

# PROFIBUS DP / Modbus TCP Gateway GT200-DP-MT

## User Manual

V 2.2

Rev A



*SST Automation*

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# **GT200-DP-MT** **PROFIBUS DP/Modbus TCP Gateway**

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# 1 Product Overview

## 1.1 Function

Connects Modbus TCP devices to PROFIBUS DP network, and establishes communication between them.

## 1.2 Features

- Ethernet interface (Modbus TCP client / Modbus TCP server) and a PROFIBUS DP slave interface
- Ethernet 10/100M adaptive
- IP address conflict detection
- Support DHCP, BOOTP and static setting
- Support standard Modbus TCP client and slave protocol
- I/O data monitoring capabilities
- Easy-to-use configuration software SST-EP-CFG

## 1.3 Technical Specification

- [1] Support PROFIBUS DP V0 protocol.
- [2] PROFIBUS DP slave, baud rate adaptive, maximum baud rate 12M.
- [3] PROFIBUS DP max input data bytes is 244 bytes and output data bytes is 244 bytes, input + output data bytes is 488 bytes.
- [4] As a Modbus TCP client, it can support visiting Modbus TCP server of at most 36 different IPs or different unit IDs.
- [5] As a Modbus TCP client, it can support the function code: 01, 02, 03, 04, 05, 06, 15 and 16.
- [6] As a Modbus TCP server, it can support up to 36 TCP connections.
- [7] As a Modbus TCP server, it can support the function code: 03, 04, 06 and 16.
- [8] PROFIBUS DP interface: 1KV photoelectric isolation.



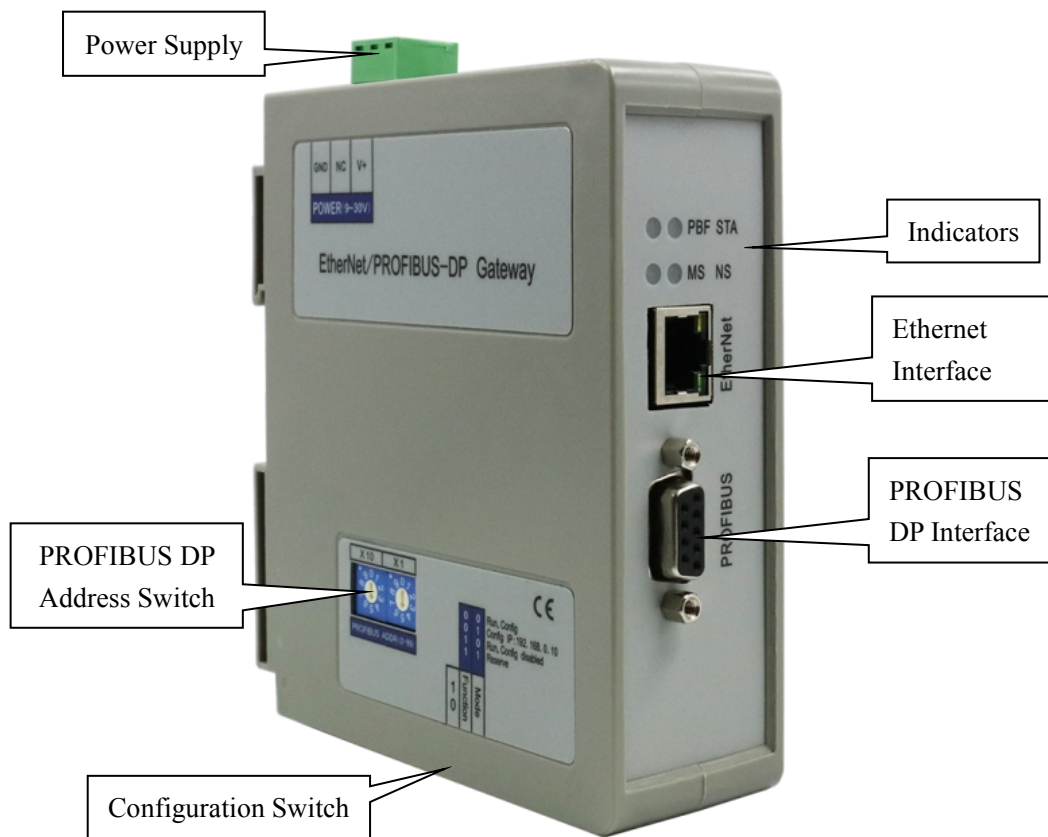
- [9] Power supply 24VDC (11V to 30V), 160mA (24VDC).
- [10] Operating temperature: -4 ° F to 140 ° F (-20°C~60°C), relative humidity 5% ~ 95% (no condensation).
- [11] External Dimensions (W\*H\*D): 1.6 in\*5.0in\*4.4in (40mm\* 125mm \* 110mm).
- [12] Installation: 35 mm DIN RAIL.
- [13] Protection class: IP20.
- [14] Test standard: Complies with EMC test standards.

