

Modbus TCP / DeviceNet Gateway GT200-MT-DN

User Manual

V 2.0

Rev A



SST Automation

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Important Information

Warning

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

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

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1 Product Overview

1.1 Product Function

The product can realize the data exchange with DeviceNet network through Modbus TCP. It supports connecting devices with DeviceNet interface to Modbus TCP network. This module is a server on the Modbus TCP side and a scanner or adapter on the DeviceNet side.

1.2 Product Feature

- DeviceNet Scanner: Supports connecting up to 8 DeviceNet devices to Modbus TCP network, such as: Robots with DeviceNet interfaces, inverters, welder, motor starting protection devices, intelligent field measurement equipment, etc.
- DeviceNet adapter: Supports data exchange between DeviceNet scanner and Modbus TCP master, such as: data exchange between robots, welder, PLCs and other devices with DeviceNet scanner interface and the host computer.
- Users don't need to know the technical details of Modbus TCP and DeviceNet, only refer to this manual and the application cases provided, complete configuration according to requirements, the network can be connected in a short time.
- Transparent communication: According to the mapping relationship between Modbus TCP communication data area and DeviceNet communication data area, users can realize data transparent communication between DeviceNet network and Modbus TCP network.
- Professional and efficient configuration software SST-DNET-COM: The gateway can scan DeviceNet adapters online through this software, quickly obtain its I/O parameters and configure parameters, support online debugging, support offline upload and download, offline configuration, and support DeviceNet scanner/adapter mode switch.

1.3 Technical Specifications

[1] Ethernet interface:

- Supports 2 10M/100M adaptive network ports with build-in switch.
- Supports Modbus TCP protocol, the Ethernet interface can be configured as a Modbus TCP server.
- Supports function codes:03H, 04H, 06H, 10H.
- The starting address of the input register is 0 (stores the received CAN frame), and support the function code 04H.
- The starting address of the output register is 0 (stores the CAN frames that need to be sent), and support the function codes 03H, 06H and 16H.
- Supports static configuration of IP address and DHCP.

[2] DeviceNet interface:

DeviceNet supports two working modes: scanner station and adapter station. DeviceNet scanner station supports pre-operation mode and operation mode

[3] As DeviceNet Scanner - Pre-operation mode (Configuration switch 1-ON, 2-OFF)

- Supports device search, namely online scanning DeviceNet adapter through SST-DNET-COM software.
- Supports one-click application of the scanned DeviceNet adapter I/O parameter configuration, and reading and writing configuration through SST-DNET-COM software.
- Supports reading and writing DeviceNet adapter parameters.
- Supports reading and writing DeviceNet I/O data(polling).
- Supports reading cos commands (COS) (up to 14 bytes).
- Supports DeviceNet baud rate: 125K, 250K, 500K.
- Supports reading and writing product information.

[4] As DeviceNet Scanner - Operation mode (Configuration switch 1-OFF, DIP2-OFF)

- Supports communication with Modbus TCP network.
- The Maximum number of input and output bytes supported by single DeviceNet adapter: 128 byte and 112 bytes.
- The maximum number of input/output bytes supported by DeviceNet adapter: 512 bytes.

- Supports connecting up to 8 adapter devices, and input timeout clearing and holding function of DeviceNet (optional).
- Supports reading cos commands (COS) (up to 14 bytes).
- Supports DeviceNet baud rate: 125K, 250K, 500K.

[5] As DeviceNet Adapter

- DeviceNet supports up to 224 bytes of input or output, 8, 16, 32, 96, 48, 64, 112, 72, 160, 192 and 224 bytes.
- The module is powered from the DeviceNet network, and the power supply voltage is DC 11~30V.
- Supports DeviceNet I/O Poll scanning.
- Supports DeviceNet baud rate: 125K, 250K and 500K.

[6] Operating temperature: -40 °F~140 °F(-20 °C to 50 °C). Relative Humidity: 5% to 95% (non-condensing)

[7] Power: 24VDC (11V~30V), maximum 80mA (24V).

[8] Built-in electrostatic protection: 15 KV ESD.

[9] External dimensions (W*H*D): 1.0 in*4.0 in *3.6in (25mm*100mm*90mm).

[7] Installation : 35mm DIN RAIL.

[10] Protection level: IP20.

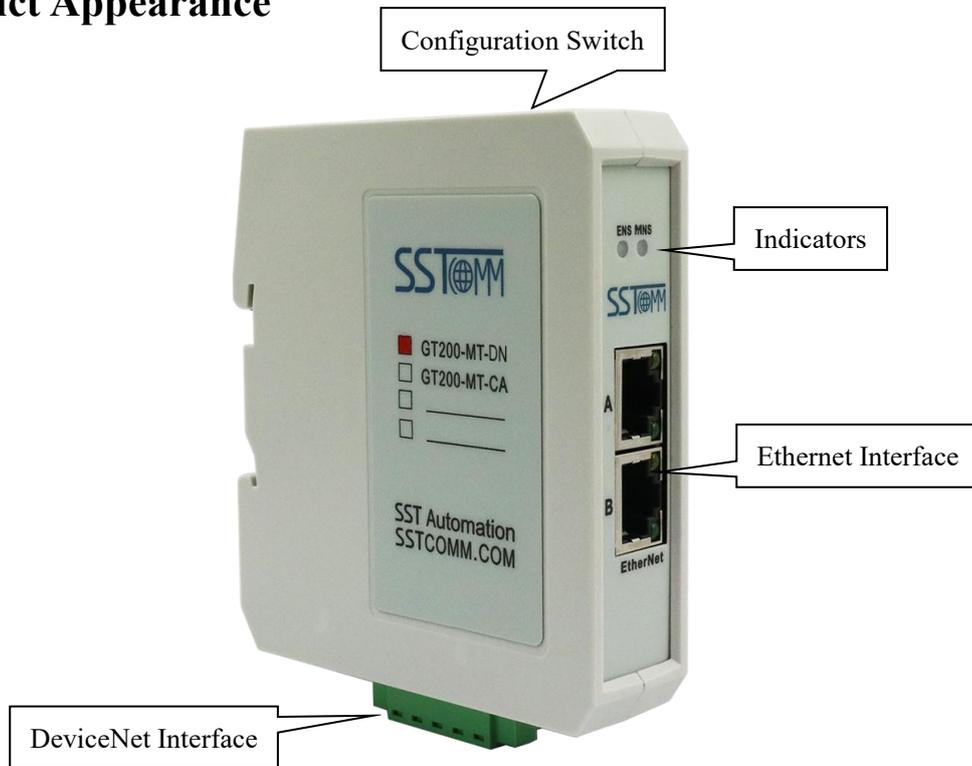
[11] Pollution level: class 3.

1.4 Revision History

Revision	Date	Chapter	Description
V2.0	04/02/2021	ALL	New Release
V2.0 Rev A	07/25/2022	PART	New DeviceNet modeling software SST-DNET-COM

2 Hardware Descriptions

2.1 Product Appearance



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

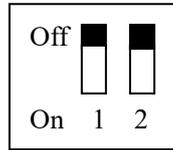
2.2 LED Indicators

Indicators	Status	Description
ENS (Ethernet Status Indicator)	Green	Modbus TCP connection is established
	Green Blinking	Modbus TCP connection is not established
	Red Blinking	DHCP
	Red Blinking twice	Power-on initialization state
MNS (DeviceNet Scanner - Pre-operation mode)	OFF	Initialization completed. searching not started yet
	Green blinking	The scanner is online, but no connection has been established with the adapter
	Green	Connected with the adapter
	Red Blinking	Disconnected with the adapter
MNS (DeviceNet Scanner - Operation mode)	Off	Module is running and initialization has not yet been completed
	Green Blinking	Initialization completed, The scanner is online, but no connection has been established with the adapter
	Green	Connected with the adapter
	Red Blinking	Disconnected with the adapter
	Red	There is no adapter on CAN network. Detected address confliction, CAN network error (like baud rate error)
MNS (DeviceNet Adapter)	Red	DeviceNet network error
	Red/Green Blinking	DeviceNet initialization
	Green Blinking	DeviceNet connection is establishing
	Green	DeviceNet network is normal
ENS Orange MNS Orange (Orange: Red/Green is on simultaneously)	Blinking alternately	Configuration mode
ENS Red MNS Red	Blinking 3 times simultaneously	Locating

Note: Configuration status: After power on, the orange blinks alternately, indicating that it is in the configuration status.

2.3 Configuration Switch/Button

The Configuration switch is used to set the operating mode of the GT200-MT-DN.



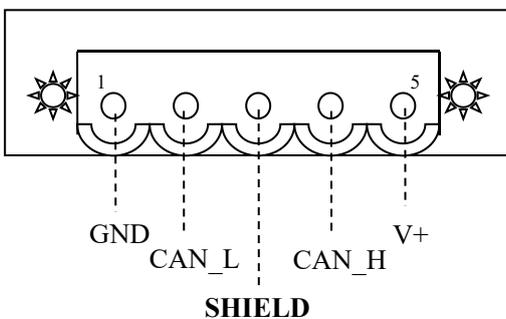
Mode (Bit 1)	Function (Bit 2)	Description
OFF	OFF	<ul style="list-style-type: none"> As DeviceNet scanner - Operation mode. As DeviceNet adapter - Operation mode and allows remote configuration.
ON	OFF	<ul style="list-style-type: none"> As DeviceNet scanner - Pre-operation mode. As DeviceNet adapter - Operation mode and prohibits remote configuration, effective in operation mode.
OFF	ON	Configuration mode, the IP address is fixed at 192.168.0.10. Users can only read and write configuration data, and operation is prohibited.
ON	ON	Enter the factory setting mode (forbidden to use by customers)

Notes:

- To apply the mode switching, please restart the gateway.
- When the GT200-MT-DN works as DeviceNet adapter, after finishing configuration, it's recommended to set the switch to 1-ON 2-OFF, which is the configuration mode that configuration in operation mode.

2.4 Interface

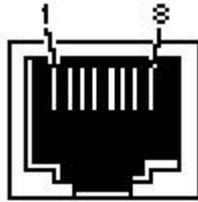
2.4.1 DeviceNet Interface



Pin	Description
1	GND
2	CAN-
3	shield
4	CAN+
5	+24V

Note: The GT200-MT-DN is powered in DeviceNet interface.

2.4.2 Ethernet Interface



RJ-45 port

The Ethernet interface uses RJ45 interface, follows the IEEE802.3u 100BASE-T standard, 10/100M adaptive, its pin (standard Ethernet signal) is defined as below:

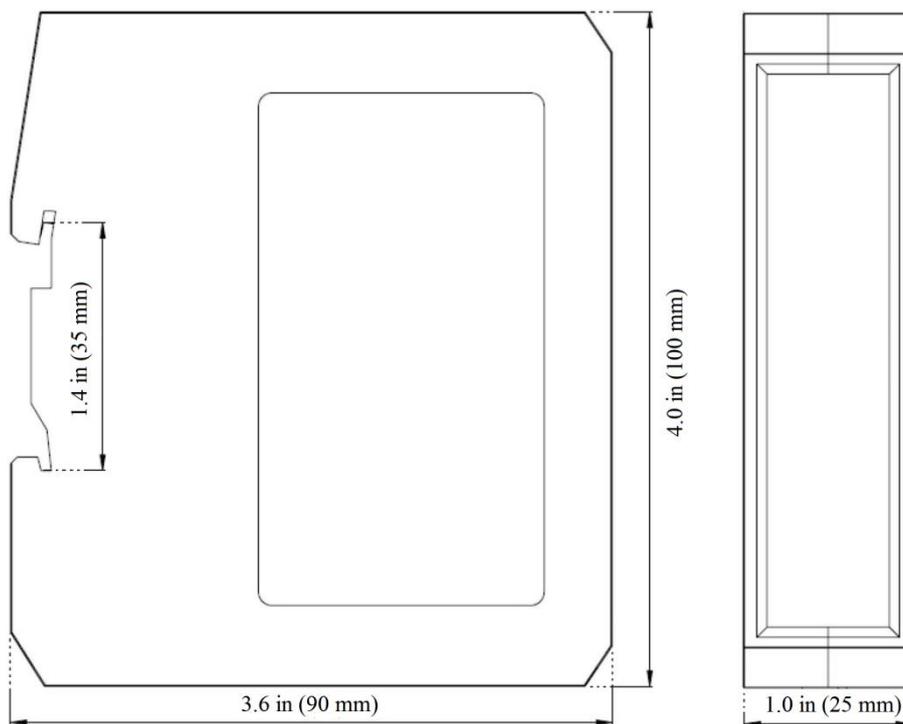
Pin	Description
S1	TXD+, Transmit Data+, Output
S2	TXD-, Transmit Data-, Output
S3	RXD+, Receive Data+, Input
S4	Bi-directional Data+
S5	Bi-directional Data-
S6	RXD-, Receive Data-
S7	Bi-directional Data+
S8	Bi-directional Data-

3 Hardware Installation

3.1 Mechanical Dimensions

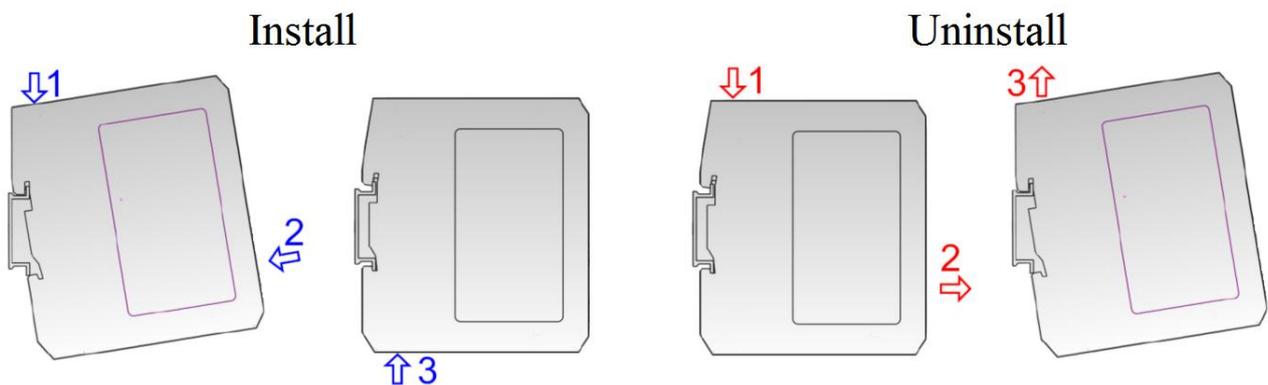
Size (width * height * depth):

1.0 in * 4.0 in * 3.6 in (25 mm * 100 mm * 90 mm)



3.2 Installation Method

Using 35mm DIN RAIL.



