Modbus/DeviceNet Gateway
GT200-DN-RS

User Manual

V 1.5

Rev A

SST Automation

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Important Information

Warning

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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 fields, and the safety includes laws, rules, codes and standards.

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GT200-DN-RS
Modbus/DeviceNet Gateway

User Manual

Catalog

SST☉MM

1 Product Overview

1.1 Product Function

The gateway can connect multiple devices with Modbus (RS485/RS232) interface to DeviceNet network. It acts as a master at the side of Modbus network, and a slave at the side of DeviceNet network. It supports RS485 and RS232 at the serial interface.

User can config RS485 as a communication interface and RS232 as a debug interface. Or, vice versa. RS232 interface is a dedicated interface for configuration mode.

GT200-DN-RS establishes the data mapping among the Modbus parameters and DeviceNet I/O data.

1.2 Product Features

- ➢ Acts as a DeviceNet slave: Group 2 only adapter.

- ➢ Supports all the baud rate which accords with the DeviceNet protocol, and support sensing baud rate automatically function.

- ➢ Acts as a Modbus master, and support the 01, 02, 03, 04, 05, 06, 15, 16 function codes.

- ➢ The range of input-voltage is 8~30V, and the standard working voltage is 24VDC.

- ➢ Free configuration software SST-MD-CFG.

- ➢ Supports the debugging without PLC.

1.3 Technical Specification

[1] Communication rate:

- ➢ DeviceNet interface supports: 125kbit/s, 250kbit/s, and 500kbit/s, auto baudrate.

- ➢ The default parameters of Modbus interface are 19200bps, 8 bits, no parity, 1 stop bit.

    The Modbus baud rate: 300, 600, 1200, 2400, 9600, 19200, 38400, 57600, 115200bps.

[2] DeviceNet topology:

- ➢ Trunk lines

Thick cable and thin cable both can be used to build the trunk lines. When the thick cable and thin cable are mixed to build the trunk lines, the longest cable length can be calculated through the following formulas:

$$L_{thick}+5*L_{thin}=500m \qquad\qquad 125kbit/s$$

$$L_{thick}+2.5*L_{thin}=250m \qquad\qquad 250kbit/s$$

$$L_{thick}+L_{thin}=100m \qquad\qquad 500kbit/s$$

Here L_{thick} is the length of thick cable, and L_{thin} is the length of thin cable.

➤ Drop lines

The length of drop lines is the distance from tap of the trunk lines to the transceiver of every device, and it should be less than 6m. The length of drop lines is related to baud rate, and the longest length with different baud rate is shown below.

Baud Rate	Length of Cable
125kbit/s	156m
250kbit/s	78m
500kbit/s	39m

[3] Working mode: DeviceNet interface only support: Group 2 only adapter.

[4] Operating temperature: -4℉~140℉ (-20℃ ~ 60℃). Humidity: 5%~95% (non-condensing).

[5] EMC testing standard compliant.

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

[7] Dimensions (W*H*D): 1.6 in*5.0 in*4.4 in (40mm*125mm*110mm).

[8] Pollution level: 3.

1.4 Related Products

The related products include: GT200-DP-RS etc.

To get more information about related products, please visit SSTCOMM website: www.sstcomm.com.
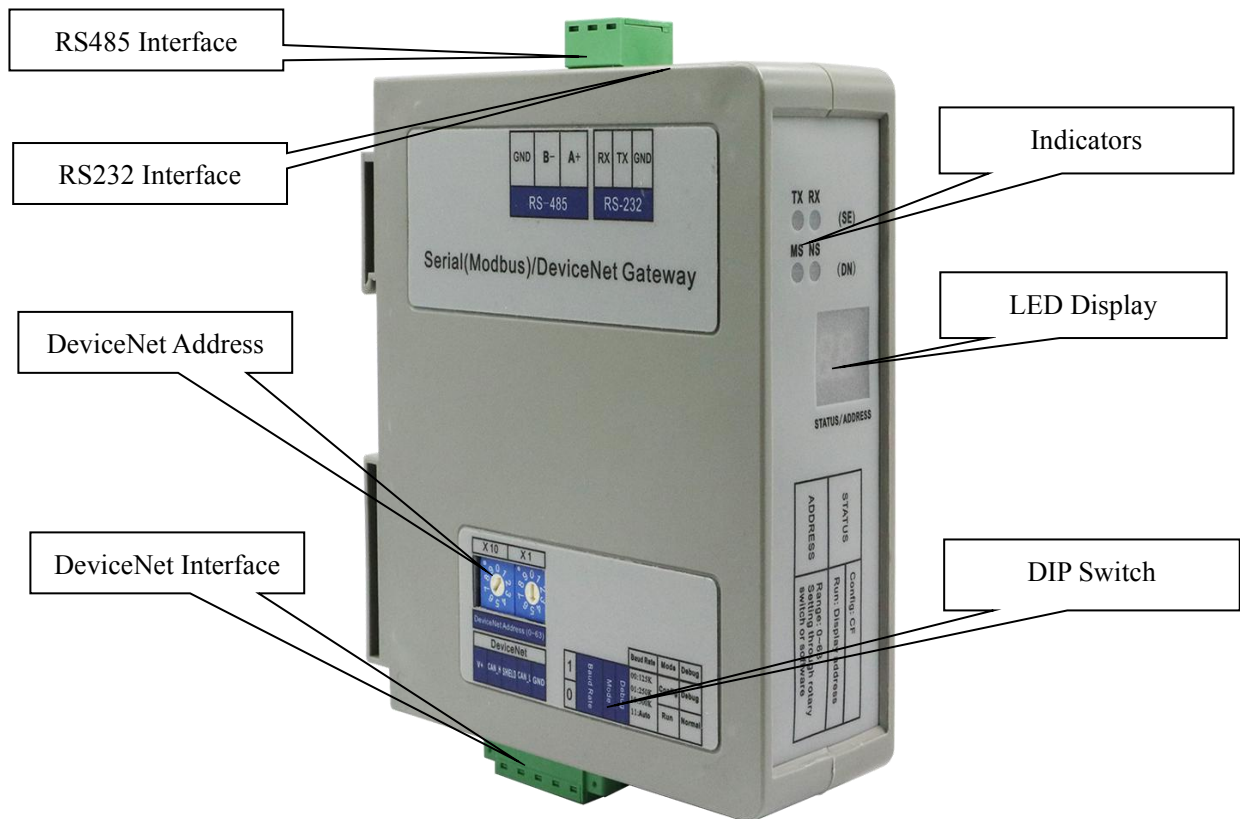
1.5 Revision History