## 1.4 Revision History

Revision	Date	Chapter	Description
V2.2	12/15/2017	ALL	New release
V2.2, Rev A	7/6/2021	ALL	Revision

## 2 Hardware Description

### 2.1 Product Appearance



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

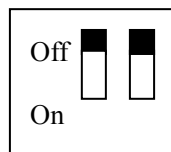
## 2.2 Indicators

Indicators	Status	Description
STA(green)	Blinking	PROFIBUS DP bus data is communicating
	Off	No data communicating
PBF (red)	On	PROFIBUS DP bus data communication fails
	Off	Communication is ok
MS	Blinking (red)	DHCP or BOOTP status
	On (red)	IP confliction
	OFF(red)	Normal communication
NS	On(green)	Modbus TCP connection has been established
	Blinking(green)	Modbus TCP connection is not established or disconnected
	OFF(green)	Modbus TCP has not started
MS, NS, and STA flashes once		Boot up
MS and NS ON		Configuration status

## 2.3 Switches

### 2.3.1 Status Configuration Switch

The configuration switch is located on the button of the product. The function is listed below:



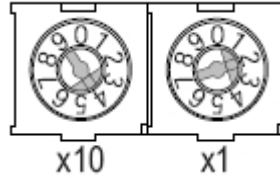
Status(1)	Status(2)	Description
Off	Off	Run mode, allow reading and writing configuration data
Off	On	Run mode, forbid reading and writing configuration data
On	Off or On	Configuration mode, IP address is 192.168.0.10 (fixed), this mode can read and write configuration data but cannot finish communication between Modbus TCP and PROFIBUS DP

Note: To apply the mode switching, restart the gateway.



## 2.3.2 PROFIBUS DP Address Setting Switch

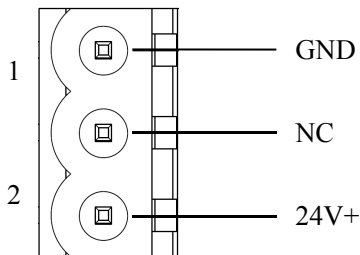
The 2-code rotary switch in the left-side is used for setting the PROFIBUS DP address of the device.



In this example, the calculation formula of PROFIBUS DP address will be:  $42 ((4 \times 10) + (2 \times 1))$ .

