Industrial Ethernet serial Gateway
（Modbus RTU/ASCII / Modbus TCP）
ES

User Manual

REV 1.2

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Table of Contents

1 About This Document

1.1 General

This document describes every parameters of the ES series gateway and provides using methods and some announcements that help users use the gateway. Please read this document before using the gateway.

Related products include:

ENB-302MT, ENB-301MT and so on.

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

1.2 Important User Information

The data and examples in this document can not be copied without authorization. SiboTech maybe upgrades the product without notifying users.

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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.

2 About the Gateway

2.1 Function

ES series gateway is a Modbus gateway which can achieve the interconnection between Modbus TCP devices and serial devices. Through the Modbus TCP protocol and Modbus RTU/ASCII protocol conversion of the product, users can easily interconnect Modbus devices. The ES series gateway supports dual Ethernet ports, built-in Switch; the serial side support single serial port / dual serials / four serials. Each port supports both

RS485 and RS232, but the same product can only achieve a kind of port, users can specify the port in the order according to actual needs.

Product Type	Ethernet protocol	Serial protocol	Serial number
ES-301	Modbus TCP	Modbus RTU/ASCII	One
ES-302	Modbus TCP	Modbus RTU/ASCII	Two
ES-304	Modbus TCP	Modbus RTU/ASCII	Four

2.2 Features

- Operating mode:

  Modbus RTU/ASCII slave mode: Modbus TCP masters communicate with Modbus RTU/ASCII slaves through the gateway;

  Modbus RTU/ASCII master mode: Modbus TCP salves communicate with Modbus RTU/ASCII masters through the gateway.

- Dual Ethernet interfaces, built-in Switch, support cascade, can be used in a ring network, save field connection cables and switches;
- ES-301 : One independent RS485 interfaces or RS232 interfaces and 1KV electromagnetic isolation;

  ES-302: Two independent RS485 interfaces or RS232 interfaces and 1KV electromagnetic isolation;

  ES-304: Four independent RS485 interfaces or RS232 interfaces and 1KV electromagnetic isolation.
- Ethernet 10/100M adaptive;
- IP address conflict detection;
- Request packet is automatically routed to the serial port ;
- Support network security settings:

  Limit the IP address range of clients;

  Login password can be set;
- Support mapping of slave ID;

- Support debugging function;
- Provide free configuration software MT-123.

2.3 Technical Specifications

[1] Slave modes: Support 4 Modbus TCP masters simultaneously communication, and can support 32 simultaneous commands request;

[2] Master modes: Support 4 different IPs or 4 Modbus TCP slaves of the different ports;

[3] Every serial interface is RS485 or RS232, half-duplex, and baud rate support: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 and 230400bps; parity mode support: none, odd, even, mark, space; 1 or 2 stop bits;

[4] Power supply: 24VDC (11V ~ 30V), 130mA (24VDC);

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

[6] Dimensions: 40mm (Width) *125mm (Height) *110mm (Depth);

[7] Installation: 35mm rail;

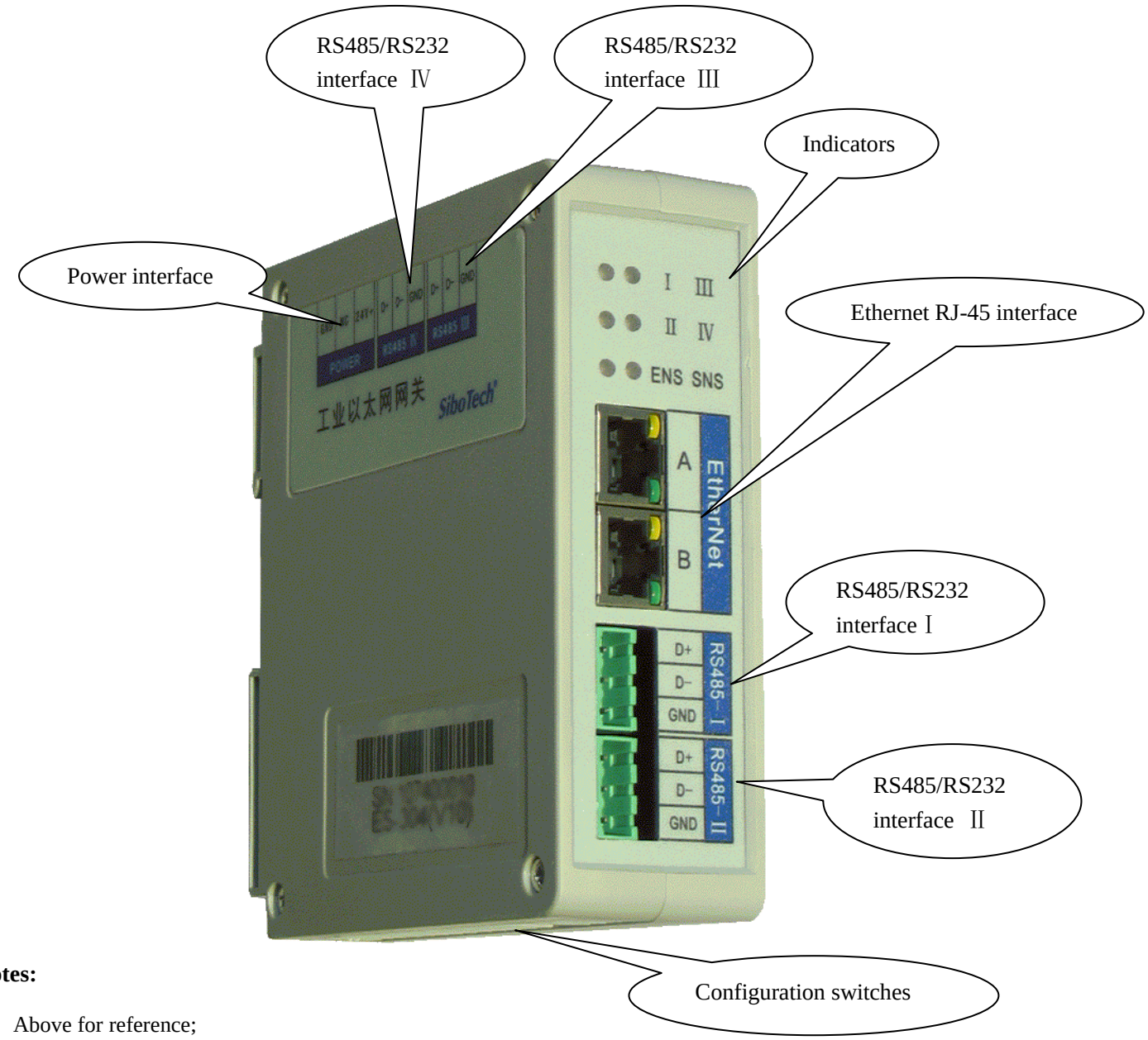
[8] Protection class: IP20;

2.4 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.

3 Hardware Description

3.1 Appearance



Notes:

1. Above for reference;

2. ES-302 has two serial ports : serial Ⅰ and serial II;

3. ES-301has one serial port: serial Ⅰ.

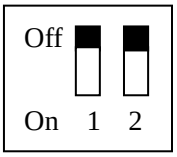
3.2 Indicators

	Indicators	Status	Descriptions
ES-301	RX	Flashing(Green)	Serial port is receiving data
	TX	Flashing(Green)	Serial port is transmitting data
ES-302	Ⅰ	RX flashing(Green)	Serial port Ⅰ is receiving data
		TX Flashing(Green)	Serial port Ⅰ is transmitting data
	Ⅱ	RX Flashing(Green)	Serial port Ⅱ is receiving data
		TX Flashing(Green)	Serial port Ⅱ is transmitting data
ES-304	Ⅰ	Flashing(Green)	Serial port Ⅰ is receiving data
		Flashing(Yellow)	Serial port Ⅰ is transmitting data
	Ⅱ	Flashing(Green)	Serial port Ⅱ is receiving data
		Flashing(Yellow)	Serial port Ⅱ is transmitting data
	Ⅲ	Flashing(Green)	Serial port Ⅲ is receiving data
		Flashing(Yellow)	Serial port Ⅲ is transmitting data
	Ⅳ	Flashing(Green)	Serial port Ⅳ is receiving data
		Flashing(Yellow)	Serial port Ⅳ is transmitting data
ES series	ENS	Green on	Slave modes: One Modbus TCP connection has been established at least; Master modes: Modbus TCP connections have been established.
		Flashing(Green)	Slave modes: There is no Modbus TCP connection. Master modes: There is Modbus TCP connection has not been established.
		Flashing(Red)	Modbus TCP connections are disconnected and no longer exist; Obtain IP address via DHCP.
		Flashing(Red) （lasts 3 seconds）	There is Modbus TCP connection disconnected.
	SNS	Green on	Serial port ready to transmit and receive data.
		Flashing(Red)	Automatic routing conflict.
		Red on	Equipment failure or updating firmware failed.
	ENS (Orange) and SNS (Orange)（Orange: Red and green light at one time）	Simultaneously lighten	Start status
		Flash alternately	Configuration mode
		Flash alternately (lasts 3 seconds）	Using locating function
		ENS always on, SNS always off	Firmware updating mode

3.3 DIP Switches

The 2-bit DIP switch in the bottom is used for setting operating mode of the device.

Bit 1 is mode bit, and bit 2 is function bit.



Mode (bit 1)	Function (bit 2)	Descriptions
Off	Off	Run mode, allowing read and write configuration data
Off	On	Run mode, forbidding read and write configuration data (configuration data protection switch)
On	Off	Configuration mode, IP address is 192.168.0.10. This mode can only read and write data, cannot communication between Modbus TCP and Modbus RTU/ASCII devices
On	On	Firmware update mode, IP address is 192.168.0.10. This mode can only update firmware

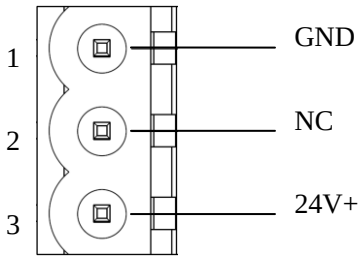
Notes:

Restart ES after resetting the DIP switches and then the configuration can take effect!

3.4 Interface

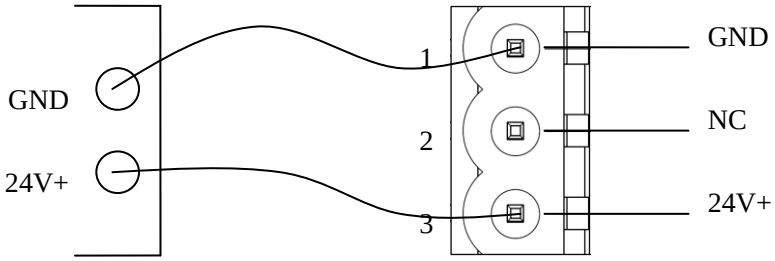
3.4.1 Power Interface

ES series gateway uses a 24V DC power supply. The power interface using a 3-pin terminal (7.62mm), which is defined as follow:



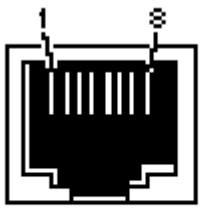
Pin	Function
1	GND
2	NC, no connection
3	24V+

Power supply wiring is shown below:



DC power: +24V　　Power interface of ES

3.4.2 Ethernet Interface



RJ-45 port

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

Pin	Signal Description
S1	TXD+，Transmit Data+, Output
S2	TXD-，Transmit 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-

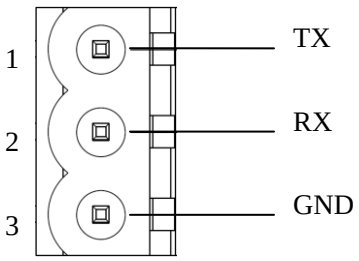
3.4.3 Serial Interface

ES series gateway uses 3 -pin terminal (5.08mm). Optionally support RS485 or RS232.

3.4.3.1 RS232 Interface

ES series gateway support standard RS232 interfaces.

RS232 interface:

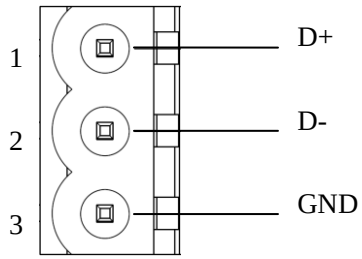


Pin	Signal Descriptions
1	TX, connect with RX of user device
2	RX, connect with TX of user device
3	GND

3.4.3.2 RS485 Interface

ES series gateway support standard RS485 interfaces.