Revision	Date	Chapter	Description
V1.5	02/11/2021	ALL	New release.
V1.5 , Rev A	01/25/2022	ALL	Update the format.

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 Indicators

● Indicators of Module Status (MS):

Indicators	Description
Off	No power supply or indicators are not working normally.
Green	Work normally.
Flashing Green	Not correctly configured.
Flashing Red	Modbus communication faults (such as no slave station can be scanned).
Red	Some error happens, please contact support.
Flashing Red-Green	Self-testing is ongoing.

● Indicators of DeviceNet network Status (NS):

Indicators	Description
Off	The repetitive MAC ID detection is not successful or no power supply.
Flashing Green	The devices are online but there are not connections established.
Green	The devices are online and there are connections established.
Flashing Red	One or more I/O connections have been timed out.
Red	The device detects errors and cannot communicate, such as there is repetitive DeviceNet address on the network.

● Indicators of Serial interface Status (TX, RX):

Indicators	Status	Description
RX (Green)	Blinking	Serial port is receiving data.
	Off	Serial port is not receiving data.
TX (Red)	Blinking	Serial port is sending data.
	Off	Serial port is not sending data.

2.3 LED Display

The LED display will show current DeviceNet baud rate setting while gateway is starting up, and the DeviceNet address while in running.

2.4 DIP Switch

DIP switch has three functions:

1) Modify DeviceNet Baud Rate.

2) Set working mode: Configuration and run mode are optional. At the status of configuration, the LED shows "CF".

3) Set debugging: Debug and normal mode are optional. GT200-DN-RS has the function of debugging, and it provides users with easy way for debugging Modbus network data communications. At the status of debugging, the LED shows "db".

Note: The priority of configuration mode is higher than debugging. When configuring the gateway, the debug switch should be set to normal. When debugging the gateway, mode switch should be set to run.
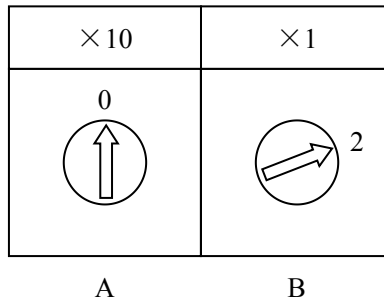
Status setting switches are located at the bottom of the product:
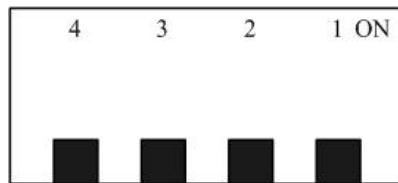
	4 3 (Baud Rate)	2 (Mode)	1 (Debug)
1	00: 125K 01: 250K	Config	Debug
0	10: 500K 11: Automatic	Run	Normal

Note: If you changed the status switches, you have to restart GT200-DN-RS (power off and power on) to make the settings take effect.

2.5 Rotary Switches of DeviceNet Address

According to the above, the DeviceNet address is calculated as follow:

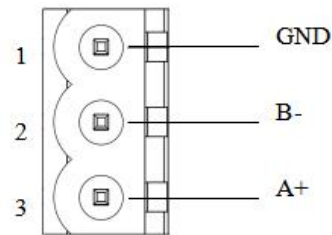**DeviceNet address = (A × 10) + (B × 1)**

2.6 Interface

2.6.1 RS485/RS232 Interface

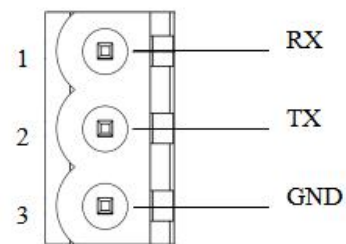The interface uses open 3 pin pluggable terminal, users could refer to the panel instruction to do the wiring:

- RS485 Interface

Pin	Function
1	GND
2	B-, RS485
3	A+, RS485

- RS232 Interface

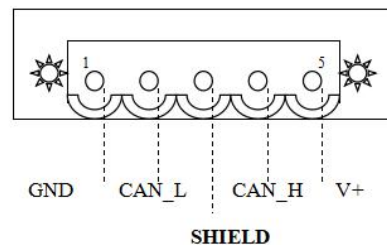| Pin	Function
1	RX, connects to RX of user's device RS232
2	TX, connects to TX of user's device RS232
3	GND, connects to GND of user's device GND

Notes: The TX pin and RX pin of RS232 have been crossed over. Please refer to the following table to do the wiring.