4 Quick Start Guide

4.1 Hardware Connection

1. According to the instructions of the RJ-45 port in Chapter 2, correctly connect the corresponding wiring of each pin of the RJ-45.
2. According to the instructions of the DeviceNet port in Chapter 2, connect the wiring correctly, and note that it is not suitable to power on at this time.
3. Check whether the wiring conforms to the instructions of the manual.
4. Power on the module and it will enter the running state.

4.2 Communication Debugging

1. The default configuration of GT200-MT-DN is DeviceNet scanner mode, the DIP switches are all OFF, and the default IP address is 192.168.0.X. Users can change the operating mode according to the actual application.
2. The gateway uses the network port connection configuration, please refer to Chapter 5 of the manual for details.
3. After the GT200-MT-DN configuration is completed, install GT200-MT-DN on the standard rail frame, power on and use.

5 SST-DNET-COM Software Instructions

5.1 Notes Before Configuration

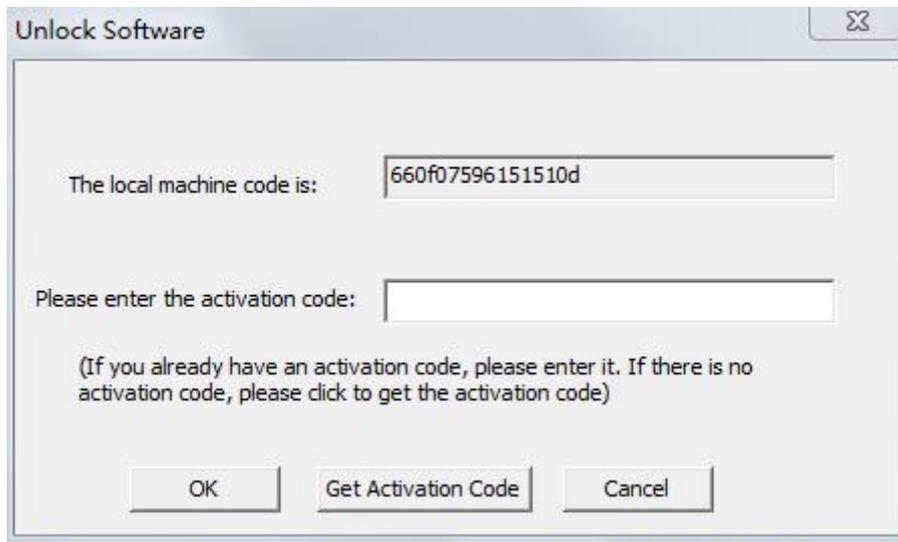
When the DIP of GT200-MT-DN is "1ON 2OFF", the gateway is in operation mode, and the I/O parameters of the adapter devices on the DeviceNet network can be configured through SST-DNET-COM software.

DeviceNet network configuration software SST-DNET-COM is developed by SST Automation. It needs to be used with SSTCOMM's GT200-MT-DN or other DeviceNet scanner modules.

The following introduction is aimed at helping you get quickly started for using our gateway. More details about using software, please refer to "Help"->"Content" in the SST-DNET-COM software.

5.2 Software Main Interface

For the first time to use the SST-DNET-COM software, it requires activation code.



Click "Get Activation Code" and it will jump to sstautomation.com for activation.

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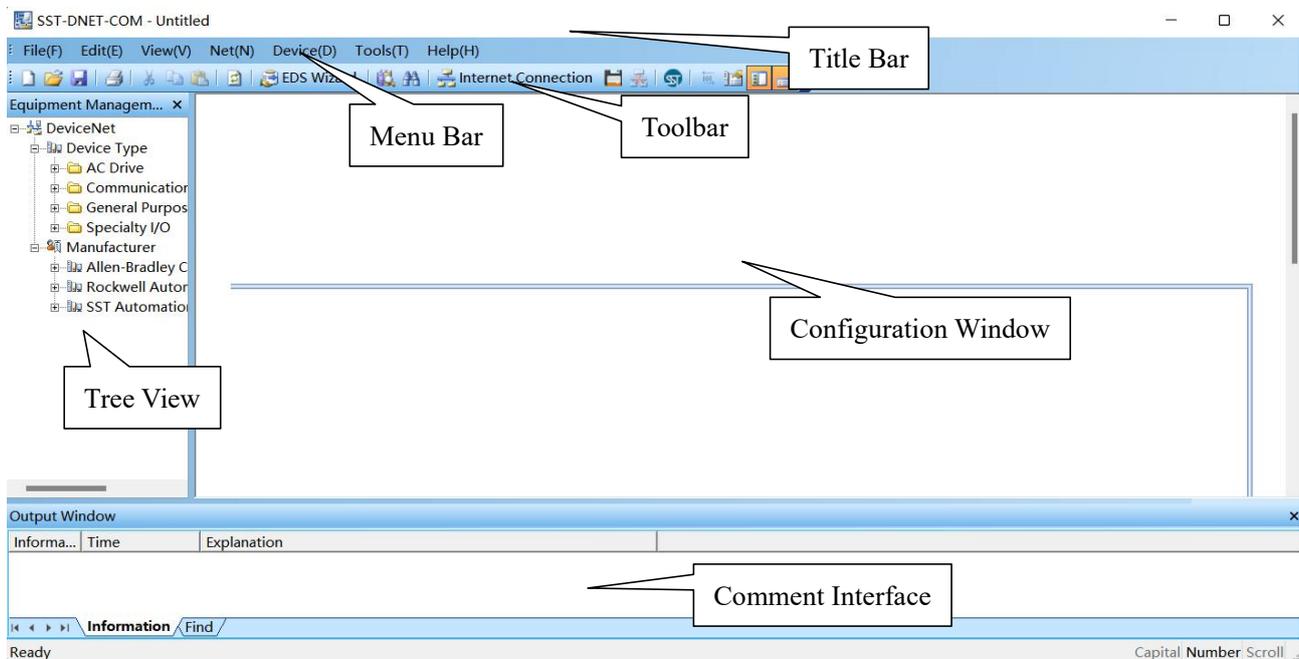
products

Your activation code: ██████████

Thanks using SSTCOMM's software!
Now you can:

Fill the activation code to activation interface of the software.
After activating, you can operate all the function of the software.

You can access SST-DNET-COM software after entering correct activation code.



Configuration window: After establishing the internet connection, display the online device and modify the address and parameters of the device online, check the input and output data. In the offline state, you can view device properties by dragging the device icon to the window.

Tree View: Displays registered DeviceNet devices in different ways: device type, manufacture. Under different manufacturers, different devices are displayed separately according to the device type.

Comment Interface: Dynamic display of network scanning information, registered device information, delete device information, etc. display the results of "find devices", "find next".

5.3 Toolbar

Toolbar is shown as below:

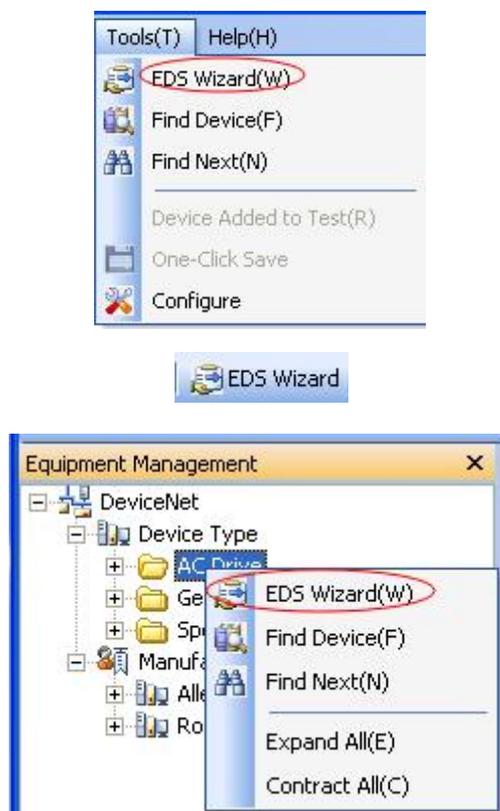


Functions separately from left to right are: New, Open, Save, Print, Cut, Copy, Paste, Refresh viewport, EDS Wizard, Find devices in the device library, find next, Internet Connection, One-Click Save, Disconnect, Configure, Send Explicit Message, Property, Device Management, Output.

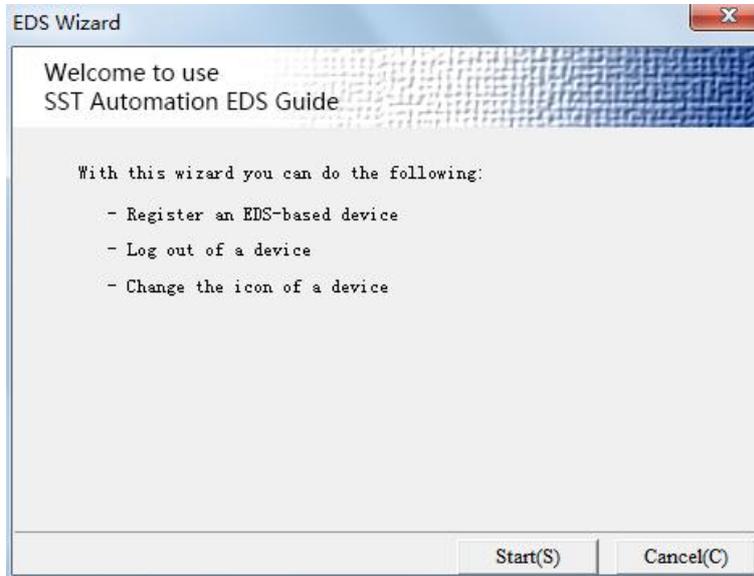
5.4 DeviceNet Device Network Configuration

➤ EDS Registration Wizard

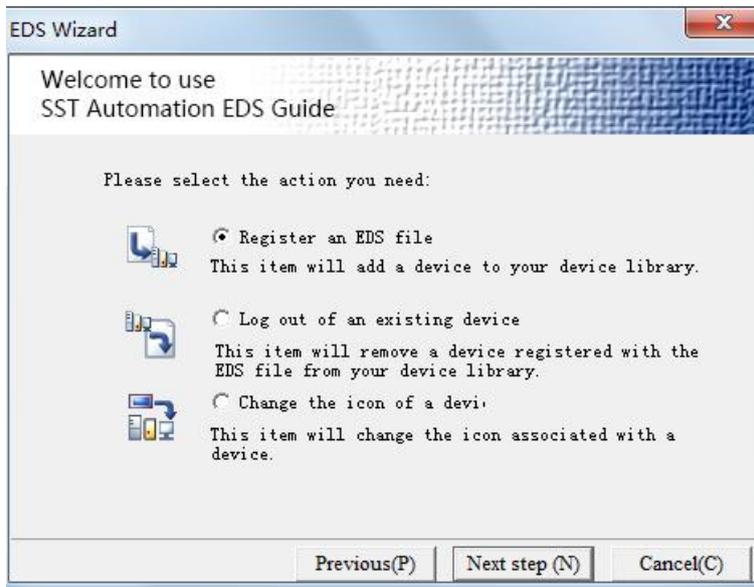
Users can configure different DeviceNet devices by registering new EDS files. Register the new EDS file, select "Tools" -> "EDS wizard", or click "EDS wizard" button in the toolbar. Or directly click the right button in the Equipment management window and select "EDS wizard" which will pop up the EDS wizard interface. The three ways are as follows:



EDS wizard interface is shown in the following figure:



Select "Start "and pop up the following interface:

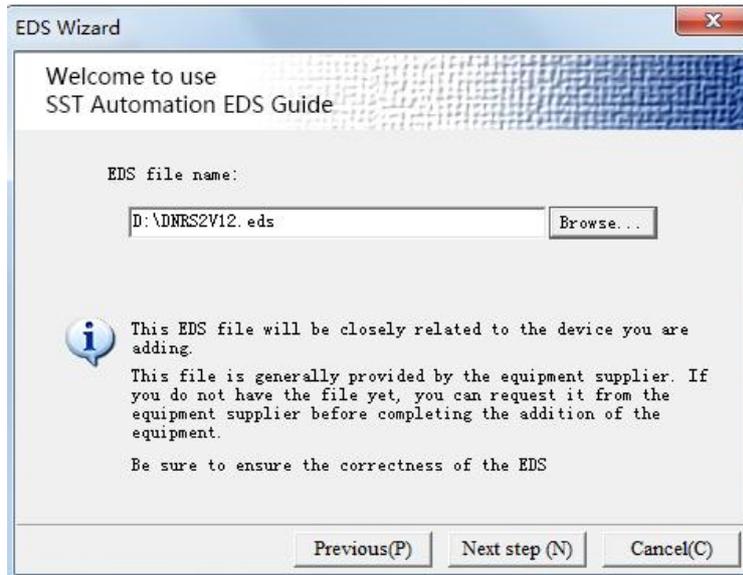


In this interface, users can choose to register an EDS file, log out of an existing device, and change the icon of a device.

