DeviceNet/PROFIBUS DP Gateway
GT200-DP-DN

User Manual

REV 4.1

SST Automation

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1 About This Document

1.1 General

This document describes every parameters of the gateway GT200-DP-DN and provides using methods and some announcements that help users use the gateway. Please read this document before using the gateway.

1.2 Copyright Information

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1.3 Terms

DeviceNet: DeviceNet Protocol, accord with DeviceNet Protocol Release 2.0.

PROFIBUS DP: PROFIBUS DP Protocol.

2 Product Overview

2.1 Product Function

GT200-DP-DN exchanges data between DeviceNet and PROFIBUS DP. It can connect a master device with DeviceNet interface to PROFIBUS DP master.

2.2 Product Features

▼**Wide Application**: Achieve the direct connection between DeviceNet network and PROFIBUS DP network. Such as: Establish the communication between Rockwell, Omron PLC and Siemens S7 PLC.

▼**Easy to Use**: Referring to the manual and the examples provided, users can establish the connection quickly.

▼**Transparent Communication:** Users can accord to the mapping relationship between PROFIBUS DP communication data area and DeviceNet communication data area to achieve the transparent communication between PROFIBUS DP and DeviceNet.

2.3 Technical Specifications

[1] PROFIBUS DP/V0 slave; Follow EN50170: The chapter 3 of measurement and control of digital data communications Industrial Control System: PROFIBUS standard;

[2] Up to 224 bytes input and 224 bytes output, user can also select 32, 96, 48, 112, 72, 160, 192 bytes;

[3] PROFIBUS DP interface and DeviceNet interface have independent 2.5KVphotoelectric isolation;

[4] Act as a slave at the side of DeviceNet, and support Poll I/O;

[5] DeviceNet baud rate: 125K, 250K, 500Kbps and Auto baud rate;

[6] Supply many LED status lights indicating network status;

[7] Power: DC 11-26V; 4W@24V;

[8] Working circumstance temperature: -40℉~140℉(-40℃~60℃), Humidity: 5%~ 95%;

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

[10] Installation: 35mm rail;

[11] Protection Level: 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.

2.5 Related Products

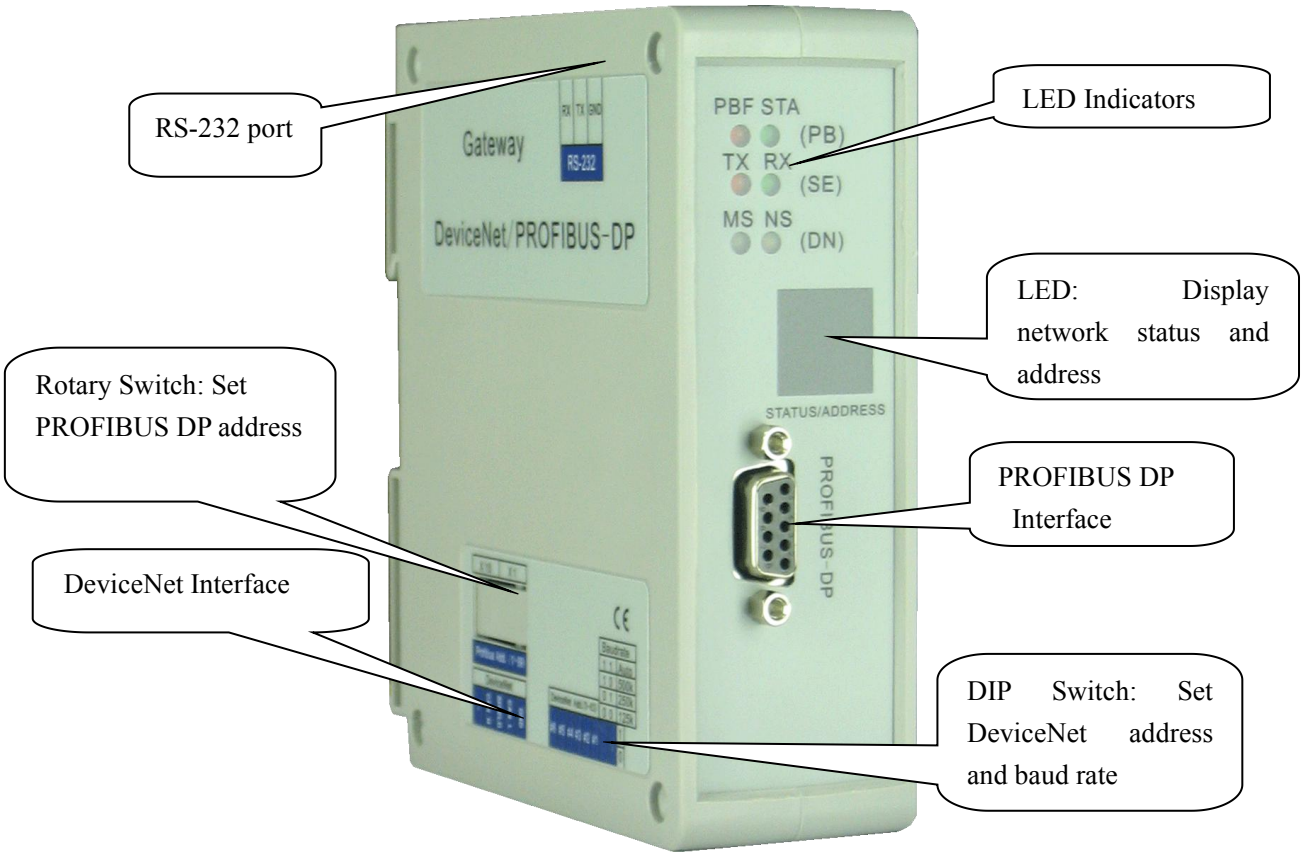
Other related products in SSTCOMM:

GT200-DPM-DN, GT200-DN-RS and so on.

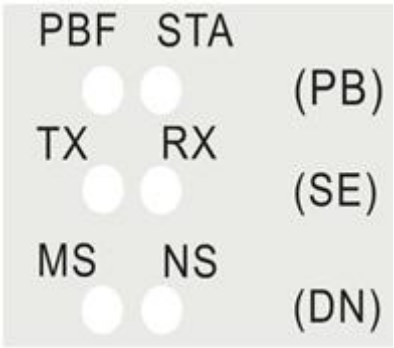
If you want to get more information about these products, please visit SSTCOMM website: http://www.sstcomm.com.

3 Hardware Descriptions

3.1 Product Appearance



3.2 Indicators



DeviceNet Module Status Indicator (MS)

Status	Description
Off	No power supply or indicator may be bad
Always Green	Work properly
Green Blinking	Incorrect configuration, or in baud rate interception status
Red Blinking	Recoverable fault
Always Red	Unrecoverable fault
Red-Green Blinking	Self-testing

DeviceNet network status indicator (NS)

Status	Description
Off	DeviceNet without power
Green Blinking	Device is online, but no connection
Always Green	Device is online and there is a connection
Red Blinking	One or more connection timeout
Always Red	Device detects an unrecoverable fault, and cannot communicate, For example, DeviceNet address repeat

RS-232 interface indicator (SE)

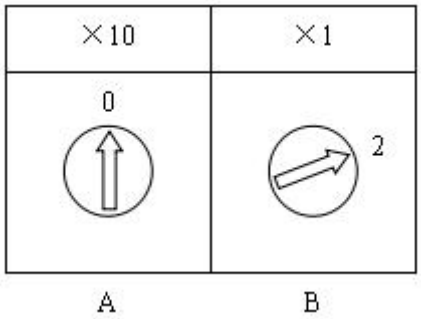
Status	Description
TX Off	Serial has no data sent
TX Red Blinking	Serial is sending data
RX Off	Serial has no data received
RX Green Blinking	Serial is receiving data

PROFIBUS DP network status indicator (PB)

Status	Description
PBF Off	Communication is OK
PBF Always Red	PROFIBUS DP communication fails
STA Off	PROFIBUS DP is not communicating
STA Green Blinking	PROFIBUS DP is communicating

3.3 Configuration Switch

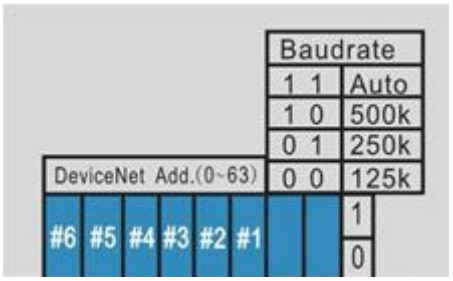
Setting switch of PROFIBUS DP address:

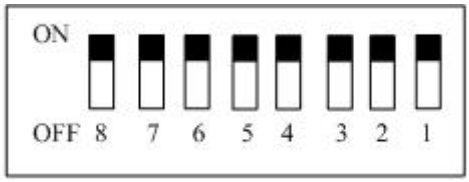


PROFIBUS DP address is calculated as:

PROFIBUS DP Address=（A×10）+（B×1）

DeviceNet address and DIP switch of baud rate instruction is shown below:





3-8 bits switches are the DeviceNet address setting switches, and they correspond with DeviceNet address #1bit - # 6bit. They use binary coding (On is 1, Off is 0).

No.1 and 2 bit are used setting DeviceNet baud rate:

bit2	bit1	baud rate
1	1	self-adaptive
1	0	500K
0	1	250K
0	0	125K

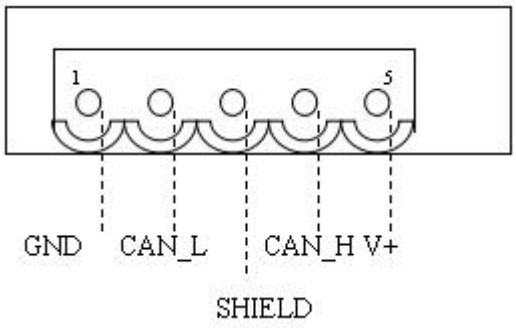
3.4 LED

The main contents of LED include: DeviceNet address and PROFIBUS DP address. After powering on, LED successively display "pb", the current PROFIBUS DP address, "dn" and the current DeviceNet address.

3.5 Interface

3.5.1 DeviceNet Interface Wiring Instructions

5-pin connector at the side of DeviceNet:



- ✧ pin GND
- ✧ pin CAN_L
- ✧ pin Shield
- ✧ pin CAN_H
- ✧ pin +24V

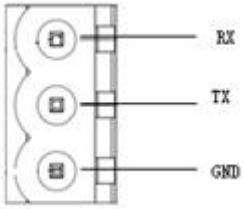
Note: V+, GND of DeviceNet interface interlinks V+, GND of power interface. This module needs to get power from DeviceNet interface.

3.5.2 PROFIBUS DP Interface

PROFIBUS DP wiring description is shown as follow:

DB9 Pin	Functions
1	NC（Not connected）
2	NC
3	PROFI_B(Must be connected), Data positive
4	RTS
5	GND
6	PROFI_5V
7	NC
8	PROFI_A(Must be connected), Data negative
9	NC

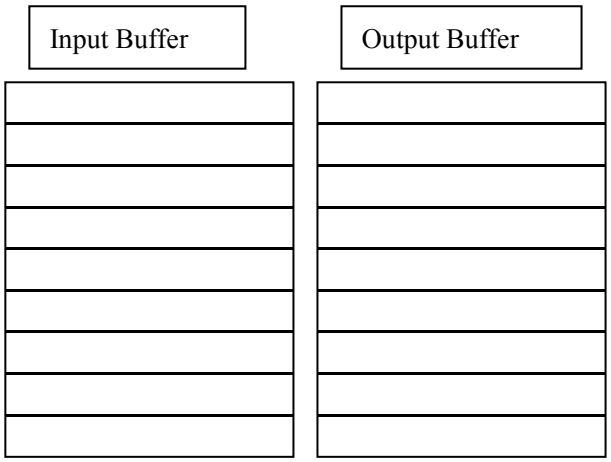
3.5.3 RS-232 Interface



Configuration interface, and after connecting with computer, users can modify GT200-DP-DN configuration parameters through Hyper Terminal. Specific configuration steps, see Chapter 6.

4 Run

The data converter of GT200-DP-DN between DeviceNet and PROFIBUS can be established by “mapping”. There are two data buffers in gateway, one is PROFIBUS Network Input Buffer, and the other is PROFIBUS Network output buffer. DeviceNet writes data which has been read from devices into Network Input Buffer, and write data to DeviceNet device through POLL I/O write commands from Network Output Buffer.



GT200-DP-DN not only acts as a DeviceNet slave node, as well as a PROFIBUS DP slave node, and needs to take up a node address of two networks.

5 Quick Start Guide

Use the following steps to apply your GT200-DP-DN:

1) According to the configuration steps to configure gateway, refer to chapter 6.

2) Setting PROFIBUS DP address through the rotary switch of the gateway, refer to chapter 3.3.

3) Setting DeviceNet address and baud rate through the DIP switch under of the gateway, refer to chapter 3.3.

4) Correctly wiring in accordance with the instruction, refer to chapter3.5.

5) Install EDS file to DeviceNet configuration software (such as RsNetWorx), and configure DeviceNet Network. The user can configure the DeviceNet scan commands and the data mapping from DeviceNet to PROFIBUS DP, refer to chapter7.

6) Install GSD file to PROFIBUS DP configuration software (such as STEP 7), and map the PROFIBUS DP input-output to the PLC or other devices, refer to chapter 8.

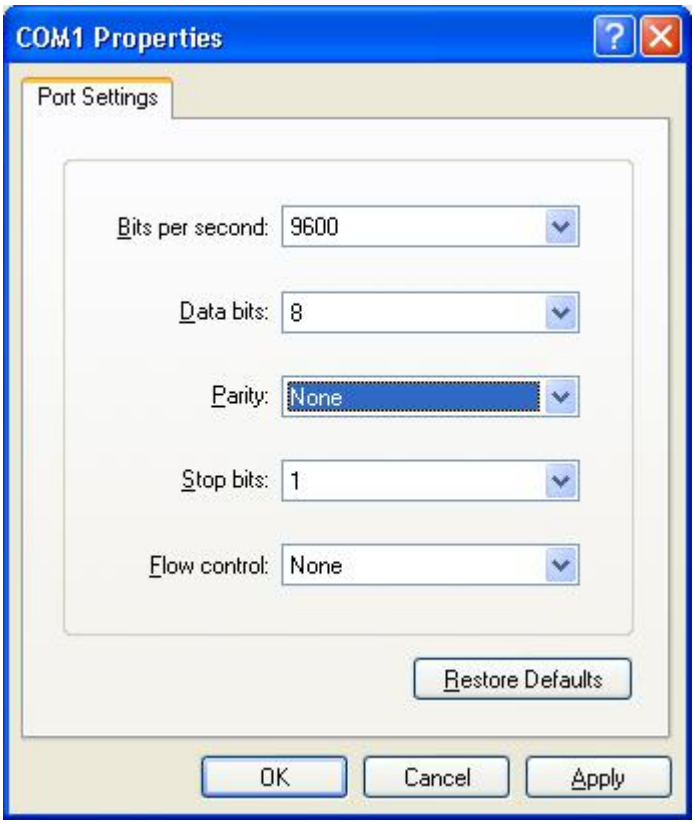
6 Gateway Configuration Instructions

Users can connect the gateway to PC through Gateway's RS-232 interface and 232 direct cable (Together with the GT200-DP-DN to the client, one terminal end is 3-pin connector, and the other end is the DB9 connector) and configure the gateway through Hyper Terminal. **Take all DIP switches of the gateway to off, and the value of the rotary code switches to 0, re-power the gateway and the gateway enter the configuration mode.**