2.6.2 DeviceNet Interface

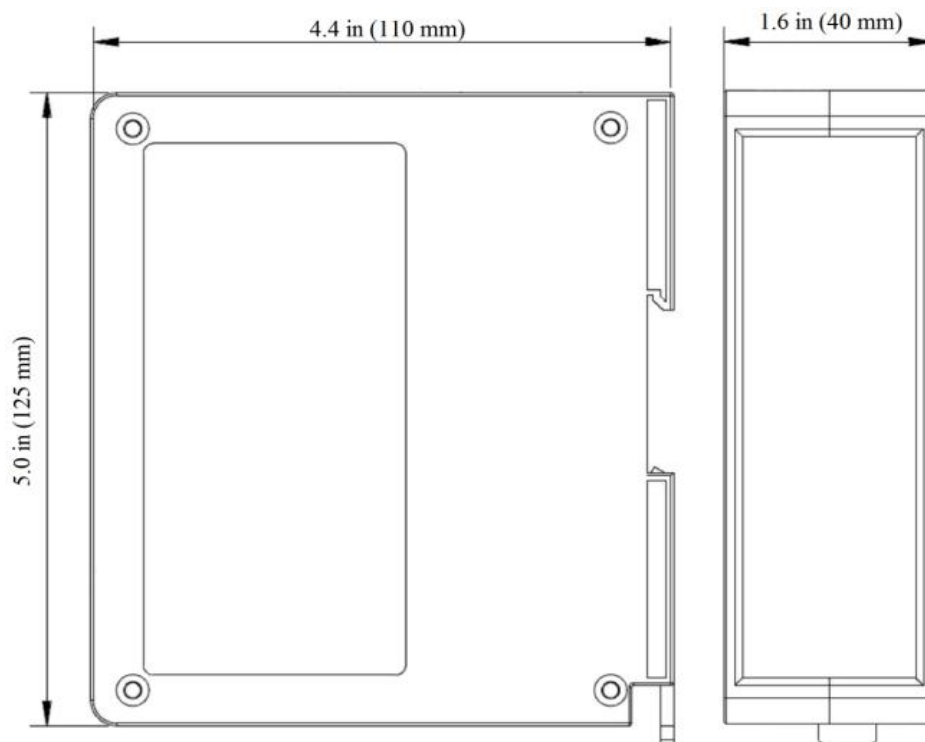| Pin	Wiring
1	GND(24V)
2	CAN-
3	shielding
4	CAN+
5	+24V

3 Hardware Installation

3.1 Mechanical Dimensions
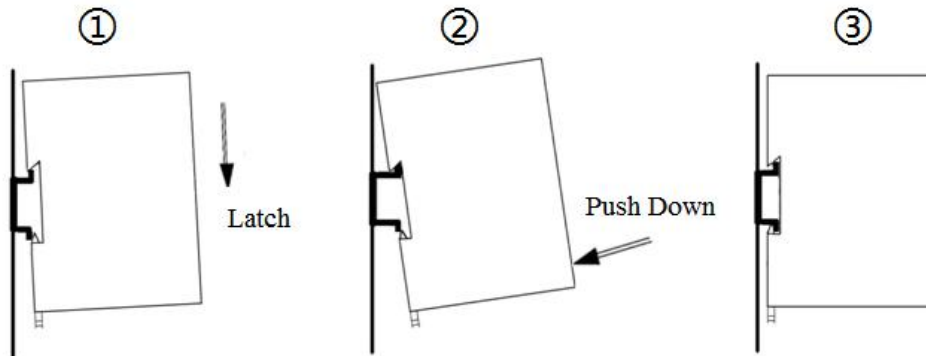
Size (width * height * depth):

1.6 in * 5.0 in *4.4 in (40 mm * 125 mm * 110 mm)
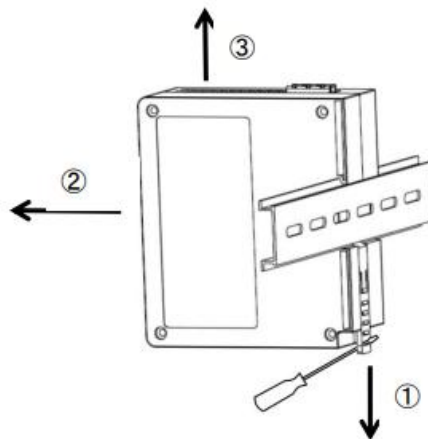
3.2 Installation Method

Using 1.4 in (35mm) DIN RAIL.

Install the gateway

Uninstall the gateway

1. Use a screwdriver to pass through the DIN RAIL bar, pull down and hold.

2. Pull out the gateway.

3. Lift up the gateway.

4 Quick Start Guide

4.1 Connection

1.   Setting DeviceNet address manually

Before connecting DeviceNet master, sets DeviceNet address by moving rotary switch at the gateway's side. The range of DeviceNet effective address is 0 to 63. The calculation method of DeviceNet address is shown at Chapter 2.5 of the manual. To supply power to this module, the LED displays blinking "bT", and then shows "12" or "25" or "50", respectively indicates "125K", "250K", "500K". Finally, it shows the DeviceNet address you have set. When baud rate is set to automatically baudrate sensing state, if there is no other CAN node on the network to send data, it shows "bT".

