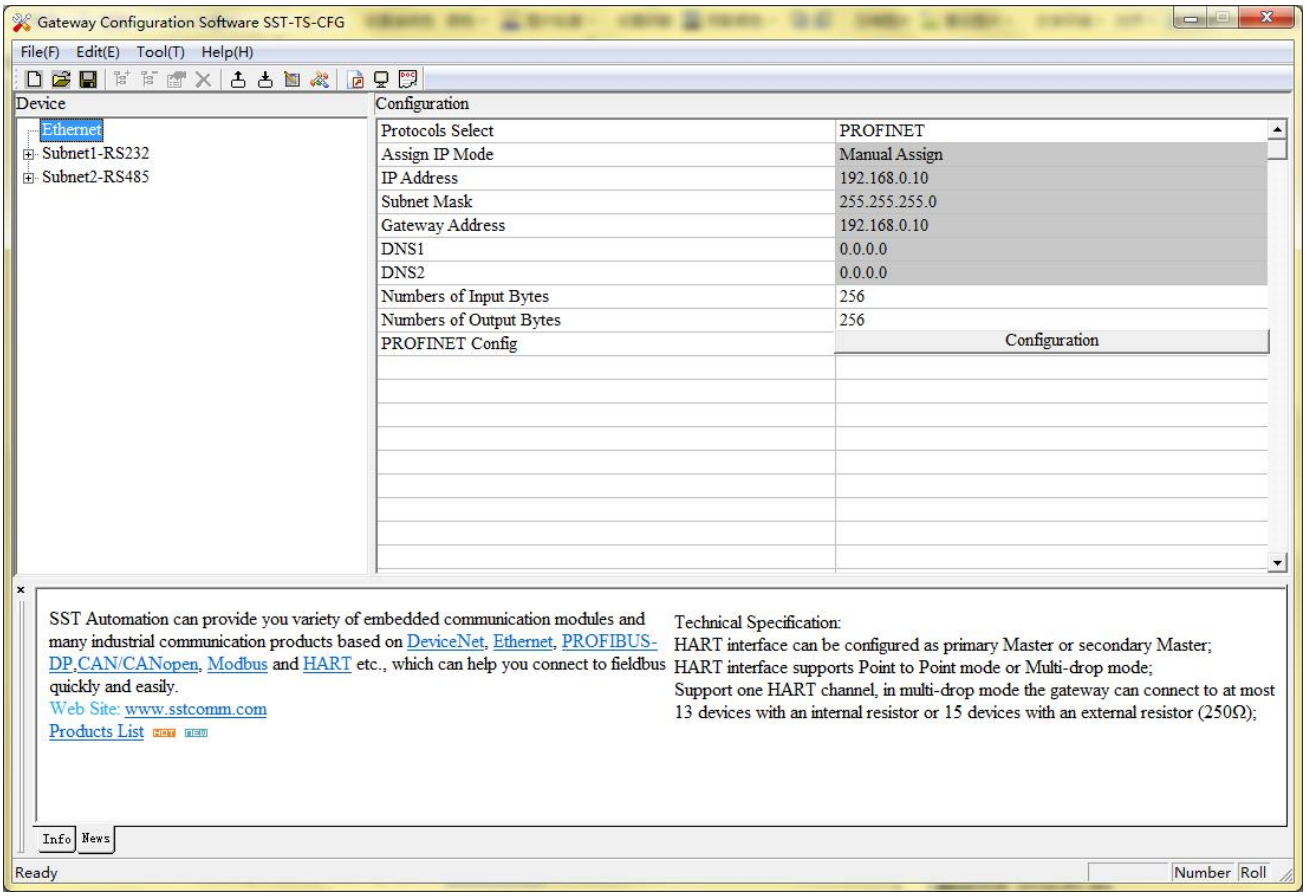
5) **Copy node:** Left click on the existing node, choose the node and execute the operation of copying nodes (include all commands under the node)

4.3 Configuration View Operation

4.3.1 Subnet Configuration Interface

4.3.1.1 Ethernet

The Ethernet configuration interface is shown as below:

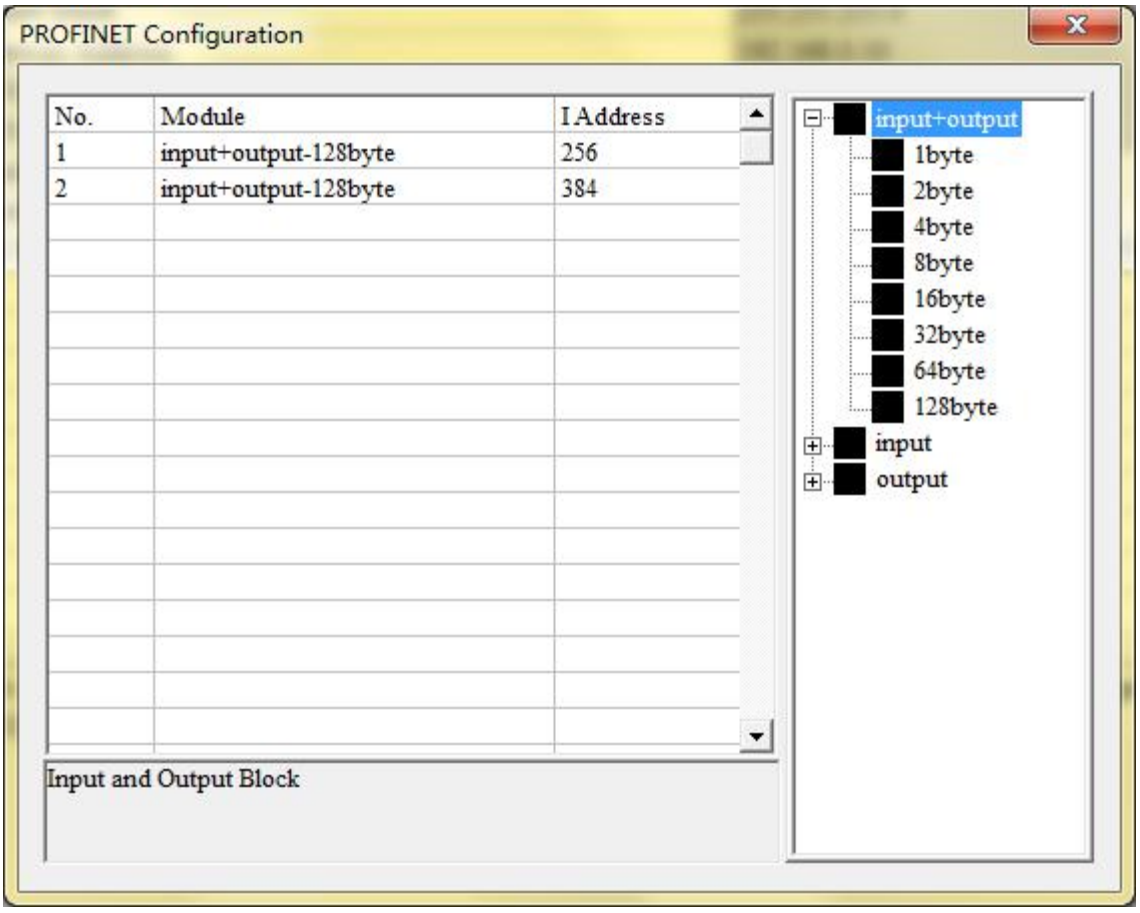


In the above parameters, the detailed information is shown as below:

- **IP Address:** IP address of GT200-PN-RS
- **Subnet Mask:** Subnet mask of GT200-PN-RS
- **Gateway Address:** Gateway address GT200-PN-RS is located in LAN
- **Numbers of Input Bytes:** The length of input data needs to be exchanged between GT200-PN-RS and PLC. It depends on the PROFINET configuration dialog box.
- **Numbers of Output Bytes:** The length of output data needs to be exchanged between GT200-PN-RS and PLC. It depends on the PROFINET configuration dialog box.
- **PROFINET config:** Input/output bytes length of GT200-PN-RS

  Notes: This configuration items must be the same as that of relevant slots in STEP7 modeling.