RS485 interface:



Pin	Signal Description
1	D+，RS485
2	D-，RS485
3	GND

The RS485 interface of the ES series gateway is standard, and the RS485 characteristics of the product are shown as follows:

1. The basic characteristics of RS485 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).

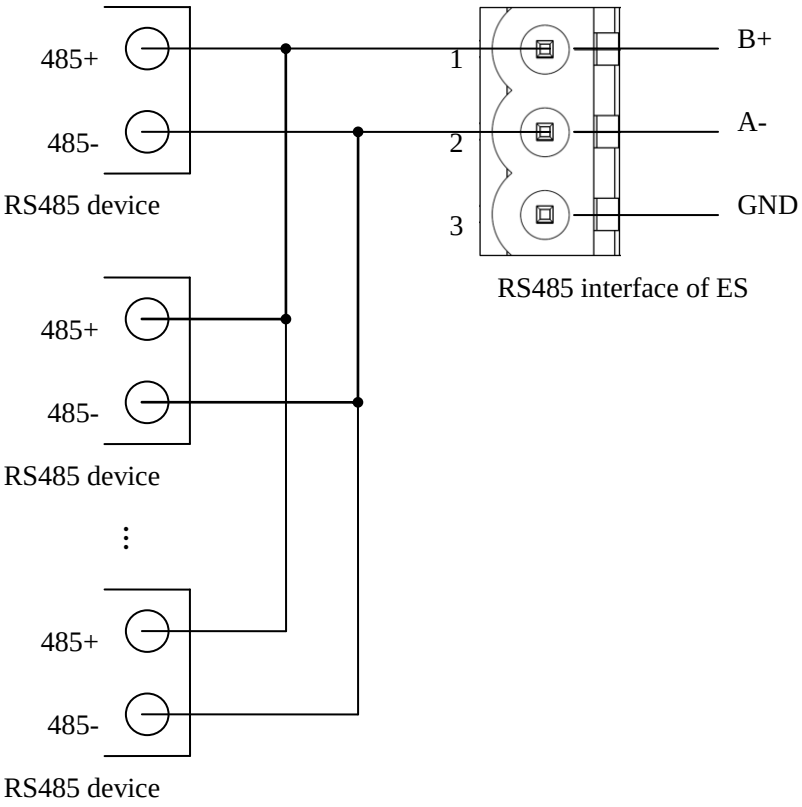
⑤Plug connection: 3-pin pluggable terminal.

2. The main points on RS485 transmission equipments installation

①All the equipments be connected with RS485 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.


485+
485-
RS485 device
485+
485-
RS485 device
485+
485-
RS485 device
1
2
3
B+
A-
GND
RS485 interface of ES

4 Instructions of Configuration Software

Take the product CD into the computer CD drive, open the CD, and install the configuration software MT-123. You can easily follow the prompts to complete the installation. Then open the configuration software and finish the configuration of ES series gateway. (ES-304 as an example below)

Notes:

The factory set of ES series gateway is 192.168.0.10, mask is 255.255.255.0, and gateway address is 192.168.0.1.

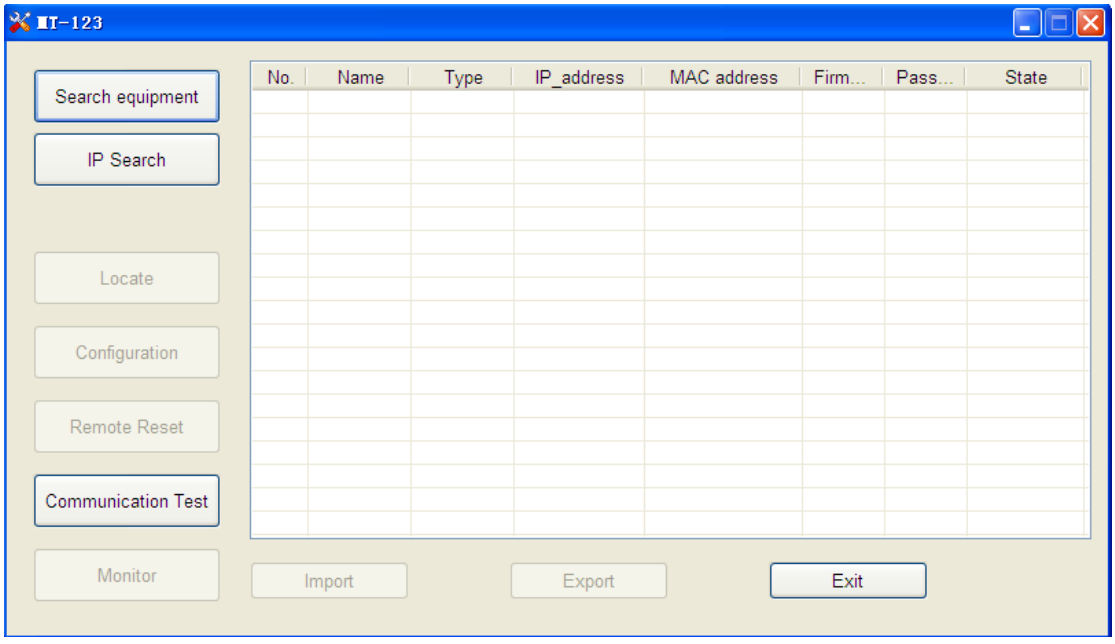
(When the user clicks the “Advanced” item in the “Restore Factory Settings ", the default IP address configuration is DHCP.)

4.1 Notes Before Configuration

MT-123 is a product based on Windows platform, and used to configure parameters of ES series gateway.

Before run the software, make sure the user’s computer and the ES need to configure in the same network.

Double-click the icon to access the main interface:

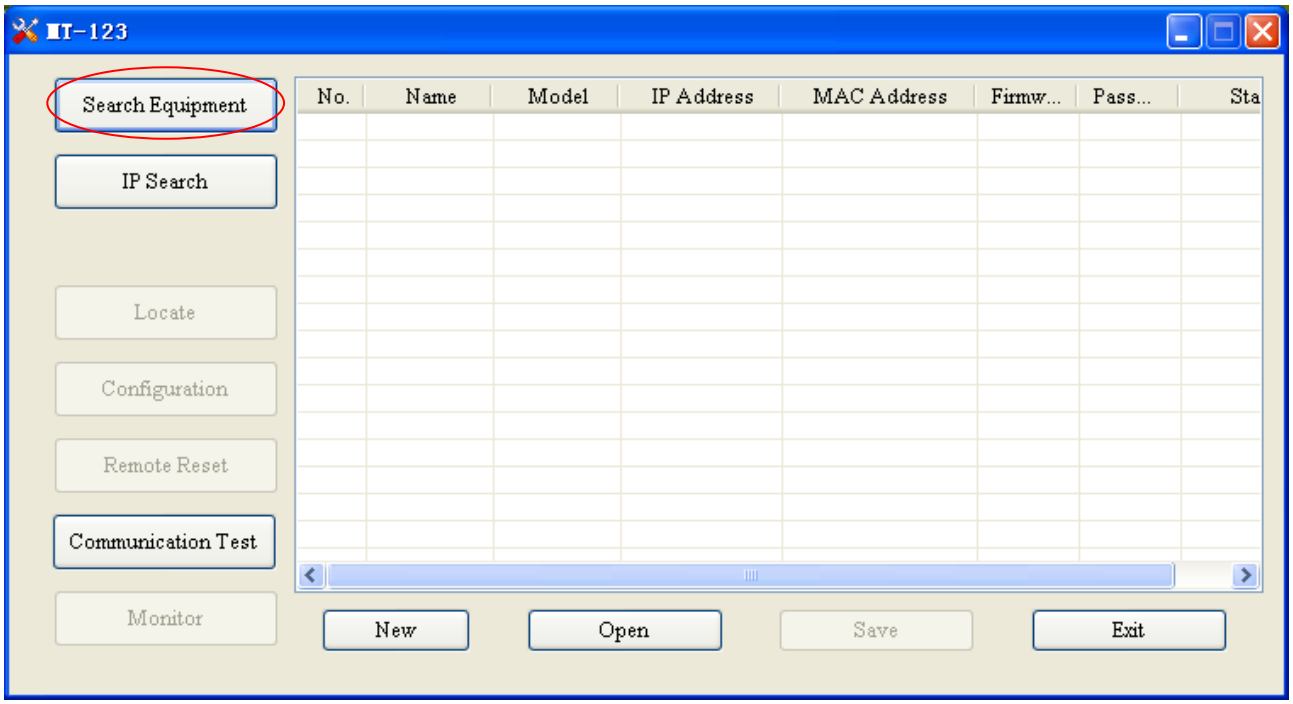


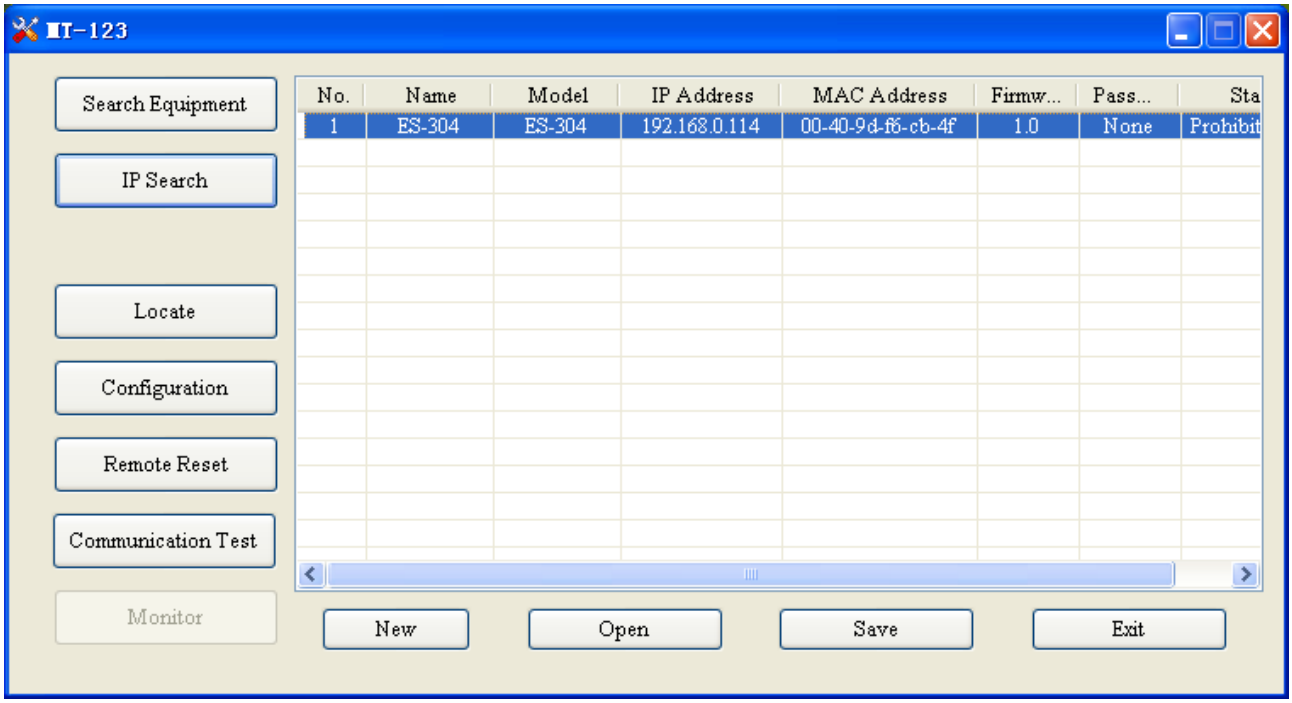
4.2 Search Equipment

Before configuration parameters of ES, the user need search the gateway using the software. The software provides two ways to search the gateway for the user.

4.2.1 Search All Equipments of Ethernet

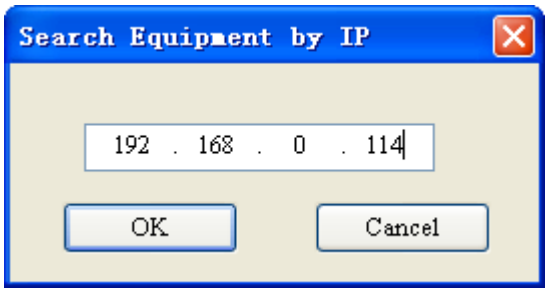
Click “Search equipment” button of the main interface, the software will search all of the available ES equipments and list them in the main interface.