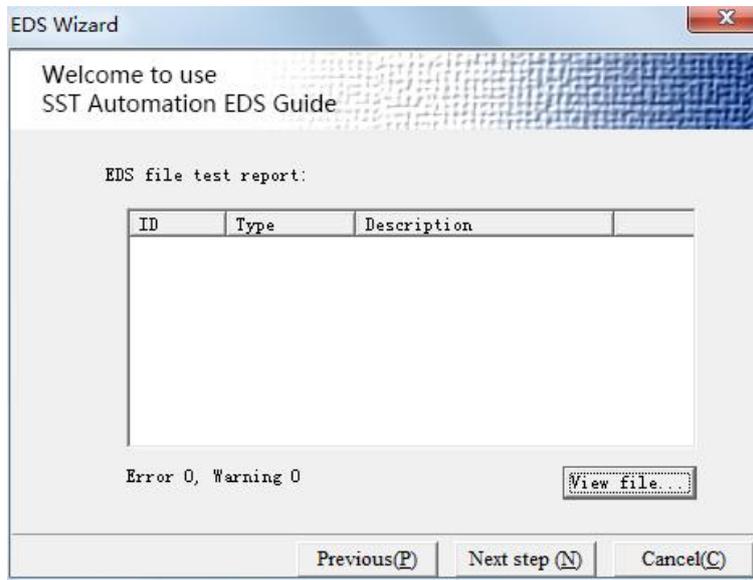
Take "Register an EDS file" as an example to introduce the following steps for registering a new EDS file:

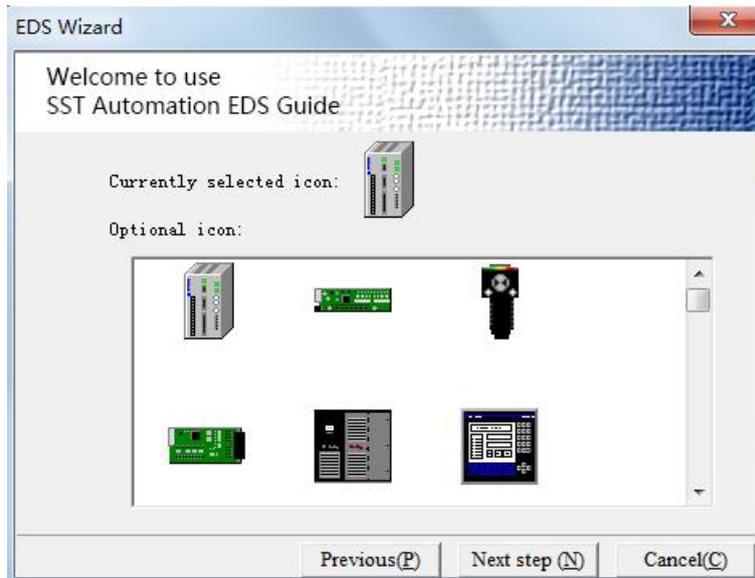
After selecting "Register an EDS file", click "Next step" and select the storage path of EDS file you want to register in the pop-up interface, as shown in the figure below:

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Click "Next step" to pop up the EDS file test report interface. If there is an error in the EDS file, the error message will be displayed in the interface, and there is no "Next step" operation. If there is no error in the file, continue the "Next step" operation, pop-up selection device icon interface as follows:





After selecting a device icon, click "next step" to pop up the factory information of the registered device, as shown in the figure below:



Click "Finish" and the EDS file registration step is over. At this time, you can see the newly registered device in the equipment Management Window.

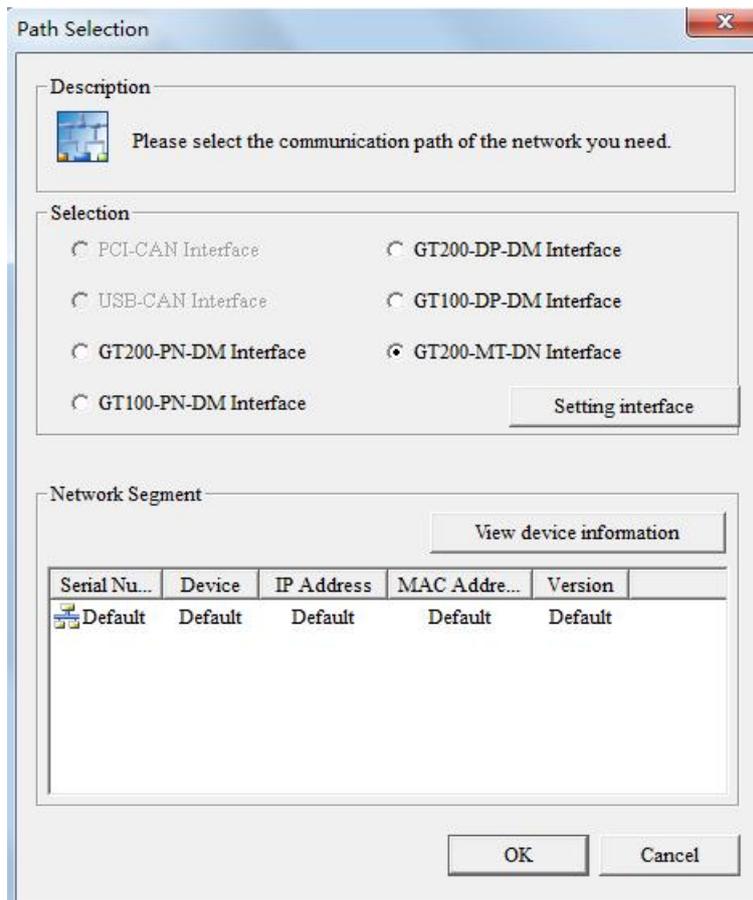
If you want to change EDS file for the same device, please first find the device in the device management library and right click. After logging out, re-register the new EDS file, or complete the logout operation through the EDS operation.

➤ PC-DeviceNet Interface Setting

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SST-DNET-COM software needs to be used together with the DeviceNet scanner module. First, connect GT200-MT-DN to Ethernet, and then connect GT200-MT-DN's DeviceNet port and user's DeviceNet device to the DeviceNet network. Power Supply of GT200-MT-DN is 24VDC.

Power on After correctly Connecting to Power Supply, the connection of DeviceNet network can be established by "Internet Connection" in the menu bar or toolbar. Click "Internet Connection" and pop up the path selection interface:

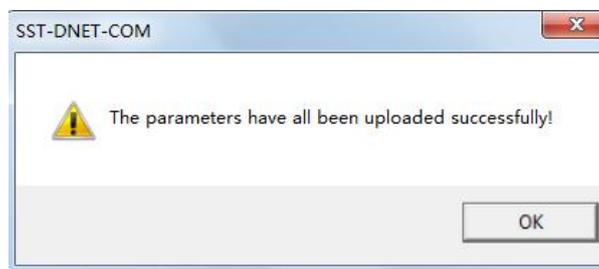
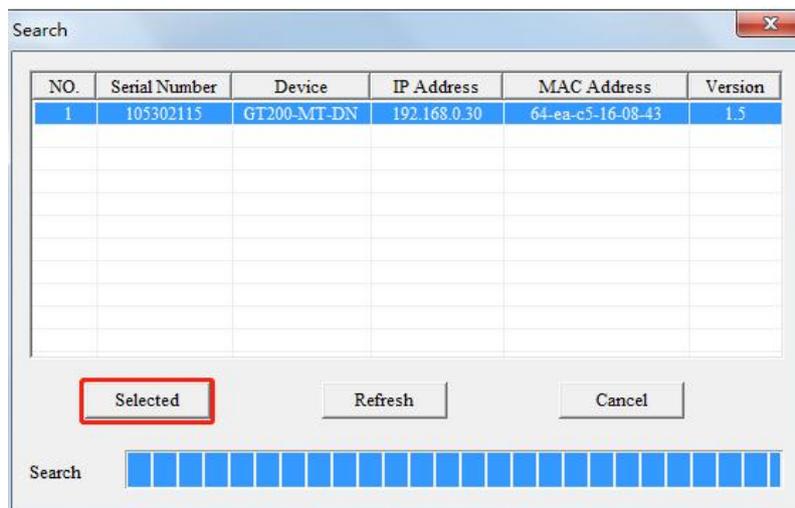
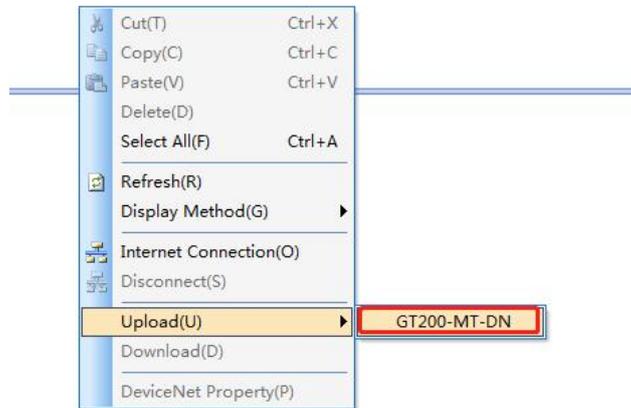


Then click the interface setting, the software will display the searched device in the list, select the scanner station to be configured for the interface setting:

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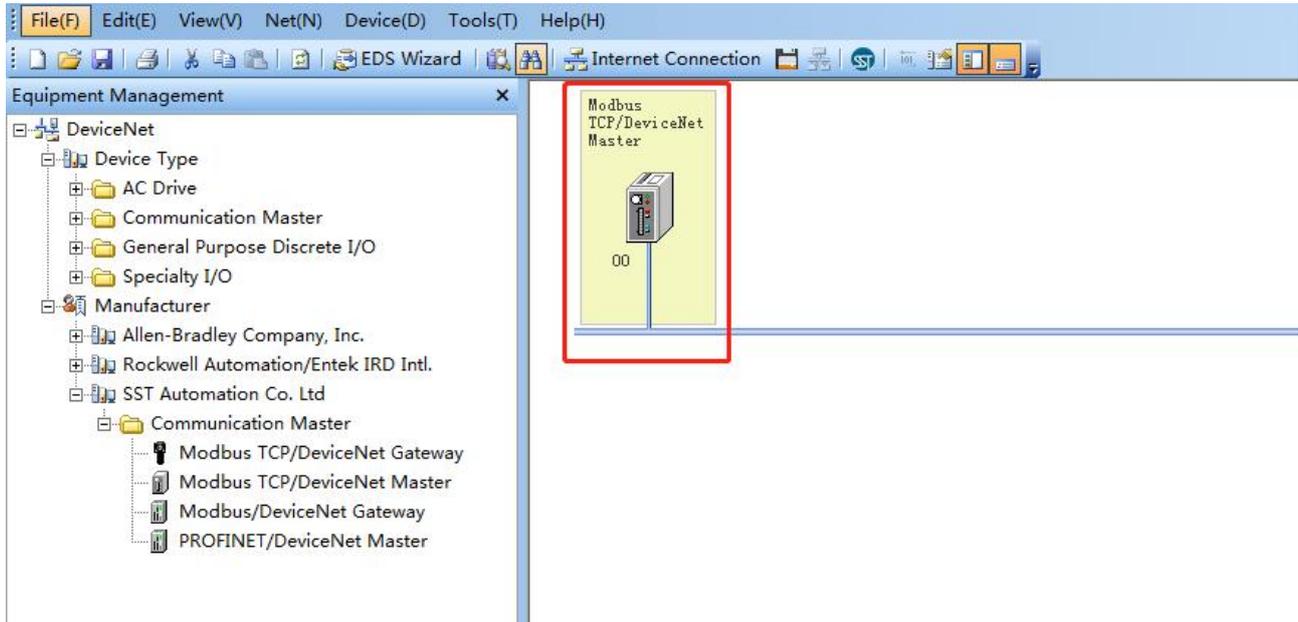
At default, the GT200-MT-DN act as a DeviceNet adapter mode. Please change to the scanner mode if you want to use it as a DeviceNet scanner mode.

Firstly, upload the gateway by right clicking the blank area.



Double click the module,

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Choose DeviceNet Parameters, click DeviceNet Slave.



Uncheck the box, and click OK, then click Download button.

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DeviceNet M/S

Polled

Input: 48 Bytes

Output: 64 Bytes

DeviceNet Slave Mod

OK

Cancel

COS

Input: Bytes

Output: Bytes

Slave Parameters

BaudRate: 125k

Address: 0

Choose the gateway shown, click Selected.

Search

NO.	Serial Number	Device	IP Address	MAC Address	Version
1	105302115	GT200-MT-DN	192.168.0.30	64-ea-c5-16-08-43	1.5

Selected Refresh Cancel

Search

SST-DNET-COM

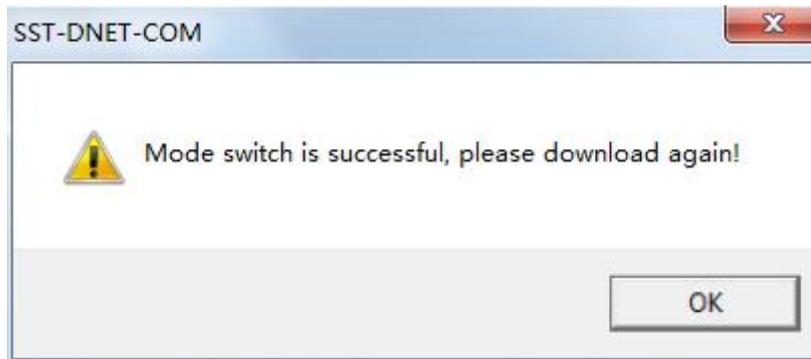
Do you want to download the current configuration?