Note: When using rotary switch to modify the DeviceNet address, restart the gateway to take the new address effect.

2.   Setting DeviceNet Baud Rate manually

Set DeviceNet baud rate manually though the baud rate setting switches below the gateway, baud rate setting switches have four combinations, respectively indicate 125K, 250K, 500K, automatically sensing baud rate. See Chapter 2.4 of the document.

3.   Connect RS485/RS232 interface and DeviceNet interface accurately and checkup the wiring. See Chapter2.6.

Note: RS232 interface is specialized configuration interface. In configuration mode, please pay attention to the wiring exactly.

4.   Power on, the module enter the run mode(DIP Switch"2 OFF"). Note the settings of other DIP Switches.

●   DIP Switch-2 ON: Configuration mode.

●   DIP Switch-1 ON: Debug mode.

●   DIP Switch-1 OFF: Normal mode.

4.2 Configuration

Please download the configuration software SST-MD-CFG on website: www.sstcomm.com/Download1/.

1. Set the DIP Switch "2 ON". Power on, the LED display will show "CF", that means the gateway is in the configuration state.

2. Open the SST-MD-CFG software installed on your computer. When using the gateway for the first time, you can click the "Upload" button to upload the example configuration for reference.

3. Click "Fieldbus" in the tree view on the left, please set the corresponding parameters:

Device	Configuration	
Fieldbus	Type of Protocol	DeviceNet
Subnet	DeviceNet Address(0~63)	0
	DeviceNet Baud Rate	Automatic
	Size of DeviceNet Input Buffer	64
	Size of DeviceNet Output Buffer	64

4. Click "Subnet" in the tree view on the left,configure the parameters as below:

Device	Configuration	
Fieldbus	Protocols Mode	Modbus Master
Subnet	Baud Rate	19200
	Data Bits	8
	Parity Check	None
	Stop Bits	1
	Slave Address	
	Transmission Mode	RTU
	Response Timeout(5~60000ms)	300
	Delay Between Polls(0~2500ms)	0
	Output Mode	Change of Value
	Output Pulse(200~2500ms)	
	Scan Rate(1~255)	10
	Communication Interface	RS485
	Debug Interface	RS232

5. Add "Node" and "Command".

6. Please fill in the "Starting Address" of the command and enter the "Number of Data" of the command, click "Auto Mapping" to automatically calculate the non-conflicting mapped memory address for each command. You can also map the data manually.

7. Click the "Conflict Detection" to check the mapping address in the Conflict Detection window.

8. Click "Download" , select the serial port that gateway is connected to the computer. After configuring and downloading Configuration into the gateway, restart the gateway to run normally.
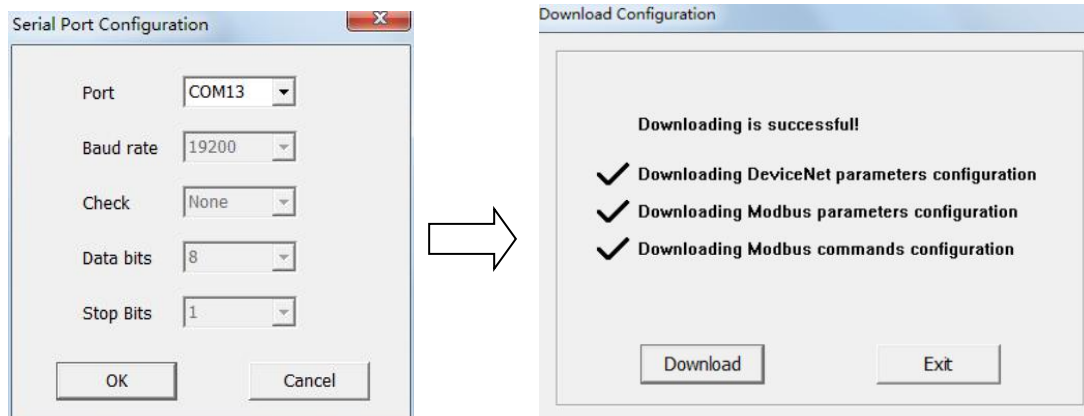
**If the upload/download failed, please find the following reasons:**

1. Please confirm that the gateway is in configuration mode.

    ✧   How to enter configuration mode?

    Set the DIP Switch "2 OFF", and when you see "CF" displayed on the LED Display, it is in configuration

    mode.

2. Please confirm that the RS232 port is wired correctly, and try to replace a cable. If the USB to RS232

    connection cable is used, please pay attention to the installation of the USB driver.

3. Please make sure that the COM port used by the computer is correct. Try to connect again using other COM

    ports of the computer.

5 Configuration Software SST-MD-CFG

SST-MD-CFG is the software based on Windows platform. It is used to configure GT200-DN-RS through RS232 serial port. Download the software on www.sstcomm.com/Download1/and run the setup program to begin the installation. Please follow the prompts to install the software.

For detailed software content, please open the SST-MD-CFG, select "Help" >> "Content" on the menu bar.