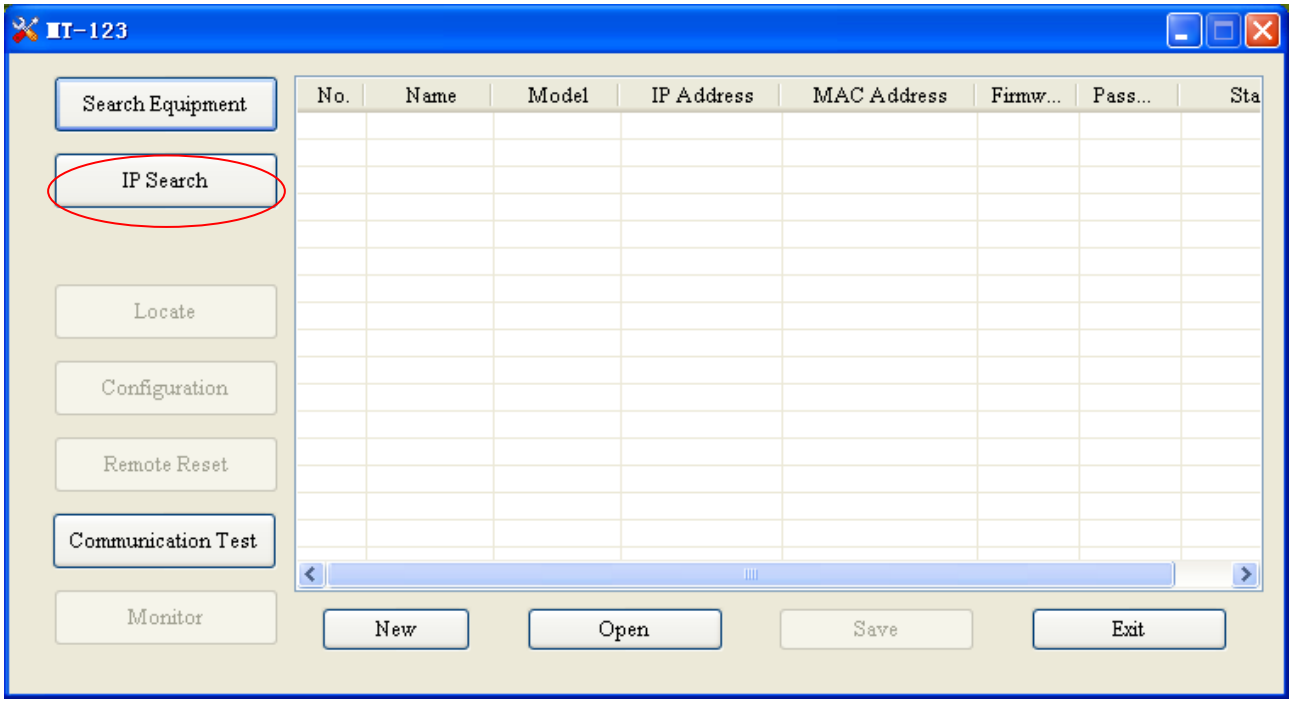


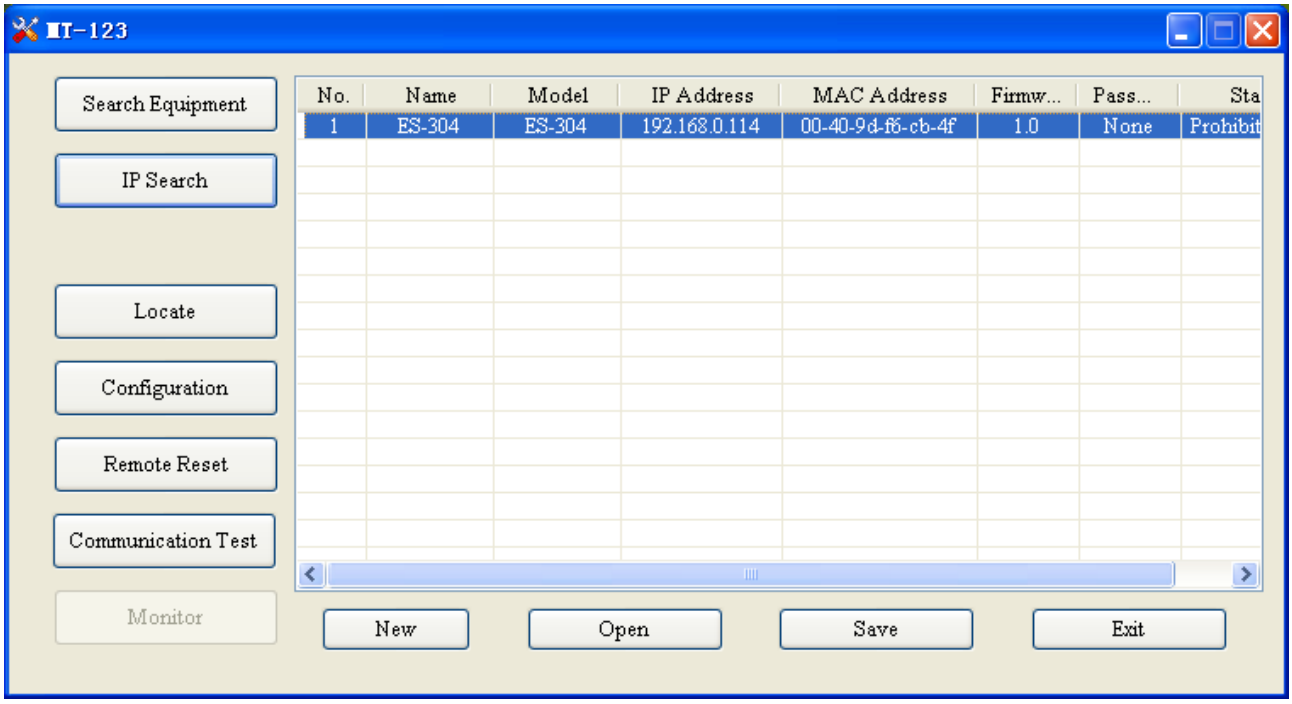
4.2.2 IP Search

Click “IP search” button of the main interface will pop up a dialog box:



After entering the correct IP address, the software will search ES with the IP address in the network, and list the information of the equipment in the main interface.



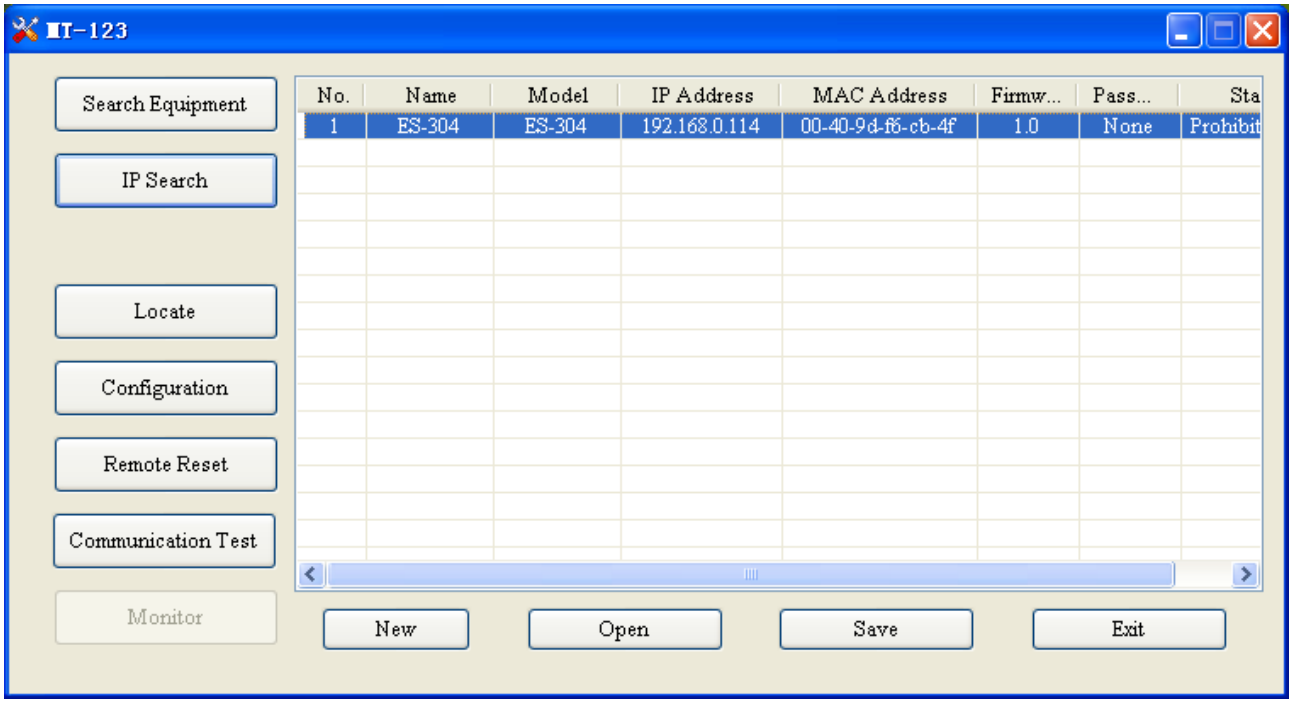


Notes:

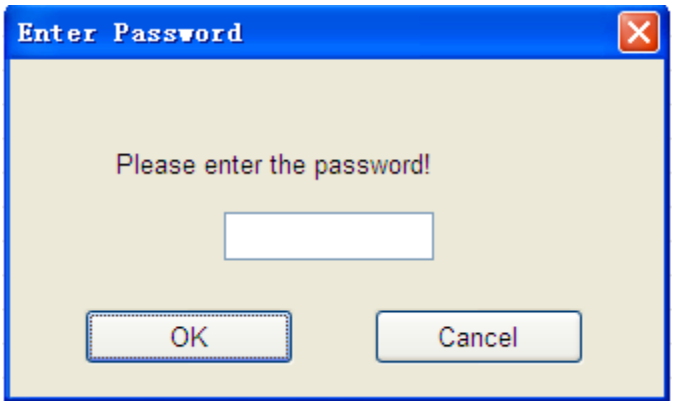
If the users select the “IP search”, the users need enter correct IP address or it cannot search equipment.

4.3 Configuration

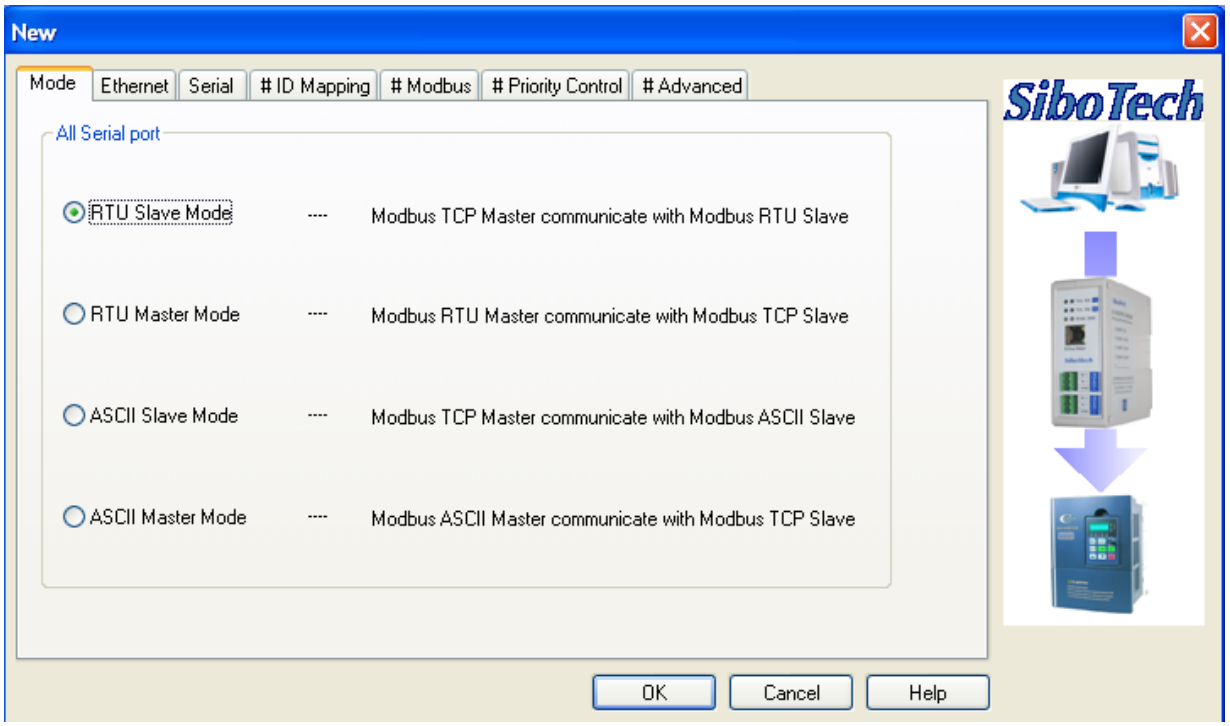
Select the equipment to be configured in the list, and the “Locate”, “Configuration”, “Remote Reset”, “Communication Test” “New”, “Open” and “Save” buttons will become available:



Click “Configuration” button, a password authentication dialog box will pop up if the equipment has been set with a password:



Pass the password authentication or no password and then enter configuration interface:



4.3.1 Mode Selection

ES series gateway provides four operating modes:

Modbus RTU slave mode——Modbus TCP master communicate with Modbus RTU slave through the gateway;

Modbus RTU master mode——Modbus TCP salve communicate with Modbus RTU master through the gateway;