6.1 Setting Hyper Terminal

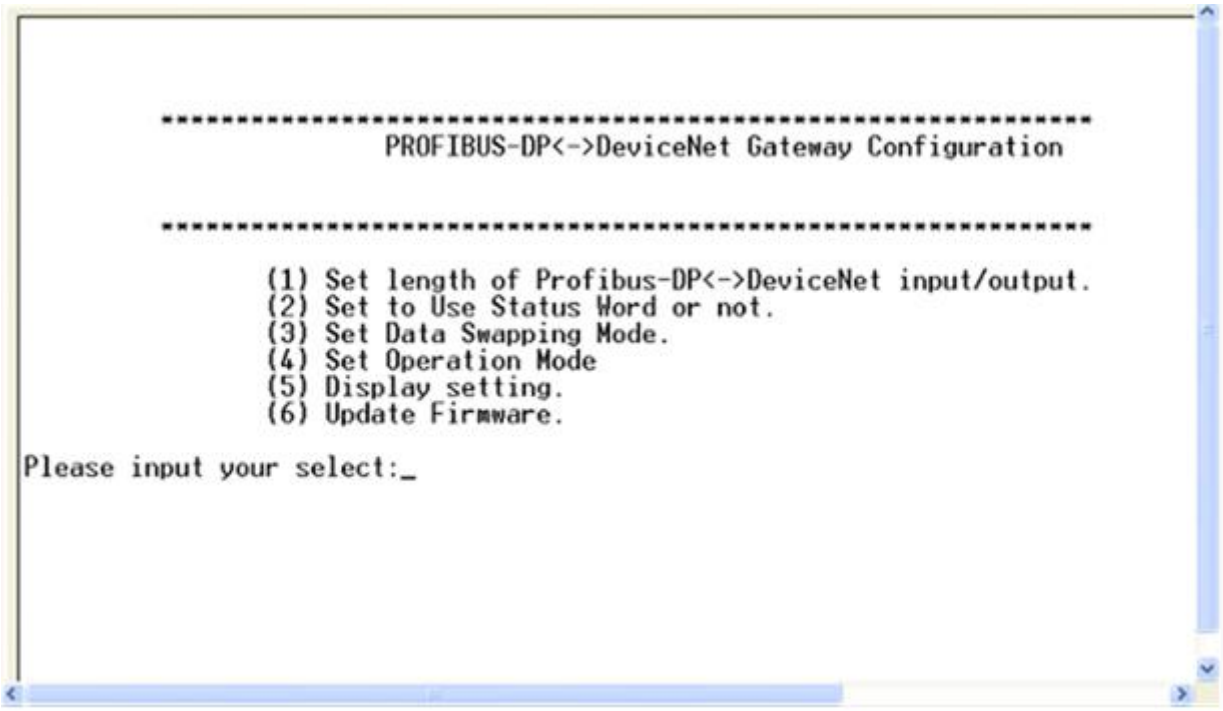
You can find the Hyper-Terminal in "Start — Programs — Accessories — Communications — Hyper Terminal". Select the port being connected to GT200-DP-DN, and the port settings are shown as follows:

9600, 8, None, 1 None.



6.2 Main Menu

After configuring the Hyper-Terminal, power on the module, PBF always Red (others are off, LED no display) and the main menu will be displayed. As the following picture shows:



Item (1): Set input and output bytes length of PROFIBUS DP and DeviceNet. 32, 96, 48, 112, 72, 160, 192, 224bytes can be selected and the default is 48 bytes;

Item (2): Open or close the DeviceNet network status word. When you select Open, the last two bytes of the network input data is the status word. You can select “Clear Data” or “Keep Last Data” the input data when a network breaks.

Item (3): Set data Swapping mode, No swapping, Two bytes swapping, and Four bytes swapping;

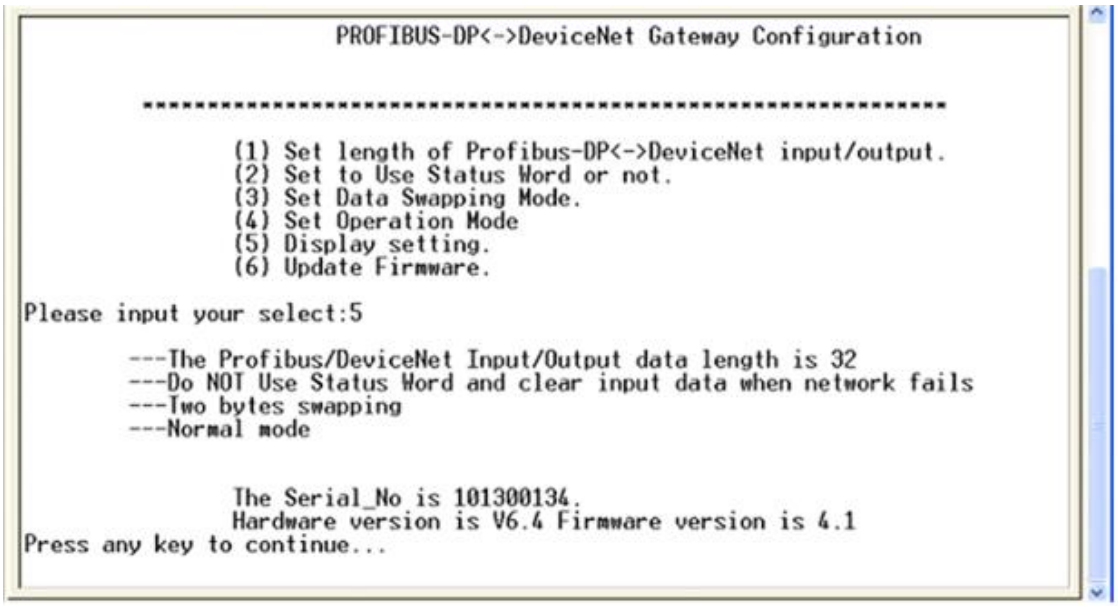
Item (4): Set operating mode, Compatible mode (Support GT200-DP-DN V31) and Normal mode(GT200-DP-DN V41).

Item (5): Display the current settings. Input and output bytes length of PROFIBUS DP and DeviceNet, Use the status word or not, Data exchange mode and product serial number, hardware version, firmware version;

Item (6): Update the firmware.

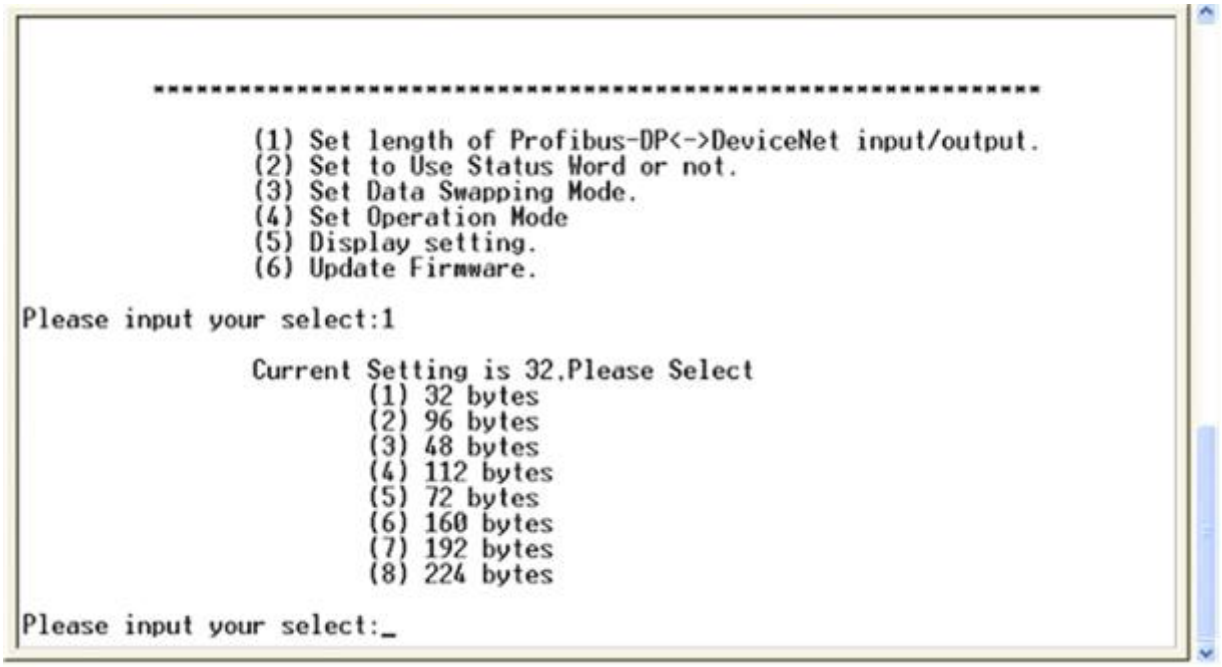
6.2.1 Show the Current Configuration

Select 5 in the configuration main page, and it will show all current configuration. For the first time into the Hyper-Terminal configuration page, can view the configuration by selecting the option to determine what needs to be modified:

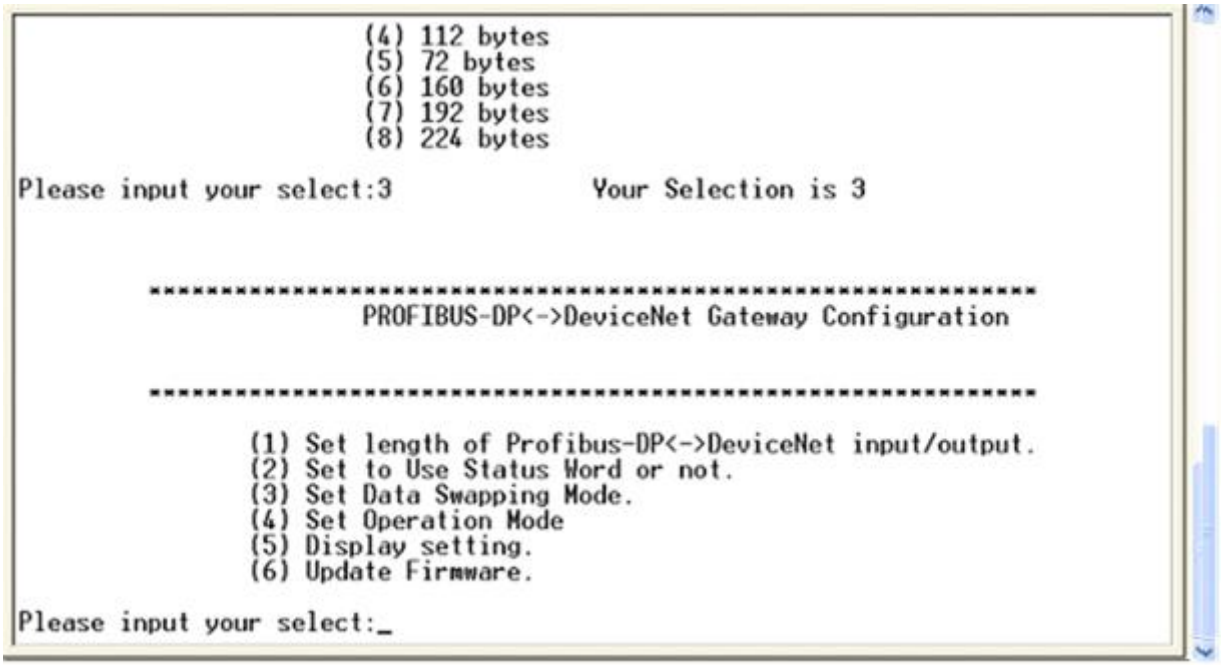


6.2.2 Set Input and Output Bytes

Select 1 in the configuration main page and it will show the current number of input and output bytes and other options. As shown below:



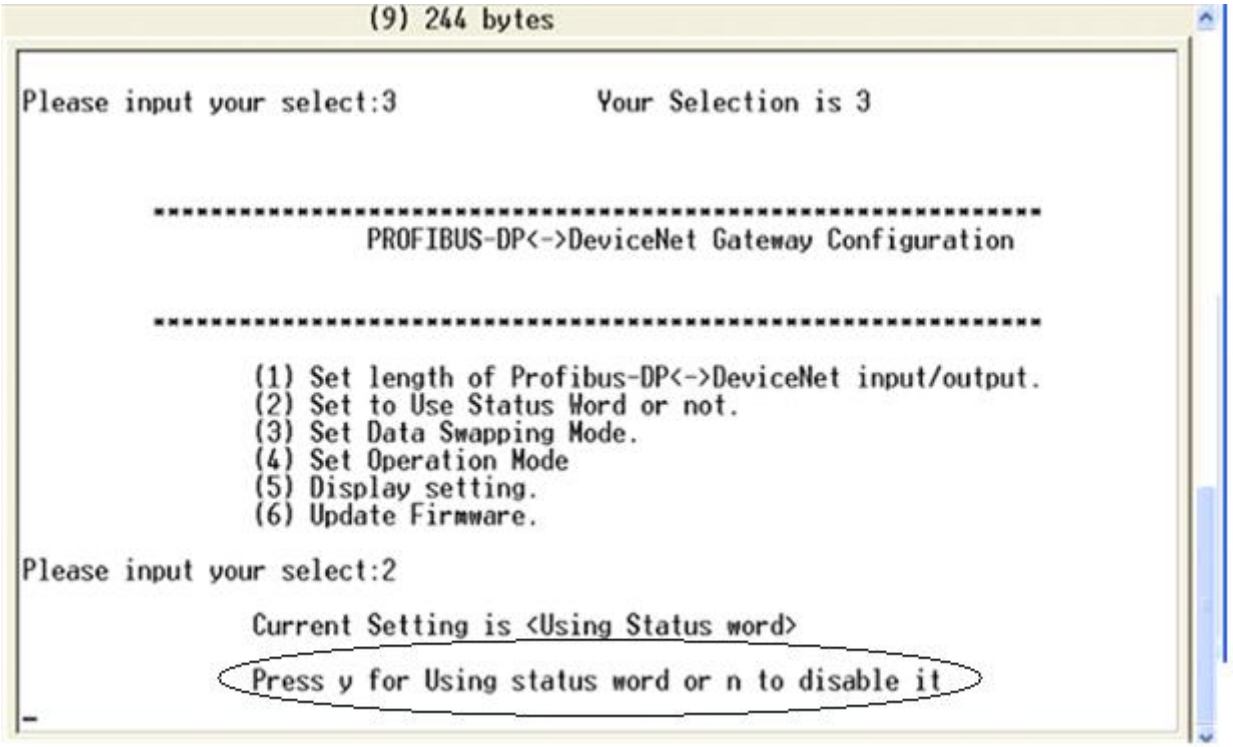
When you need to change the settings, you can set input and output bytes through inserting the different number of bytes. The figure chooses 3, namely 48-byte input and output.



6.2.3 Set Status Word

Select 2 in the configuration main page and it will show status word set options and current configurations.

As shown below:



When you need to change the settings, you can follow the prompts, enter “y” for using status word, that is, the last two bytes of input data show the network status of another network. Enter "n" to disable it.