Double-click on the icon and enter the main interface:
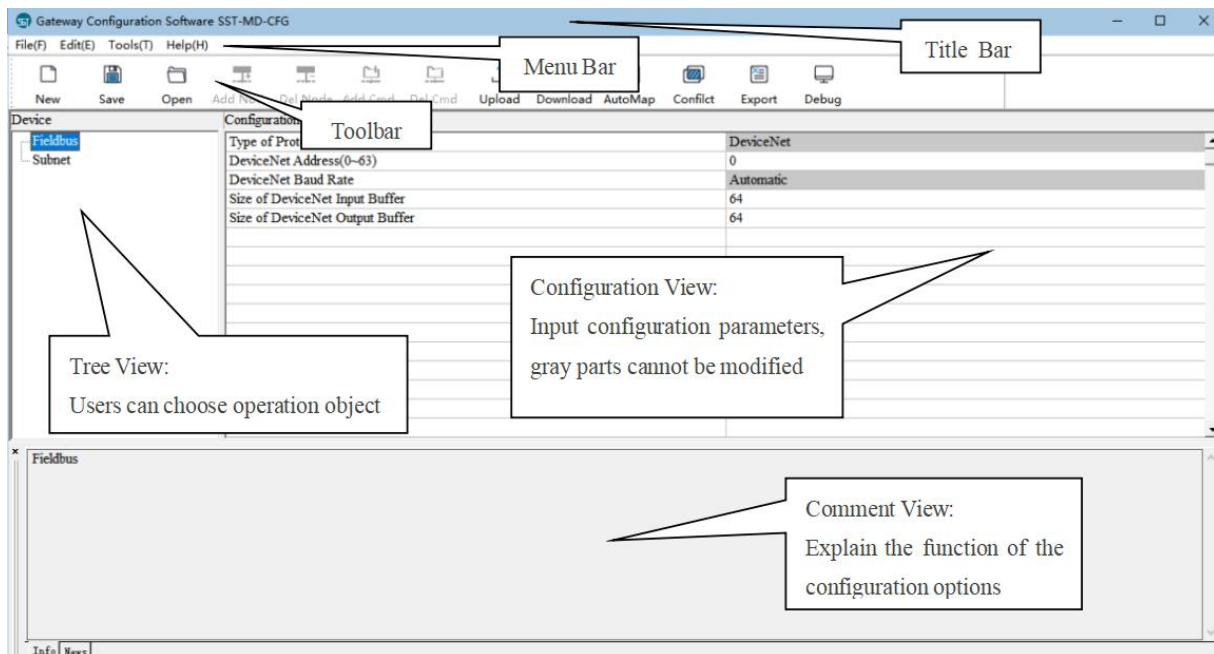
6 Working Principle

6.1 Data Exchange Mode

The data exchange between GT200-DN-RS Modbus and DeviceNet is established by "mapping". GT200-DN-RS has two data buffers, one is DeviceNet network input buffer, and the other is DeviceNet network output buffer. Modbus read commands read the data and then write the data into input buffer for DeviceNet network reading. Modbus write commands get data from network output buffer, and then output the data to Modbus devices by writing commands.
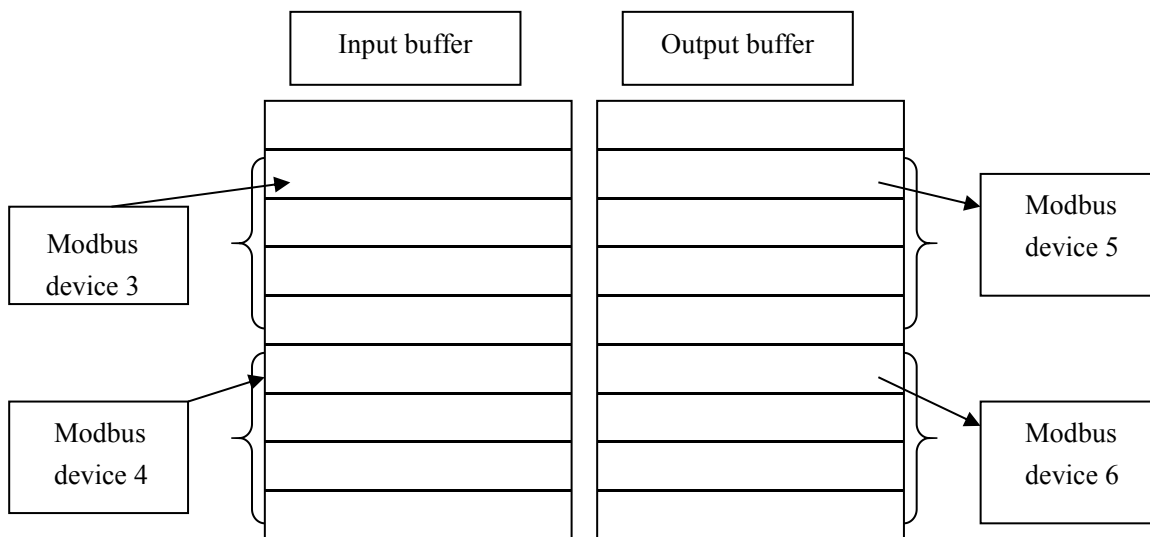
Users can configure 48 commands at most, and can use a Modbus command to read a serial Modbus registers.

Note 1: If there is something wrong with Modbus communication, DeviceNet I/O data cannot be effectively collected, and the data got through I/O scanning is zero.

Note 2: When DeviceNet interface of GT200-DN-RS receives network output-data, Modbus interface will send writing-commands. That is to say that after DeviceNet master station sending data, Modbus interface of GT200-DN-RS will send writing-commands, and transmit data to Modbus slave devices. If AB's PLC is in programming mode, there will be no network output-data.