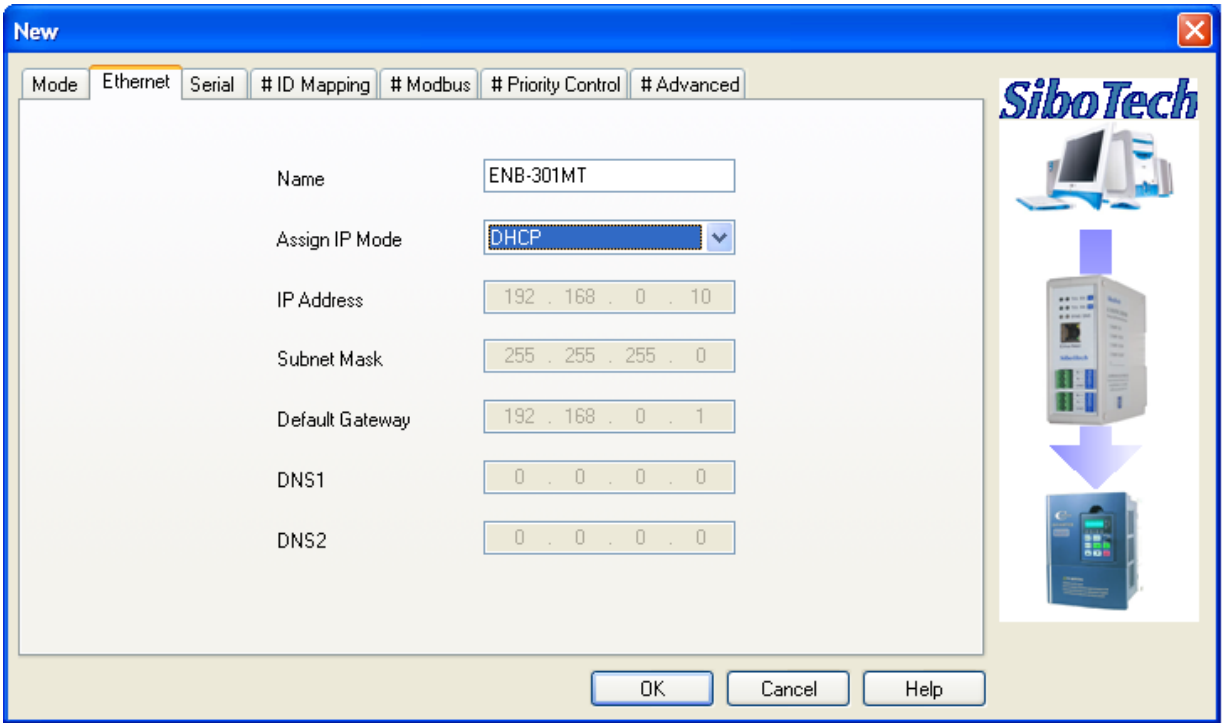
Modbus ASCII slave mode——Modbus TCP master communicate with Modbus ASCII slave through the gateway;

Modbus ASCII master mode——Modbus TCP salve communicate with Modbus ASCII master through the gateway.

Operating mode of ES series gateway is defined by the serial equipment. For example, when you want to achieve the communication between Modbus TCP master device and Modbus RTU slave device, the users need to select “RTU/ASCII slave mode” of ES series gateway.

4.3.2 Ethernet Parameters

Ethernet parameters include: “Name”, “Assign IP Mode”, “IP address”, “Subnet mask”, “Default Gateway”, “DNS1”, “DNS2”.



Name——Enter a name to identify the device in order to distinguish from other equipment;

Assign IP Mode——Set the device's IP address configuration mode;

IP address——Set the device's IP address;

Subnet mask——Set subnet mask of the device;

Default gateway——Set gateway address of the device;

DNS1——0.0.0.0 (currently only support 0.0.0.0)

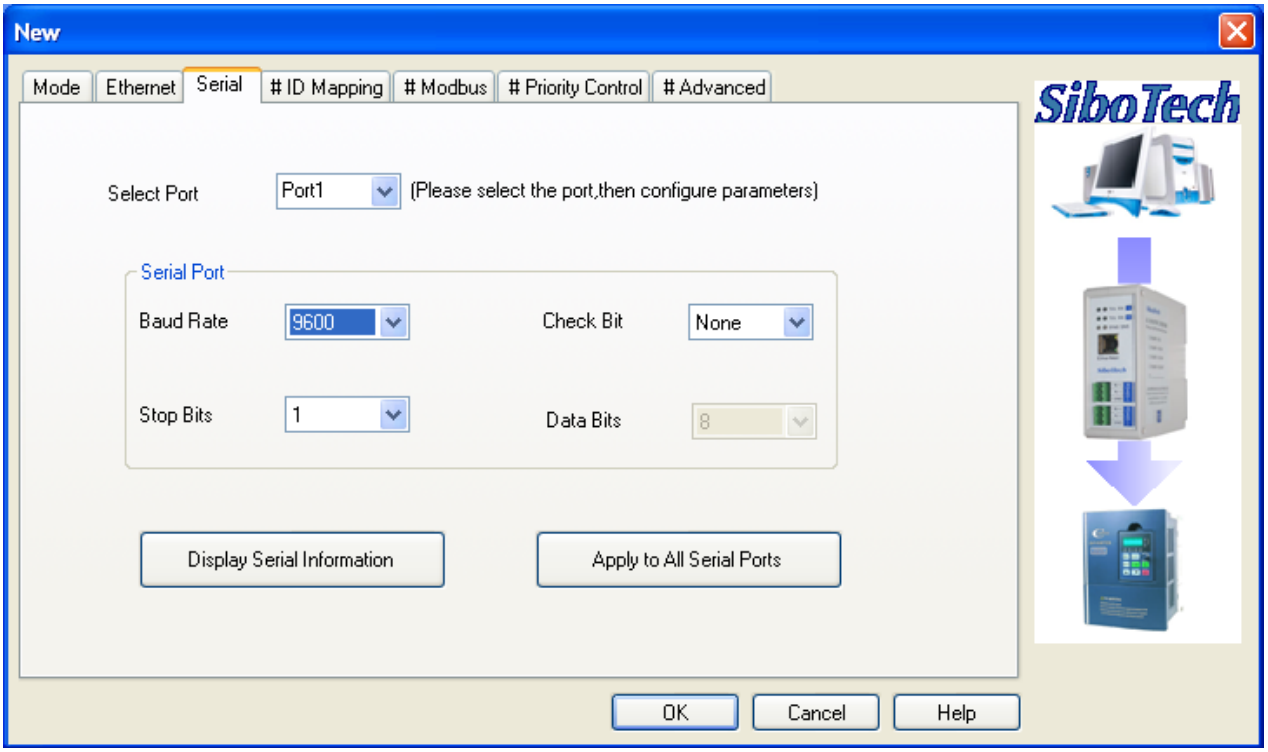
DNS2——0.0.0.0 (currently only support 0.0.0.0)

Notes:

The name cannot have spaces, up to 20 characters, it is best not to use Chinese.

4.3.3 Serial Parameters

Serial parameters include: “Baud Rate”, “Check Bit”, “Stop Bits”.



Baud Rate——1200、2400、4800、9600、19200、38400、57600、115200、230400bps;

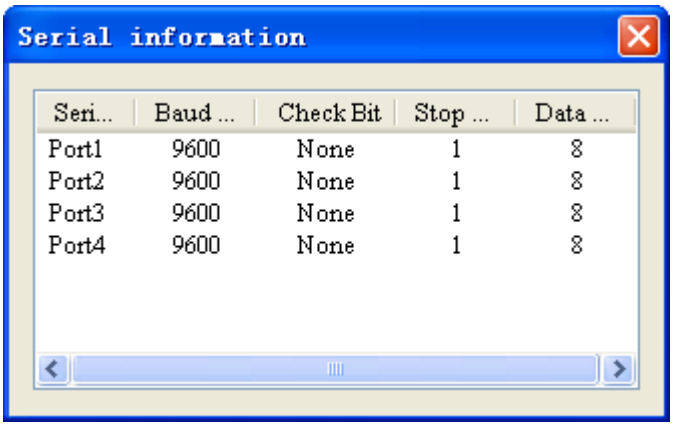
Check Bit——None, Odd, Even, Mark, Space;

Stop Bits——1, 2;

Data Bits——8 (currently only support 8 data bits)

Notes:

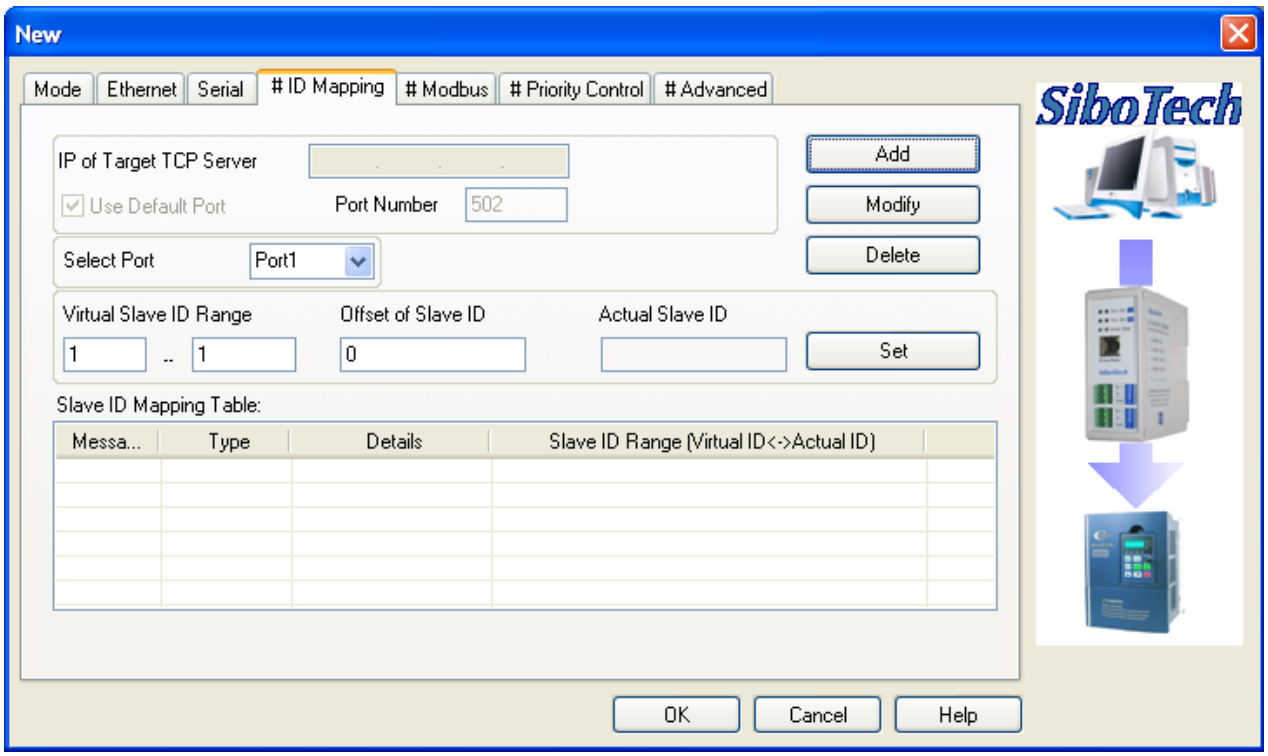
ES-302/ES-304 gateway: You only need to set one serial port, if all serial port parameters are consistent, and then click "Apply to All Serial Ports”, all serial port parameters can be configured to the current display serial port parameters. Click “Display Serial Information” will pop up:



4.3.4 ID Mapping (Advanced Parameters)

When you select RTU slave or ASCII slave mode, and only configure the basic parameters, the item cannot be configured.

When you select RTU master or ASCII master mode, the item specify request packets being sent to which server.



Virtual slave ID range——Ether an ID range, the left is minimum, the right is maximum (not more than

247);

Offset of slave ID——D-value of virtual ID and actual ID (can be negative);

Actual salve ID range——By clicking “Set” button to calculate;

When select “RTU/ASCII slave mode”, users need to specify the serial port to be mapped.

When select “RTU/ASCII master mode”, users need to set “IP address of target TCP slave”, that is the IP address of the server to be connected.

After setting “Virtual slave ID range” and “Offset of slave ID”, click “Set” button, “Actual salve ID range” value is automatically calculated.

When click “Add” button, users can add a message in “Slave ID Mapping Table”.

When want to modify the added information, users fist select the information you want to modify, and then set “Virtual slave ID range” and “Offset of slave ID”, click “Modify” button.

When want to delete the added information, users need select the information you want to delete, and click “Delete” button.