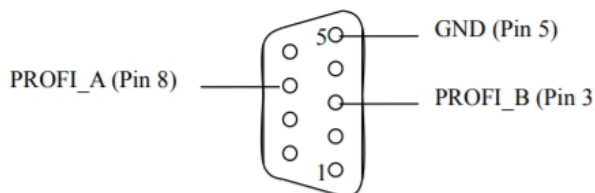
## 2.4 Interface

### 2.4.1 Power Interface



Pin	Description
1	GND, Power ground
2	NC, not connected
3	24V+, DC+24V

### 2.4.2 PROFIBUS DP Interface



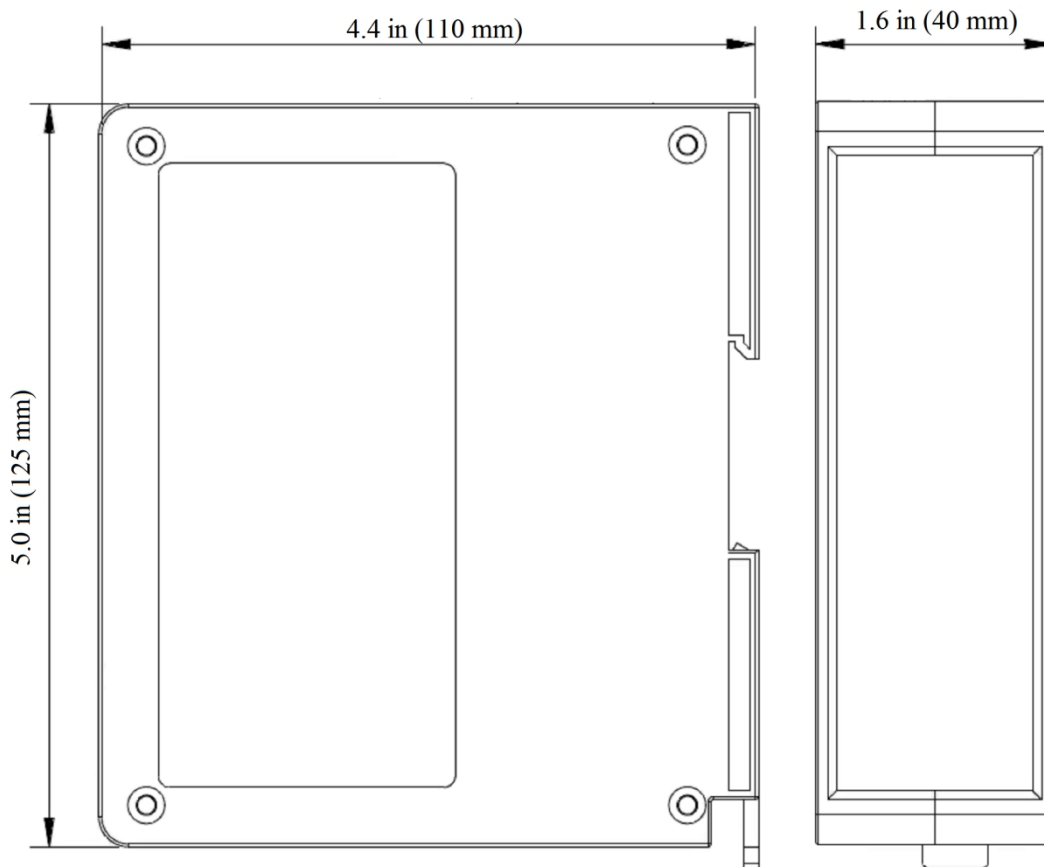
Pin	Description
3	PROFI_B, Data+
4	RTS(Request to send)
5	GND
6	+5 V for terminating resistors
8	PROFI_A, Data-
Others	Not Connected

## 3 Hardware Installation

### 3.1 Machine Dimension

Size (width \* height \* depth):

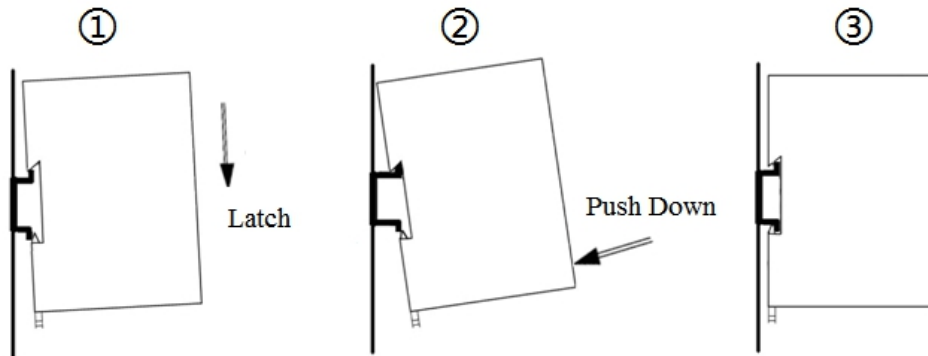
1.6 in \* 5.0 in \* 4.4 in (40 mm \* 125 mm \* 110 mm)