Note 3: During the configuration of GT200-DN-RS, when polling mode of output commands is set to "Change of State", the function of the local data exchange cannot be used.

Local data exchange: Configure writing-commands to input-area (0000~3FF0).

6.2 Terminal Resistor

DeviceNet network requires a 120ohm terminal resistor respectively at the two farthest terminals of the network. Modbus requires terminal resistors too. GT200-DN-RS has a terminal resistor at the side of Modbus interface, users only need add a 120ohm terminal resistor at the other side of the Modbus network.
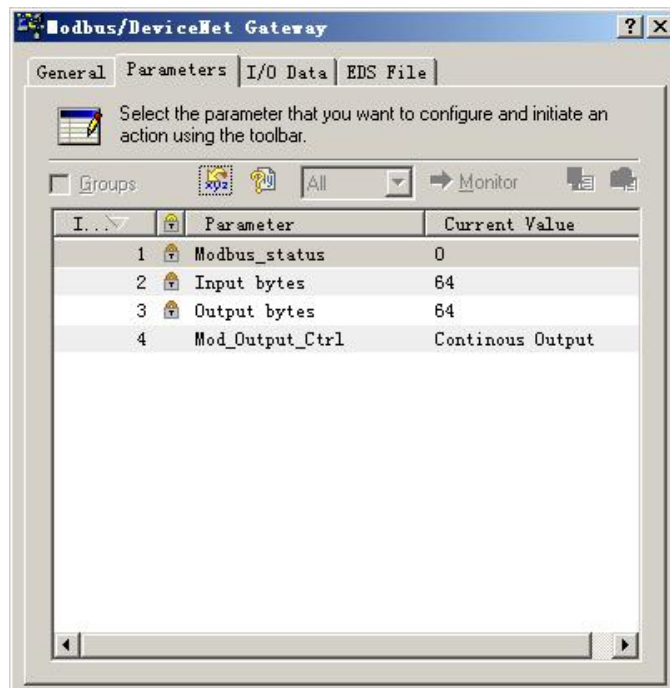
6.3 Instructions of DeviceNet I/O and Parameters

1. I/O Configuration

DeviceNet input-bytes could be configured as 8 bytes, 16 bytes, 32 bytes, 64 bytes, 96 bytes, 128 bytes or 160 bytes.

DeviceNet output-bytes could be configured as 8 bytes, 16 bytes, 32 bytes, 64 bytes, 96 bytes and 112 bytes.

2. DeviceNet Parameters

Modbus_status: The value shows the status of Modbus communications. If it keeps zero, the Modbus communication is OK. If it is a non-zero value, the communication of the command is failed.

Input bytes: Number of DeviceNet I/O input bytes.

Output bytes: Number of DeviceNet I/O output bytes.

Notes: The parameters of input bytes and output bytes must be the same with the numbers of input/output bytes in DeviceNet master scanning list of RSNetWorx and so on, or the connection can't be established.

Mod_Output_Ctrl: Modbus output control.

Continuous Output

Disable Output

Output of Status Change: When the network output data has changed, Modbus commands can be sent.

Note: If the output mode is "Disable Output", though it has configured Modbus output commands, the gateway won't send Modbus output commands.

To ensure securities of output-data, if PLC hasn't effective output-data (For example, PLC in programming mode or DeviceNet device has not been connected), Modbus output commands will not be sent.

This parameter also could be modified through Modbus setting in SST-MD-CFG.

3. DeviceNet Network Configuration Instructions

Users need to install the *.EDS file in the disc to DeviceNet configuration software, then you can configure GT200-DN-RS through network configuration software.