Tips:

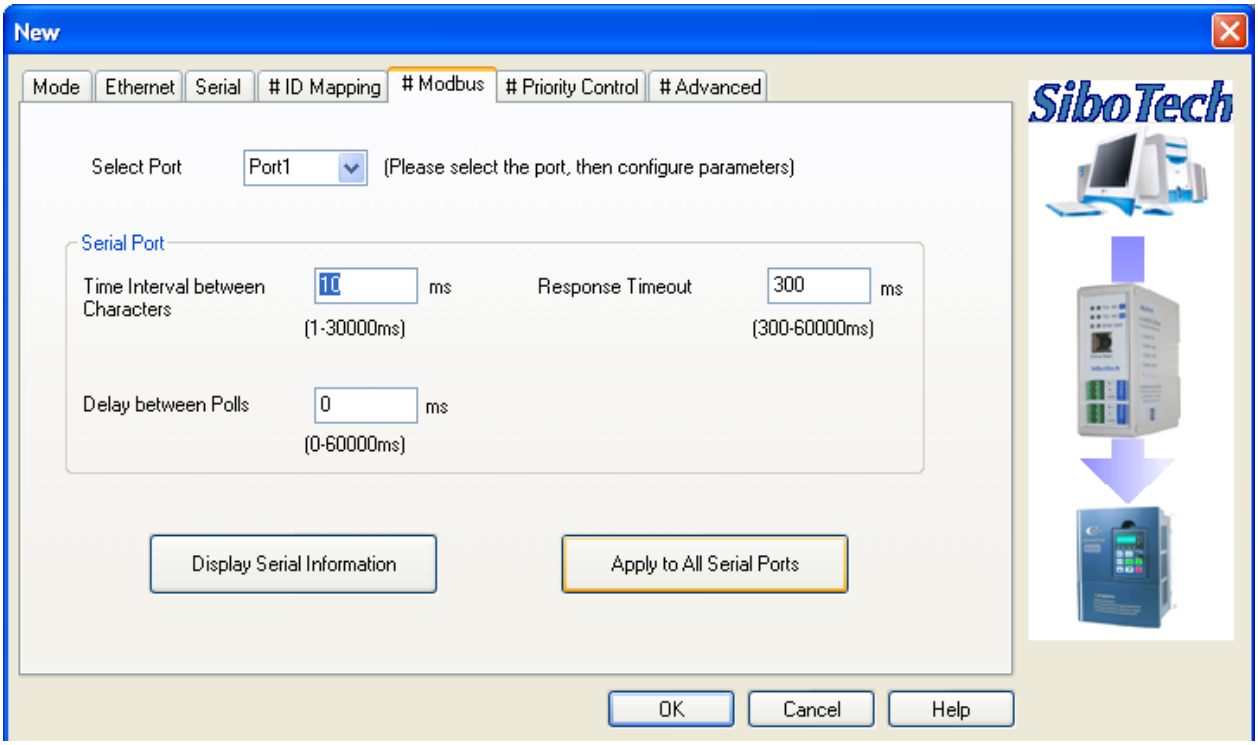
1. “Add” and “Modify” button both have “Set” function, users do not need to click “Set” then click “Add” or “Modify”.

2. Support up to 4 groups ID mapping.

4.3.5 Modbus Parameters (Advanced Parameters)

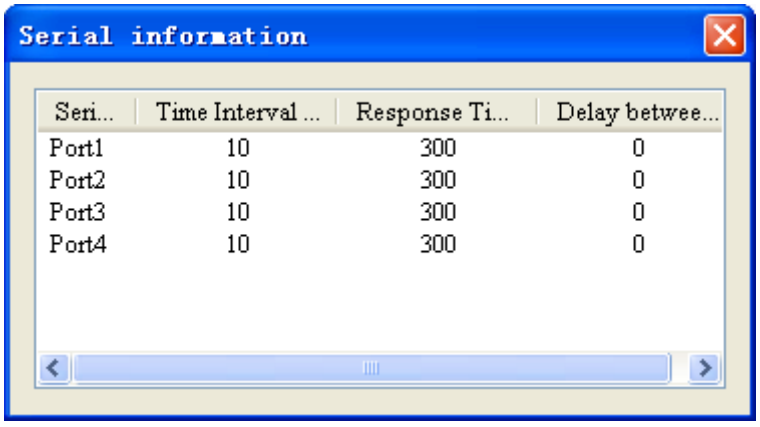
When you select RTU slave or ASCII slave mode, and only configure the basic parameters, the item cannot be configured.

Set “Time Interval between Characters”, “Response Timeout” and “Delay between Polls” of Modbus RTU/ASCII in the follow interface:



Notes:

ES-302/ES-304 gateway: You only need to set one serial port, if all serial port parameters are consistent, and then click "Apply to All Serial Ports", all serial port parameters can be configured to the current display serial port parameters. Click "Display Serial Information" will pop up:



4.3.6 Priority Control (Advanced Parameters)

When you select RTU slave or ASCII slave mode, and only configure the basic parameters, the item cannot

be configured. (ES series gateway does not support this function temporarily.)

Ethernet speed is faster than serial port, and it will cause the frame line, then you can set priority of frames.

After enabling “Priority control”, user can set, and only “RTU/ASCII salve mode” supports the function.

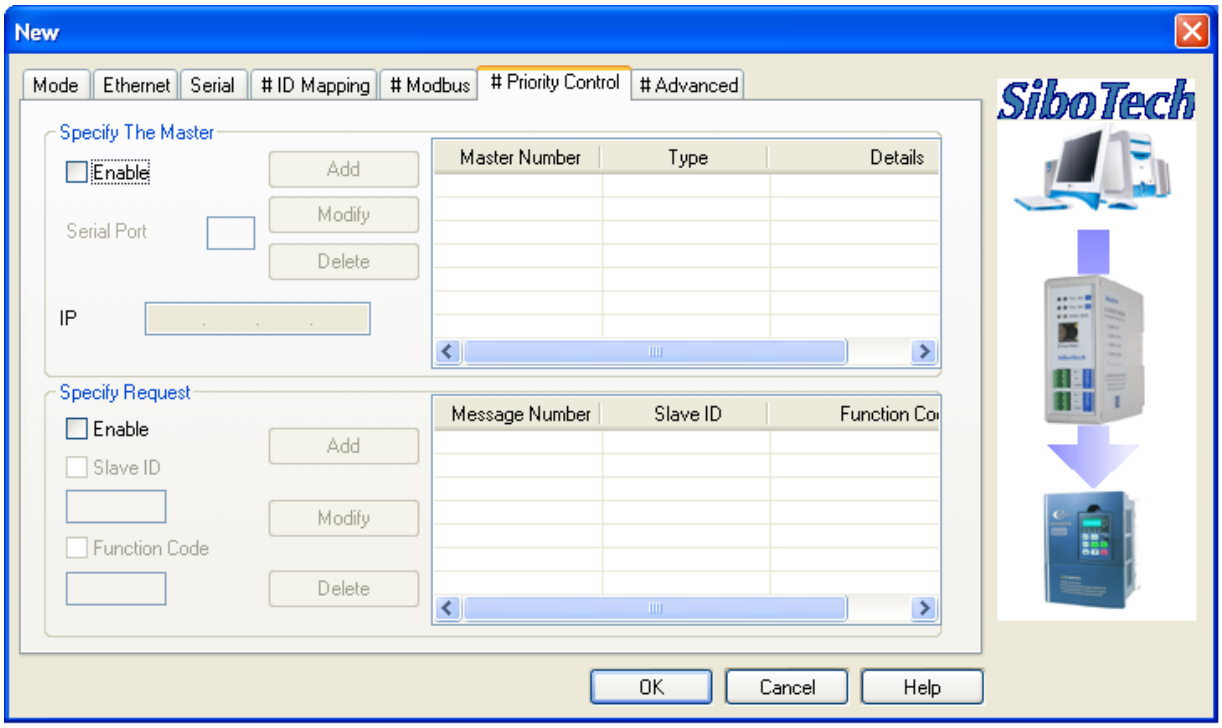
Specify the master——The requests of specified master are prior to transmit.

Specify the request——The requests of specified slave ID (virtual ID) or function codes are prior to transmit.

Priority of requests:

Conditions	Priority
Comply with specified the main master, and comply with specified the request	High
Comply with specified the main master, or comply with specified the request	General
Not comply with priority conditions	Low

Use method of “Add”, “Modify” and “Delete” is the same with “ID mapping”.

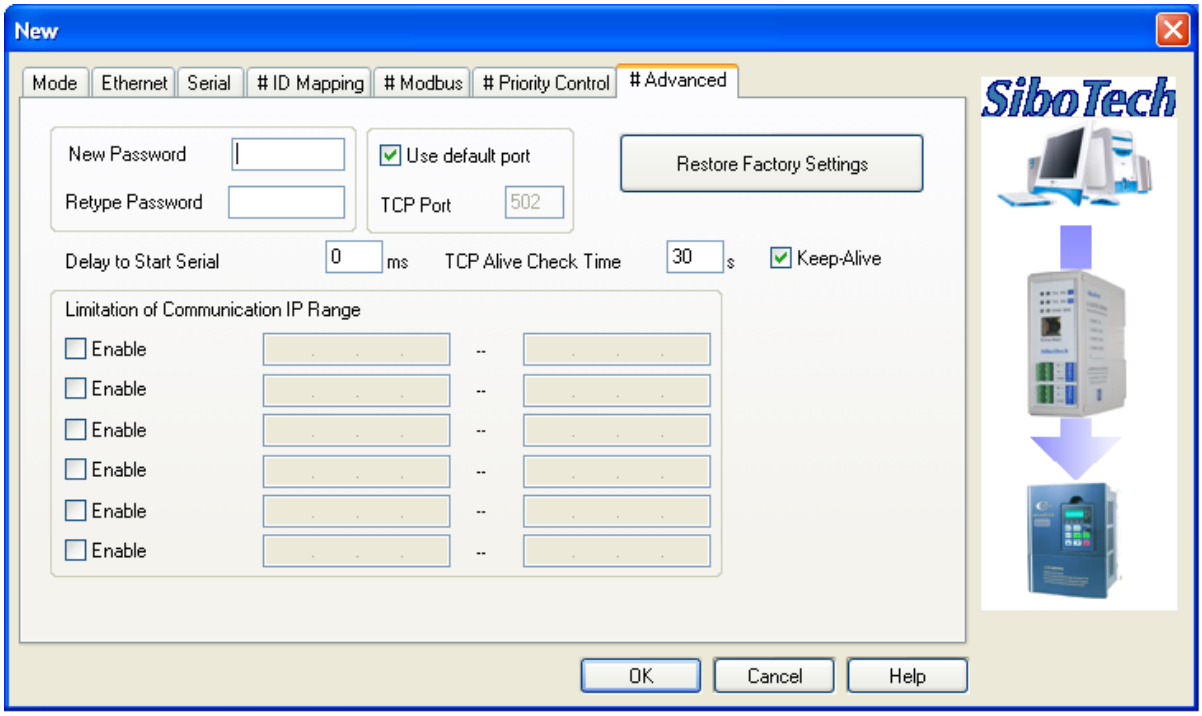


4.3.7 Advanced Parameters

When you select RTU slave or ASCII slave mode, and only configure the basic parameters, the item cannot be configured.

Advanced parameters include: “New Password”, “Retype Password”, “Use default port”, “TCP Port”, “Delay

to Start Serial", "Restore Factory Settings", "TCP Alive Check Time", "Limitation of communication IP range".



Password——After setting the password, users need to enter the password when configurate parameters again. If users want to delete the password, just put your password is set to empty.

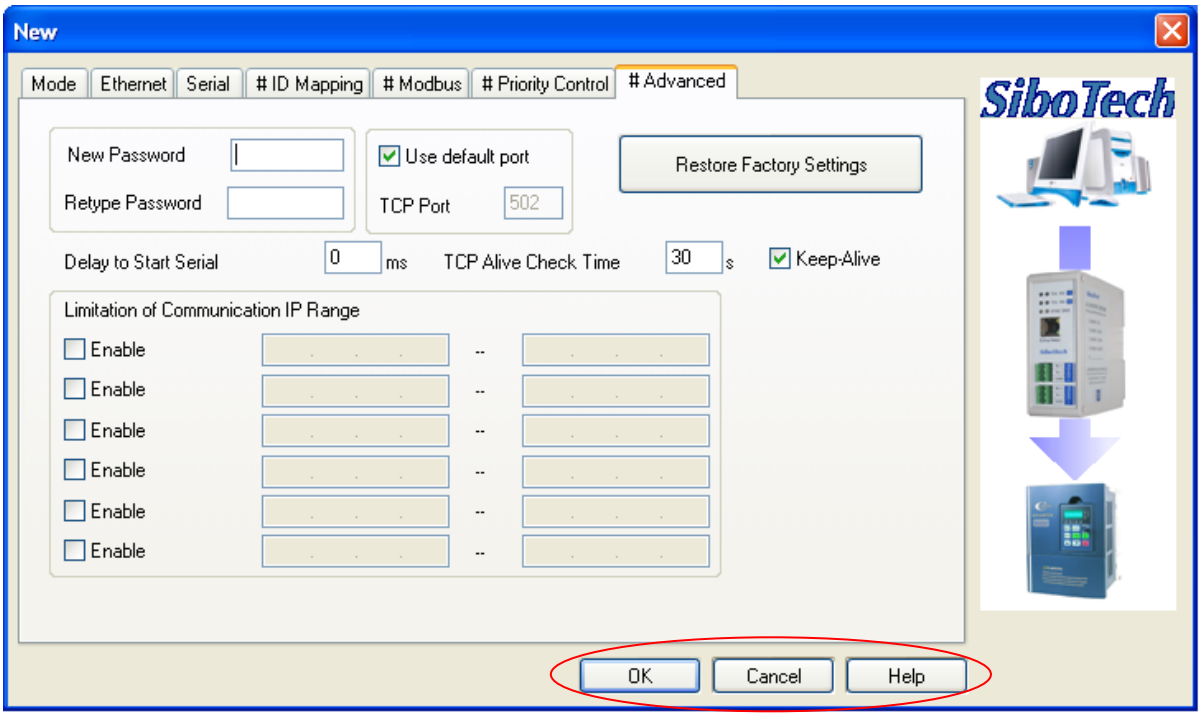
Restore Factory Settings——When users click the button, the previous configuration information will be lost.