PROFINET configuration dialog box is shown as below:



As is shown above, there are 2 slots configured, that is: 128byte input + output, 128byte input + output

The same as STEP7 module, users can drag the data module on the right side to the left slots.

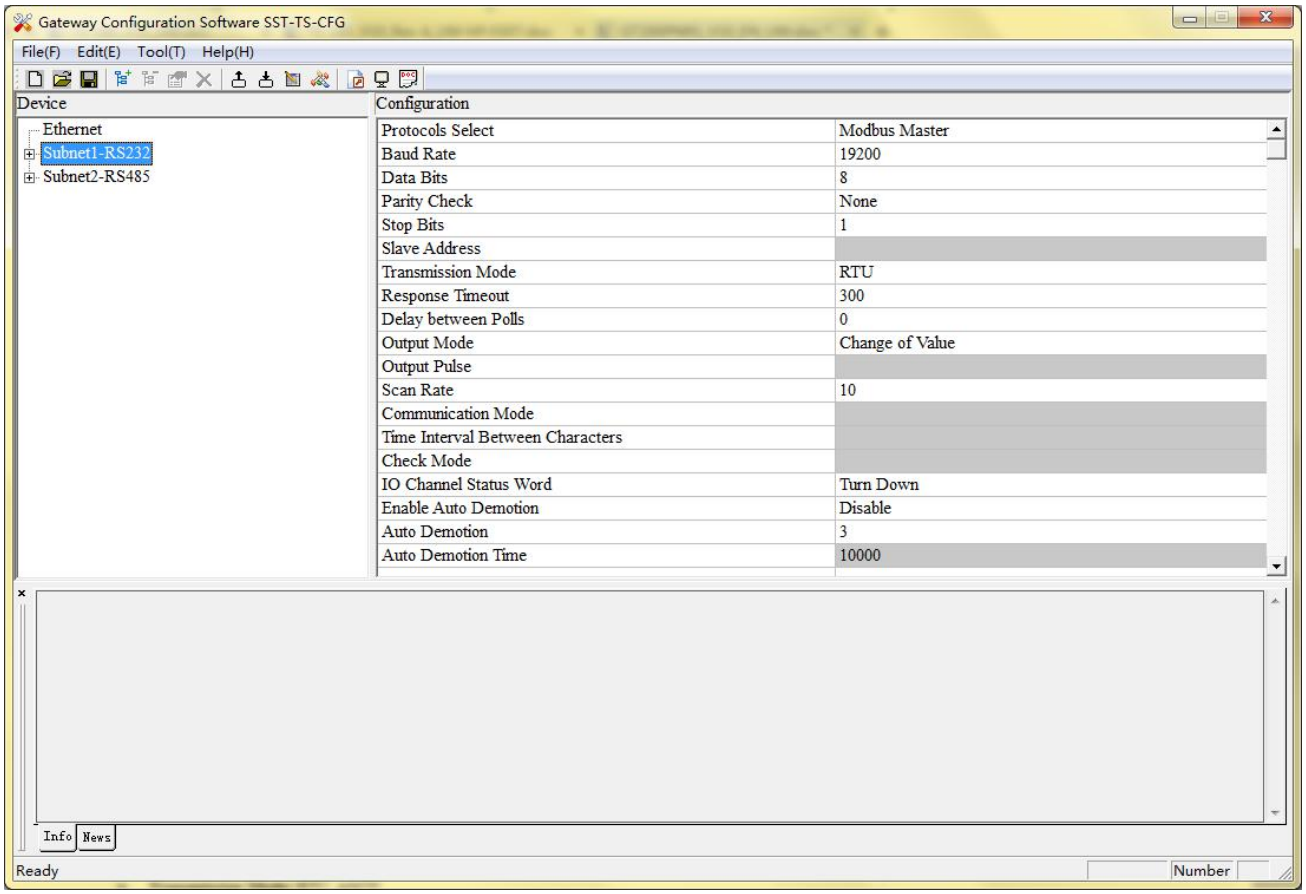
Notes: The slots and module in PROFINET configuration must be the same as that of STEP7.

4.3.1.2 Modbus Master

The configurable parameters are:

Modbus baud rates, data bits, parity, stop bits, transmission mode, response timeout, delay between polls, output mode and scan rate

The configuration interface is shown as below:



- **Baud Rate:** 300, 600, 1200, 2400, 4800,9600, 19200, 38400, 57600 and115200bps optional
- **Data Bits: 7,**8
- **Parity:** None, Odd, Even, Mark and Space optional
- **Stop Bits:** 1, 2
- **Transmission Mode:** RTU, ASCII
- **Response Timeout:** After the Modbus Master sends request, it waits the Modbus slave's response time; range: 300 ~ 60000ms
- **Delay between Polls:** Delay between a response has been received and sending next request, the range is 0~ 2500ms.
- **Output Mode:**

  Modbus write command, there are three modes: cycle, forbidden, change of value

  Cycle: same as Modbus read command output way, start scan output according to scan rate

  Forbidden: disable output of Modbus write command

Change of Value: when the output data change, the write command will be sent and stop to output when receiving the right response