SST-DNET-COM

The current device is the DeviceNet slave, which is inconsistent with the DeviceNet master mode to be downloaded. Whether to switch the device to the DeviceNet master mode?

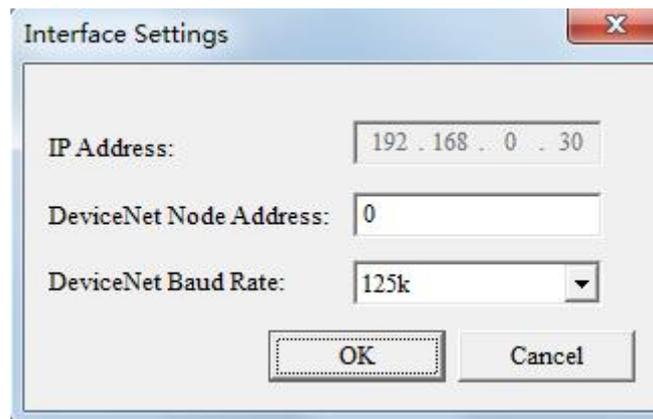
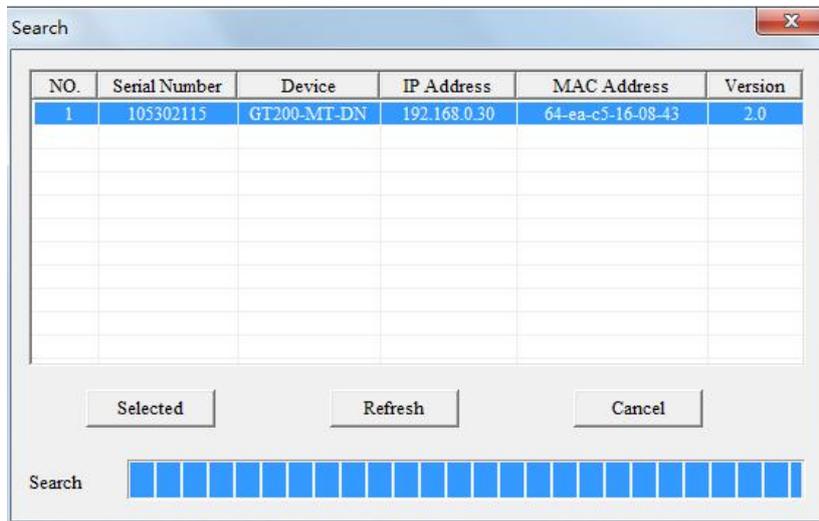
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Then the gateway will enter DeviceNet scanner mode.

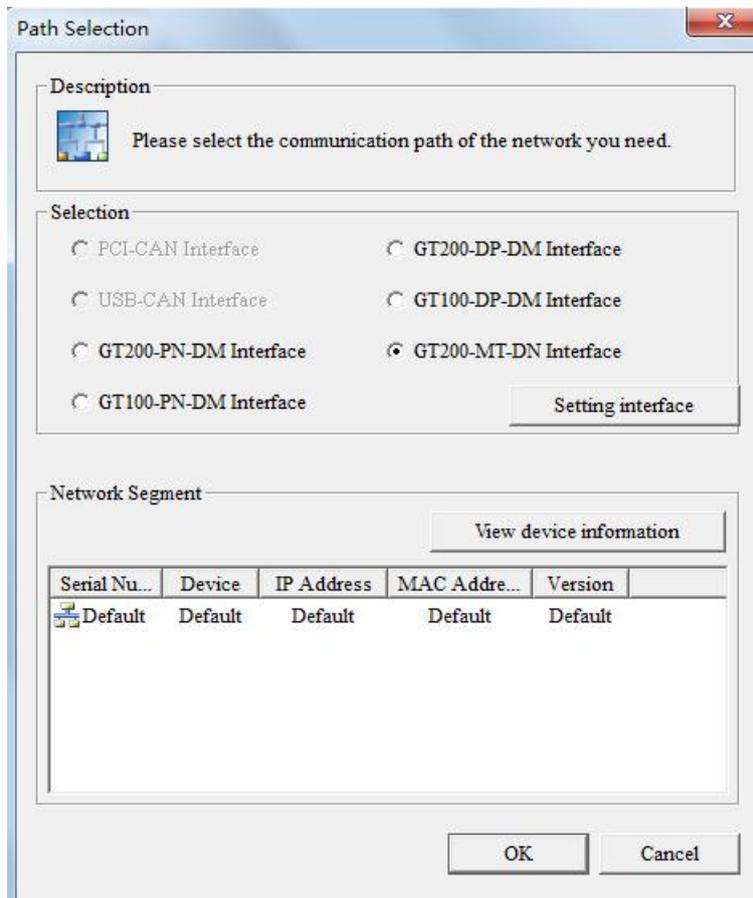
And re-upload the gateway, it will show the Version 2.0 which means the gateway is in the DeviceNet scanner mode.



Notes: the interface settings configuration, "IP address" is the IP of the device selected at the time of search. "DeviceNet Node Address" is the Address of DeviceNet Scanner Module. Set any value between 0 and 63, which can't conflict with other node addresses on the bus. "DeviceNet baud rate" is the baud rate of DeviceNet scanner module, 125K, 250K, 500K optional. Keep Bus Baud Rate Consistent.

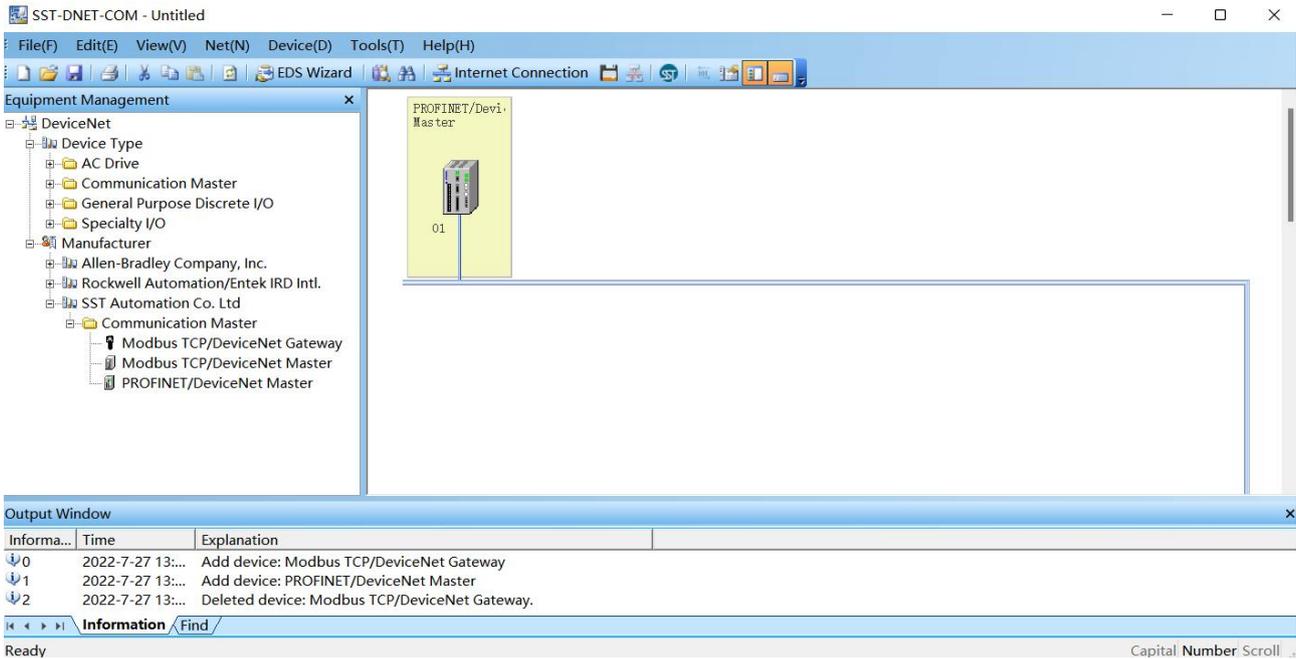
5.5 DeviceNet Network Scanning

After the interface is set up, the network scanning interface pops up:

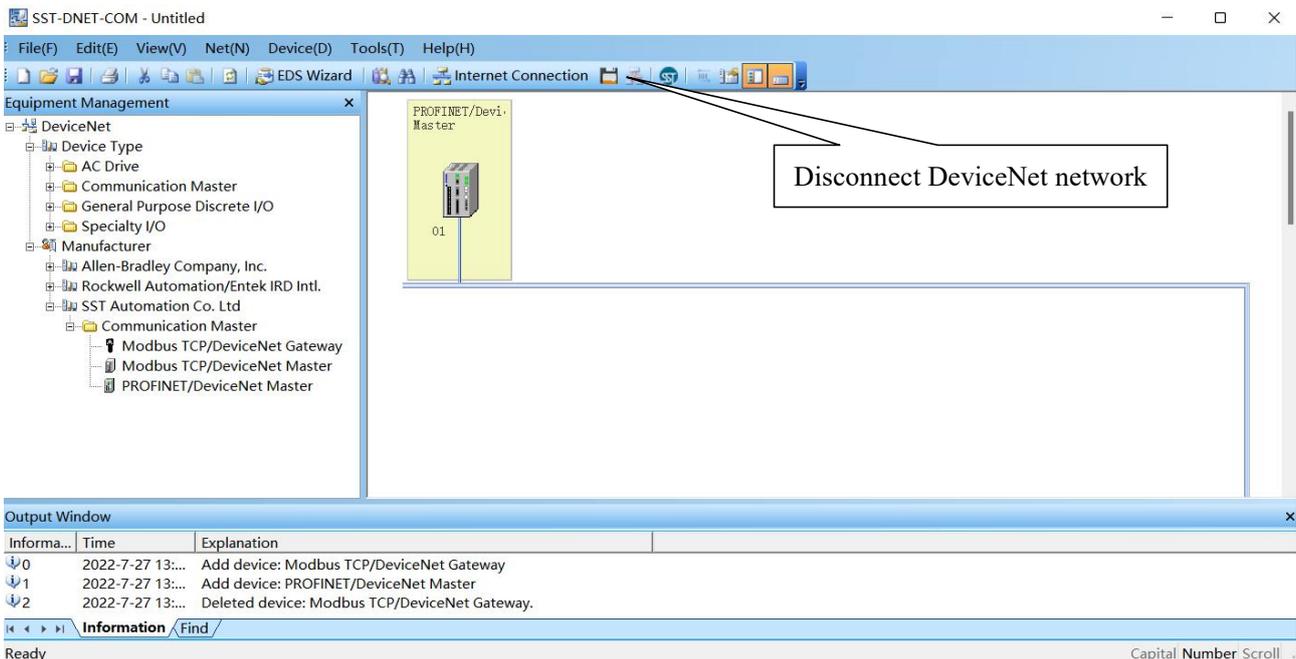


The scanned device is displayed in the main window, as shown in the figure below:

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After the DeviceNet network is connected, the user can "Disconnect the network" through the toolbar button, as shown in the figure below:

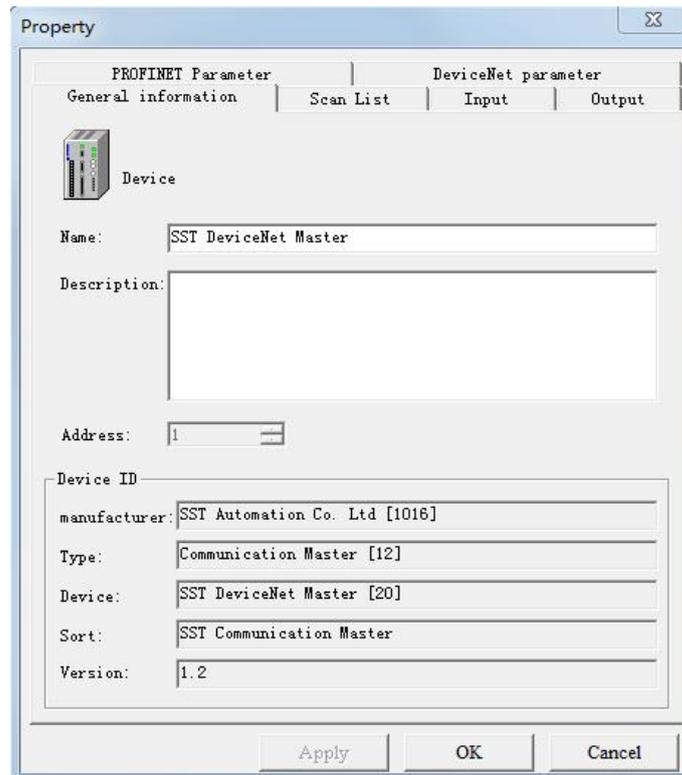


5.6 Equipment Parameter Modification and I/O Data Test

Double-click the scanned network node and appear the device property page.