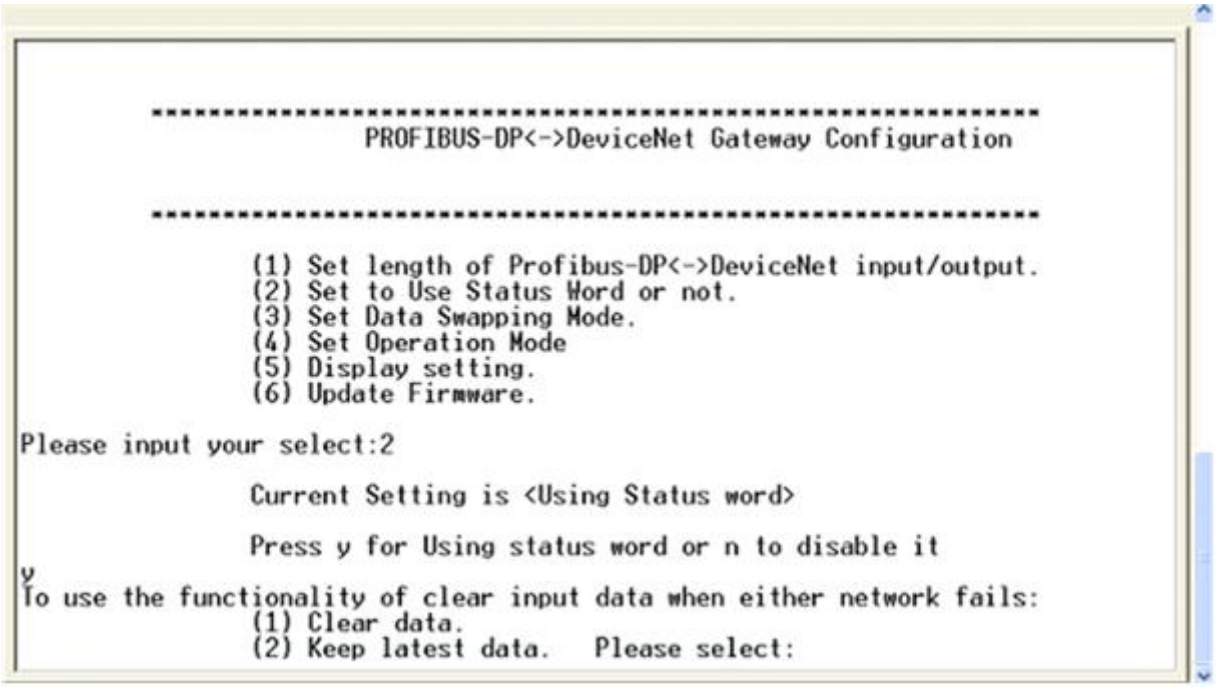
When you enter "y”, it will pop-up "clear or not" option:

Option 1: Clear Data;

Option 2: Not to clear data. Keep Last Data.

Note: When choose not to use status words, input data of breaking network will be cleared forcibly.

As shown below:



6.2.4 Setting Data Exchange Methods

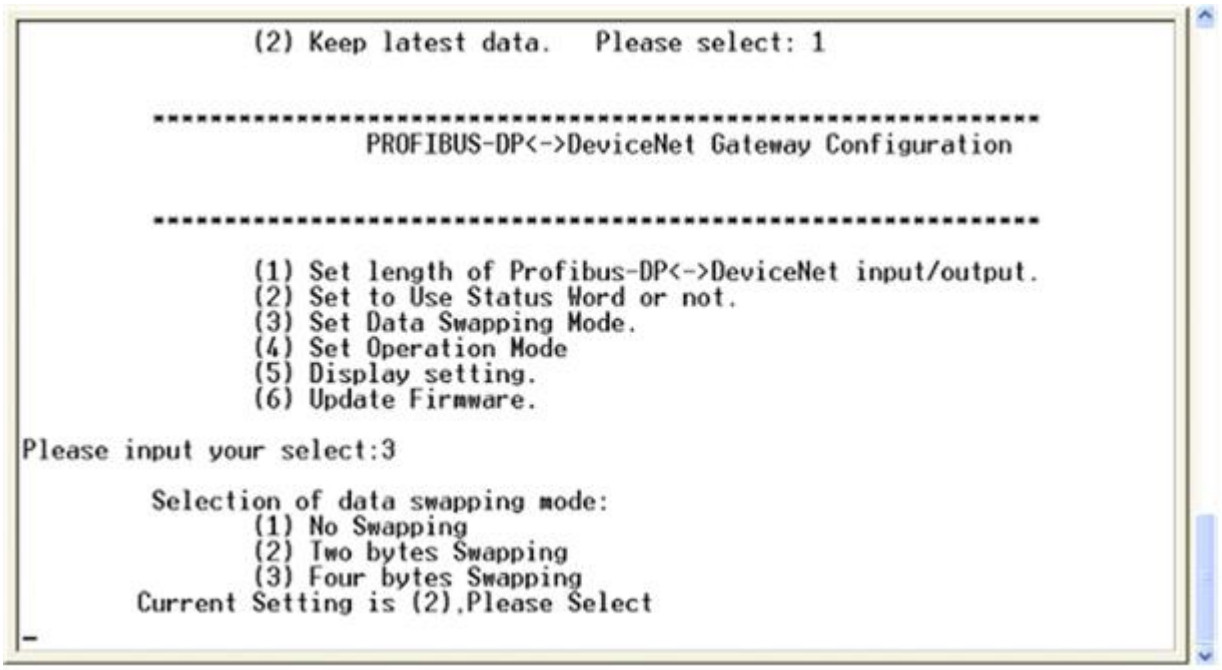
Select 3 in the configuration main page, shows data exchange options and all current configurations. As shown below:

Option 1: No swapping;

Option 2: Two bytes swapping;

Option 3: Four bytes swapping;

Configuration options as shown below:



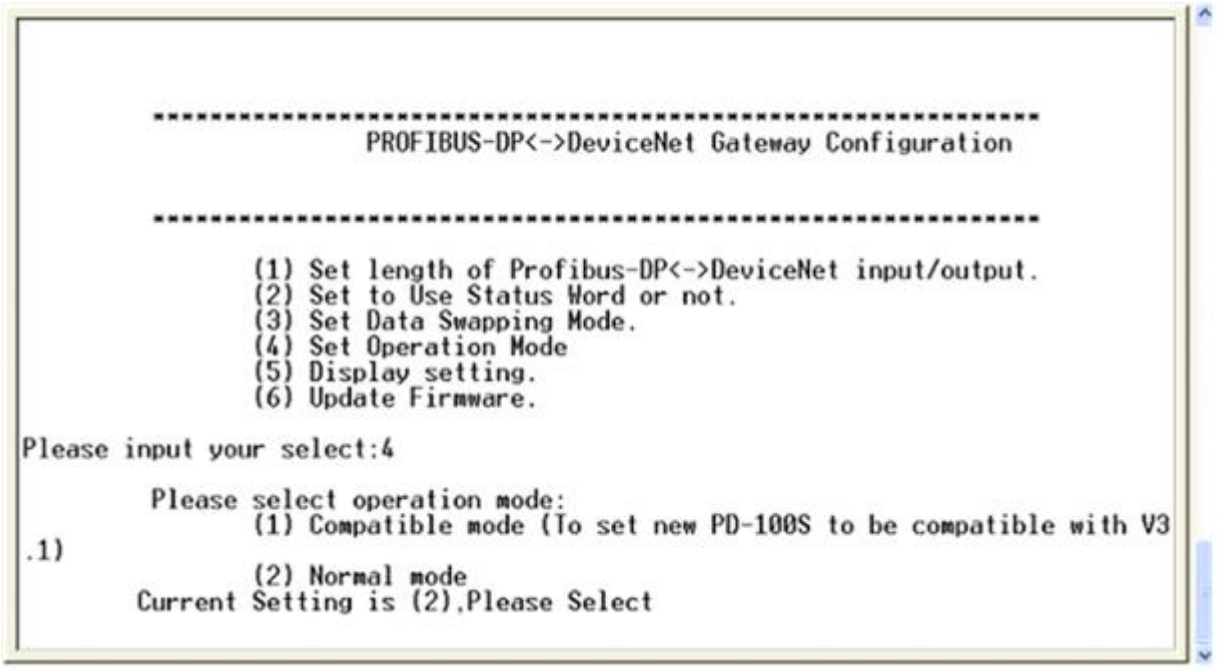
6.2.5 Setting Operation Modes

Selected 4 in the configuration main page and it will show operation mode options and current configurations.

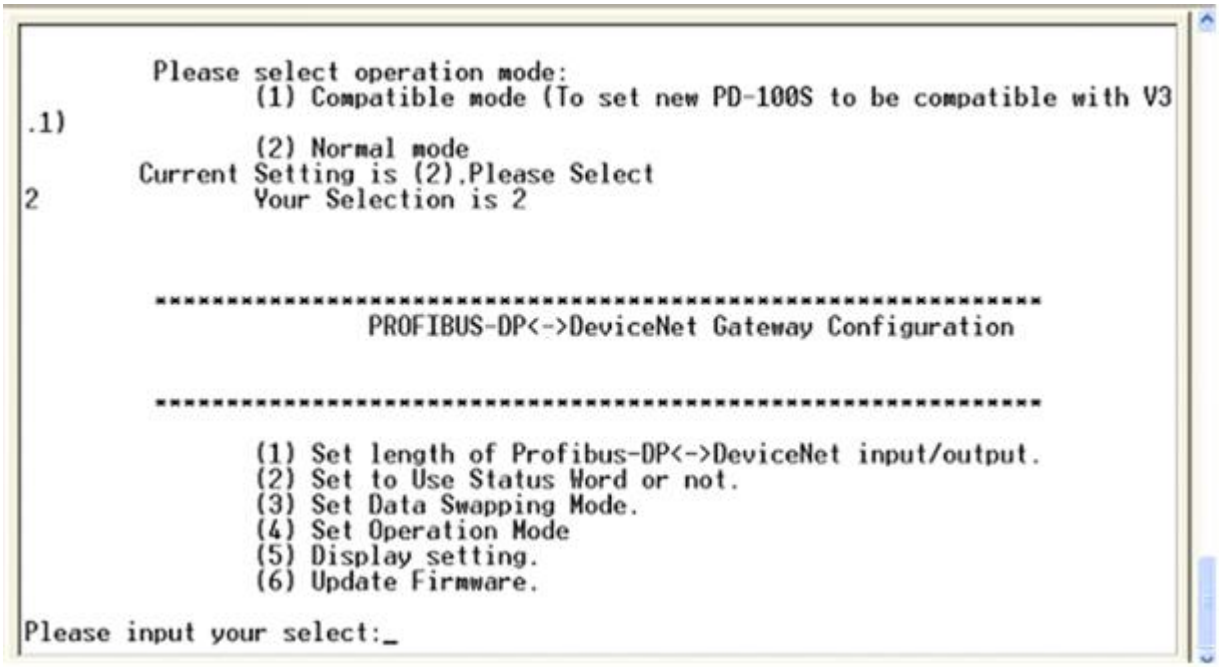
Option 1: Compatible mode (Support GT200-DP-DN V3.1 and user can use EDS file and GSD file of GT200-DP-DNV31);

Option 2: Normal mode (GT200-DP-DN V4.1).

Configuration options as shown as below:



When select "2", it select "Normal mode". As the following picture shows:



6.2.6 Update Firmware

Select 6 in the main configuration page, it shows "Press y to enter the mode to update the firmware. Press any other key to exit".

At this moment, enter "y" to enter the updating firmware mode, enter the other value can exit updating firmware. Enter "y", it will show "Please close the serial port and start the firmware upgrading program", show as below:

Follow the prompts, after disconnecting with the Hyper Terminal, the updating firmware operation can be carried out.

Note 1: After disconnecting with the Hyper Terminal and before updating the firmware, the keyboard cannot be entered any values to prevent these values affect the product firmware via the serial port.

Note 2: Number of input and output bytes of PROFIBUS DP and DeviceNet and data swapping methods which is set in Hyper Terminal can be also configured in the fieldbus network, specifically in the chapter 7 and 8.

Note 3: To exit configuration mode, you just need to set dial switches and rotary switches to a non-zero value, re-power the gateway and the gateway go into the normal operating state.

7 DeviceNet Network Configuration Instructions

After registering the GT200DPDN.EDS to DeviceNet configuration software, users can configure via the software.

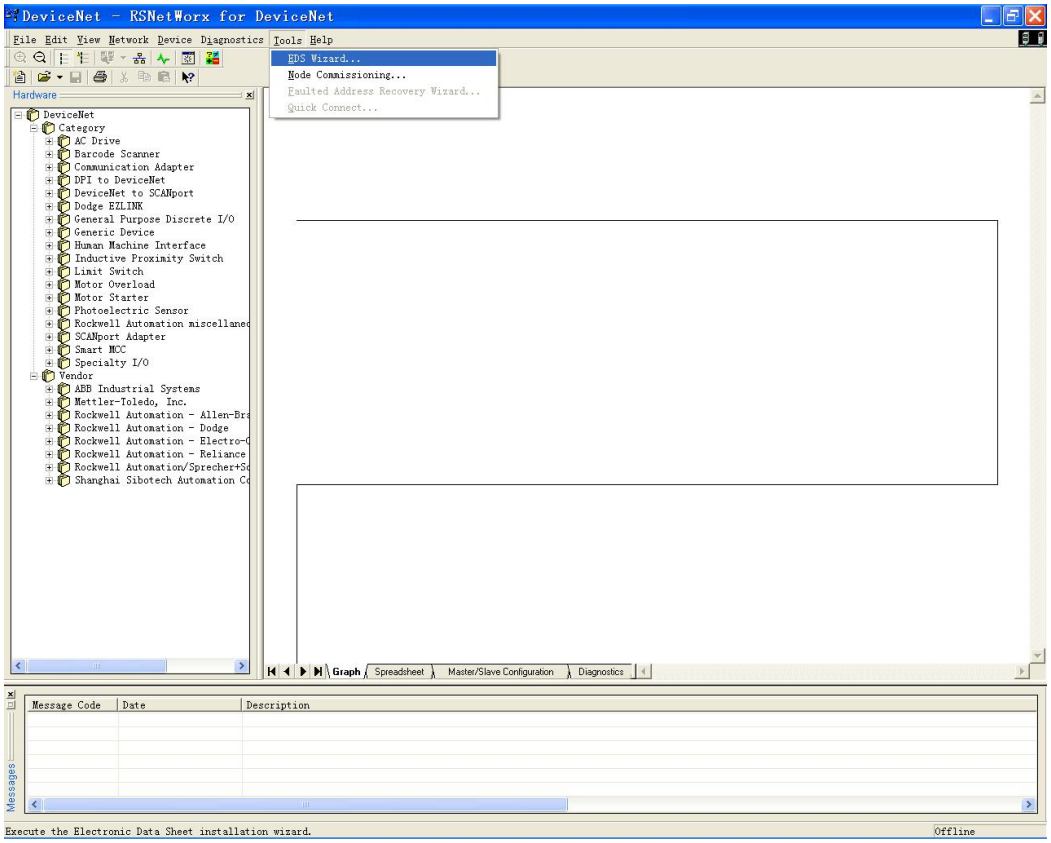
7.1 EDS Register

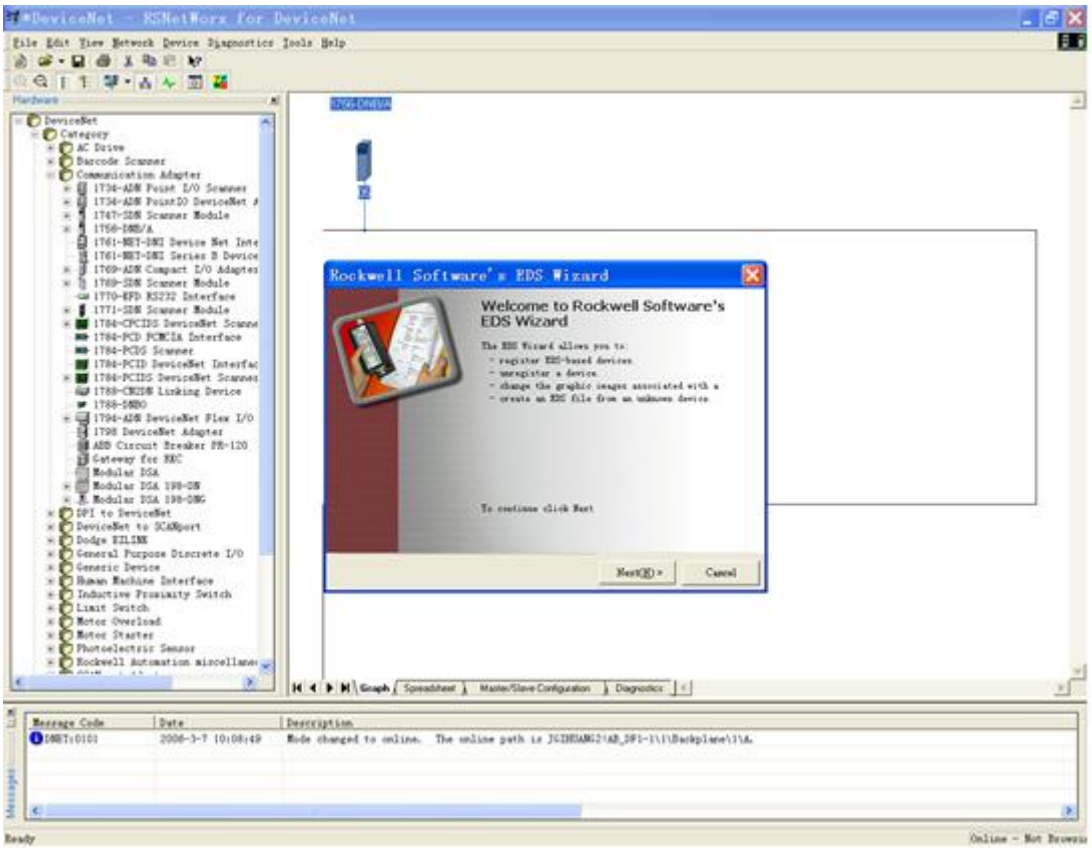
EDS（Electronic Data Sheet）is comprehensive description which supports DeviceNet network function. It equals to equipment's driver of Windows. Users need install EDS files to DeviceNet network configuration software, such as RsNetWorx and so on, and then the configuration can be going on through network 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:


DeviceNet - RSNetWorx for DeviceNet
File Edit View Network Device Diagnostics Tools Help
EDS Wizard...
Node Commissioning...
Faulted Address Recovery Wizard...
Quick Connect...
Hardware
DeviceNet
Category
AC Drive
Barcode Scanner
Communication Adapter
DPI to DeviceNet
DeviceNet to SCANport
Dodge EZLINK
General Purpose Discrete I/O
Generic Device
Human Machine Interface
Inductive Proximity Switch
Limit Switch
Motor Overload
Motor Starter
Photoelectric Sensor
SCANport Adapter
Smart MCC
Specialty I/O
Vendor
Graph
Spreadsheet
Master/Slave Configuration
Diagnostics
Message Code
Date
Description
Messages
Execute the Electronic Data Sheet installation wizard.
Offline


Rockwell Software's EDS Wizard
Welcome to Rockwell Software's EDS Wizard
Next(N) >
Cancel

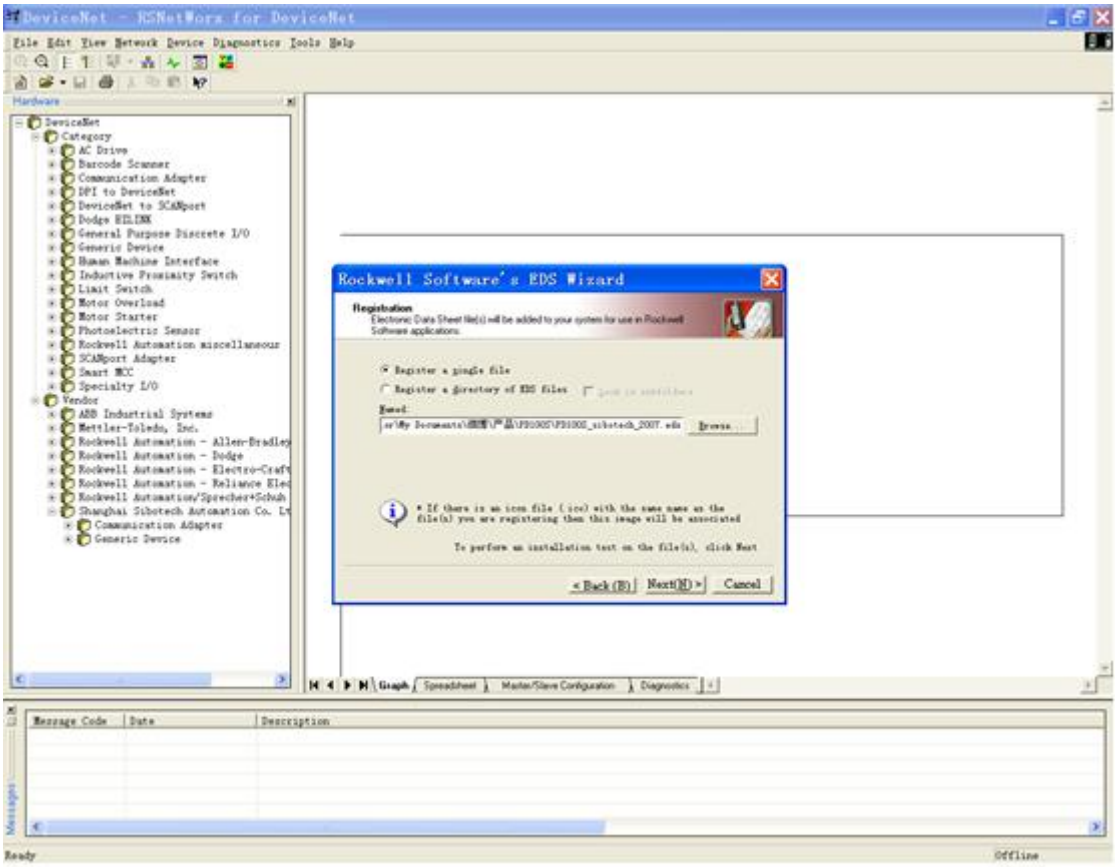
Step3: Select “NEXT”, as follow:

Step4: Install gateway GT200-DP-DN

Shown as above, select “Register an EDS file”, as follow:

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

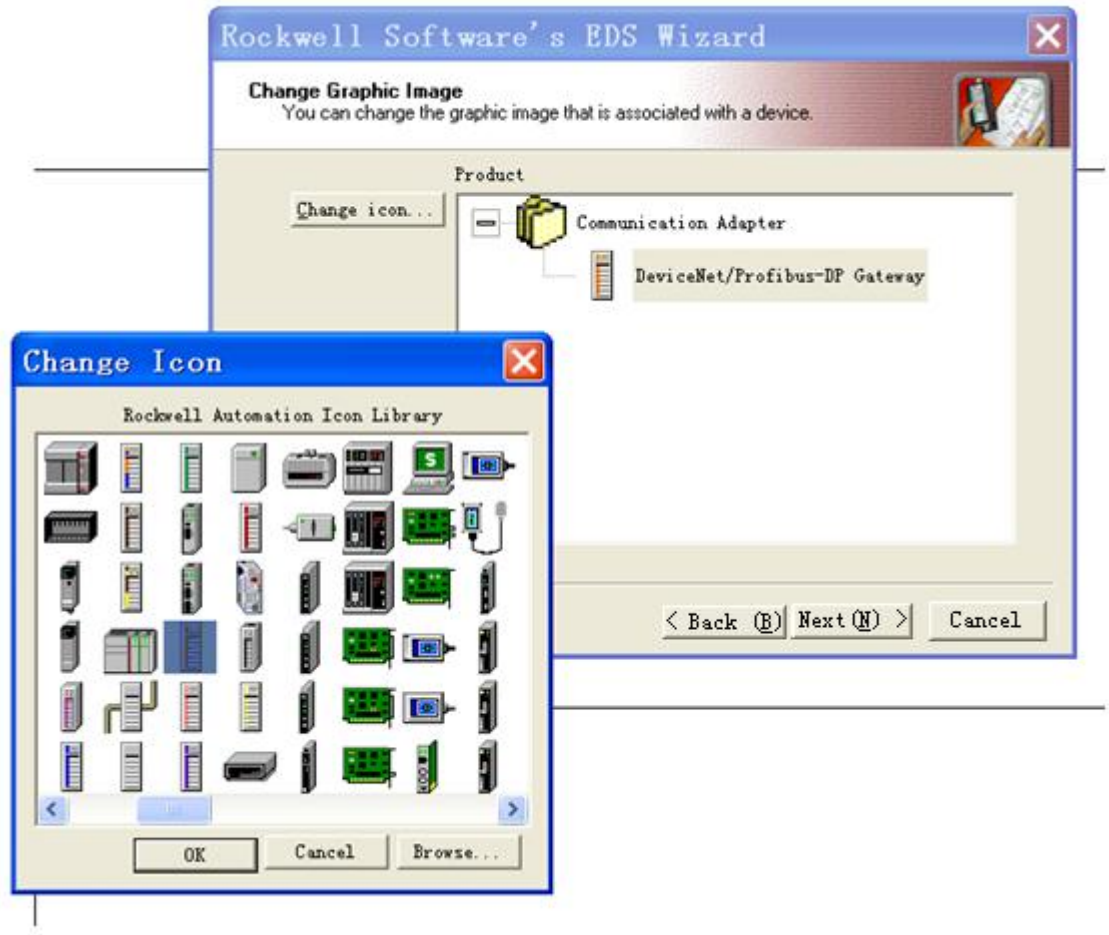
Step 5: Select the file registering to choose



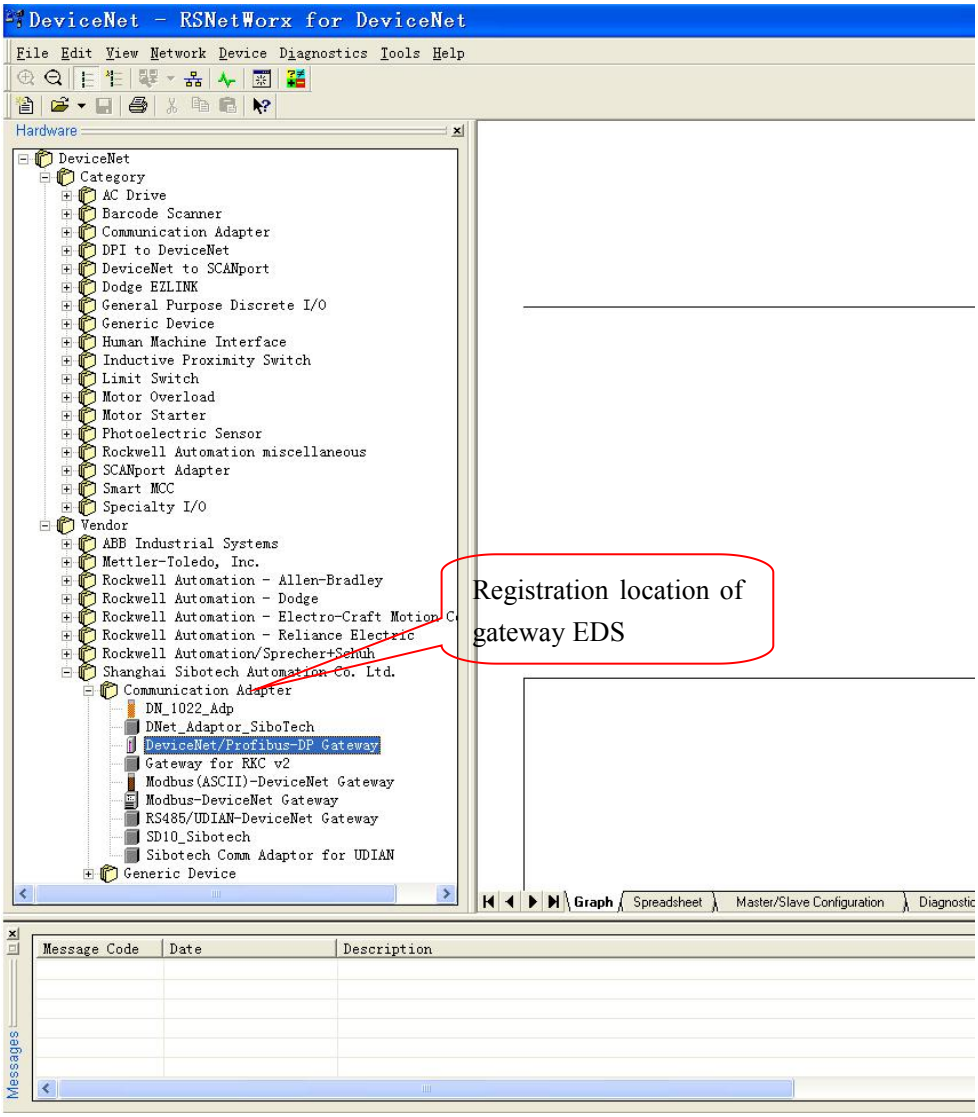
Click "NEXT":

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-DP-DN to DeviceNet network, click “SCAN” button of RsNetWorx , or select “Network-Online” in menu bar, your gateway will be scanned by system and identified exactly.

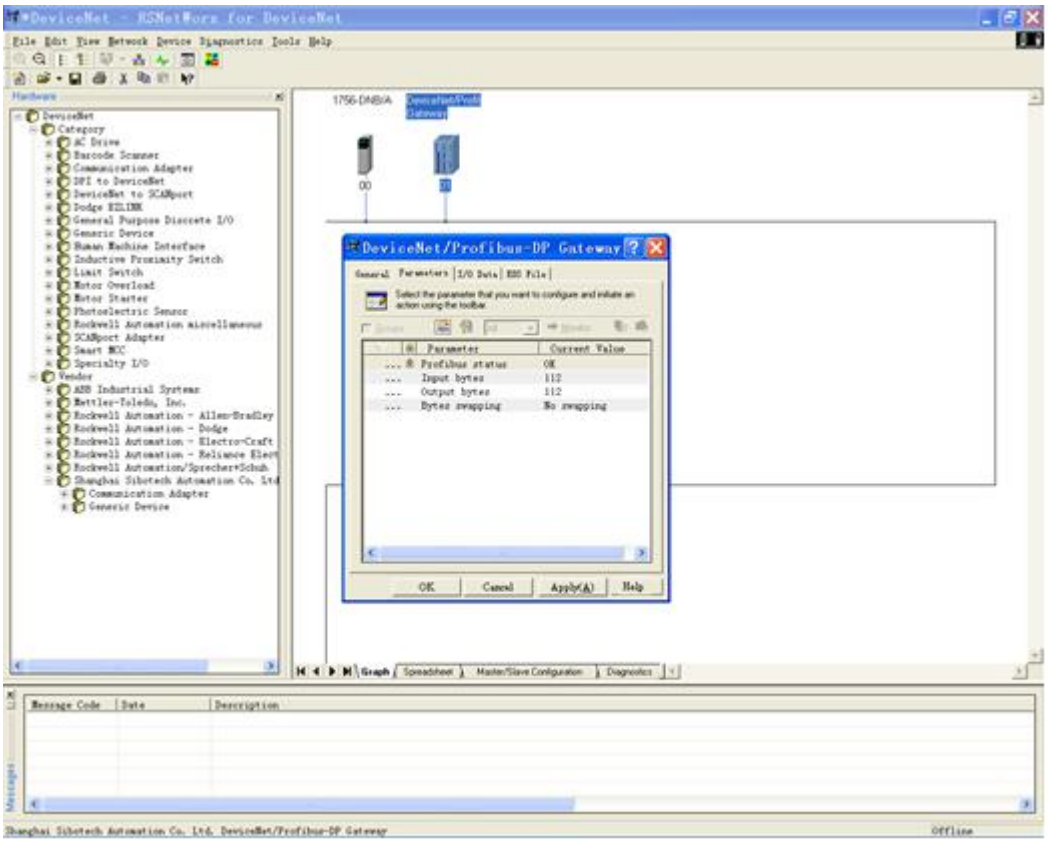
7.2 DeviceNet Parameters Information

You can configure devices online or offline. For details, please refer RsNetWorx manual.