TCP Alive Check Time——When a TCP connection idle time reaches the set value, if select "Keep-Alive", then transmit keep-alive message; If not, then disconnect the TCP connection. The default value is 8 seconds.

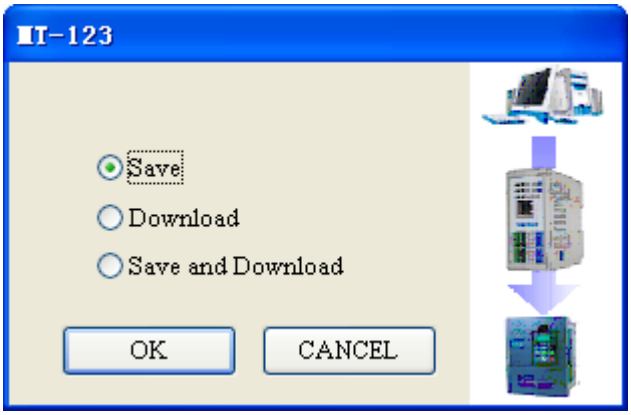
Limitation of communication IP range——Set the range of communication IP to limit the client to connect to ES.

4.4 OK, Cancel and Help

After configuring parameters, users need click "OK" button to write the configuration to the equipment. If you do not want to write to the configuration, click "Cancel" button.



(1) OK:

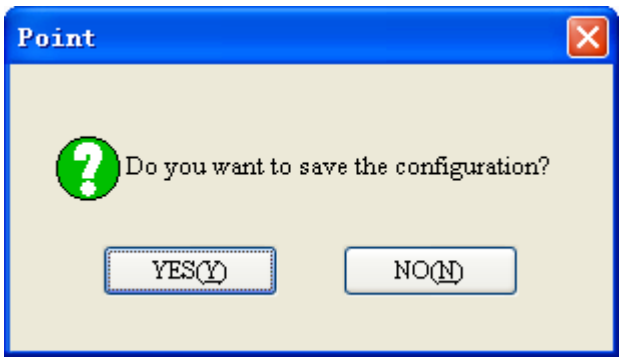


Save: Save the configuration as ". Inf " format to a local disk;

Download: Download the configuration to the device;

Save and Download: Save to the hard disk and download to the device.

(2) Cancel:



Yes: Save to local disk and close;

No: No save but direct closure.

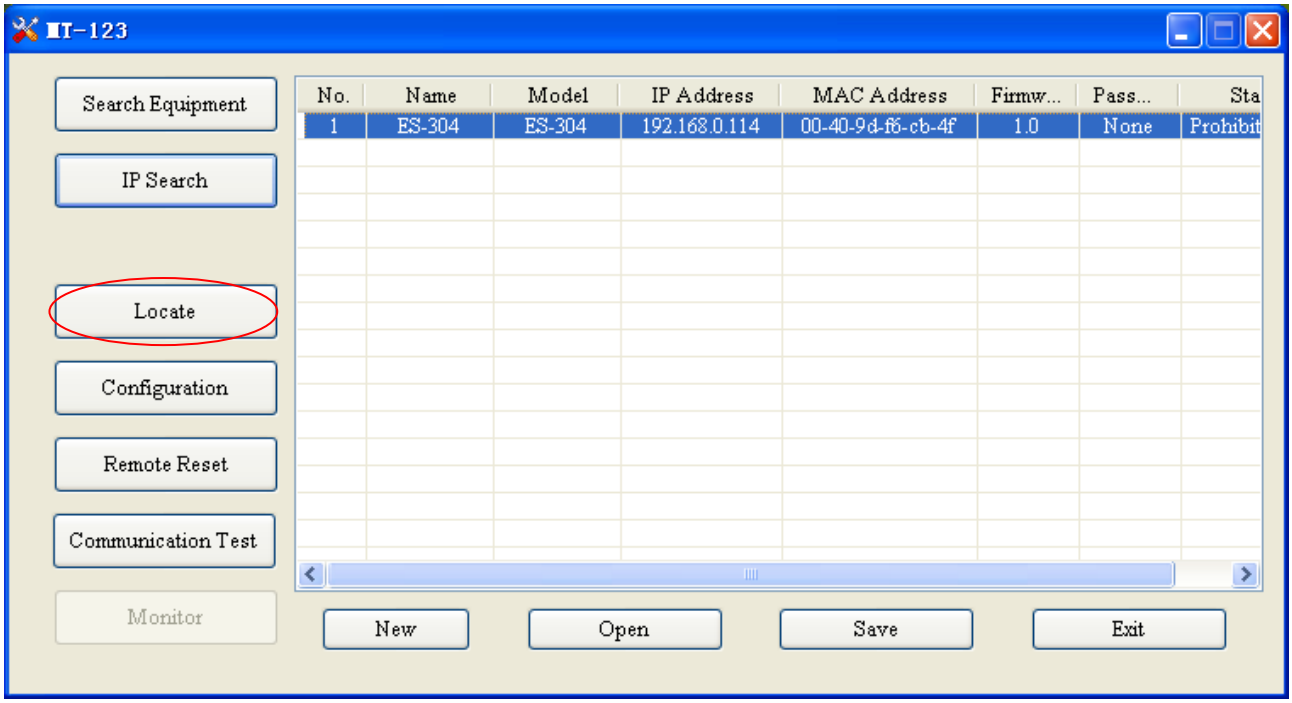
(3) Help:

Open the software manual.

4.5 Locate

When the user manage multiple ES gateways, they can use “Locate” function determine equipment that you want to configure.

Users click on the “Locate” button, the ENS and SNS read indicators of the equipment in Ethernet will flash alternately 3 seconds then the user can find it.



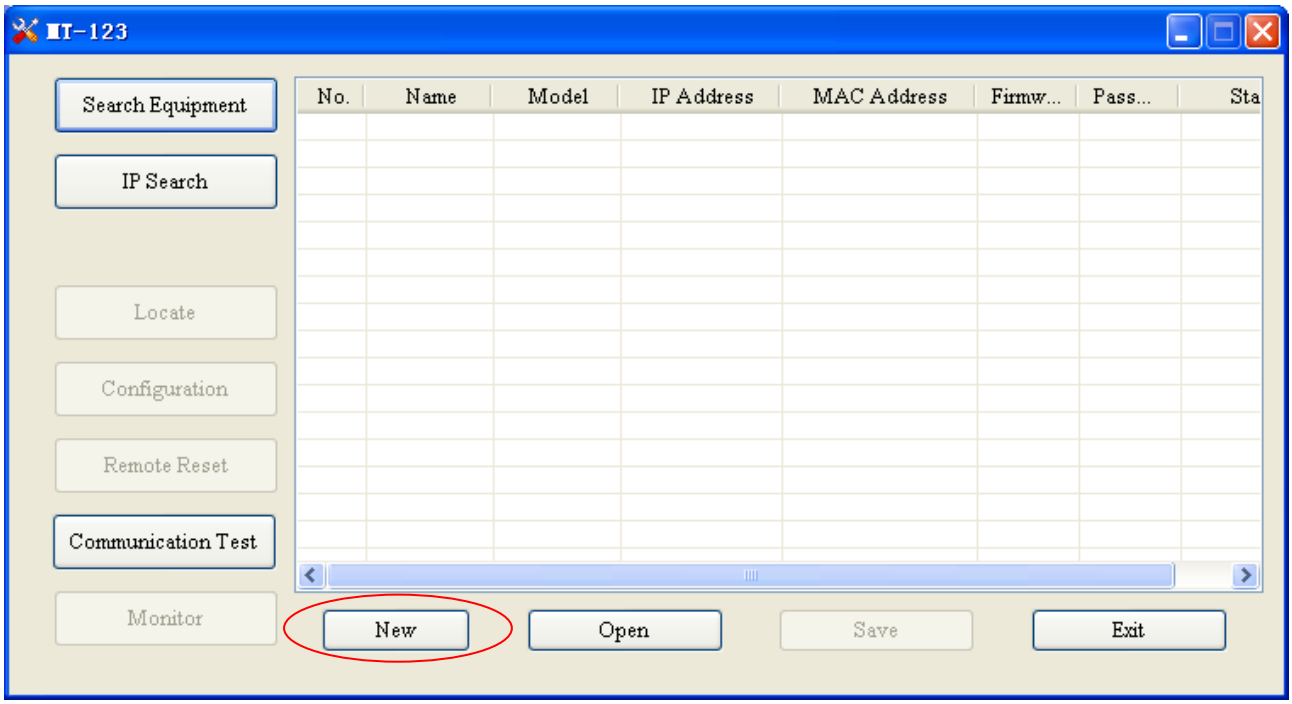
4.6 Remote Reset

The function of "remote reset" is restarting the selected device. When remote reset, ENS and SNS red lights will be on at the same time

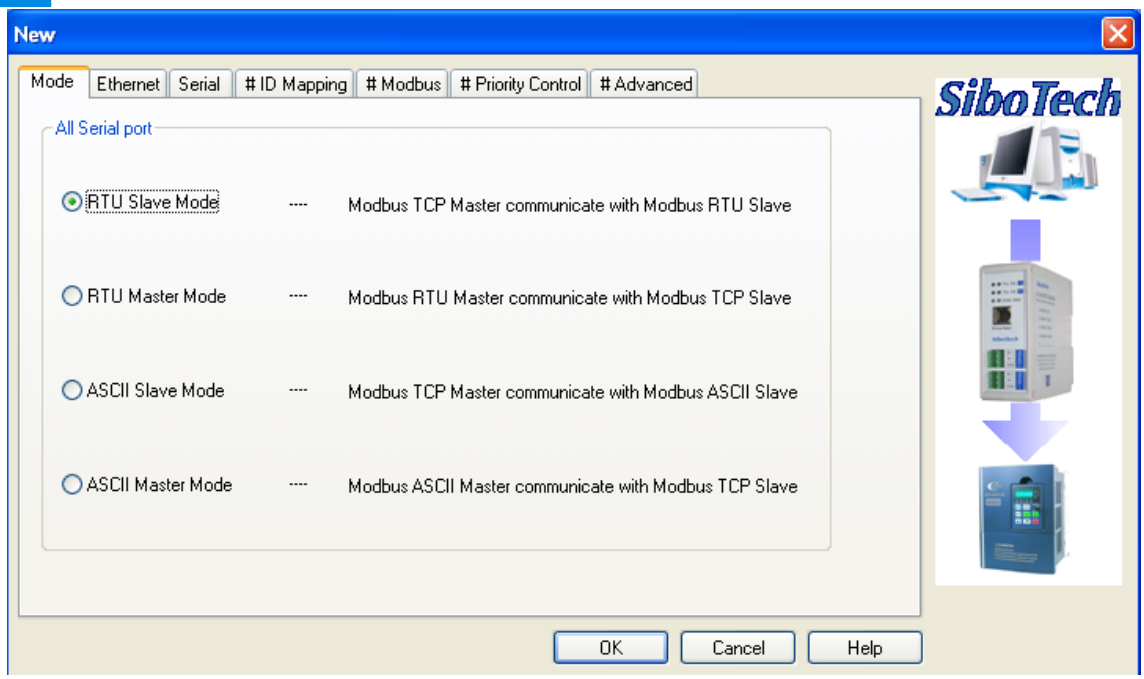
Select the equipment in the list first, click "Remote Reset" button, it will pop up a confirmation dialog, then click "OK" to complete the operation.

4.7 New (Offline Configuration)

Click “New” and select a device message dialog box:



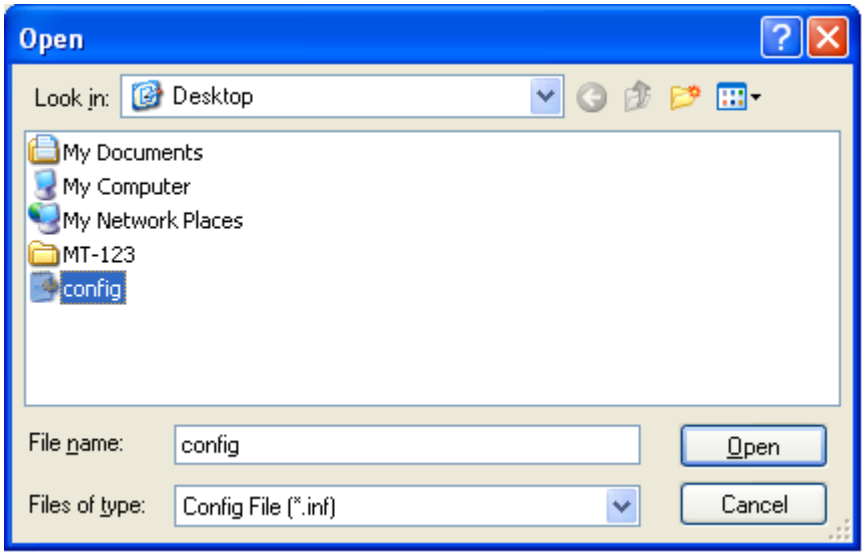
Into the new configuration interface, all of the data is the factory defaults.