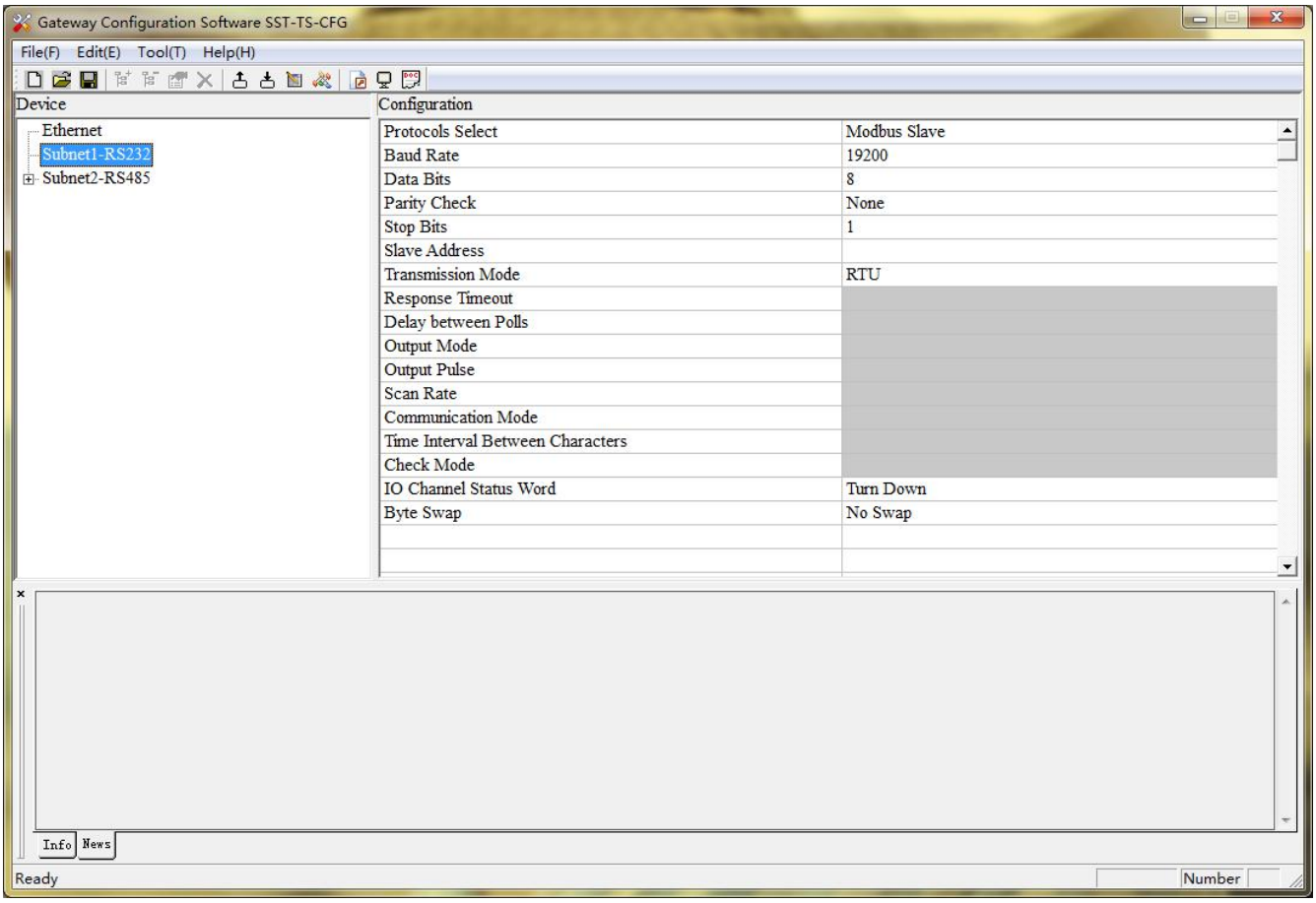
- **Scan Rate:** Scan Rate is the ratio of fast scan cycle to slow scan cycle. If this parameter value is set to 10 then every fast scan command will be sent 10 times and those slow scan commands will be sent once.
- **IO channel status word**: When enabled, an area is reserved at the front end of the input buffer to indicate the execution of each command under the subnet.
- **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 successive incorrect Response the command will be demoted a slow scan command. The range of the parameter value is 1 to 255. Default value is 3.
- **Auto Demotion time:** When the Demotion Time timeout the command will promote a fast command. The range of the parameter value is100 to 3600000ms. Default value is 10000ms.

4.3.1.3 Modbus Slave

The configurable parameters are:

Modbus baud rate, data bits, parity, stop bits, slave address and transmission mode

The configuration interface is shown as below:



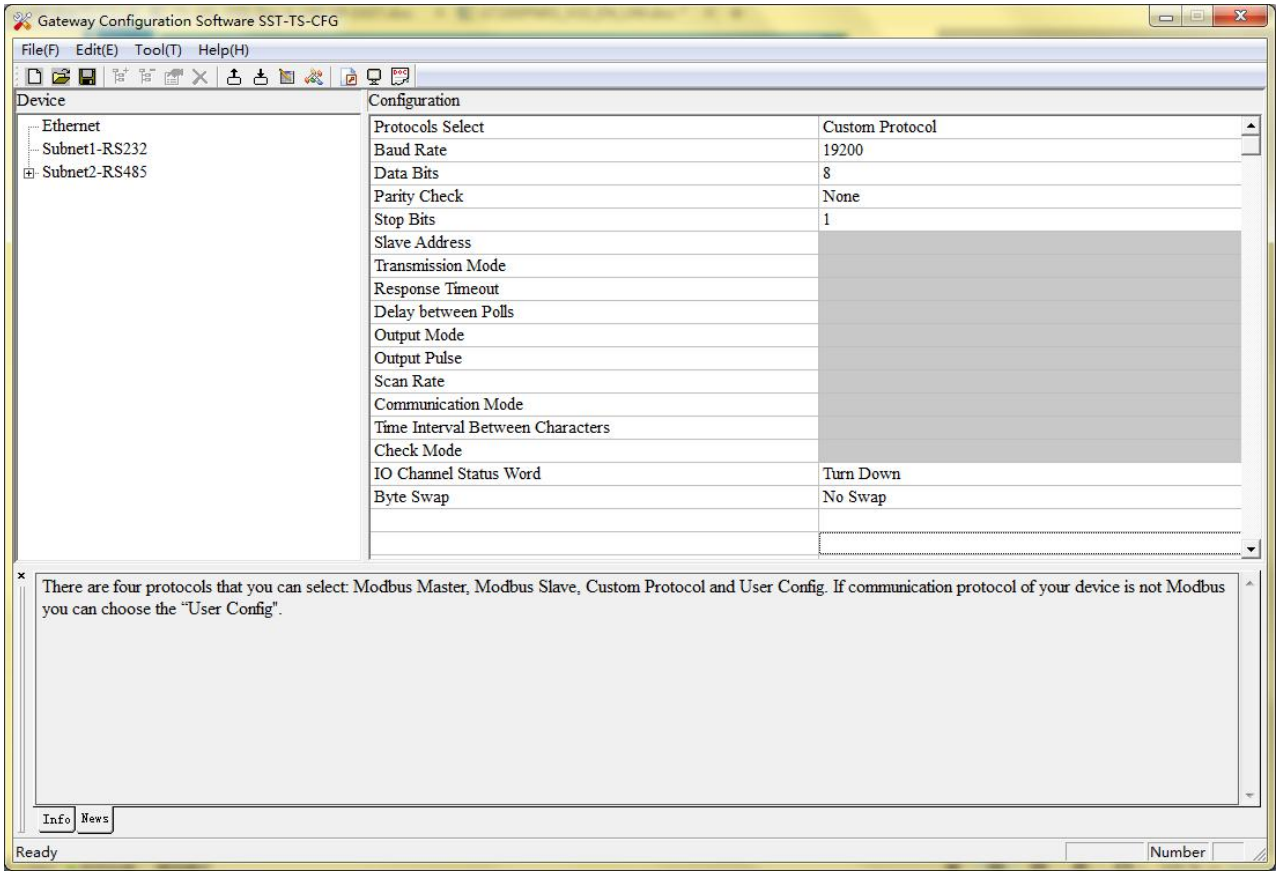
- **Baud Rate:** 300, 600, 1200, 2400,4800, 9600, 19200, 38400, 57600 and 115200bps optional
- **Data Bits:7,** 8
- **Parity:** None, Odd, Even, Mark and Space optional
- **Stop Bits:** 1, 2
- **Slav Address:** 0~247
- **Transmission Mode:** RTU, ASCII
- IO Channel Status Word: Enabled, will use a 16-bit integer to represent receives the correct number of frames
- Byte Swap: No swap, double-byte swap, four-byte swap and Four-Byte Big-endian and Little-endian Swap

4.3.1.4 Self-defined Protocol

The configurable parameters are:

Baud rate, data bits, parity and stop bits.