EDS (Electronic Data Sheet) is comprehensive description which supports DeviceNet network function. It equals to equipment's driver of Windows. Users need to install EDS files to DeviceNet network configuration software, such as RSNetWorx and so on, and then the configuration can be going on through network configuration software.
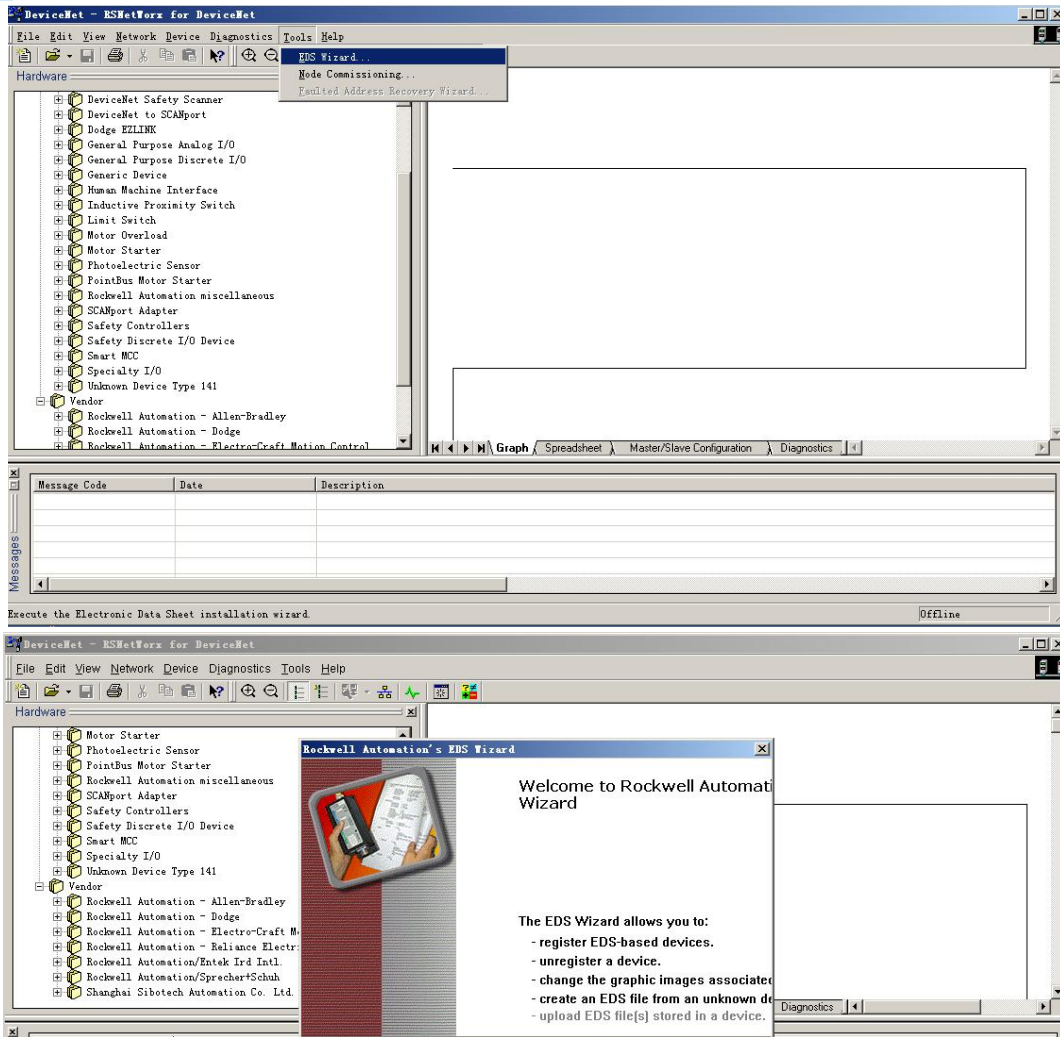
Here we take Rockwell's RSNetWorx for example (edition 4.12.0), and explain how to install. For further details, please refer to the network configuration software instructions.

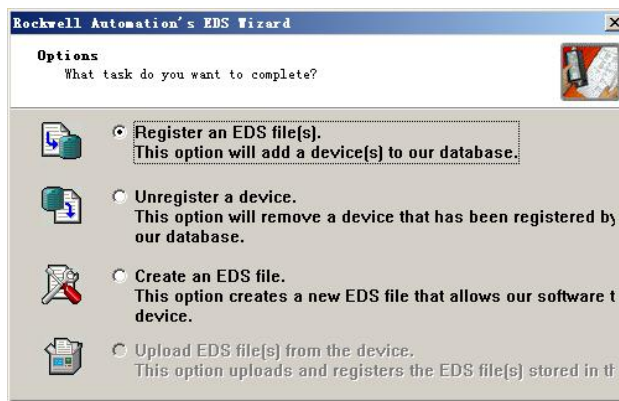Step1: Create a new network configuration profile.

Step2: Select EDS operation guide, select "Tools" and then "EDS-Wizard", you will see that:

Step3: Select "Next", as follow:
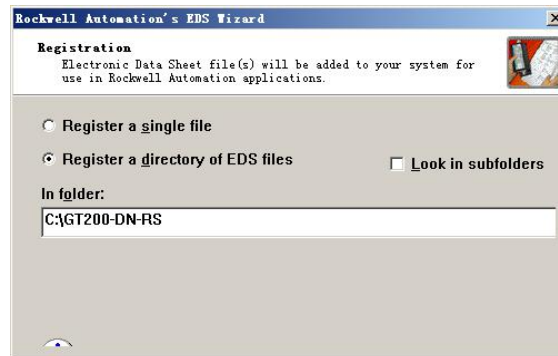

Step4: Register gateway GT200-DN-RS.

Shown as above, select "Register an EDS file", as follow:

Please register GT200-DN-RS.EDS file we provided, according to the place where you save EDS file, and select
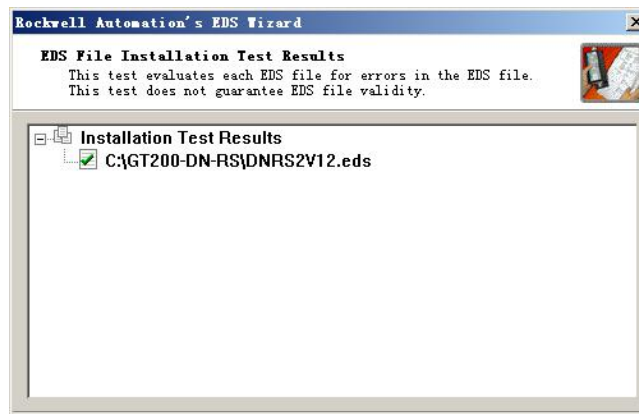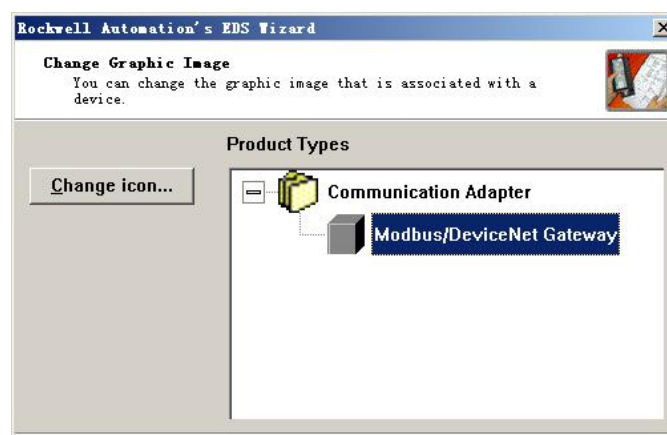
the file.