4.8 Open

Open: Including open online and open offline;

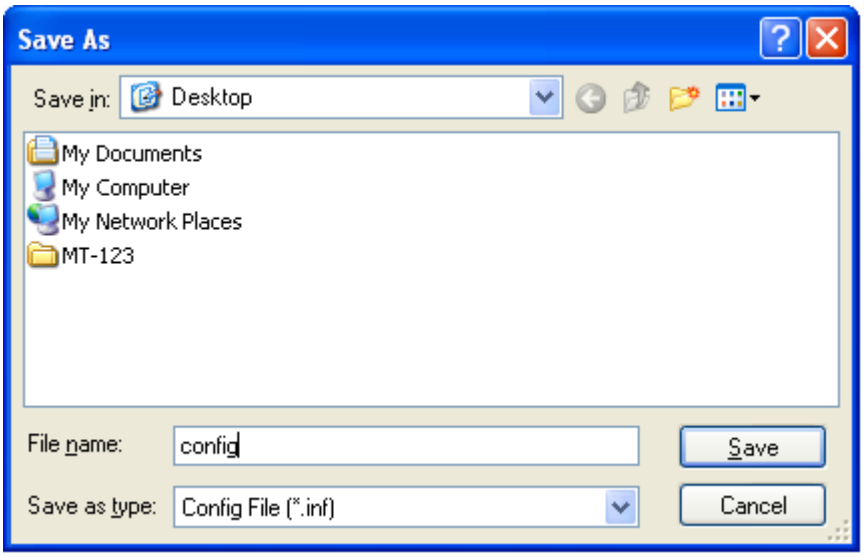
Open online (shown as below) : be equivalent with “import”, select the device from the list, click the " Open " , if the device type of the gateway is the same with the opened configuration file type , and the device allows remote configuration , open successfully ; otherwise ,given the appropriate error message.



Open offline: Open directly without choosing the device .

4.9 Save

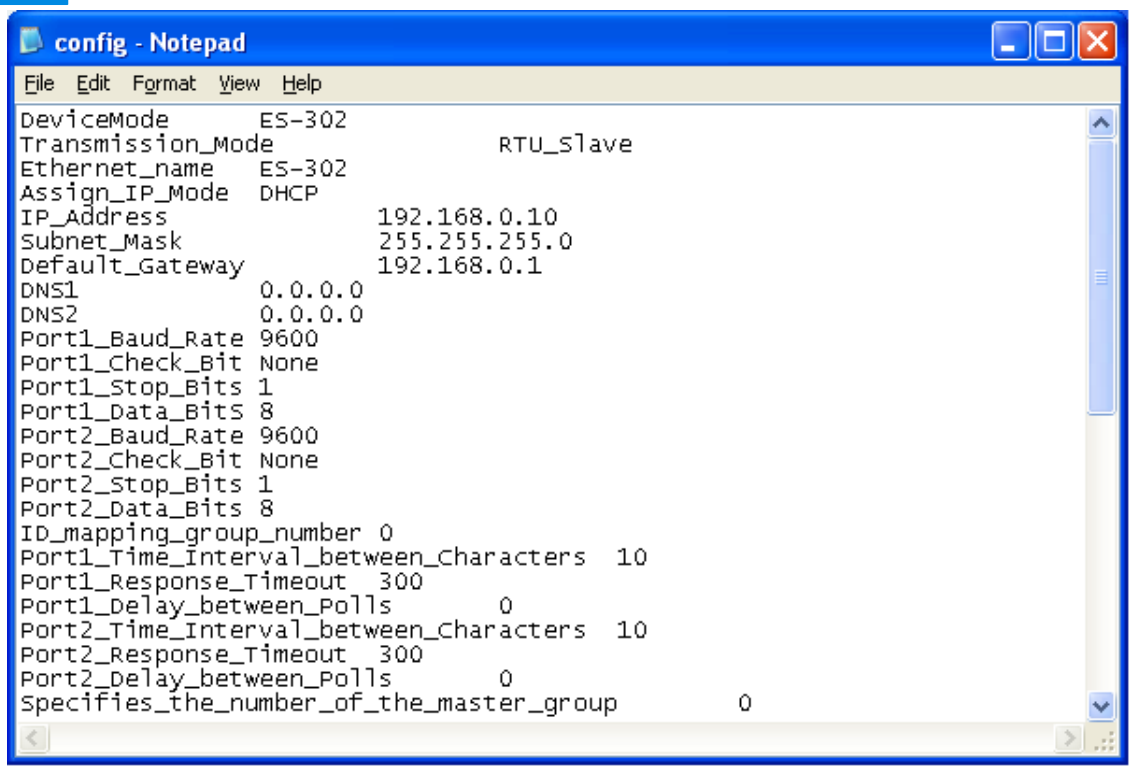
Save: Select a device, click "Save", save the parameters of the device as ".Inf" format on the hard disk.



Notes:

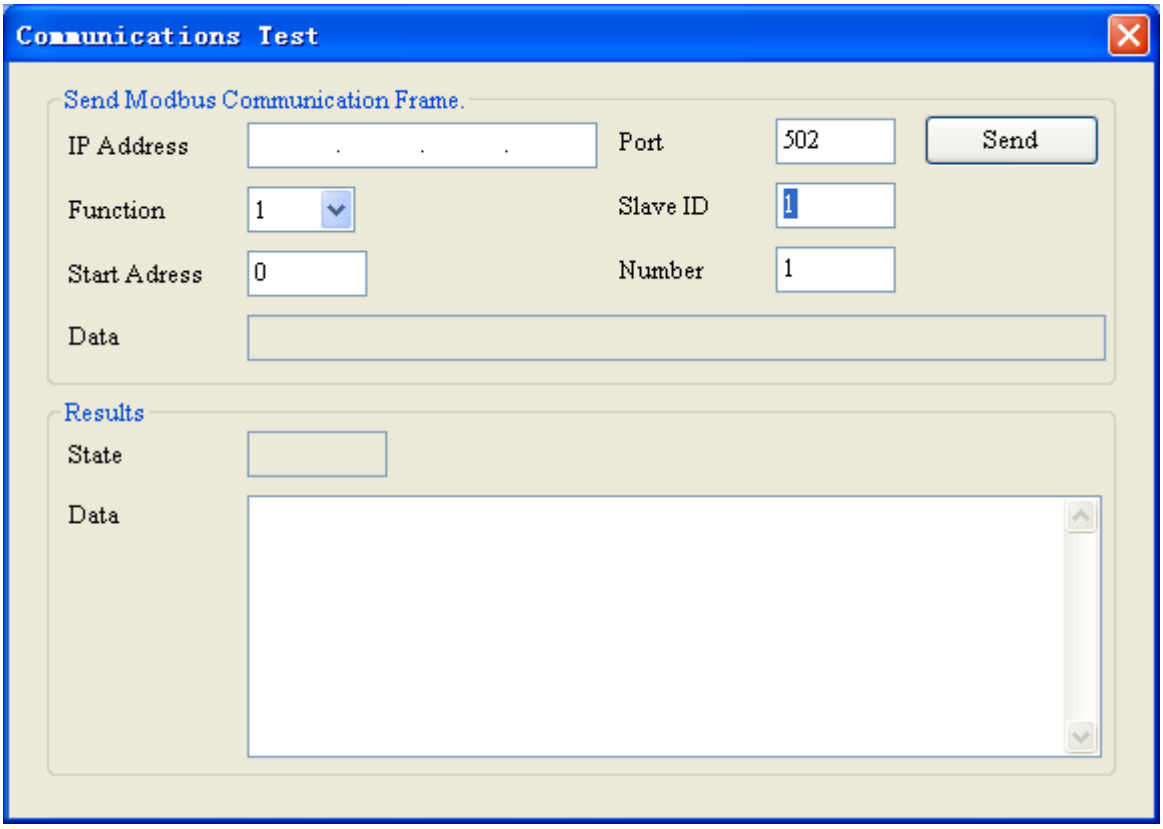
The configuration file can be open with Notepad, you can modify the data inside, be sure to modify the accuracy of the data;

Please don't modify keywords, don't add a space.



4.10 Communication test

"Communication test" can manually transmit Modbus TCP request to test serial devices. Click "Communication test" button and it will pop up the follow interface:



IP address——The IP address of ES to be connected;

Port——The port of ES to be connected and the default is 502;

Function ——Support function code: “1”, “2”, “3”, “4”, “5”, “6” , “15”and “16”;

Slave ID——Slave address (virtual ID);

Start address——Starting address of registers or coils, Decimal;

Number——Number of registers or coils, Decimal;

Data (above)——The data to be sent; hex; between bytes, separated by a space;

State——Status of response, there is “no response”, “right response”, and “wrong response”;

Data (below)——Show the content of response.

Notes:

The format of input data is hexadecimal, must follow such as “12 ff 0c” format. The format of response data is also hexadecimal.

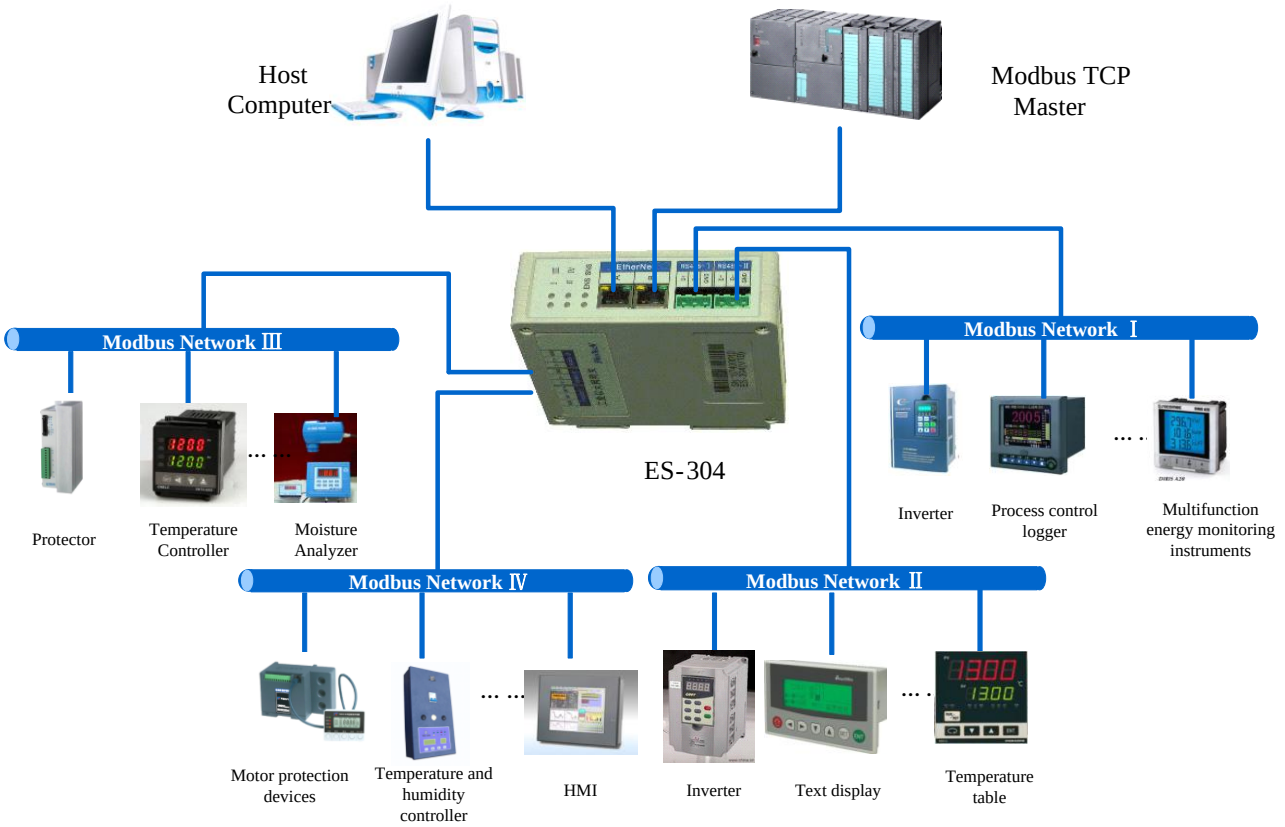
5 Typical Application

ES can connect Modbus master/slave devices to Ethernet. ES is a bridge in the communication to complete the conversation of Modbus TCP and Modbus RTU/ASCII.