The configuration interface is shown as below:



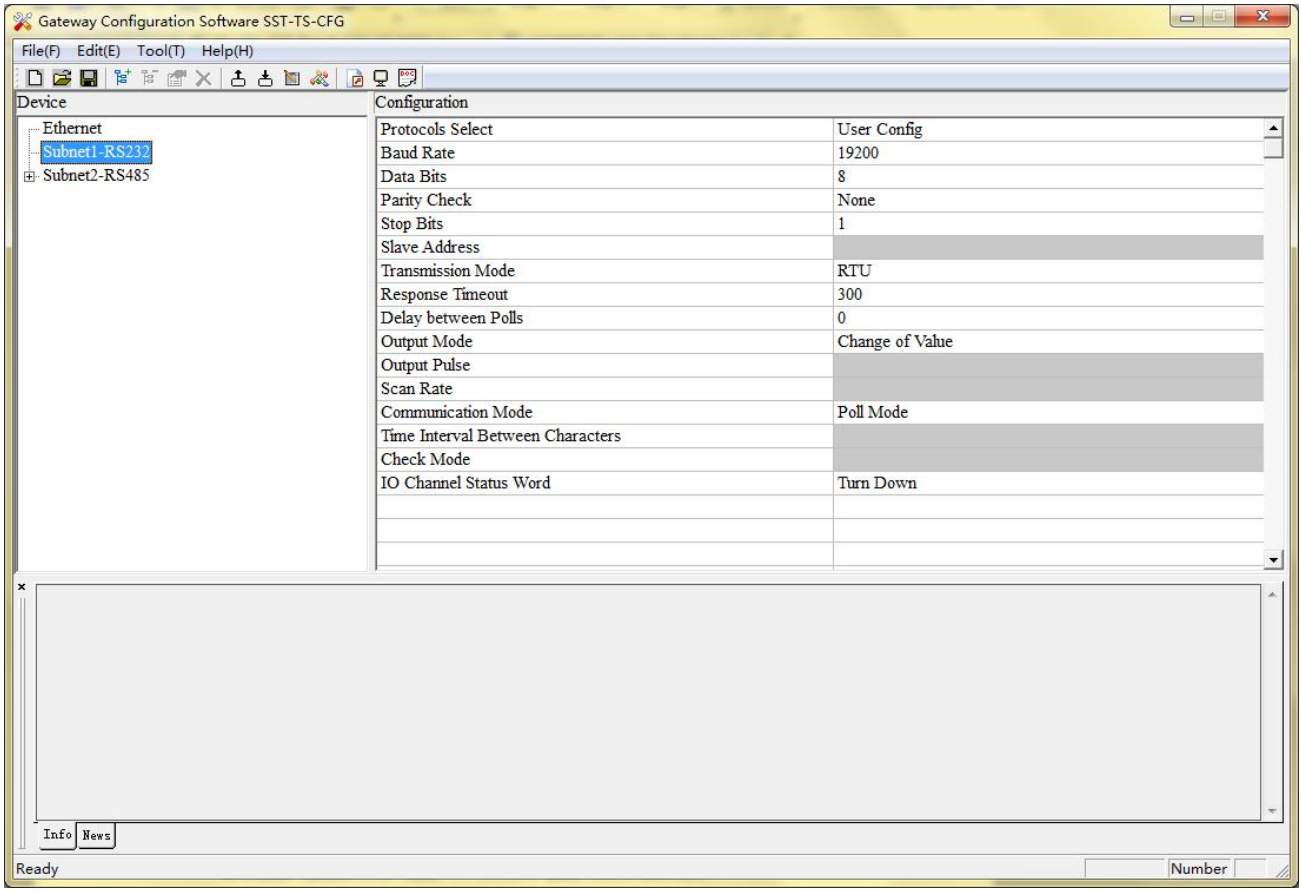
- **Baud Rate:** 300, 600, 1200, 2400, 4800,9600, 19200, 38400, 57600 and 115200bps optional
- **Data Bits:7,** 8
- **Parity:** None, Odd, Even, Mark and Space optional
- **Stop Bits:** 1,2
- IO Channel Status Word: Enabled, will use a 16-bit integer to represent receives the correct number of frames
- Byte Swap:No swap, double-byte swap, four-byte swap and Four-Byte Big-endian and Little-endian Swap

4.3.1.5 User Config

The configurable parameters are:

Baud rate, data bits, parity, stop bits, transmission mode, response timeout, delay between polls, output mode, communication mode, time interval between characters and check mode.

The configuration interface is shown as below:



- **Baud Rate:** 300,600, 1200, 2400,4800, 9600, 19200, 38400, 57600 and 115200bps optional
- **Data Bits:7,** 8
- **Parity:** None, Odd, Even, Mark and Space optional
- **Stop Bits:** 1, 2
- **Transmission Mode:** RTU, ASCII, valid when communication mode is poll mode
- **Response Timeout:** After the Modbus Master sends request, it waits the Modbus slave's response time; range: 300~60000ms
- **Delay between Polls:** Delay between a response has been received and sending next request, the range is 0~ 2500ms. Valid when communication is poll mode.
- **Output Mode** (valid when communication is poll mode)

  Write command (command with data in request). There are three types of output command: Cycle,

Forbidden and Change of value.

Cycle: same as Modbus read command (command without data in request) output way

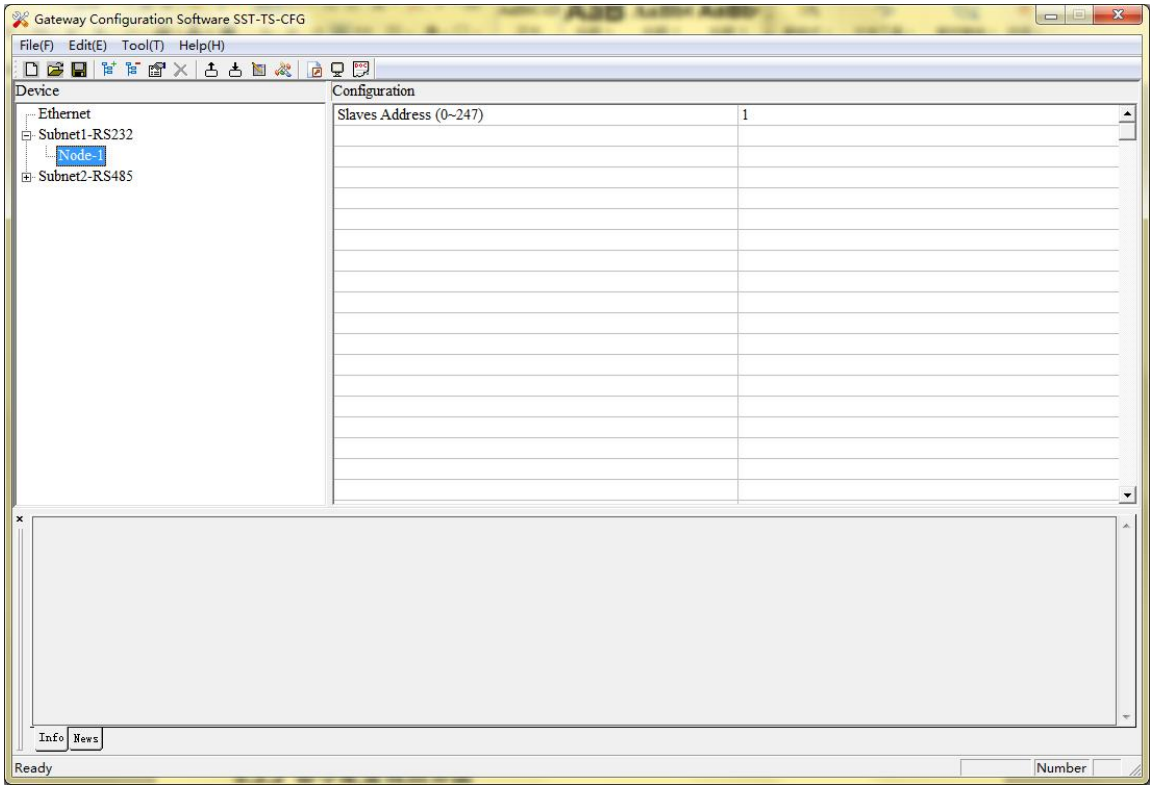
Forbidden: disable output of Modbus write command

Change of Value: when the output data change, the write command will be sent and stop to output when receiving the right response

- **Communication Mode:** Poll and Read. Poll mode uses the communication way that master asks the slave to respond. It is like the communication mode of Modbus master. Read mode only receives data with no response.
- **Time Interval between Characters:** Start to count after receiving last byte. If exceeding that time, this will be regarded one full frame is received and ready to receive next frame. Range: 1~300ms. Valid when communication mode is read mode.
- **Check Mode:** None, CRC and Sum optional. Valid when communication mode is Read Mode.