## 3.2 Installation Method

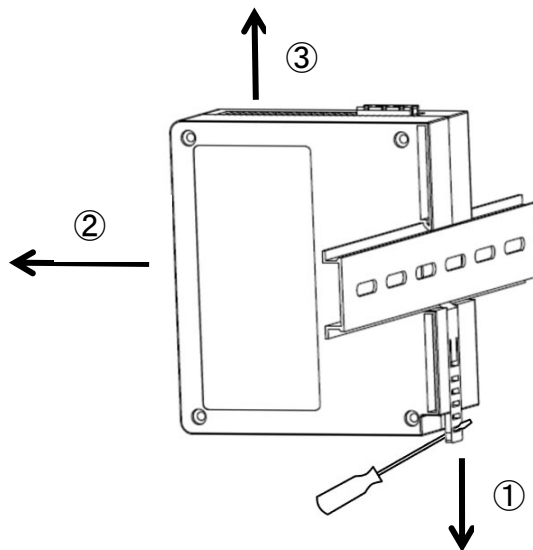
Using 1.38 in (35 mm) DIN RAIL.

### 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.

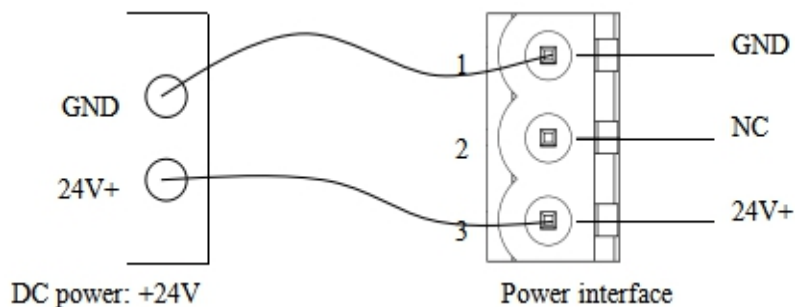


## 4 Quick Start Guide

The following steps will help in successfully setting up the GT200-DP-MT with your system. For detailed information for the configuration, refer to Chapter 6.

### 4.1 Connection

1. Connect the power supply to the gateway.



2. Connect to the computer by using an Ethernet cable to connect to the computer directly or by connecting the gateway to a router and finding it over the TCP/IP network.

**\*Note: Ensure that the network segment of Ethernet port is the same as the gateway segment to establish connection**

3. Set the status configuration switch to Status(1): ON. This will set the gateway to configuration mode and fix the IP address of the gateway to 192.168.0.10.

4.

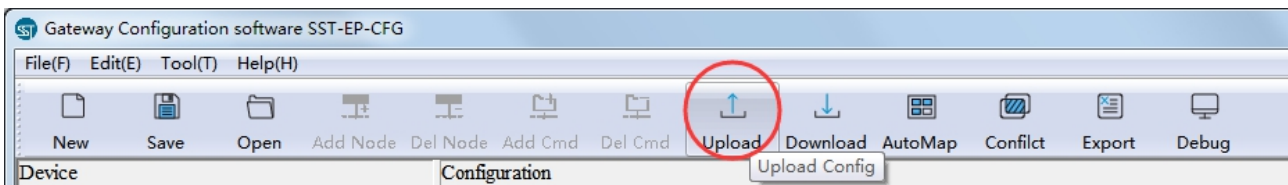
**\*Restart GT200-DP-MT after resetting the configuration to make the configuration take effect.**

5. Connect GT200-DP-MT to PROFIBUS DP PLC or control system. It is suggested to use the standard PROFIBUS DP connector, refer to chapter 2.4.2.