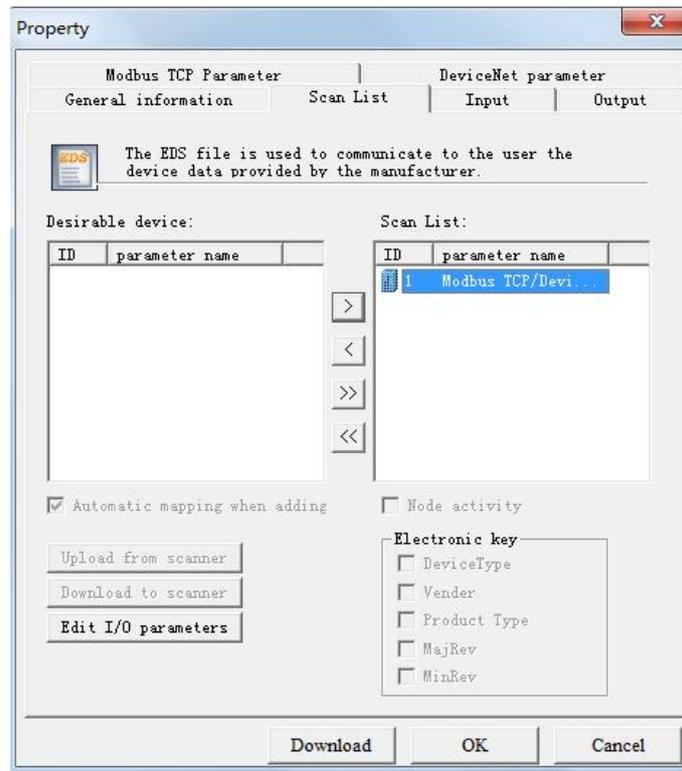
5.6.1 DeviceNet Scanner Module (Some functions are not opened yet)

In "General information" options Interface, DeviceNet scanner module address cannot be modified here. It can only be modified in the interface settings, as specified in Chapter 5.5 of this manual, "Device ID" displays the information of the device manufacturer, type, device, sort and version. If you choose to configure GT200-MT-DN, after setting all the parameters, you can click the "Apply" button to download.

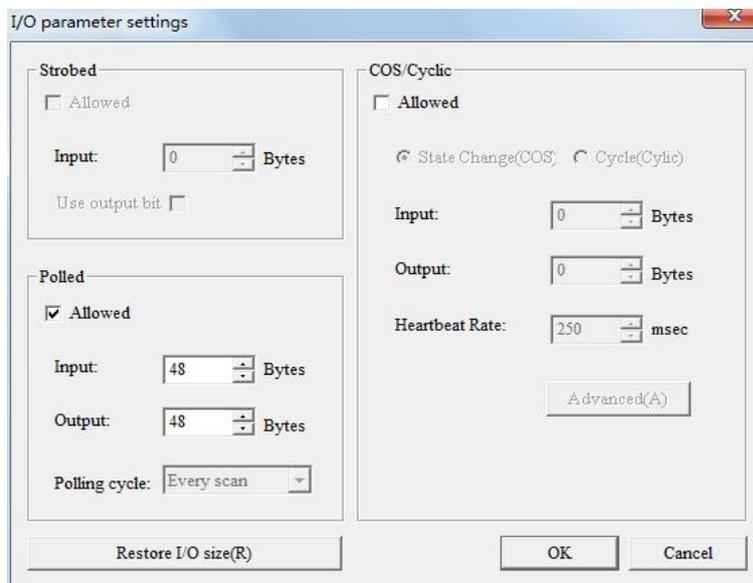


In the "Scan List" option interface, users can select devices to add to the "Scan List" of the scanner and set its I/O parameters:

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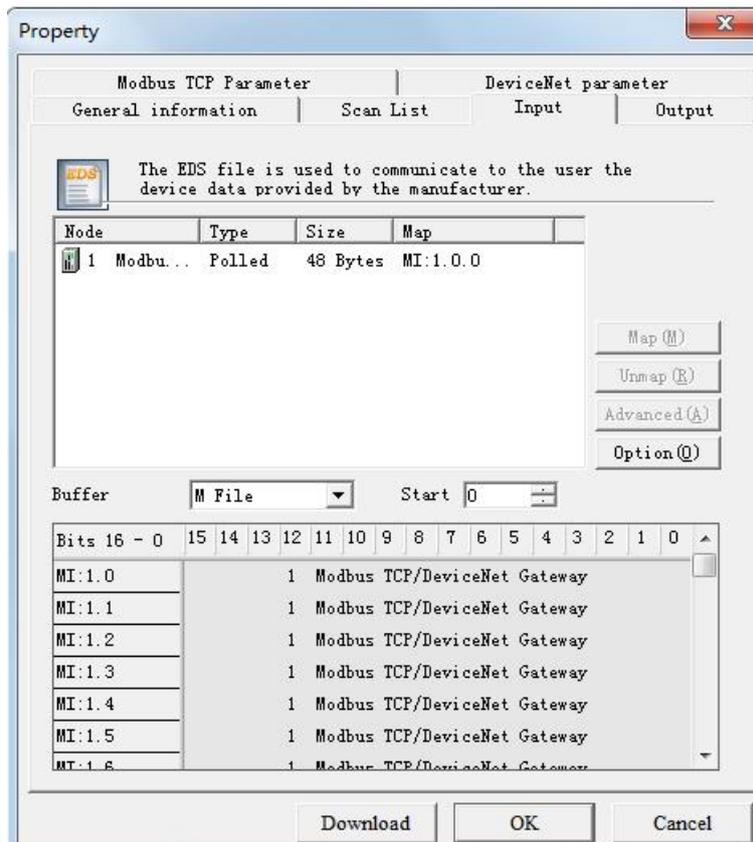
Add adapter station 9 to the scanner station mapping list, and then select adapter station 9 in the "Scan List". After selecting it, click "Edit I / O parameters". This interface sets the number of input and output bytes of the adapter:



Notes: If the I/O parameters of the node have been saved in GT200-MT-DN, the scanned I/O parameters are the saved I/O parameters. if the I/O parameters of the node have not been saved in GT200-MT-DN, this I/O parameter is the default value, and users can configure it according to the actual I/O parameters.

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In the "input", "output" options interface, The user can map the address of the device added to the scanner and select automatic mapping. In the figure below, the "start" edit box parameter is the starting address of the automatic mapping. The automatic mapping will start with the address set here, where one unit is two bytes, that is, when the "Start" edit box parameter is "1", the automatic mapping will start with the third byte.



If users need to map manually, they can also click the "Advanced" button to set the starting address in the dialog box shown below.

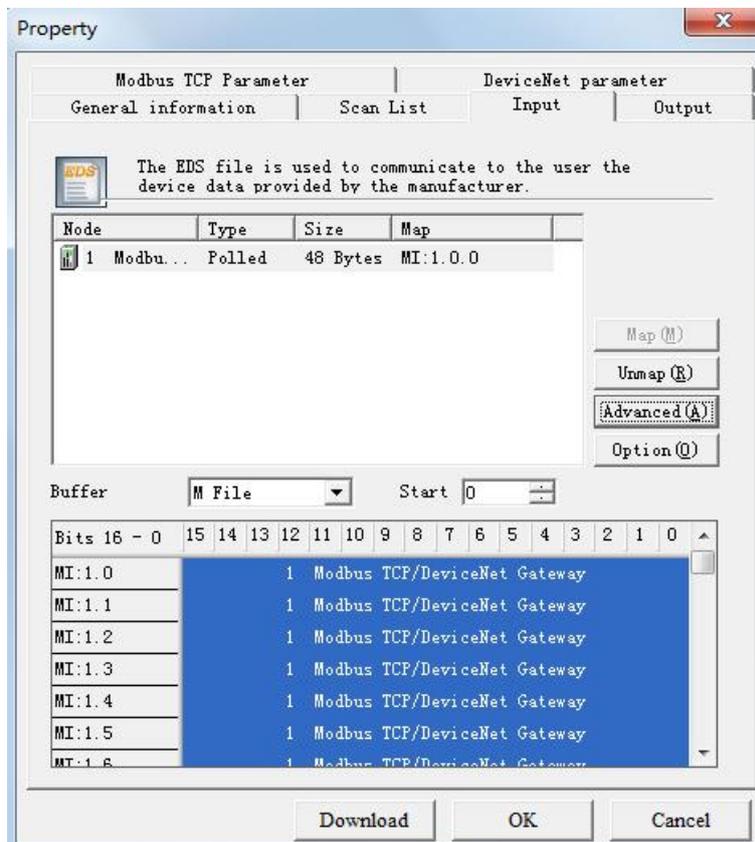
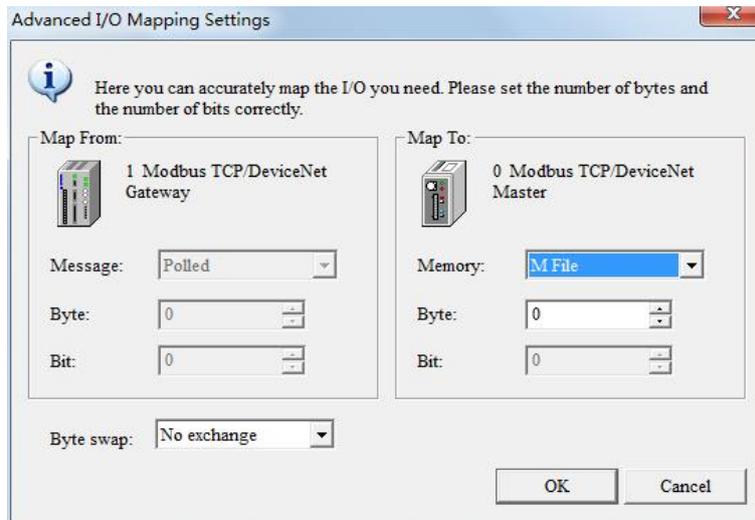
In the advanced Settings interface, the user can also set the byte exchange mode of this adapter device. There are three types of byte exchange: no-exchange, two-byte exchange, and four-byte exchange. The meanings are as follows:

no-exchange: data transfer normally

Two-byte exchange: Two-byte exchange in the same register, for example, the result after 1234 swapping is 3412

Four-byte exchange: Four-byte exchange in two registers, for example, after 12, 34, 56, 78 swap, the result is 78, 56, 34, 12

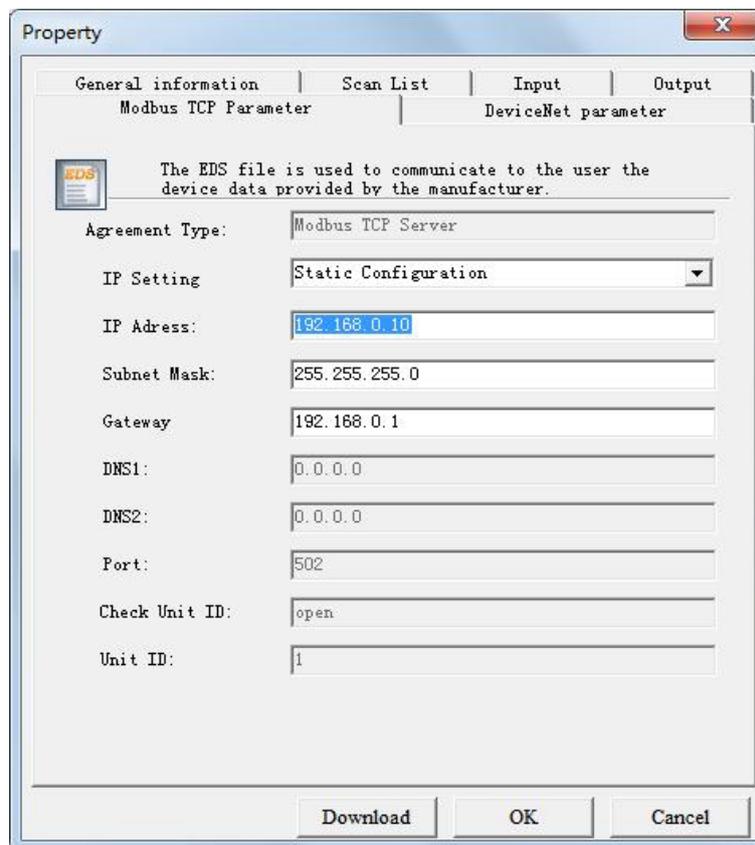
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If you need to set the unit that maps the starting address in "advanced I/O mapping Settings", click "option" button to set it. As shown in the figure below, "Byte Align" means in one byte and "Word Align" means in two bytes:

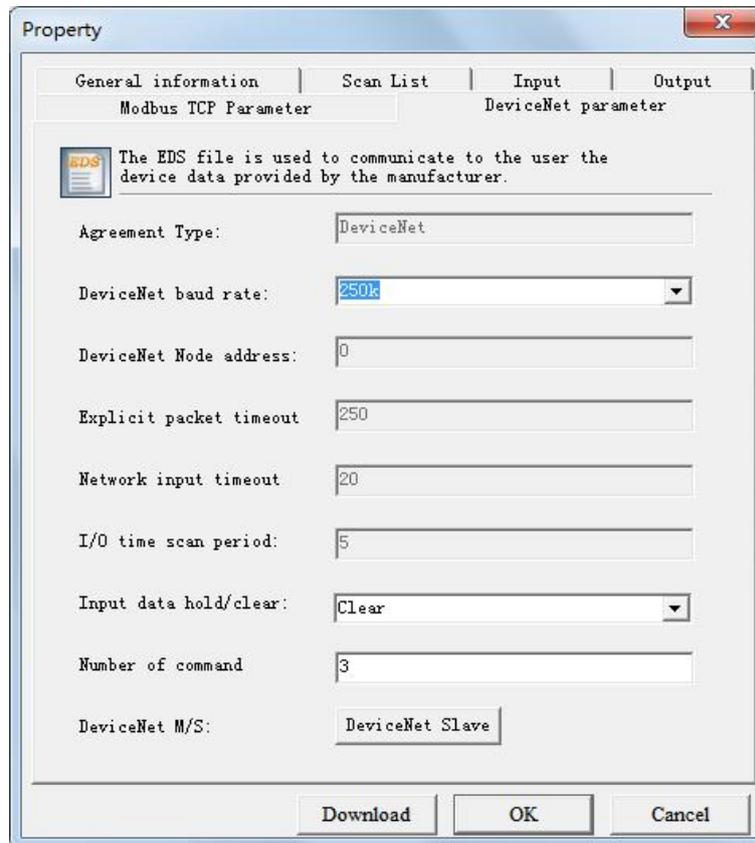


In the "Modbus TCP parameter " interface, if the users want to set the Modbus TCP parameters of GT200-MT-DN, it needs to be set in offline mode. Modbus TCP parameters cannot be modified in the online mode.