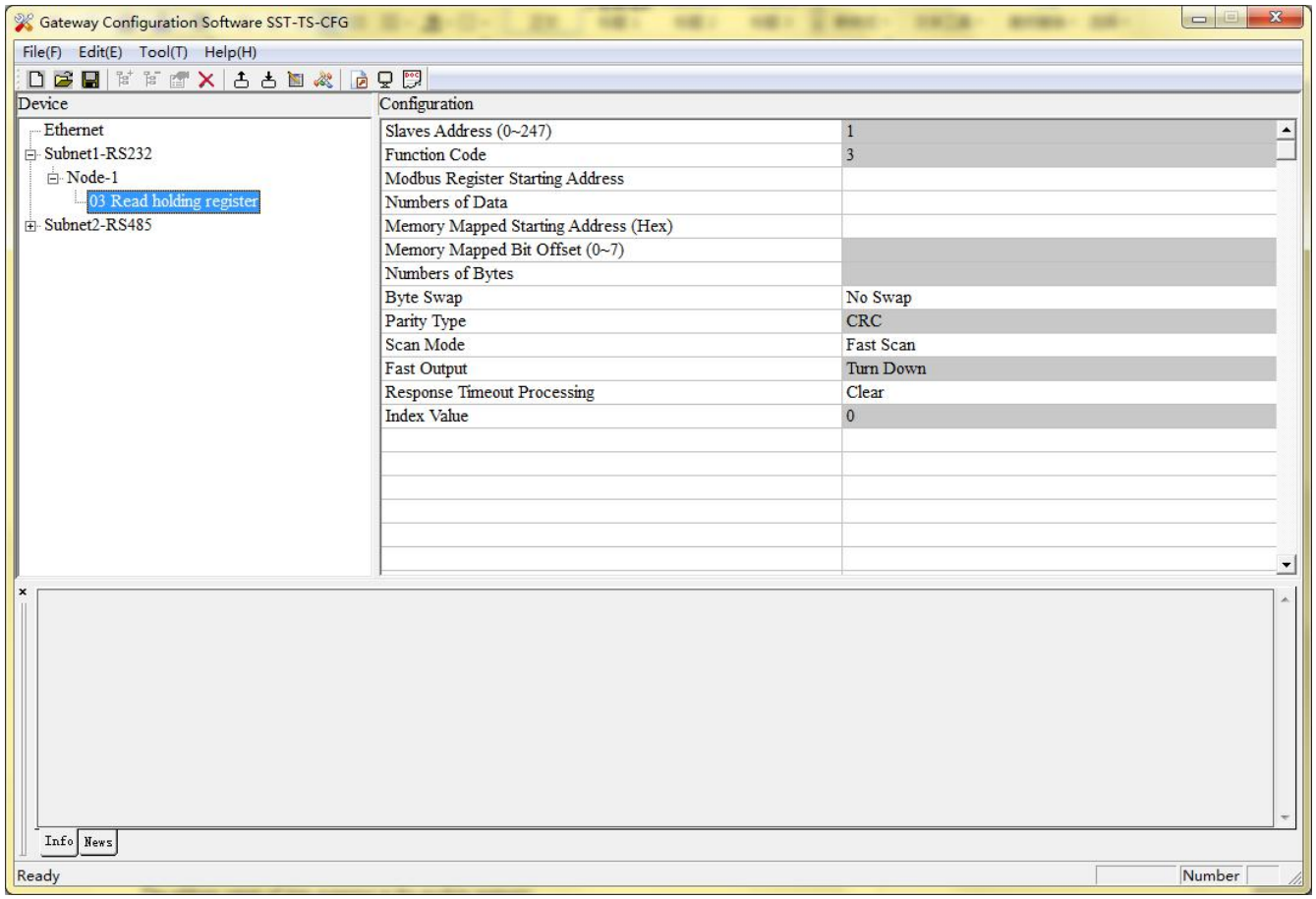
4.3.2 Node Configuration

Under the "Modbus Master" mode, left click on a node and then the configuration interface is shown as below:



4.3.3 Command Configuration

Under the "Modbus Master" mode, left click on a command and then the configuration interface is shown as below:



- **Starting Address**: the starting address of the register/switching value/coil in Modbus salve device, the range of the parameter value is 0 to 65535.
- **Number of Data:** number of the register/switching value/coil of Modbus slave devices
- **Mapping Address (HEX):** starting address of data in the module

  The address range of data mapping in the module memory:

  Read command (1, 2, 3, 4): 0x0000~0x03FF

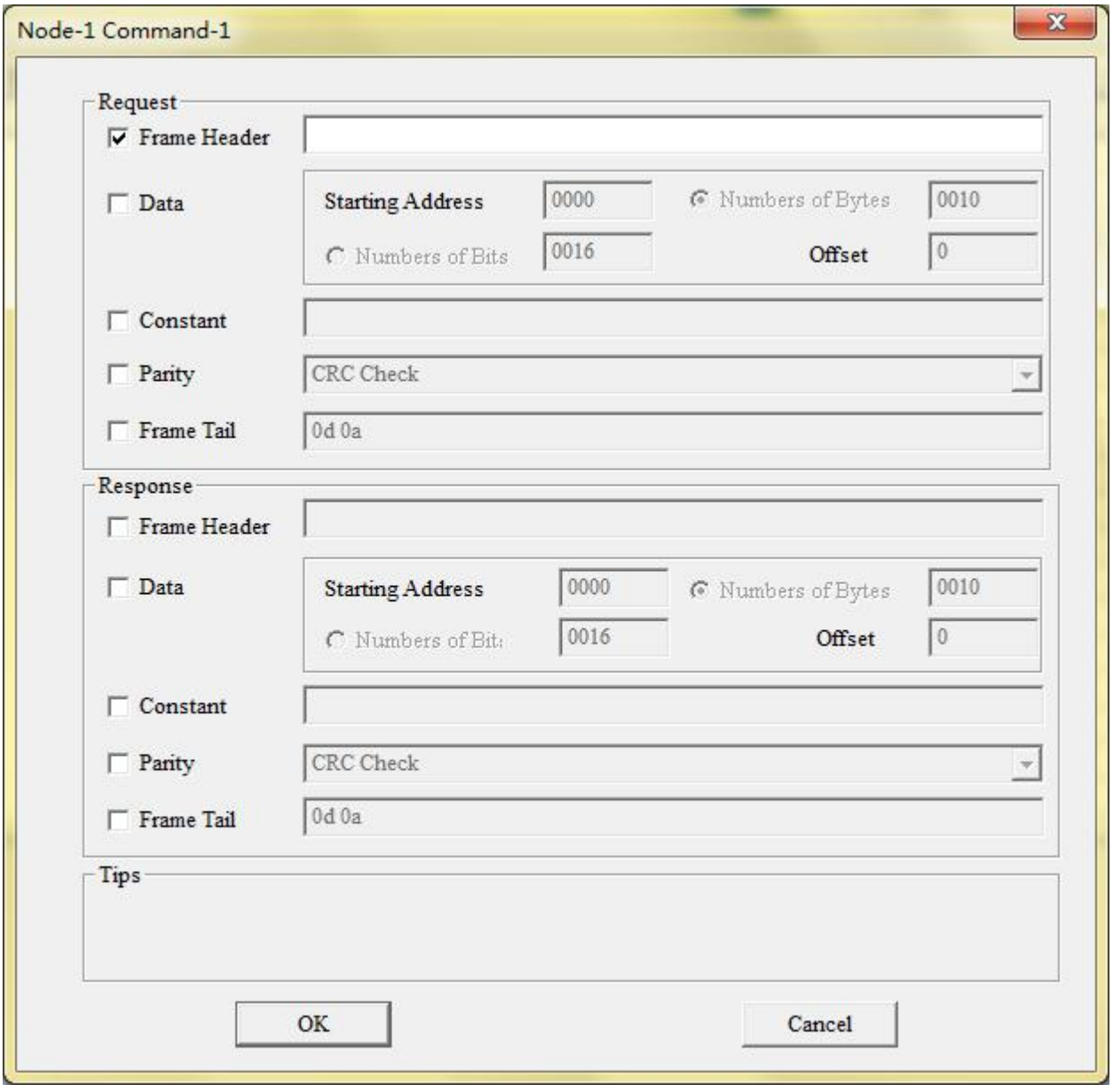
  Write command (5, 6, 15, 16): 0x4000~0x43FF