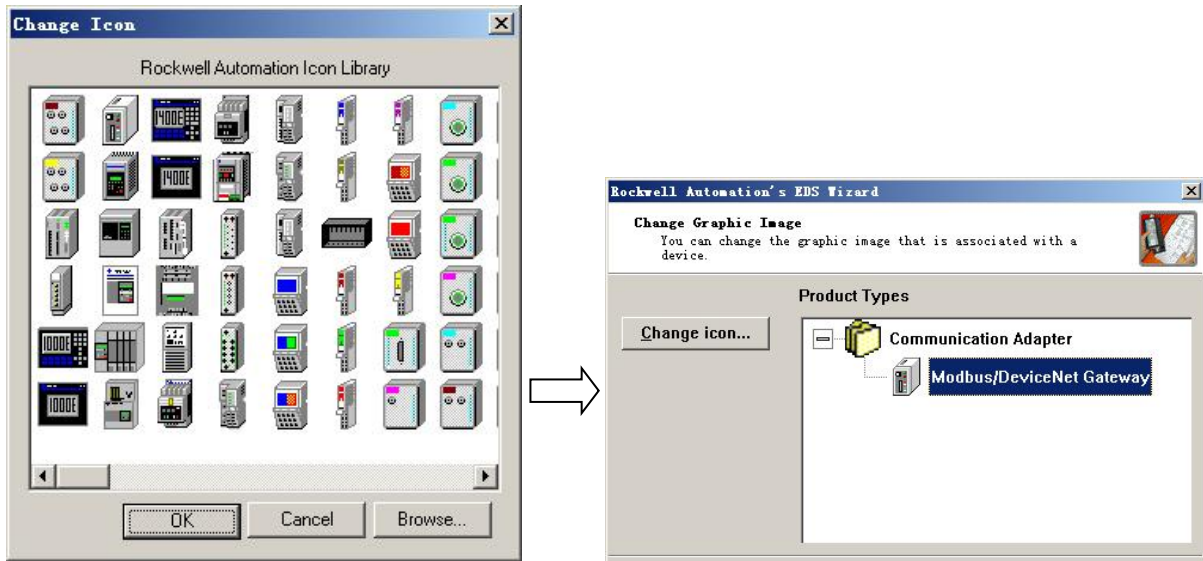Step 5: Confirm register file you choose.

Click "Next" .

Step 6: Select the icon.

Following network configuration software will prompt you the equipment category in equipment storehouse, you may choose icon in this process.
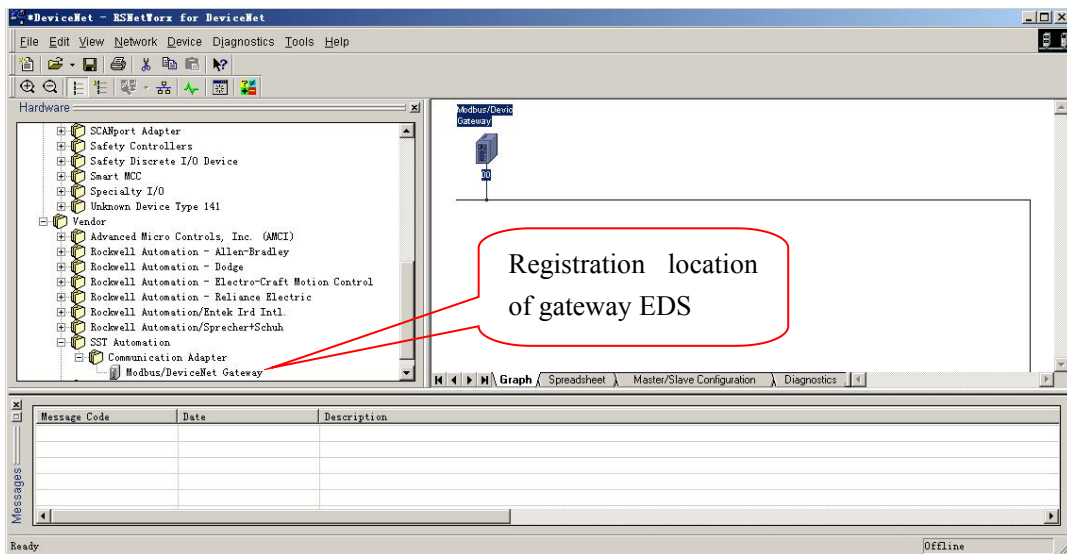
Here, the device has successfully registered to the icon library location of configuration software's equipment storehouse.

Then, you should connect gateway GT200-DN-RS to DeviceNet network, click on "SCAN" button of RSNetWorx, or select "Network-Online" in menu bar, your gateway will be scanned by system and identified exactly.