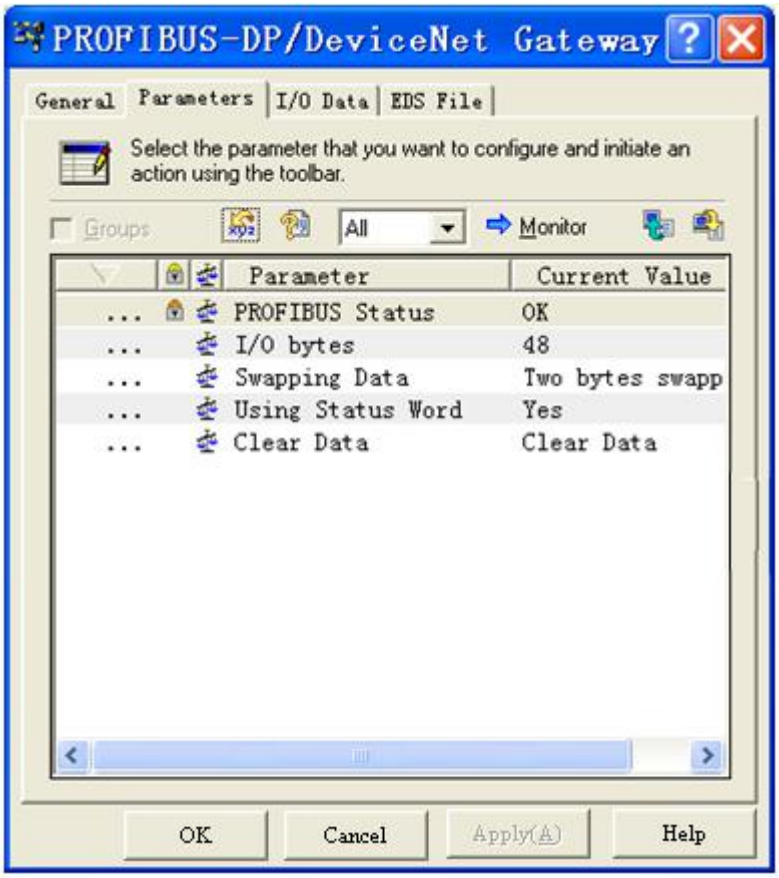
The following configuration demonstrates are in "Offline" status.

From the device catalog, you can find the "DeviceNet / PROFIBUS DP Gateway" in "Vendor" (manufacturing number) and "SST Automation." directory, and drag it into the editing area, select the device

address matching with the actual address, then double-click the device, you will see the following screen:



You can also modify the device address. Click the "Parameter", then you can enter the parameter interface:



This is DeviceNet network configuration parameters interface of a device in RsNetWorx (GT200-DP-DN default configuration).

Note: If you modify number of I/O bytes in the interface, you need re-power the gateway to take the modification effect.

The first parameter is "PROFIBUS status", it shows the current PROFIBUS DP state;

The second parameter is the "I / O bytes", it shows the DeviceNet input and output bytes, 32, 96, 48, 112, 72, 160, 192, 224 bytes are optional, and the default is 48 bytes. You need to restart the gateway after re-setting the parameter and downloading.

Users can accord the actual needs of bytes to choose the length of input and output bytes. After modifying the parameter; users need to pay attention to configure the scan list in 1756-DNB module (DeviceNet Master Module), which is the same with the parameter "I / O bytes".

Note: If you modify DeviceNet input and output bytes here, you have to modify the PROFIBUS DP input and output bytes in PROFIBUS DP configuration interface (PROFIBUS DP master configuration software)! If

you set the parameter is 48/48 bytes here, you must choose "48 byte input 48 byte output" at the PROFIBUS DP side.

The third parameter is "Swapping Data", it shows whether to swap sequencing of the two networks when exchange data, you can select "No swapping" (not swap), "Two bytes swapping" (double-byte swap) and "Four bytes swapping" (4 bytes swap). After downloading the parameters, with immediate effect, power-down can be saved. The default is double-byte swap.

Note: If the mapping data is multi-byte variable, which being transmitted by PROFIBUS DP is high-byte first, while being transmitted by DeviceNet is low-byte first, you need exchange the sequence of bytes. Some devices, such as PLC of GE which has data swapping function. Users can turn on this function according to their needs.

GT200-DP-DN also has data swapping function; you can choose "No swapping", "Two bytes swapping" or "Four bytes swapping".

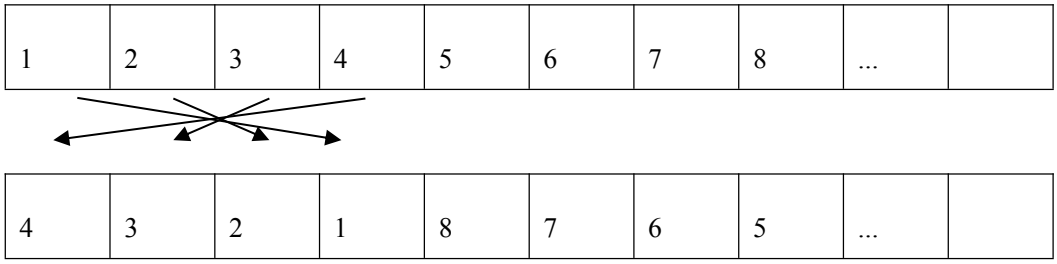
For example: Select the “Two bytes swapping”

DeviceNet output:

Input data of PROFIBUS DP.

For example: Select the “Four bytes swapping”

DeviceNet side output:



Input data of PROFIBUS DP.

Note: If the mapping data is multi-byte variable, which being transmitted by PROFIBUS DP is high-byte first, while being transmitted by DeviceNet is low-byte first. This is determined by protocol. Users may need to exchange data sequence.

Note: When the fourth parameter is “Using status word”, the last two bytes of the input data is the status word. The last two bytes do not exchange sequence.

The fourth parameter is "Using Status Word", whether to use the status word or not: "Yes" shows using the status word, "No” shows not using the status word. The default is "No”.

The fifth parameter is the "Clear Data", whether to clear input-data of breaking network or not: "Clear Data" shows that it will clear the input-data of breaking network, "Keep Last Data" shows that it will not clear the input-data of breaking network. The default is "Clear Data".

Note: When the fourth parameter is "No", the fifth parameter is forced to "Clear Data”, which is clearing input-data of breaking network. At this point, if the choice is "Keep Last Data", download and re-upload, the parameter is still "Clear Data".

7.3 Configure PLC’s I/O Scan List

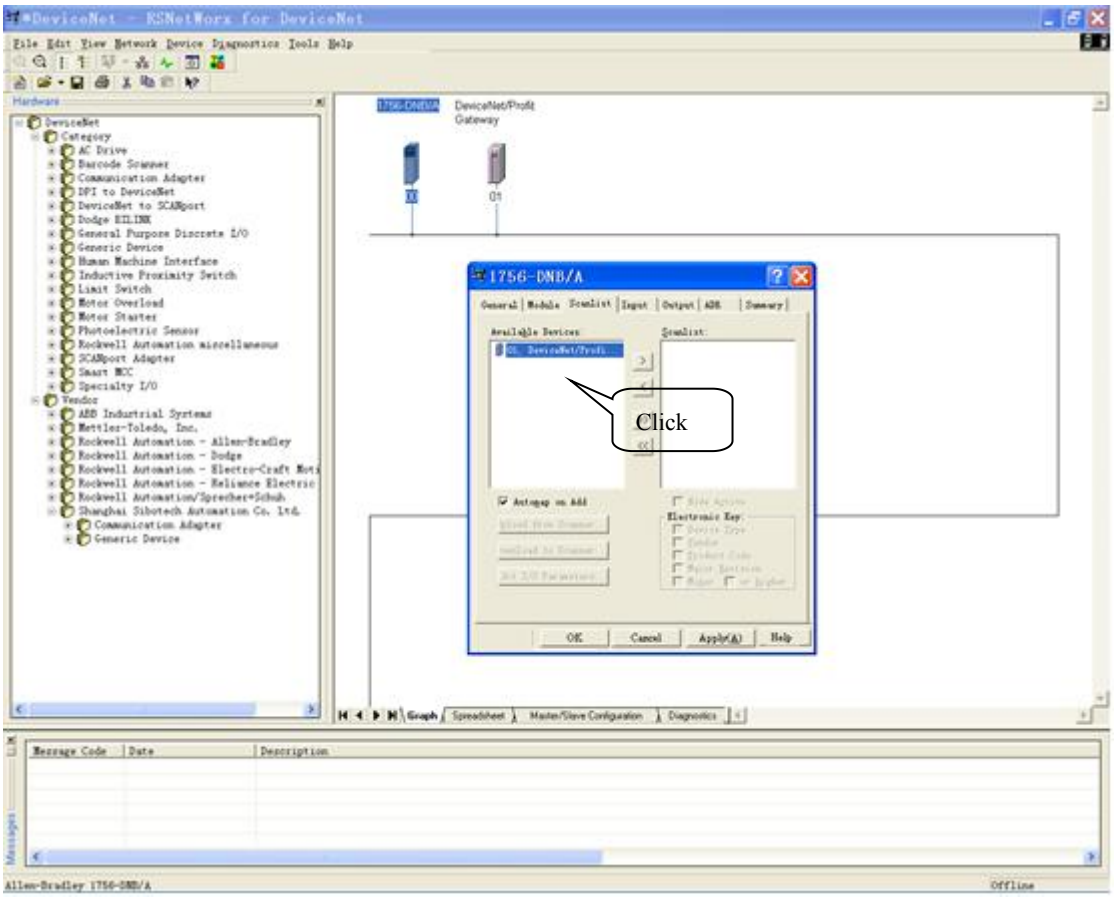
This section briefly describes how to configure scanning parameters list of RSLogix5000 +1756 / DNB through RsNetWorx.

PLC platform: Rockwell’s ControlLogix5555

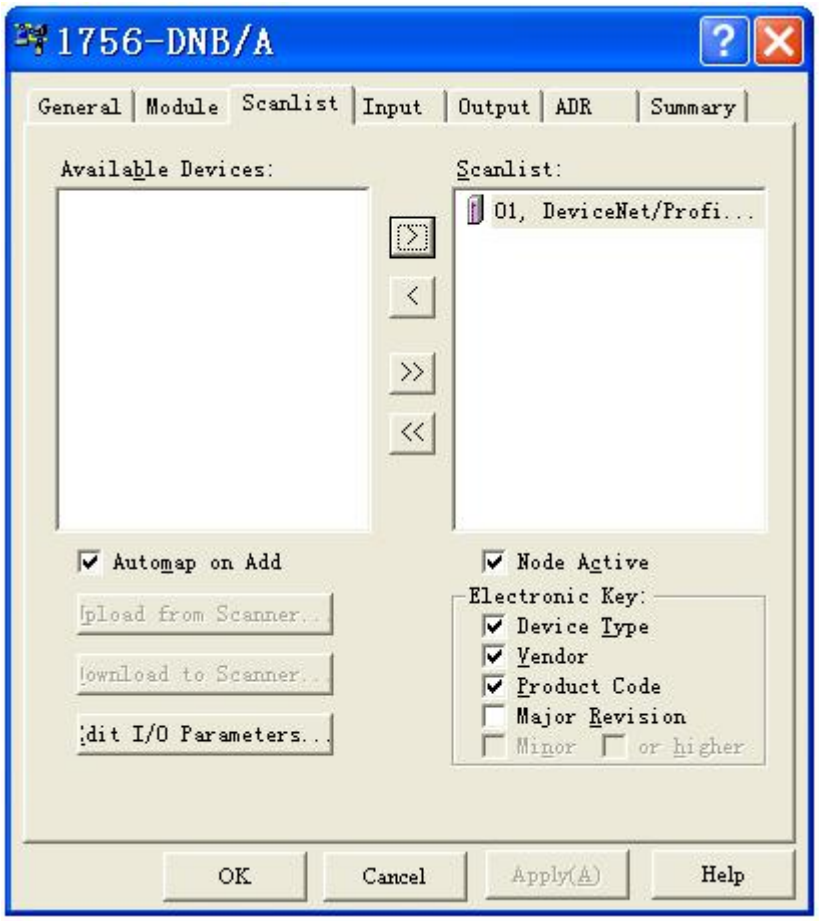
DeviceNet interface card: 1756DNB

Configuration software: RsNetWorx

Step one: Open the parameters page of 1756DNB and go into the "Scan list" tab.



Step two: In this interface, select the device being added to the scanning list, then click the arrow button, and then you can see:

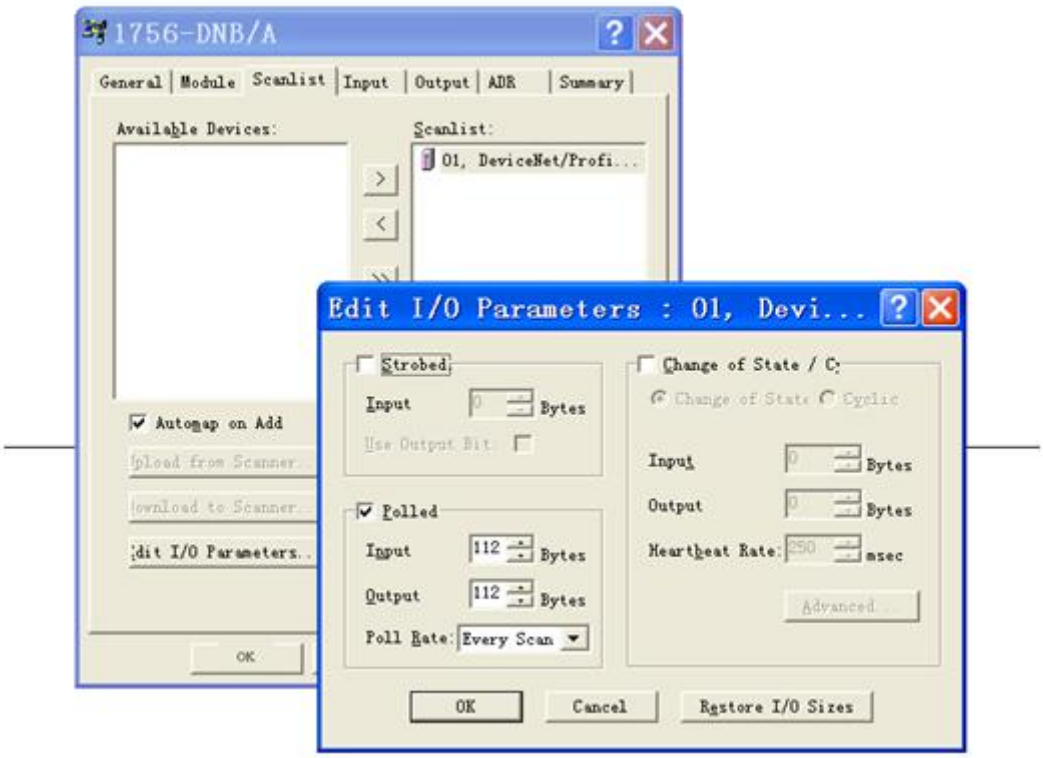


Device is in the scan list of 1756-DNB DeviceNet Master.

If you know how to configure the DeviceNet, you can click on the "Edit I / O Parameters ..." and modify parameters, or click the confirmation directly, and add all the devices to the scan list.