  Users can also use this area when write command is used as local data exchange: 0x0000~0x03FF
- **Mapping Bit (0~7):** For the bit operation command, the position where the start bit is located in, range:

0~7

- **Type of Scan:** There are two ways, fast and slow scan. Every Modbus command can be set to fast scan or slow scan. The gateway will send Modbus command according to the "Scan Rate". Scan Rate is ratio of fast scan to slow scan (configured in the subnet configuration interface).

In the device view interface, select "User Config ", double click the new command (communication mode is poll mode), the configuration interface is shown as below:



Under this condition, configuration method of commands can refer to chapter 4.3.3.

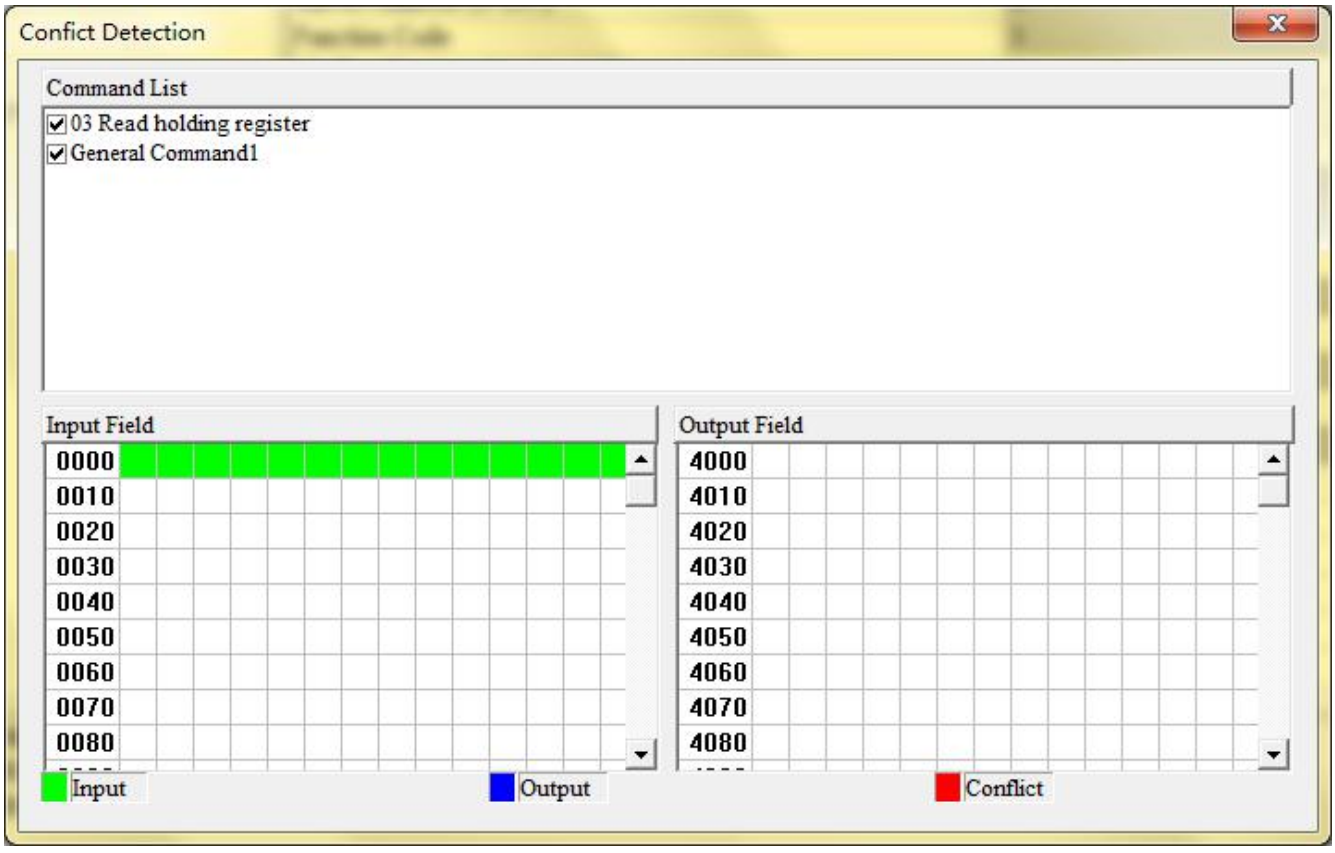
4.3.4 Comment Interface

Comment interface displays the explanation of relevant configuration item. For example, when configuring starting address, comment interface is shown below:

The number of data: 1~127 (Modbus function code 3, 4, 16); 1~2000 (Modbus function code 1, 2, 15)

4.4 Conflict Detection

It is used to check whether there exists confliction in "memory mapping data". If users find confliction, it can be adjusted in time. The interface is shown below:



4.4.1 Command List Operation

It shows configured command in the command list interface. Check box before each command is used to check the position of this command in memory mapping area. Click one command and check the box, it will show the position where relevant commands occupy in the memory mapping area. Click the command again and uncheck the box, the command will not be shown in the mapping area. This function will be used for confliction detect among commands in memory mapping area.

4.4.2 Memory Mapping Area Operation

Memory mapping area divides into input area and output area.

Input mapping address range: 0x0000 ~ 0x3FFF;

Output mapping address range: 0x4000 ~ 0x7FFF.

Each grid represents one byte address.