In the "DeviceNet parameter" interface, users can set DeviceNet parameters. "Input Data Hold/clear" means whether the corresponding DeviceNet input data is cleared when the number of DeviceNet command response errors reaches the number of DeviceNet command retransmissions. Select "clear", DeviceNet input data is cleared, select "hold", DeviceNet input data keep the correct data received last time. "Number of command resends" means that when DeviceNet command responds incorrectly, the number of the command Resends ranges from 2 to 254

and the default value is 3.

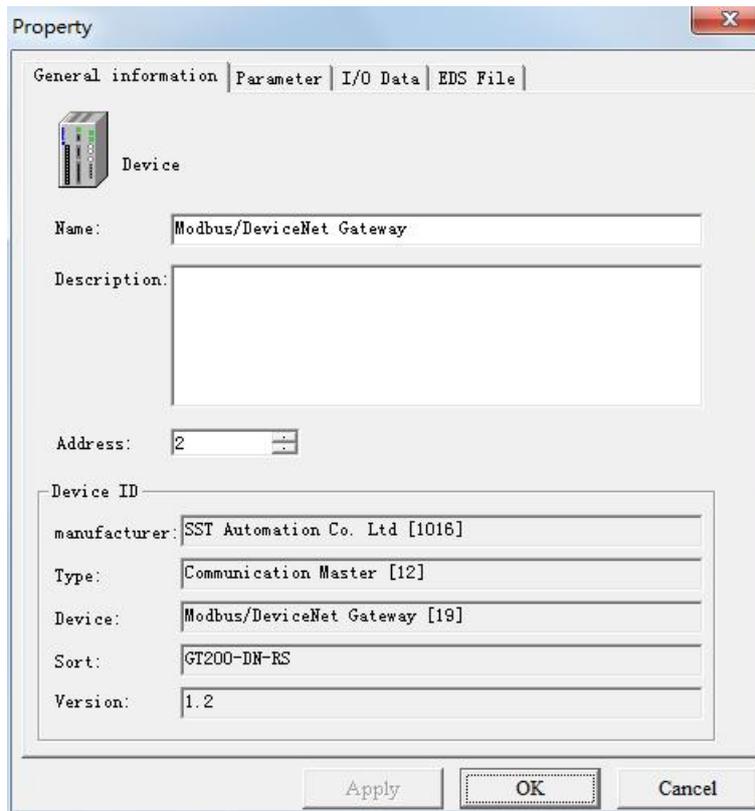


5.6.2 DeviceNet Adapter Module

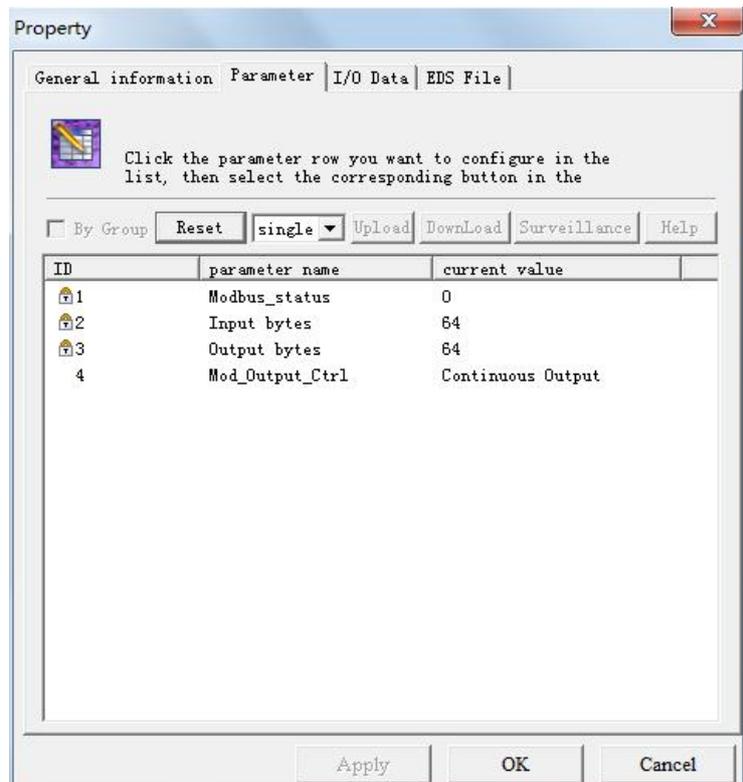
As shown in the figure below, in the "General" option interface, you can modify the address. "Device ID" shows the information of the device manufacturer, type, device, sort and version.

Notes: The adapter node address can be modified. When modifying, make sure that the adapter node has disconnected from the DeviceNet network.

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The parameter interface is shown in the figure below. In this interface, the user can upload and download the parameters of the device to facilitate online modification of the device parameter values.



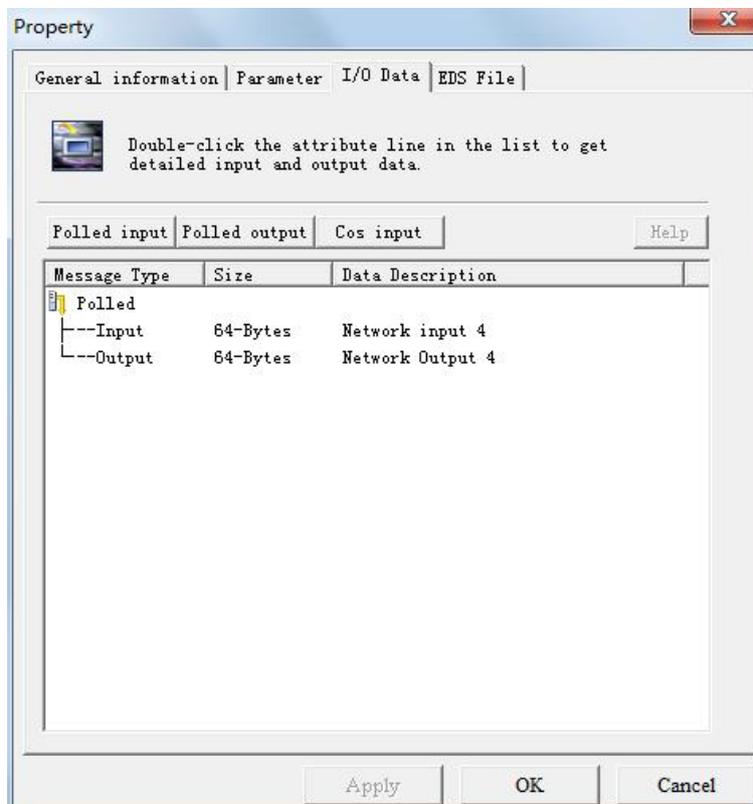
The "Reset" button can restore the default value of the parameters, and can only "Reset" for a single parameter.

The "Upload" button supports single and full parameter operation. After clicking "Upload", the interface will display the actual parameter value of the current online adapter DeviceNet device.

The "DownLoad" button only supports single parameter operation, through which the parameters of online devices can be modified. Whether the parameters support the "Download" operation can be seen from the "ID" number of the interface. If there is an  icon before the ID, the parameter cannot be modified online by the configuration software. Whether the parameters support online modification is determined by the EDS file that is registered.

The display of the property interface also includes: parameter ID, parameter name and the current value of the parameter, SST-DNET-COM software supports relevant linear operations on parameters defined in EDS files, The current value shows the result of the operation, and the user can set the relevant operation factor as required.

The I/O data interface is shown in the figure below. After the DeviceNet network device is connected, the byte length of network output and network input is determined. How does the user know the length of the input and output? You can learn from EDS.



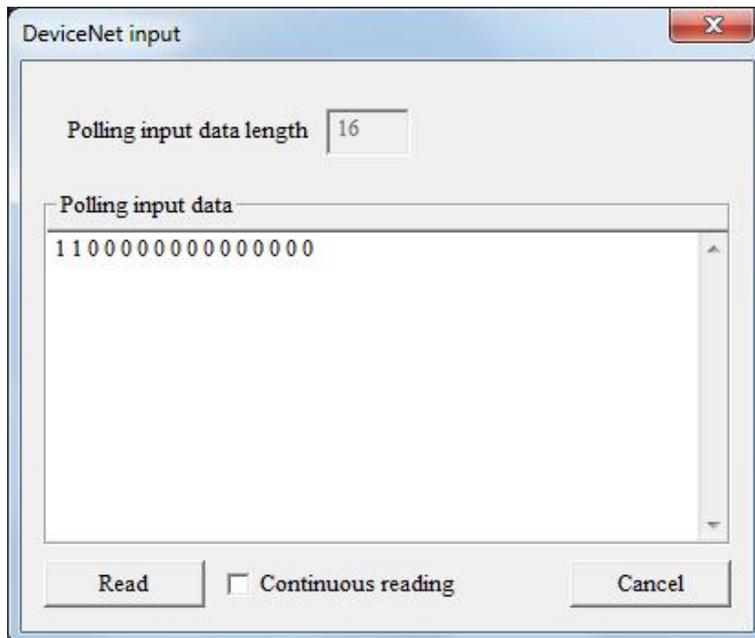
The number of bytes in/out of SST-DNET-COM software can also provide this information.

In the figure above, the input and Output 64-Bytes bytes provided under the "Polled" project are the default input and output data byte lengths.

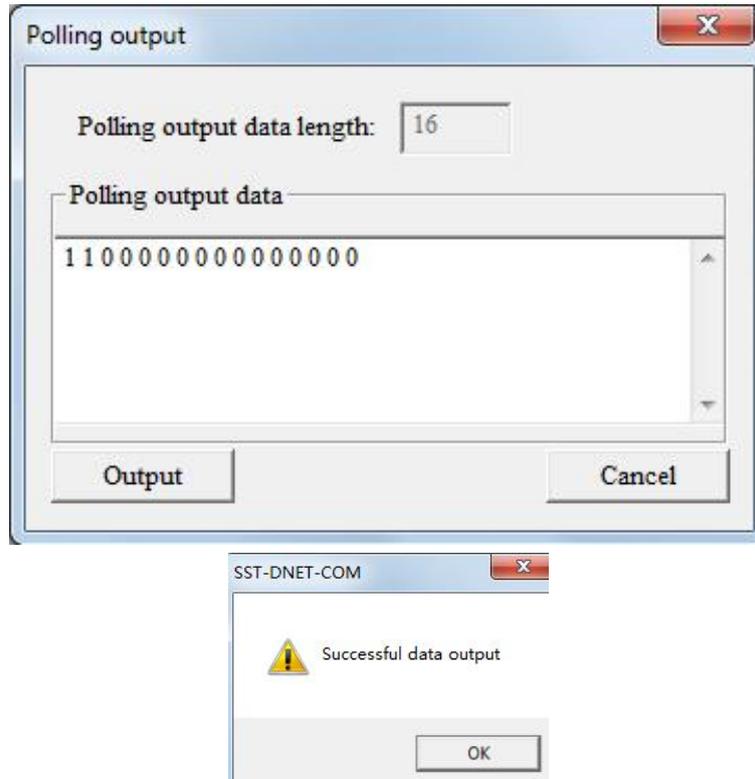
The maximum number of input bytes supported by SST-DNET-COM software is 128, and the maximum number of output bytes is 112.

Take "Polled Input" and "Polled Output" as examples:

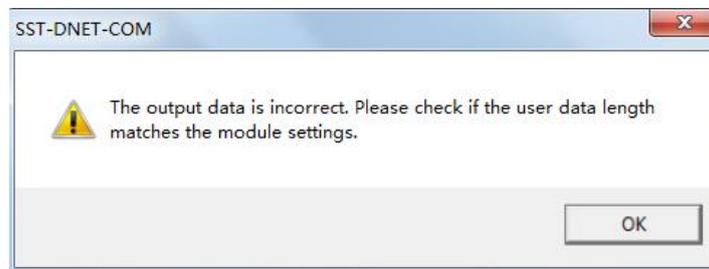
Click the "Polled Input" button, and then click the "Read" button, DeviceNet software will read the network input data. If the user selects the "Continuous reading" check box, SST-DNET-COM software will continuously read the network input data of the field DeviceNet device. As shown in the figure below:



Similarly, by clicking the "Polled Output" button, users can see the network output data dialog box. The user must type in all the output data, otherwise the output data is incomplete (the number of bytes is incorrect), and the output will not succeed.