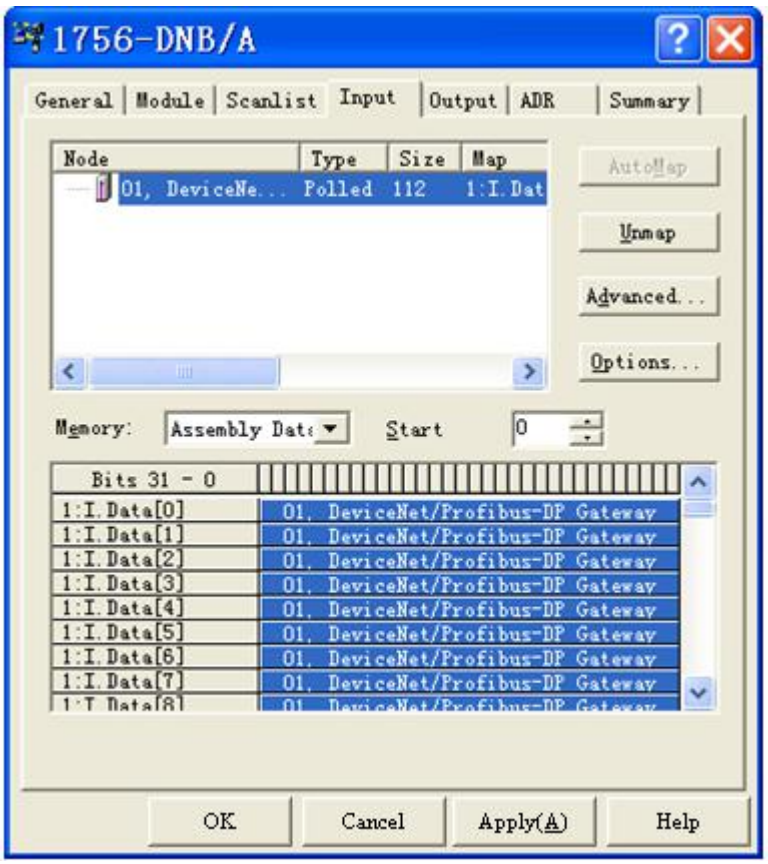
After clicking the "Edit the I/O Parameters..." , you will see the diagram below, users can set the I/O data input and output mode: Polling, Cyclic, Change of state and so on. Users can also select the input / output bytes.

Note: The number of input and output bytes is a key! PLC / DeviceNet master will check input and output bytes here with the actual response of the device when establish a connection. If the number of bytes is not the same, the DeviceNet I / O connectivity cannot be established, it cannot be input and output.



Step three: Confirm input and output mapping.

Users can see Input and Output Properties page; here is the settings on how DeviceNet I / O information of device be associated with 1756DNB memory. Generally use the default settings (Auto-map).

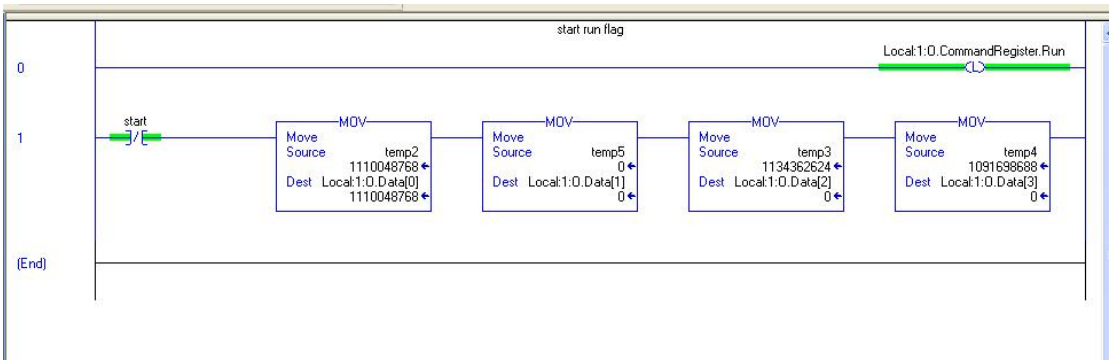


Step Four: Download the appropriate scan list to 1756DNB according to the prompts.

Step Five: Preparing corresponding program, download it to ControlLogix, then change the PLC state to run, if the be in the programming status, PLC take DeviceNet I / O scanning, cannot output data (IDLE), but only can input data.

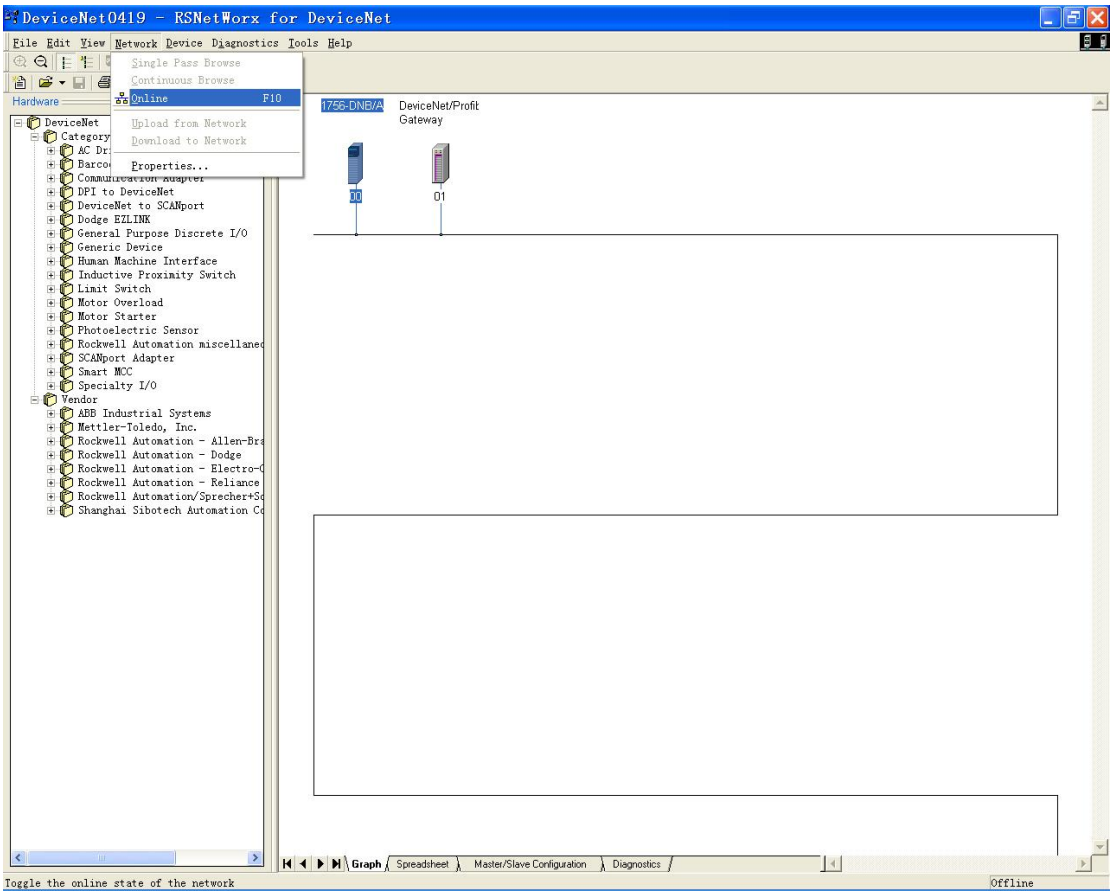
Note: When 1756DNB is in developing PLC program, you need to set a run control bit of 1756DNB to 1.If the module's position in the rack is 1, the bit is Local: 1: O.CommandRegister.Run.

Ladder Example:

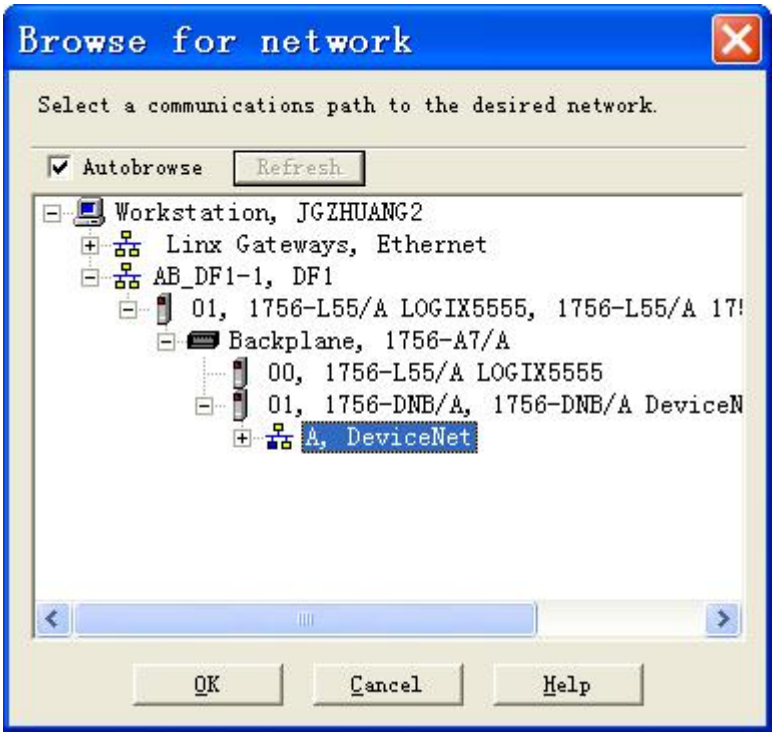


7.4 Select Online Path

From offline to online, users need to select the path.



According to actual configuration options, users can select the path, the next map is using serial port (DF1) .



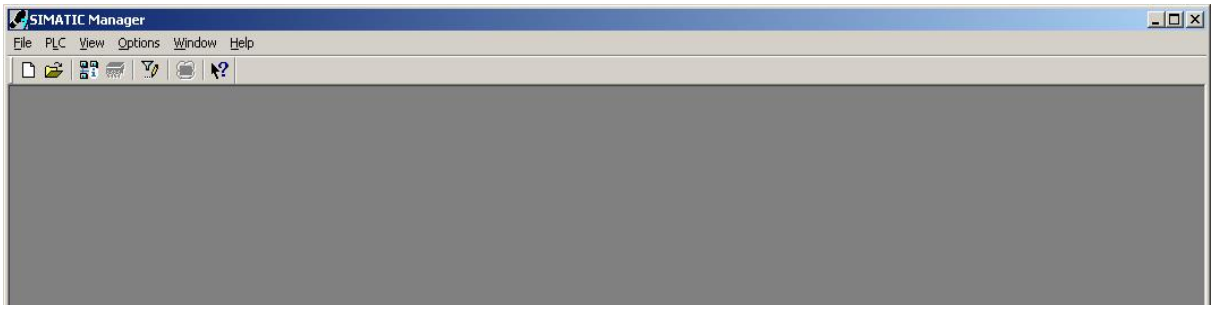
Users have any further questions, please reference RsNetWorx user manual.

8 PROFIBUS DP Network Configuration Instruction

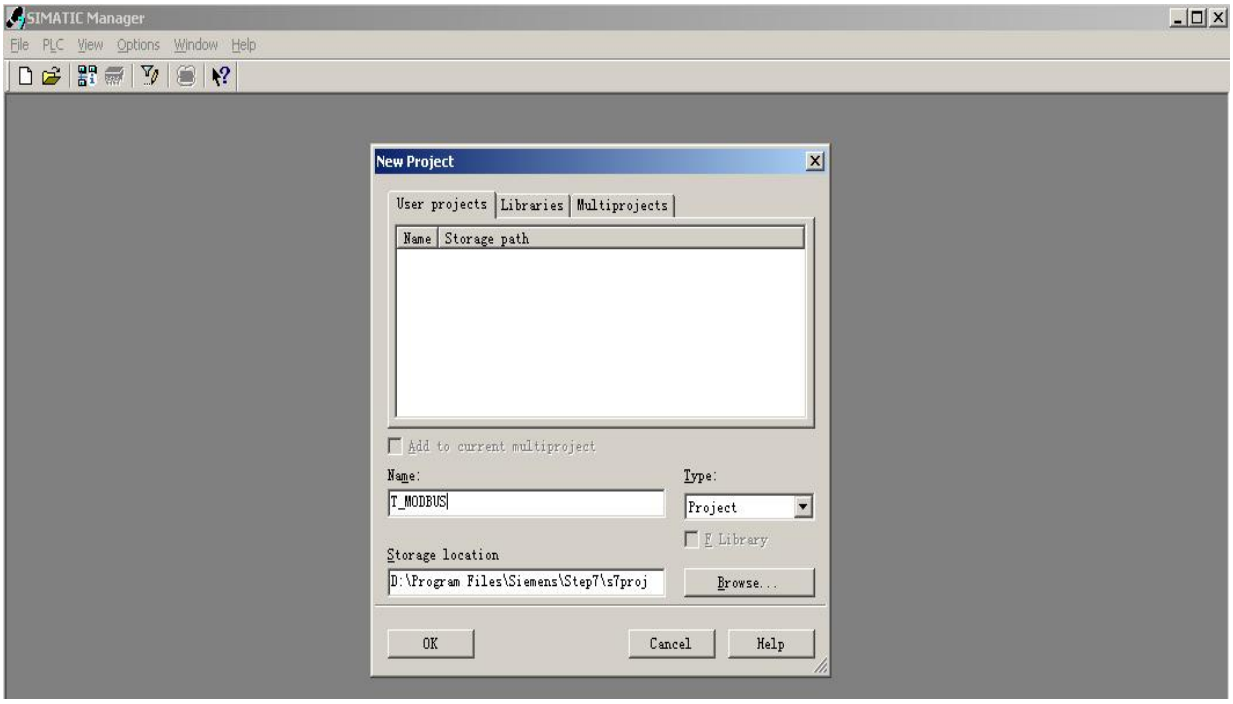
The following content explains how to use STEP7 to set GT200-DP-DN.

First, copy *.gsd file to the following path: ***Step7\S7data\gsd***

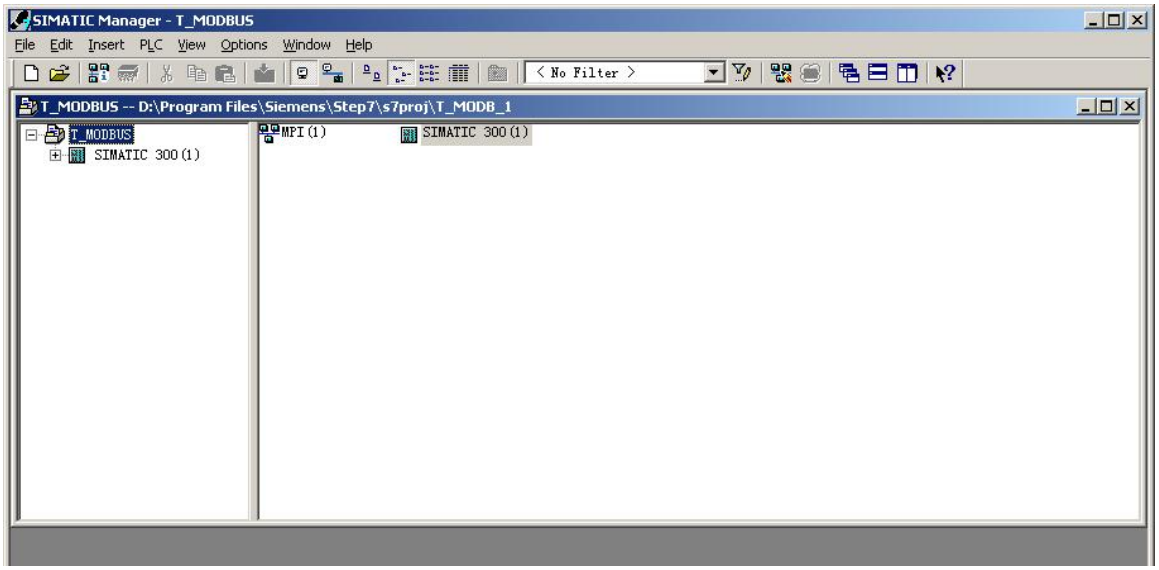
1. Open SIMATIC Manager :