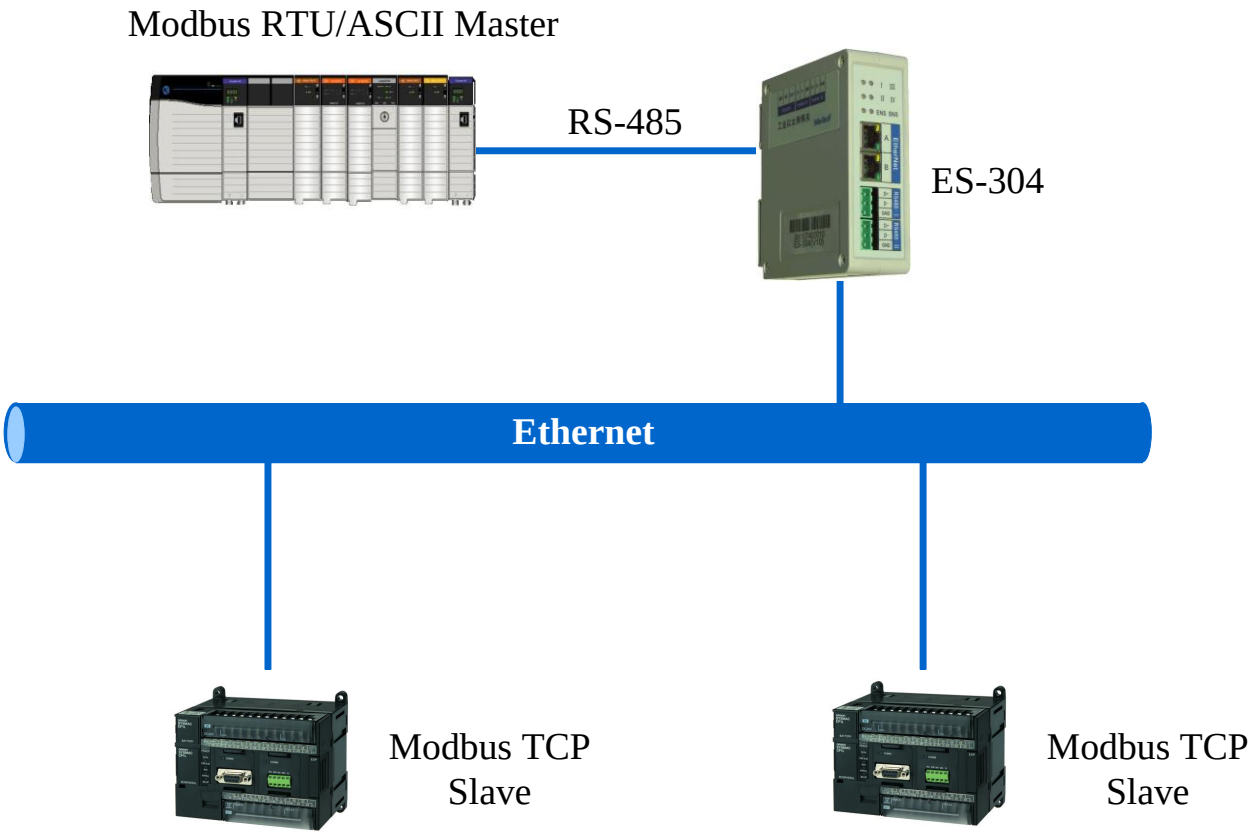
The following is some typical application of ES. (Example ES-304)

5.1 Multiple Ethernet Masters Connect Multiple Serial Slaves

ES-304 supports dual Ethernet ports, built- Switch function .Support more than one independent serial .when serial is RS485, it can connect nearly 100 Modbus slave devices to the Ethernet.

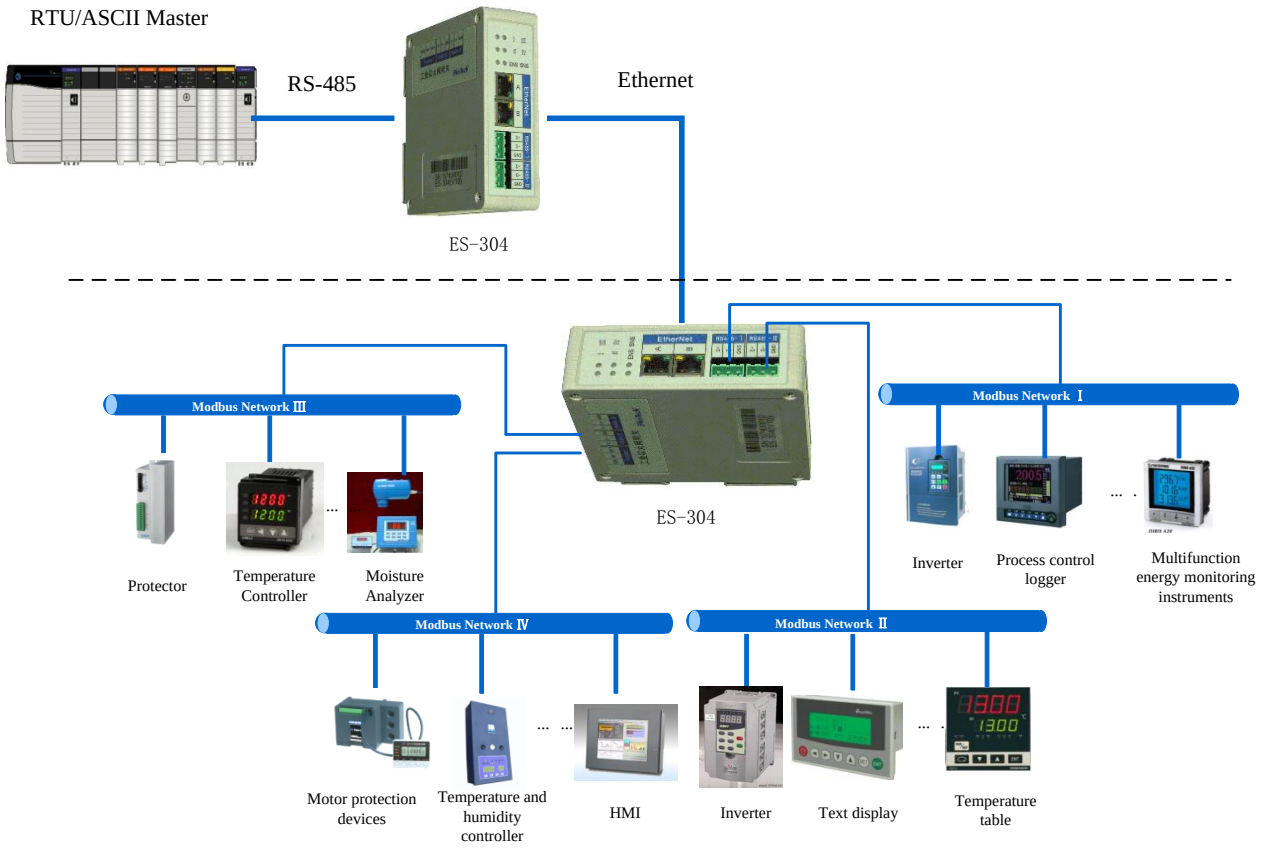


5.2 Multiport serial masters connect multiple Ethernet slaves



5.3 Serial master connect serial slave via Ethernet

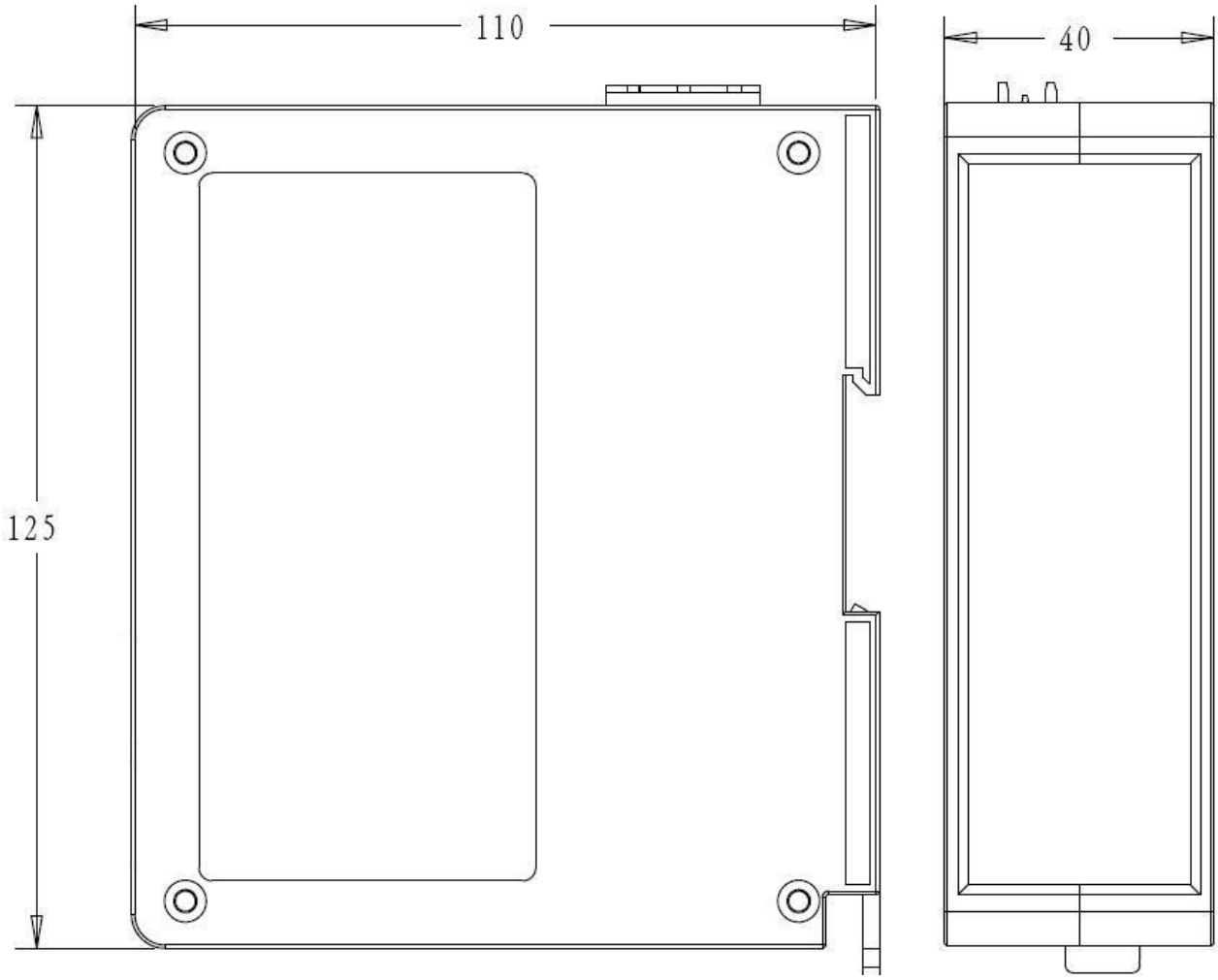
Serial devices via Ethernet communication, not subject to the limitation of the transmission distance.


RTU/ASCII Master
RS-485
Ethernet
ES-304
ES-304
Modbus Network Ⅲ
Modbus Network Ⅰ
Modbus Network Ⅳ
Modbus Network Ⅱ
Protector
Temperature Controller
Moisture Analyzer
Inverter
Process control logger
Multifunction energy monitoring instruments
Motor protection devices
Temperature and humidity controller
HMI
Inverter
Text display
Temperature table

6 Installations

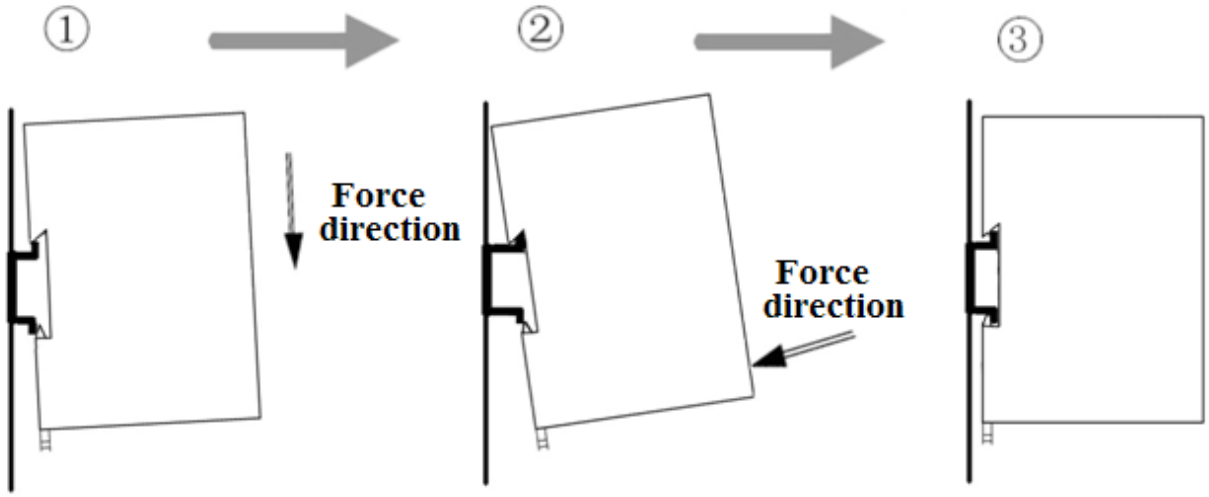
6.1 Mechanical Dimensions

Size: 40mm (Width)*125mm (Height)*110mm (Depth)



6.2 Installation

35mm DIN rail mounting


①
②
③
Force direction
Force direction