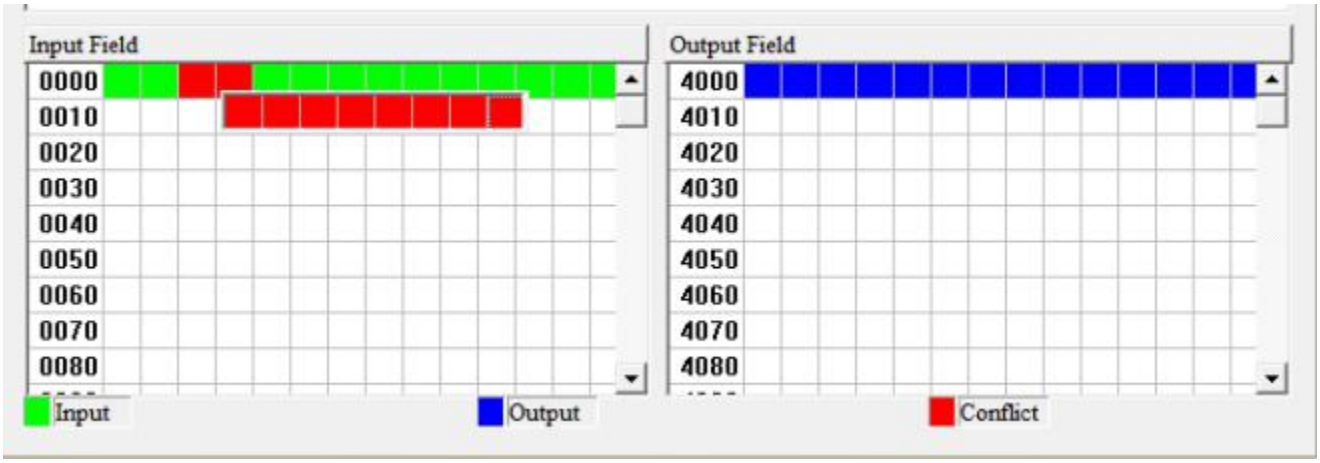
Green: read command is shown in input mapping area, it will be in green without conflict.

Blue: When address mapping area is located in output area, it will be in blue without conflict.

Red: In input area or output area, different command occupied on the same byte, this byte area will be in red.

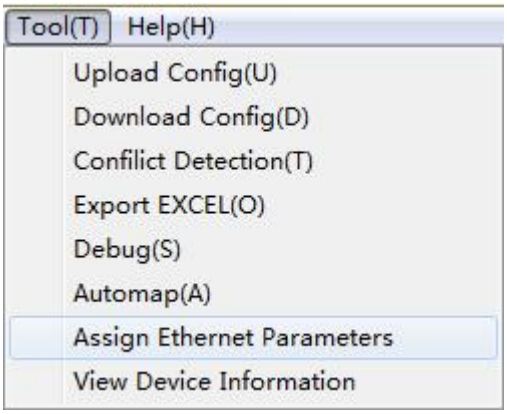
For bit operation command, the above grid displaying meaning works the same.

Click input/output area grids, each bit of relevant byte in the grid will show whether each bit is occupied. As is shown below:



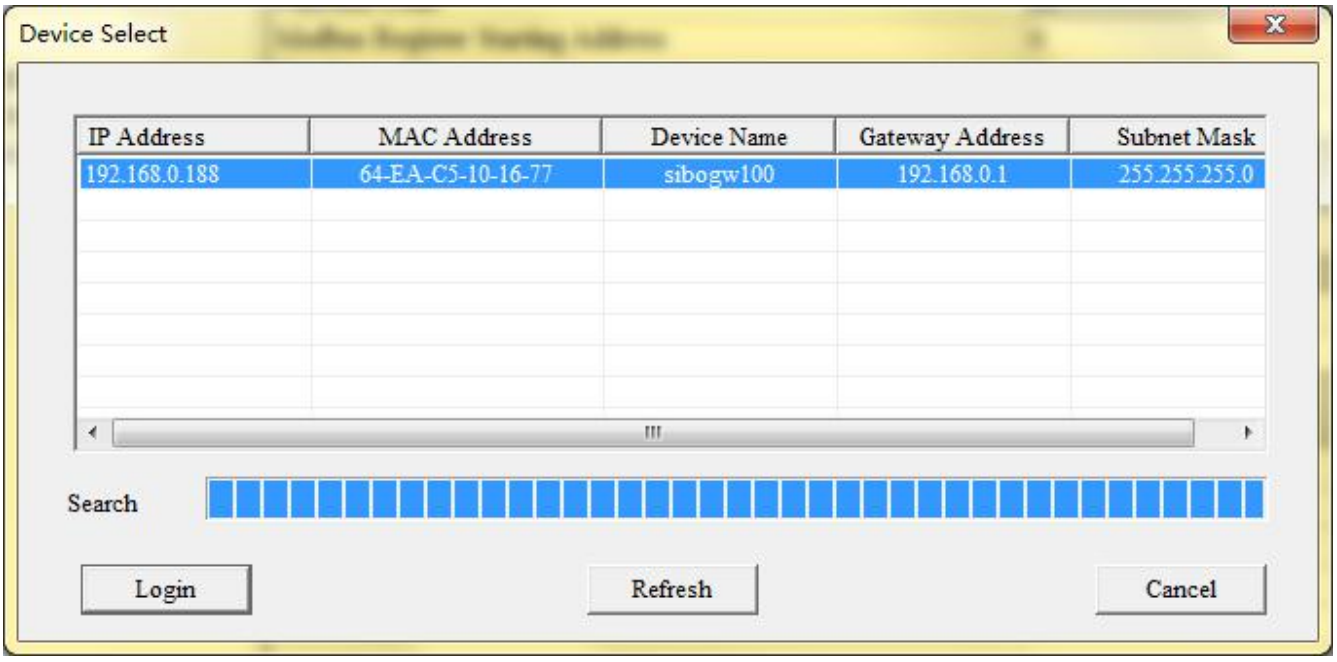
4.5 Hardware Communication

Communication menu is shown as below:



4.5.1 Ethernet Configuration

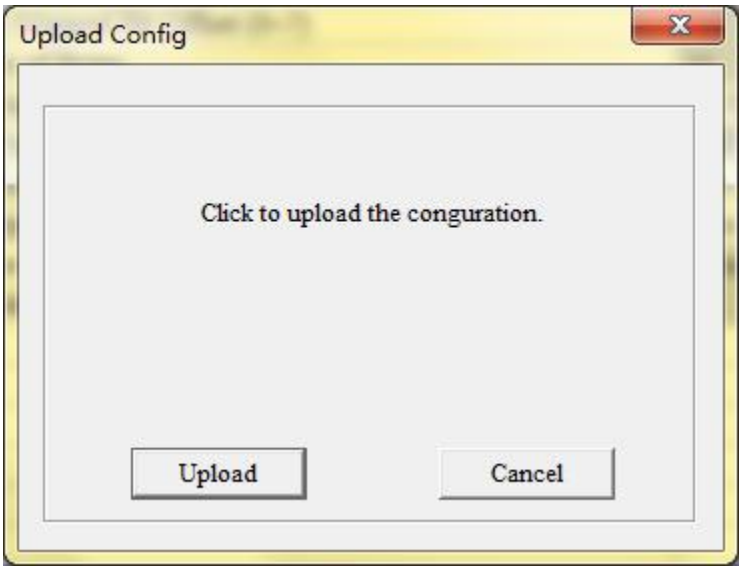
After configuration, click "Upload" or "Download" on the tool bar, it will pop up the following interface:



If scanning no device, please click "Refresh". In the above picture, GT200-PN-RS shows, first select the device and click "Log In".