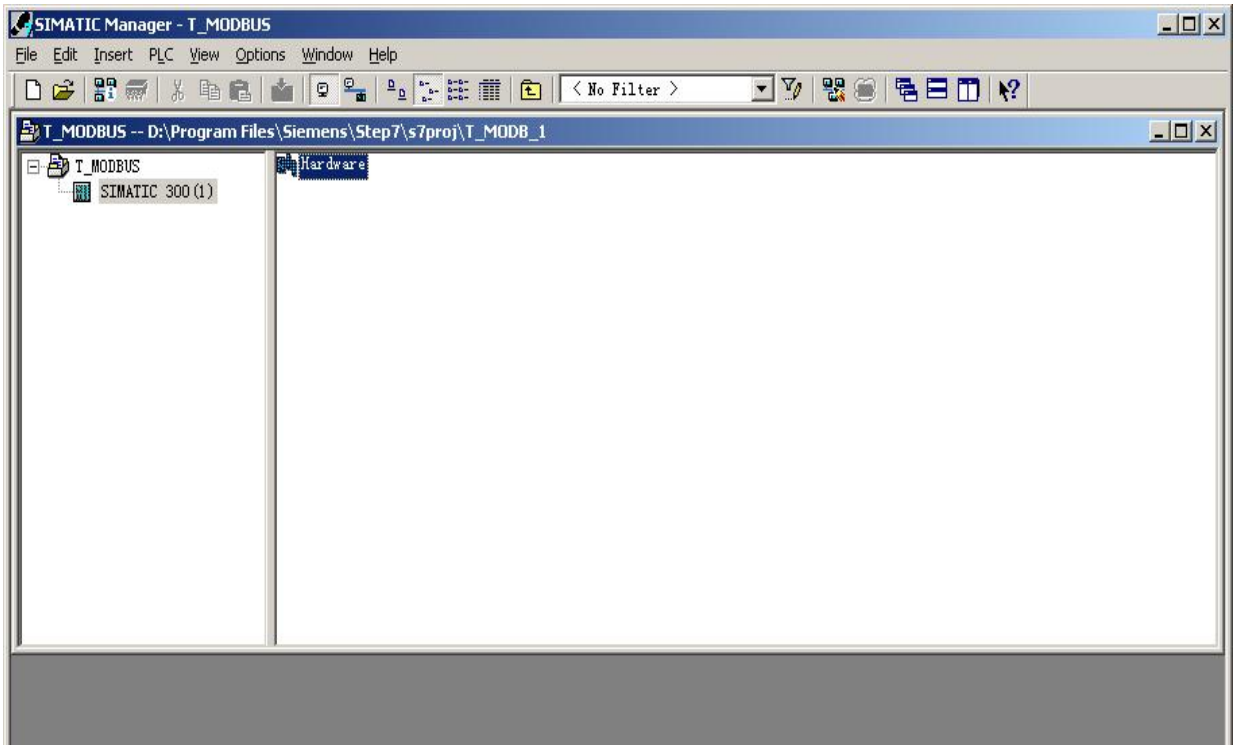
2. Click File->New, create a new file:



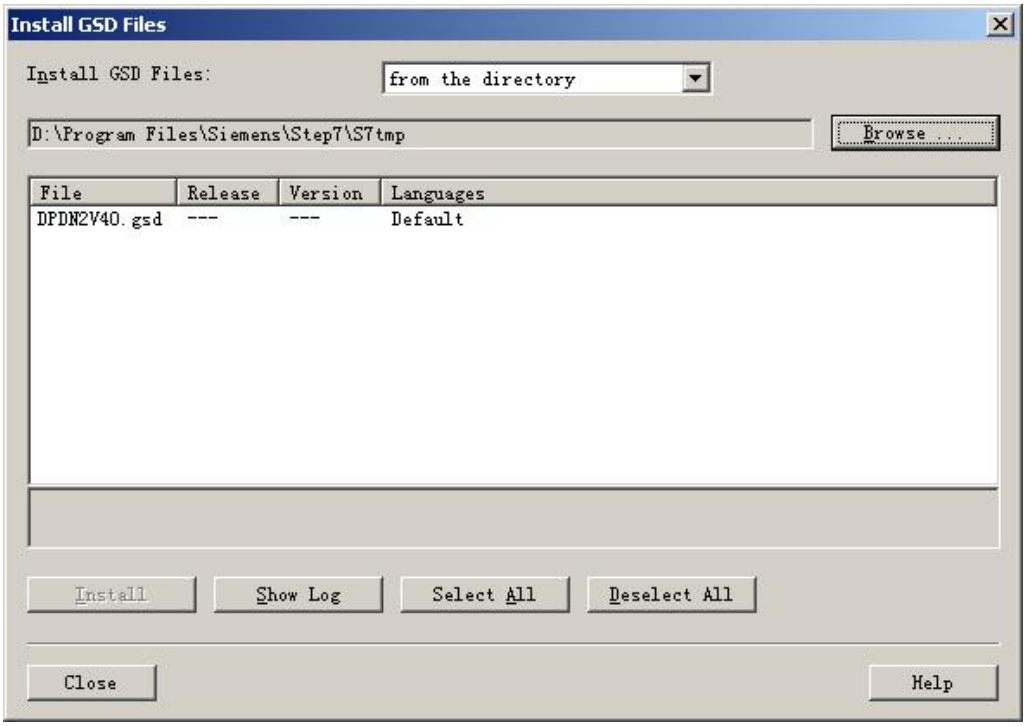
3. Insert->Station->SIMATIC 300 Stations:



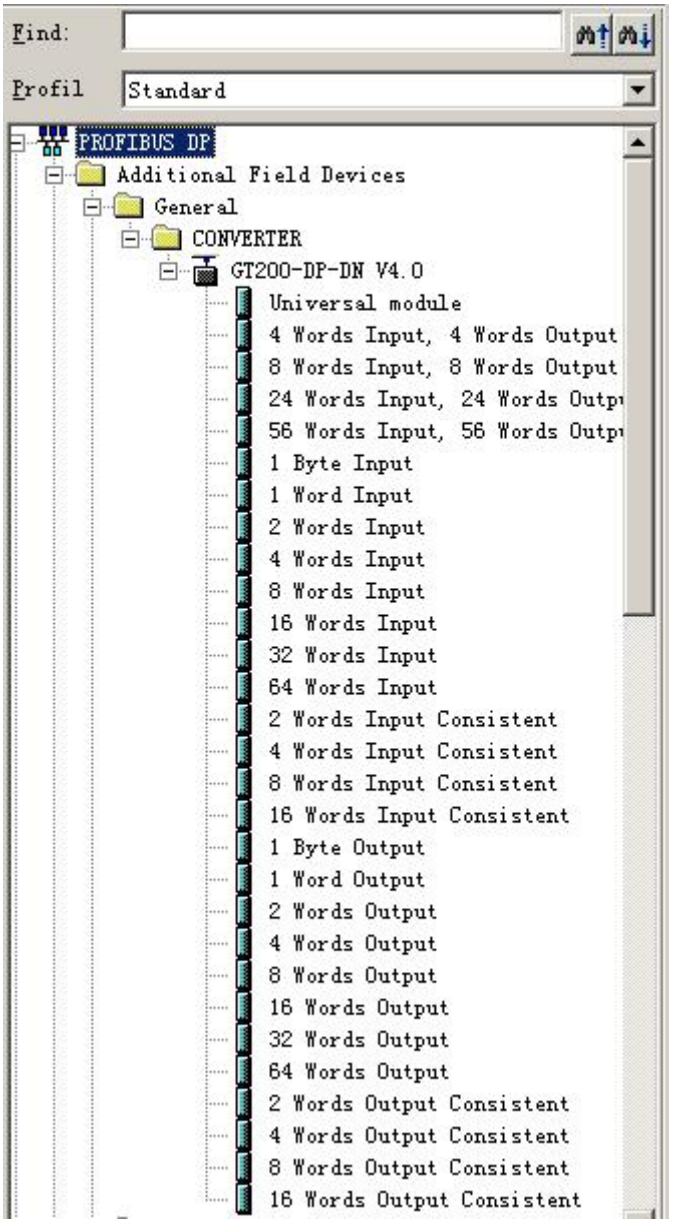
4. Open S7 PLC hardware configuration: SIMATIC 300(1) ->Hardware, double click:



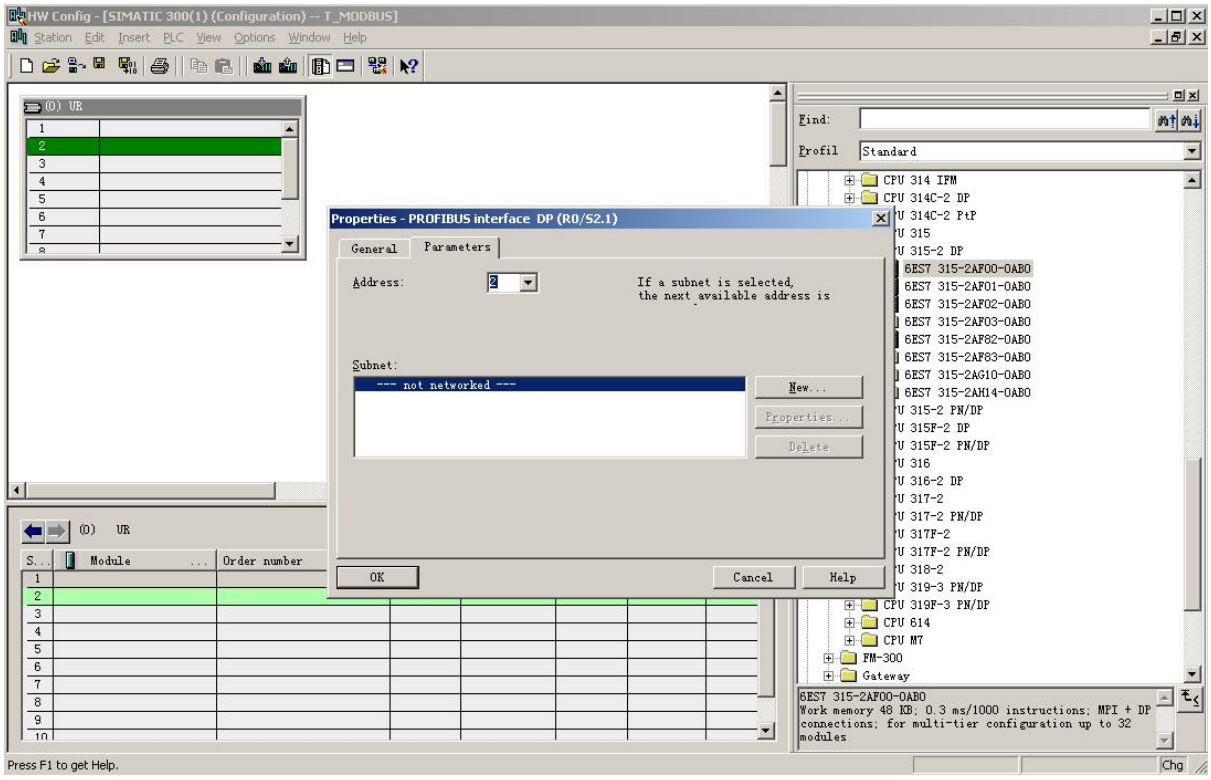
5. Click Options-> Install GSD File, and install GSD of GT200-DP-DN:



Copy the GSD file in the relevant directory, select and register, you can find your registered device in the hardware configuration interface, the right the window of the hardware configuration interface/ PROFIBUS DP / Additional Field Devices/Converter/GT200-DP-DN, as shown as below:

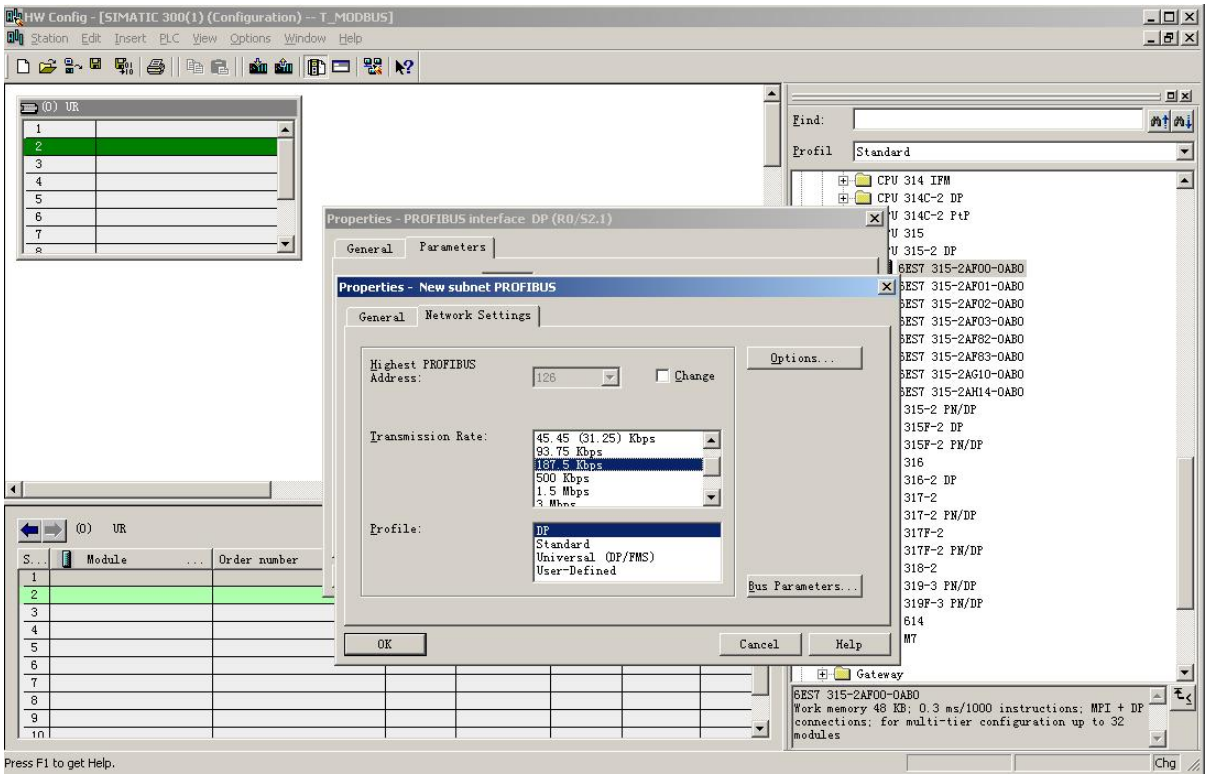


6. Set PLC rack, double-click “Hardware Catalog\SIMATIC 300\RACK-300\Rail”:

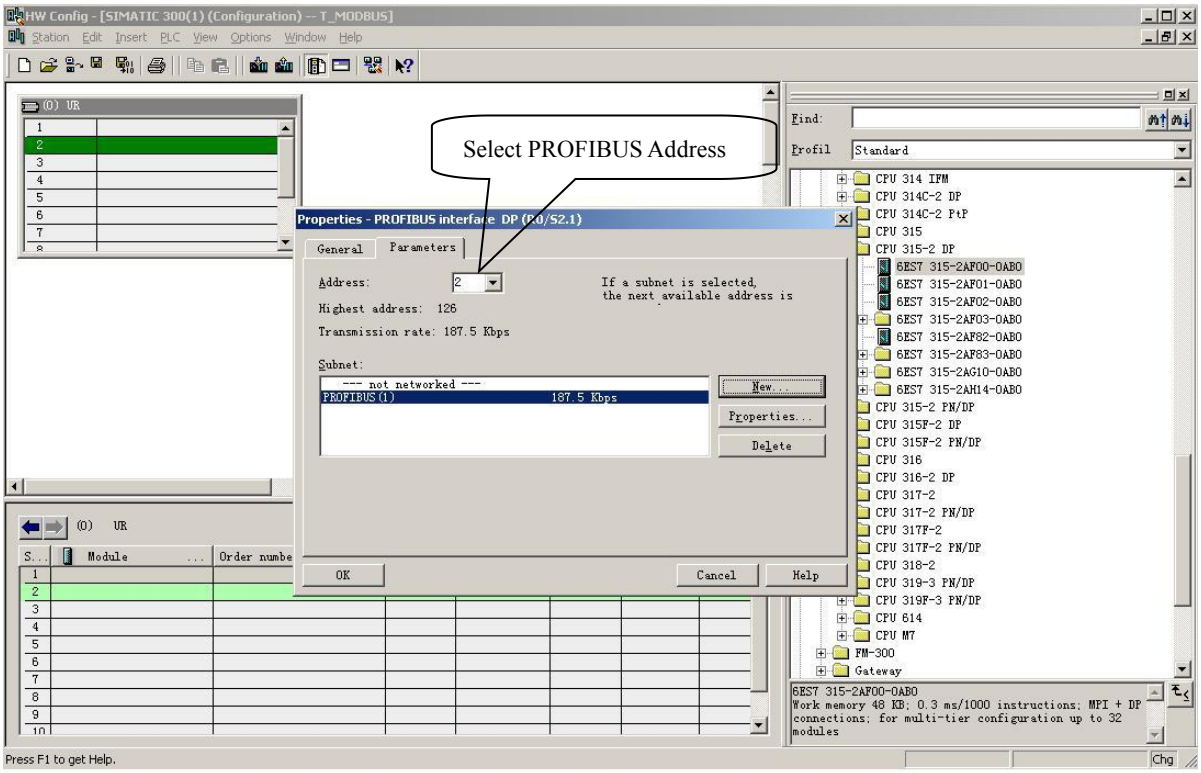


7. Set CPU module, choose the corresponding device types and the occupied slots;

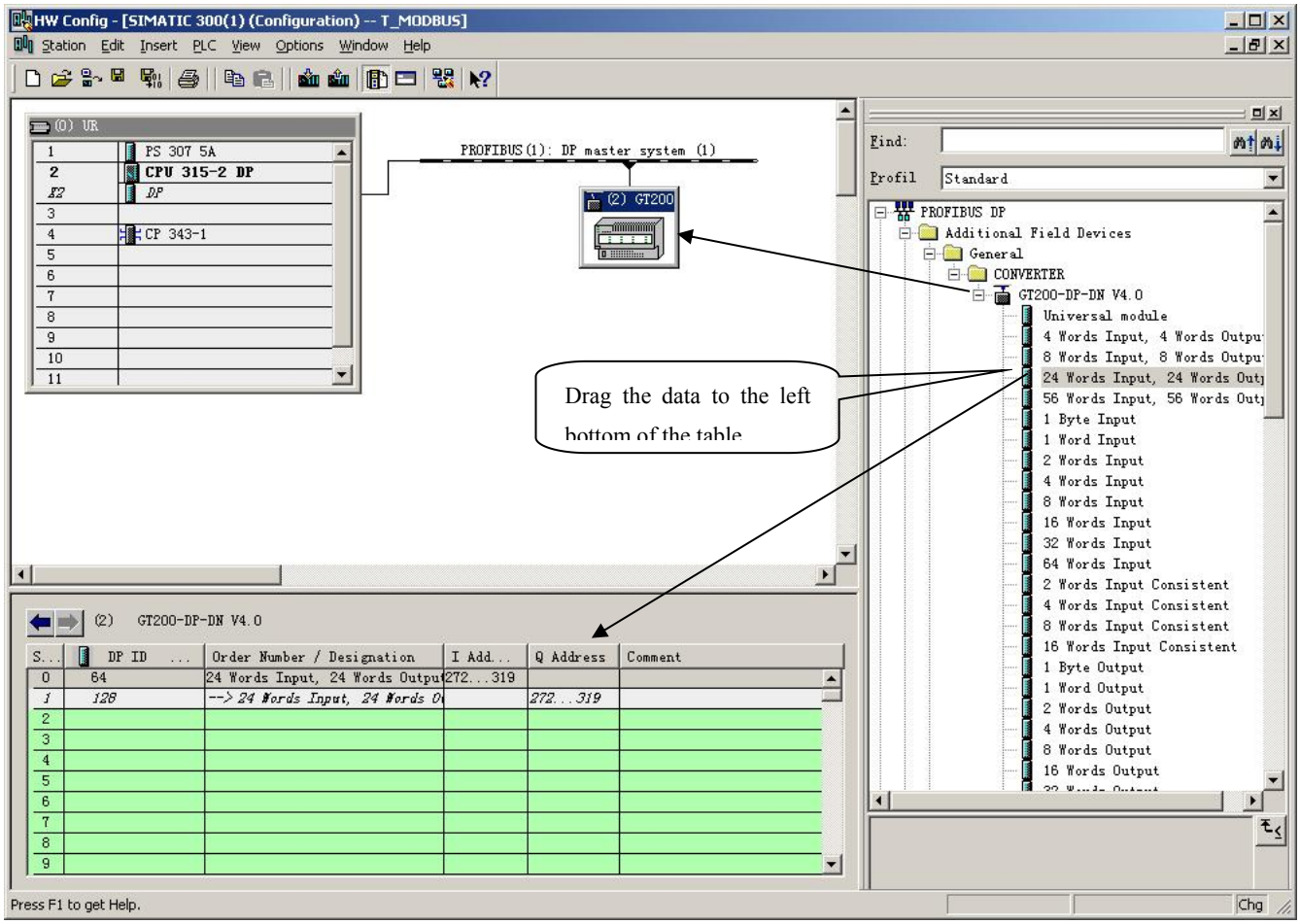
8. Create PROFIBUS DP network, set PROFIBUS DP: New->Network settings, choose “DP”, choose a kind of baud rate as 187.5Kbps, then click “OK”. Double-click it:



9. Choose address of PROFIBUS Master station:



10. Configure GT200-DP-DN to PROFIBUS Network, and map the I/O module to S7-300 or other controller's memory.



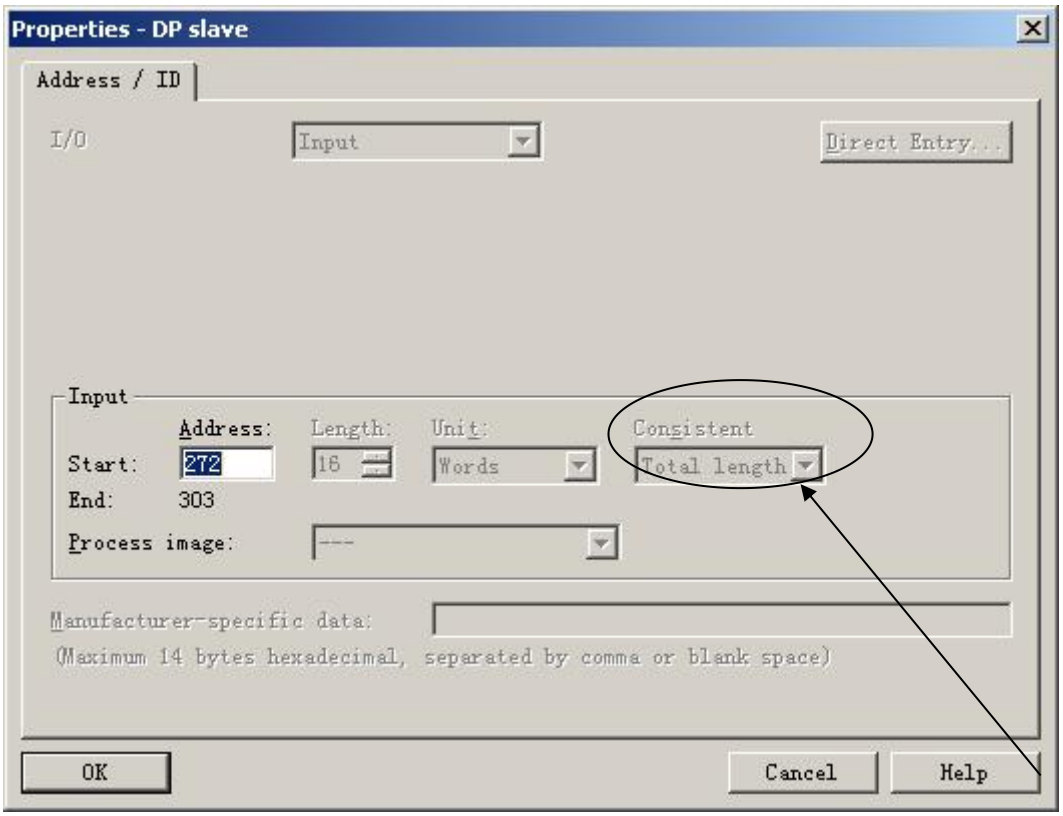
Operation includes two steps. The first step is moving GT200-DP-DN to the left and up area, (PROFIBUS DP bus), the mouse will change sharp, it means you can move it in. The second step is moving data to left and down data mapping table, (PLC memory).

Note: Number of GT200-DP-DN can be 32-byte input and output, 96-byte input and output, 48-byte input and output and 112-byte input and output. If the gateway is configured to 48 bytes input / output in Hyper Terminal or DeviceNet configuration interface, you need take "48 Byte In, 48 Byte Out" into the data mapping table. If you drag the data block does not match the configuration of the gateway, PROFIBUS DP connection cannot be established.

The factory configuration of number of bytes is "48 Byte In, 48 Byte Out".

Note: Slave station's address should be the same with the setting of module's dial switches!

11. As shown above, right-click input and output mapping of the slot, set the relevant property, as shown below:



You can set input and output mapping area start address in the page. When the setting is "32 bytes input and output", the consistent is "Total length".

12. Compile and download the configuration to the PLC.

9 How Step7 read and write Gateway Data

Data blocks which use “Total Length” as “consistent” are shown as follow:

2 Words Input Consistent

4 Words Input Consistent

8 Words Input Consistent

16 Words Input Consistent

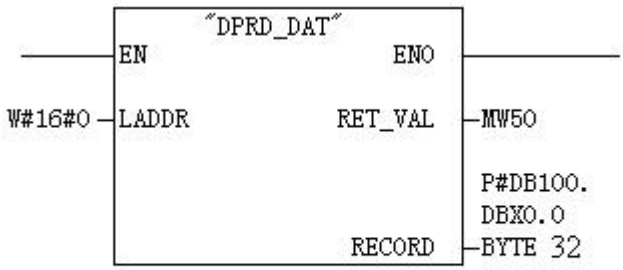
2 Words Output Consistent

4 Words Out put Consistent

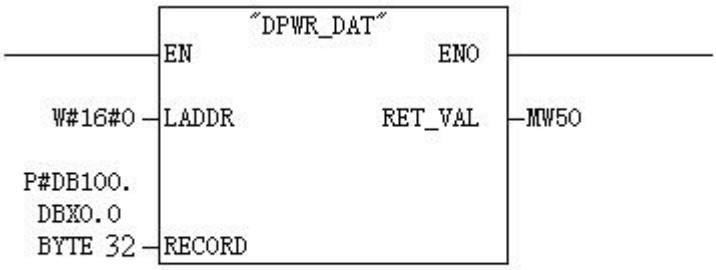
8 Words Out put Consistent

16 Words Out put Consistent

In the Step7 program, you need use SFC15 (packaged sent) send data and use SFC14 (packaged receiver) receive data.



SFC14



SFC15

Data blocks which use “Words” as “consistent” are shown as follow:

4 Words Input, 4 Words Output
8 Words Input, 8 Words Output
24 Words Input, 24 Words Output
56 Words Input, 56 Words Output
1 Byte Input
1 Word Input
2 Words Input
4 Words Input
8 Words Input
16 Words Input
32 Words Input
64 Words Input

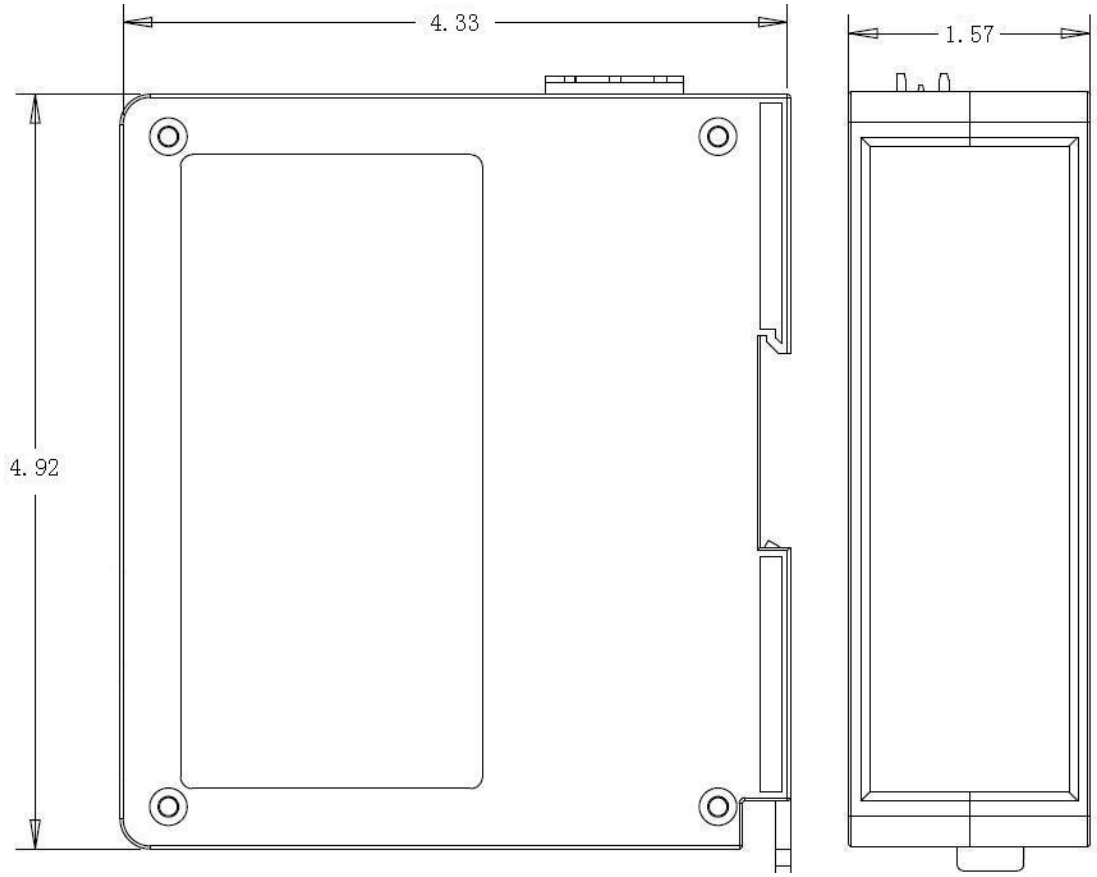
1 Byte Output
1 Word Output
2 Words Output
4 Words Output
8 Words Output
16 Words Output
32 Words Output
64 Words Output

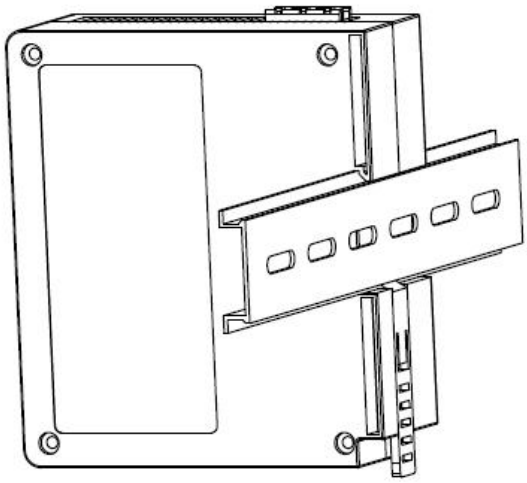
In Step7 program, you can use “MOVE” instruction read and write data.

10 Installation

10.1 Machine Dimension

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



10.2 Installation Method

35mm DIN rail