If the output data length is incorrect, it will be displayed:

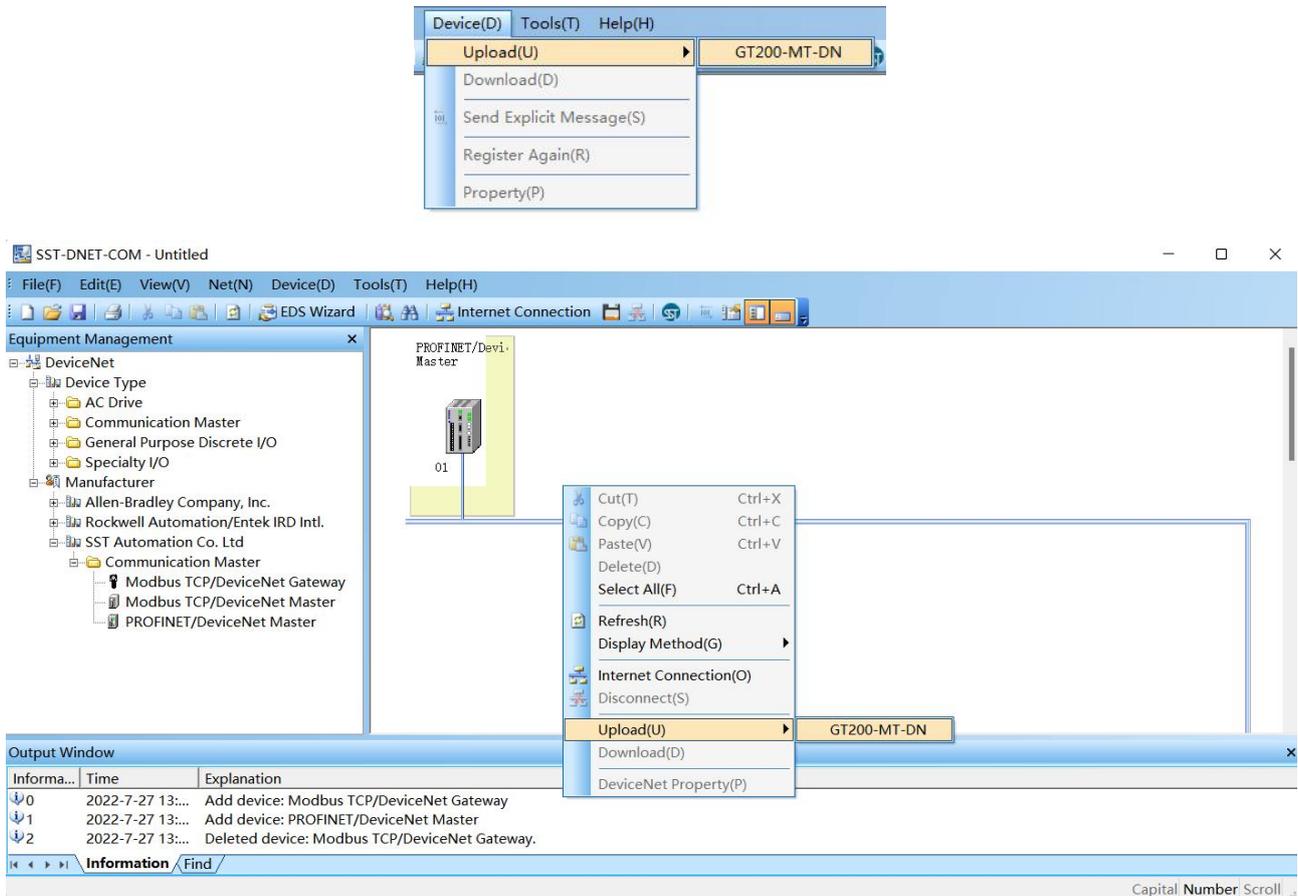


Note that after the address is changed in the general interface, because the device with the modified address will be restarted and the DeviceNet internet connection has been disconnected, at this time, the I/O data input and output operation will not be able to see the data, You need to disconnect SST-DNET-COM's "Internet Connection" and re-establish the internet connection.

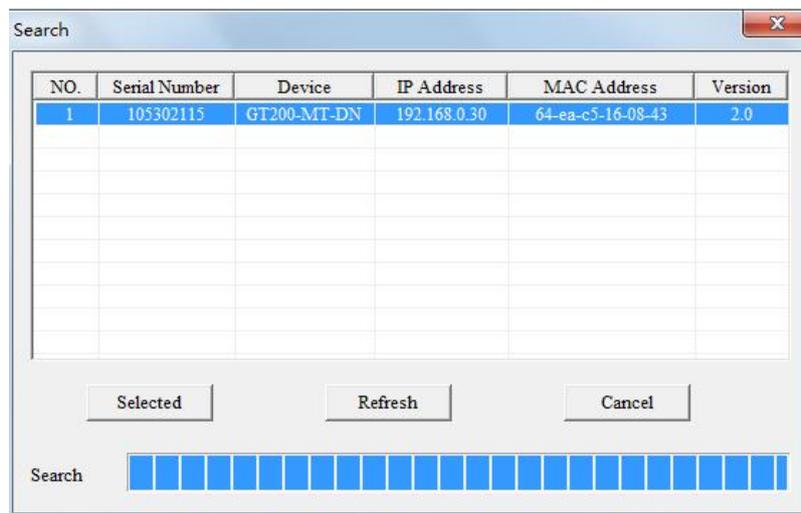
5.6.3 Offline Upload and Download Configuration

The upload device can only be used when the network connection is disconnected. After opening the software, click Device -> Upload -> GT200-MT-DN, or right click in the main window -> Upload -> GT200-MT-DN.

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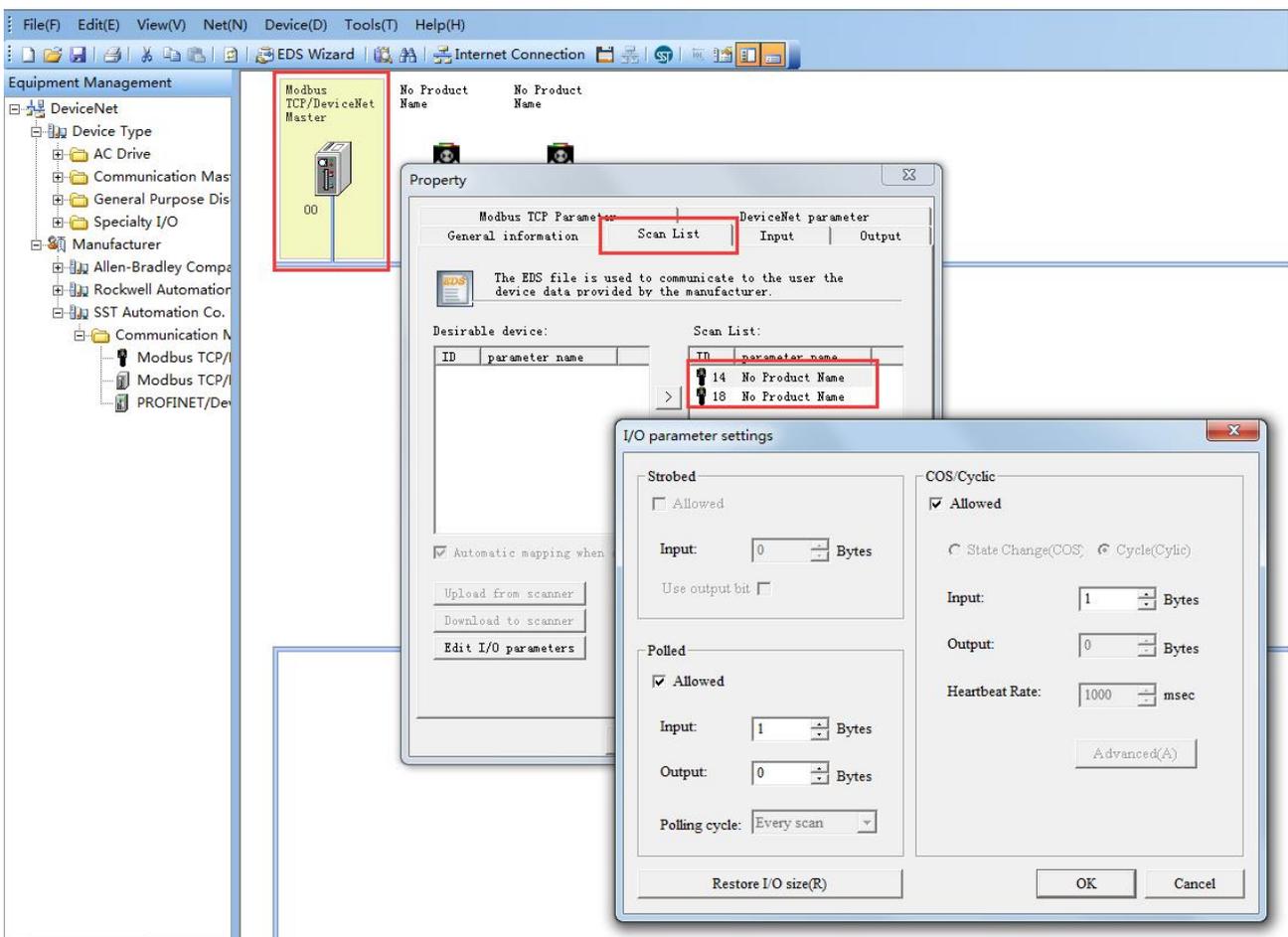
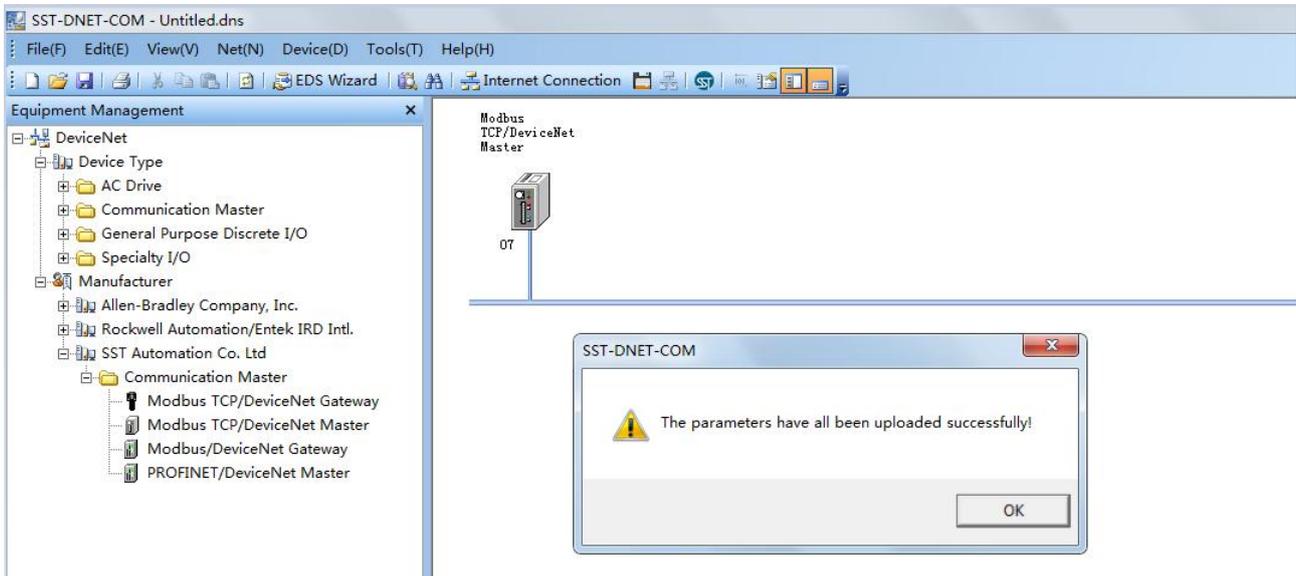
Select a device to upload:



After the upload is complete, the uploaded device is displayed in the main window and prompts that the upload is successful. Double-click the uploaded scanner device to view and modify the configuration information. The node information of the adapter can be viewed and modified in the scan list of the scanner, and the IP address of the

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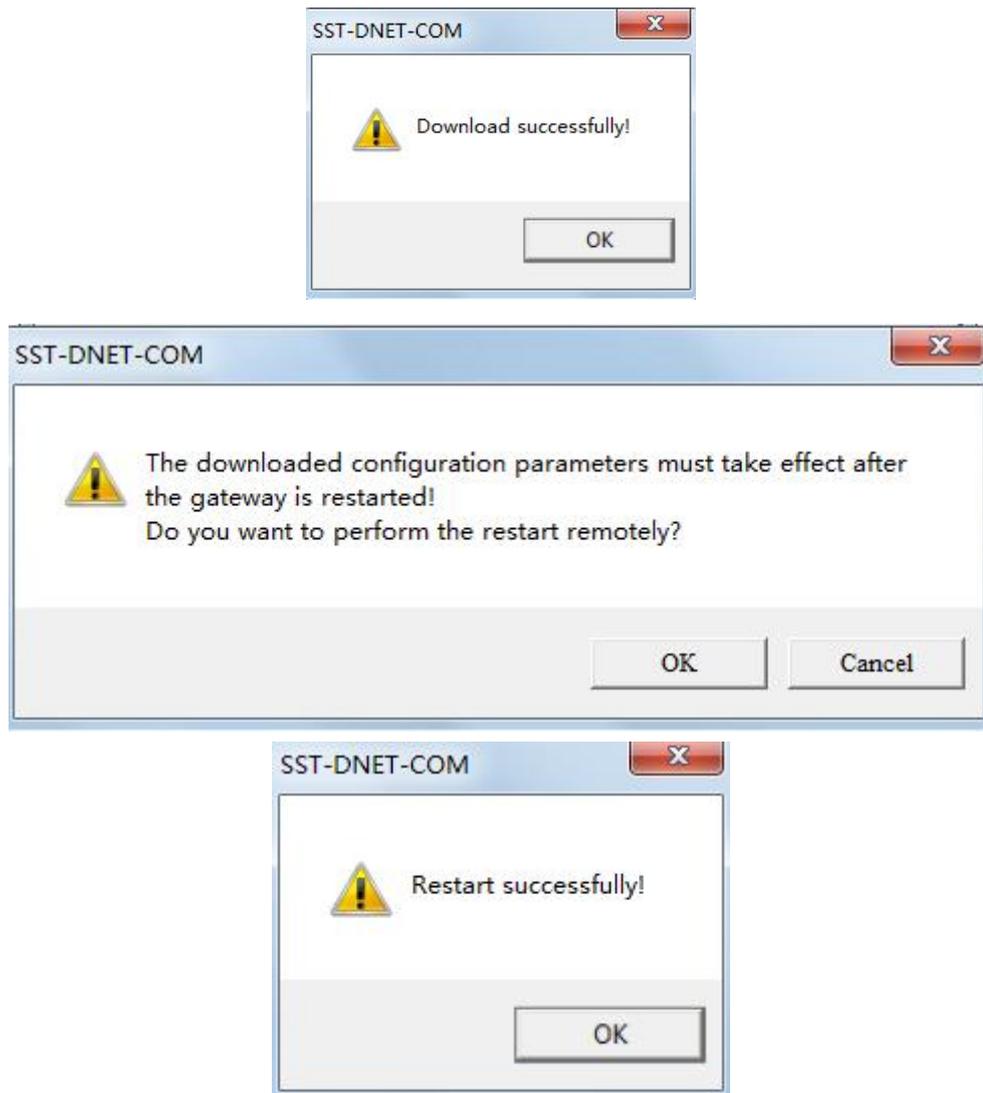
Modbus TCP can also be modified, as shown in the following figure:



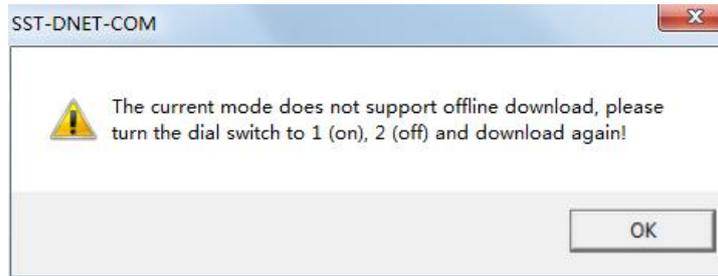
The modified configuration parameters can be downloaded to GT200-MT-DN. GT200-MT-DN as the DeviceNet

scanner station only supports Operation mode for downloading configuration parameters, and Pre-operation mode does not support downloading.

When downloading configuration in Operation mode, it prompts that the download is successful and restarts the gateway, as shown in the figure below:



When downloading the configuration in the Operation mode, it prompts that it cannot be downloaded. To download in the Operation mode, please turn the DIP to 1ON 2OFF, as shown in the figure below:

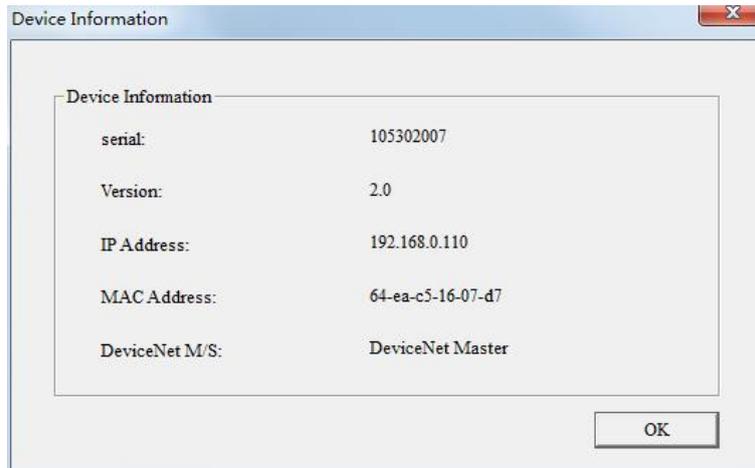


About 5s after the DIP switch is set to 1ON 2OFF, the device can download configuration. After downloading, it will prompt that the download is successful and the downloaded configuration will take effect after restarting the device, and it will prompt that the DIP switch should be set back to 1OFF 2OFF.

Note: If users open the SST-DNET-COM software, drag GT200-MT-DN from the device management window on the left to the main window, double-click the dragged device, and open the general, scan list, input, output, Modbus TCP parameters, DeviceNet parameters, etc., modify the required parameters and download.

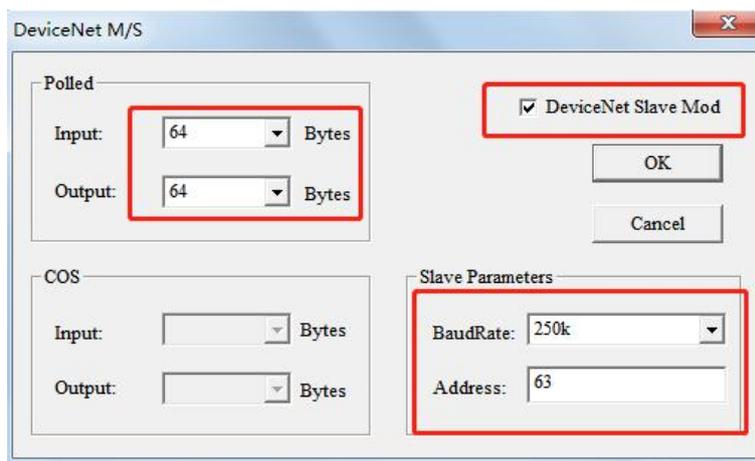
5.6.4 View Device Information

Users can check whether the current device is in scanner or adapter mode in SST-DNET-COM, click "Network Connection" -> "GT200-MT-DN" -> "View Device" -> "View".



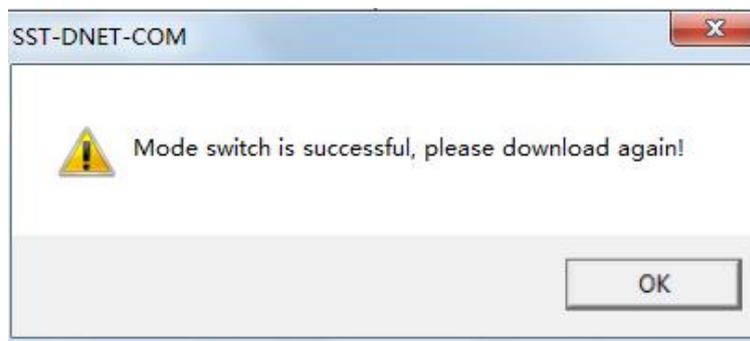
5.6.5 Switching of Working Mode

Please switch the DIP to 1ON 2OFF before switching the working mode. Open the property bar of GT200-MT-DN, click "DeviceNet Parameters" -> "DeviceNet Adapter" -> "DeviceNet Adapter Mode"(Ticking it means adapter mode, not ticking means scanner mode), then set the number of input and output bytes, baud rate and adapter address of the adapter, and click "OK "->"Download", SST-DNET-COM will prompt whether the mode does not match, whether to switch, as shown in the figure below:

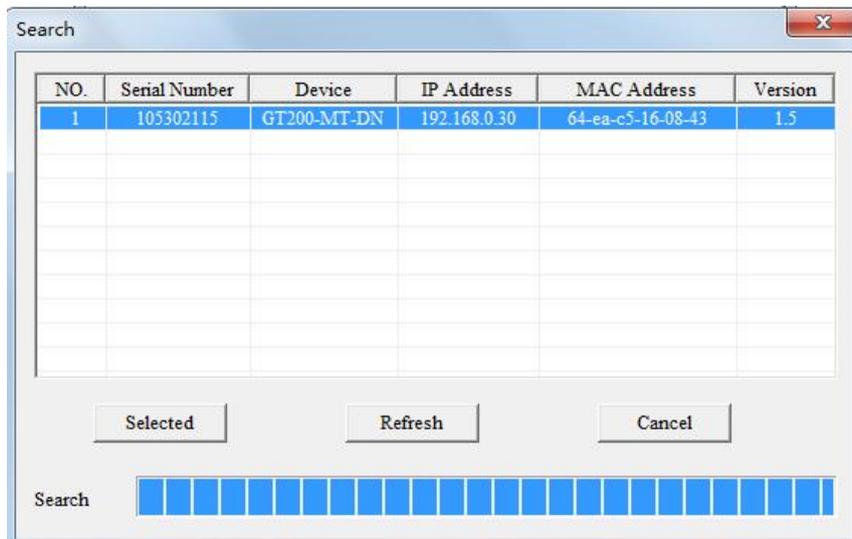




Click "OK" to switch the mode, prompting that the switch is successful, please download again, as shown in the figure below:



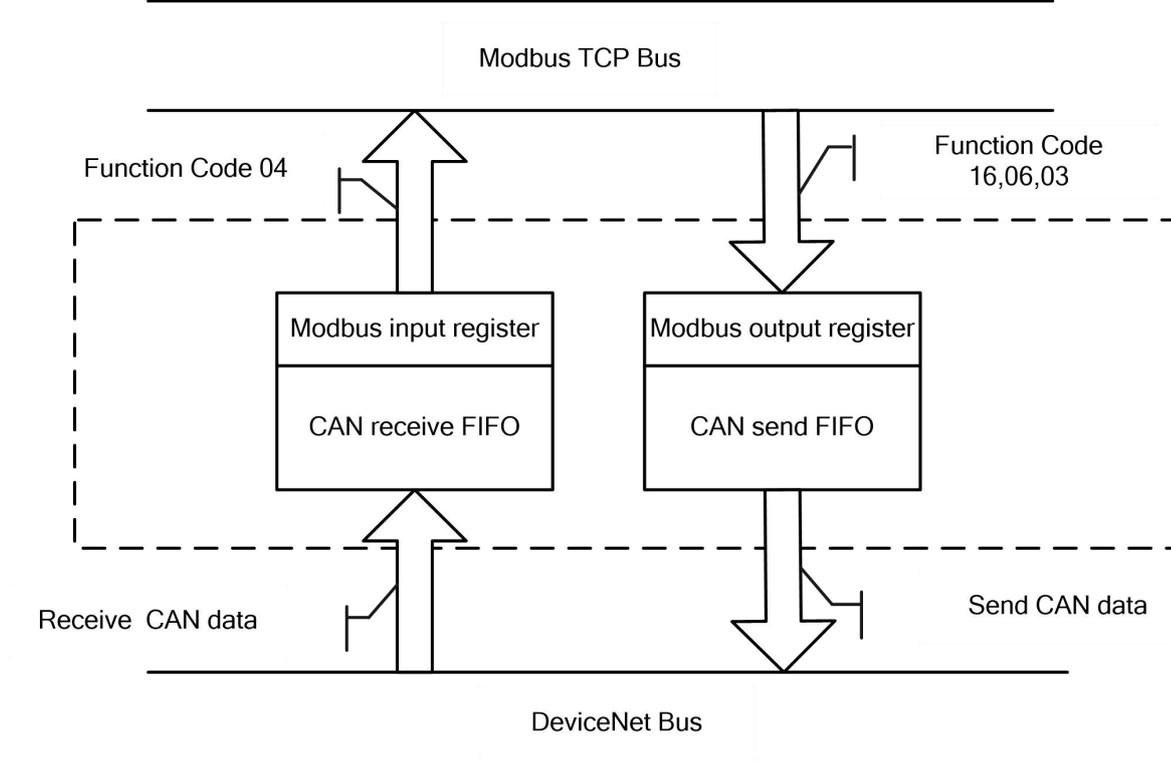
Click Apply/Download again, it prompts that the download is successful and restart.



6 Working Principle

6.1 Data Exchange

GT200-MT-DN has two data buffers, one is sending buffer. the other is receiving buffer.



6.2 Terminating Resistor

In the case of high baud rate (1M, 500k), the CAN network needs to connect a 120Ω terminal resistor at the two farthest ends of the network.

7 DeviceNet Network Configuration Instructions (DeviceNet Adapter)

7.1 I/O Configuration

The configuration instructions in AB PLC when GT200-MT-DN is used as a DeviceNet adapter.

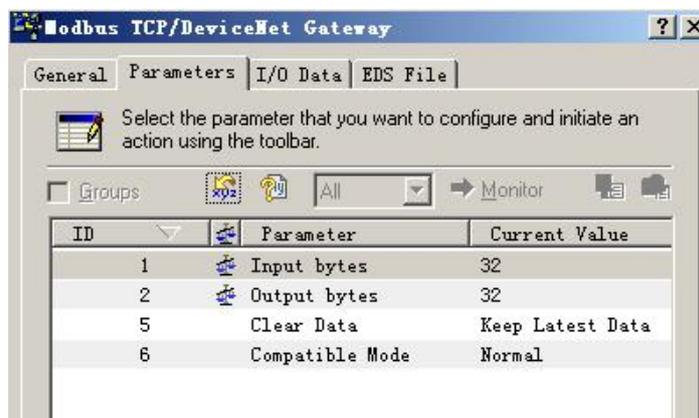
I/O input:

DeviceNet I/O input bytes can be configured as 8, 16, 32, 48, 64, 72, 96, 112, 160, 192, 224 bytes.

I/O output:

DeviceNet I/O output bytes can be configured as 8, 16, 32, 48, 64, 72, 96, 112, 160, 192, 224 bytes.

7.2 DeviceNet Parameters



Input Bytes: DeviceNet I/O connection input bytes.

Output Bytes: DeviceNet I/O connection output bytes

The above two parameters must be consistent with the configuration input/output bytes in the DeviceNet scanner scan list of configuration software such as RSNetWorx, otherwise the connection will fail.

Keep Latest Data: "Keep Latest Data" means to keep the latest updated data of the disconnected side network, and it is not cleared.