4.5.2 Upload

Select "Upload", it will read configurations form the gateway, and the interface is shown as below:



4.5.3 Download

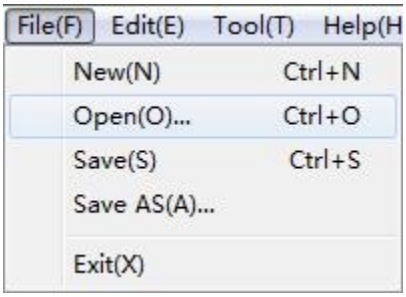
Select "Download", it will download configurations to the gateway, and the interface is shown as below:

Remark: Please confirm the configurations are correct before downloading configurations.

4.6 Load and Save Configuration

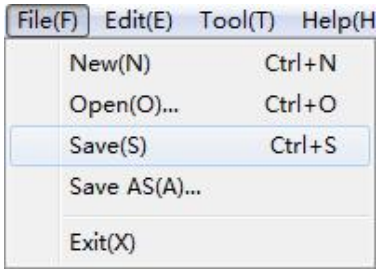
4.6.1 Load Configuration Project

Select "Open", you can open the configuration project that you have saved.



4.6.2 Save Configuration Project

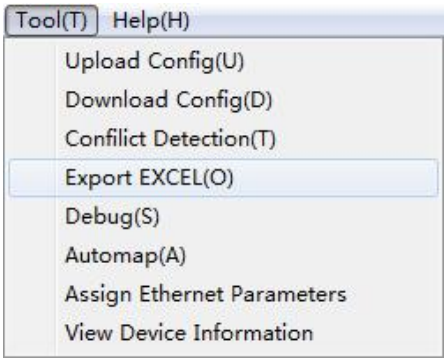
Select "Save" or "Save as", you can save the configuration project with .chg as its extension.



4.7 Export EXCEL

Users can use the function to check the gateway configurations.

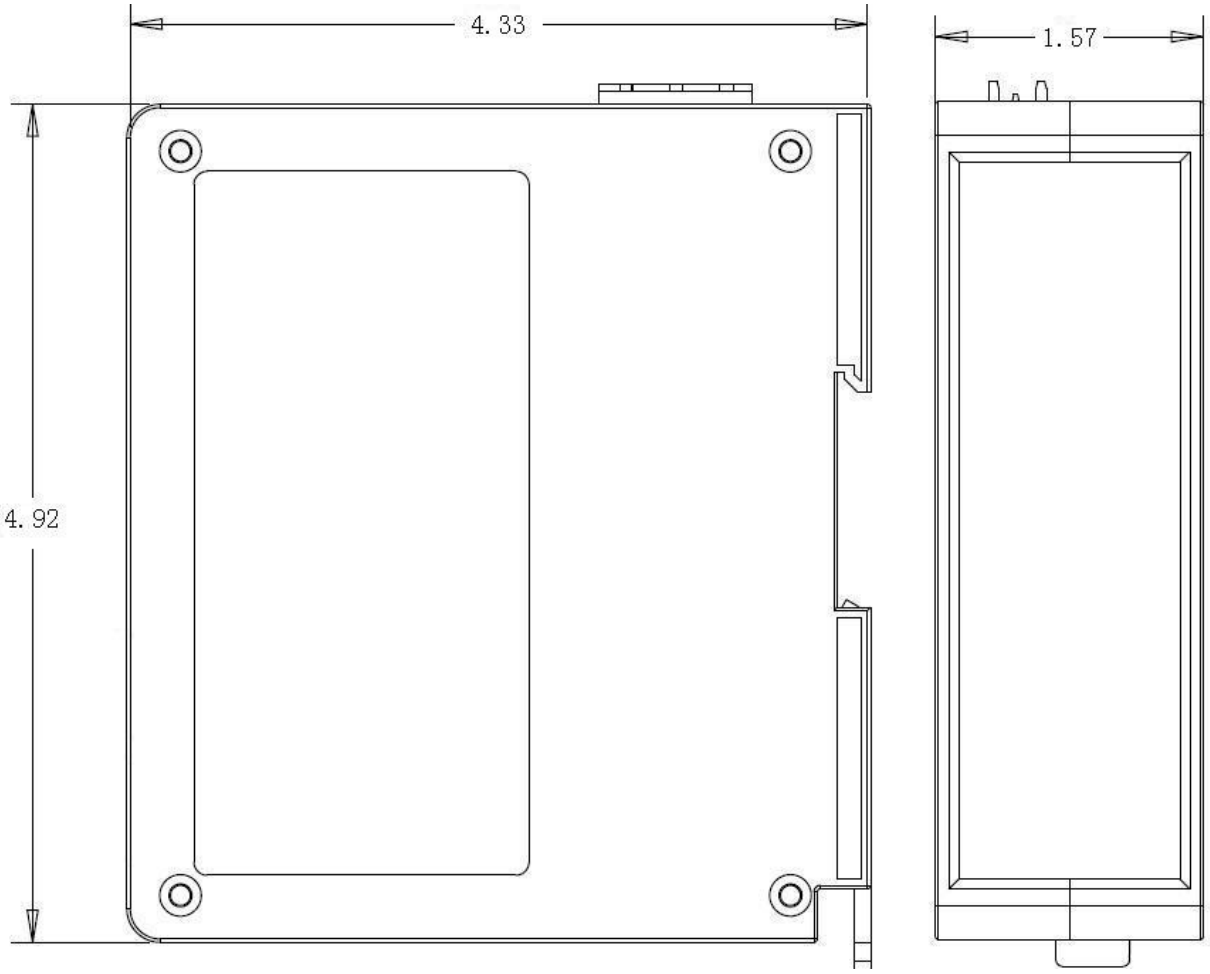
Click icon on the tool bar you can save the configuration with .xls as its extension.



5 Installation

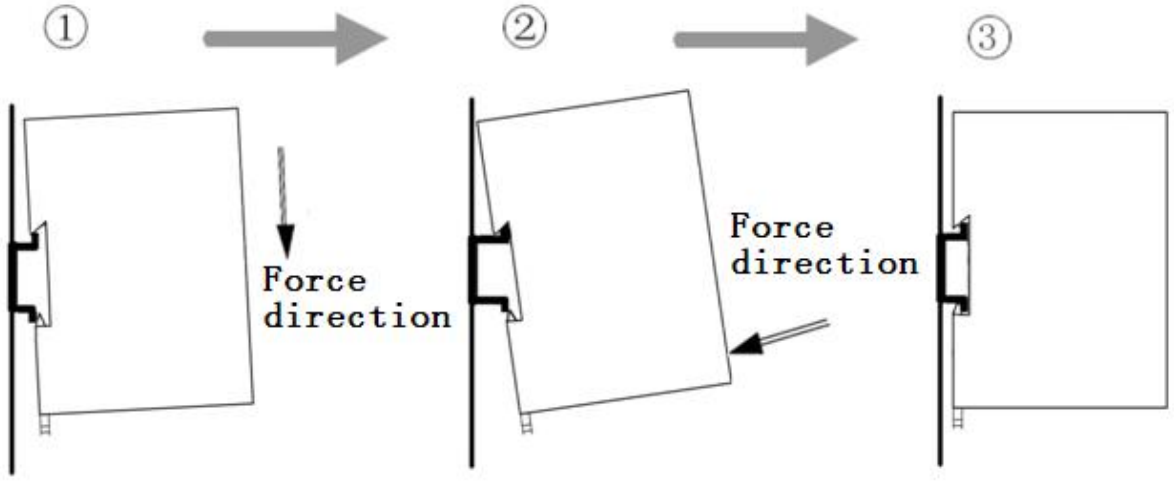
51 Machine Dimension

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



5.2 Installation Method

Using 35mmDIN rail


①
②
③
Force direction
Force direction