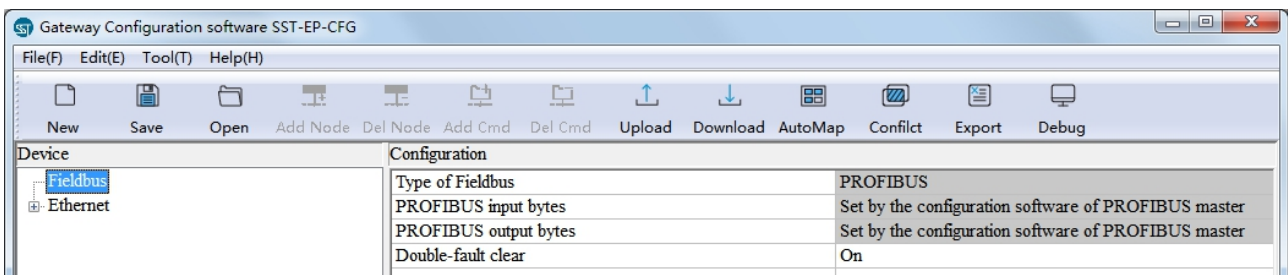
## 4.2 Configuration

1. Download, install, and run the configuration software, SST-EP-CFG, which can be found on the GT200-DP-MT product page at [sstcomm.com](http://sstcomm.com). For more details of SST0EP-CFG, please see [chapter 6](#).
2. Click the upload button on the tool bar. The Upload Configuration will pop up, in this window select the GT200-DP-MT gateway you wish to configure and click “Upload.”

Note: This will upload the default configuration in the software, this is also how you can edit your configuration after downloading your configuration to the gateway. If you cannot find the gateway, check your connections and network settings.



3. Click “Field Bus”. Configure the parameters to meet the needs of your project. Use the PROFIBUS DP Address Setting Switch ([Ch 2.3.2](#)) to set the address of the device.

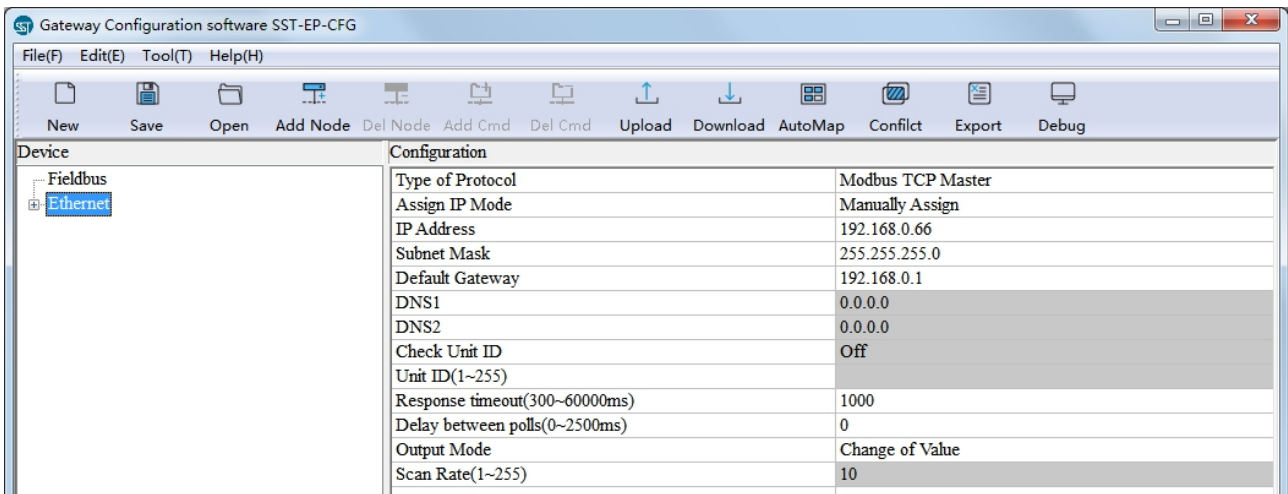


4. Click “Ethernet”. Configure the parameters located in the Configuration Section to meet the needs of your project.

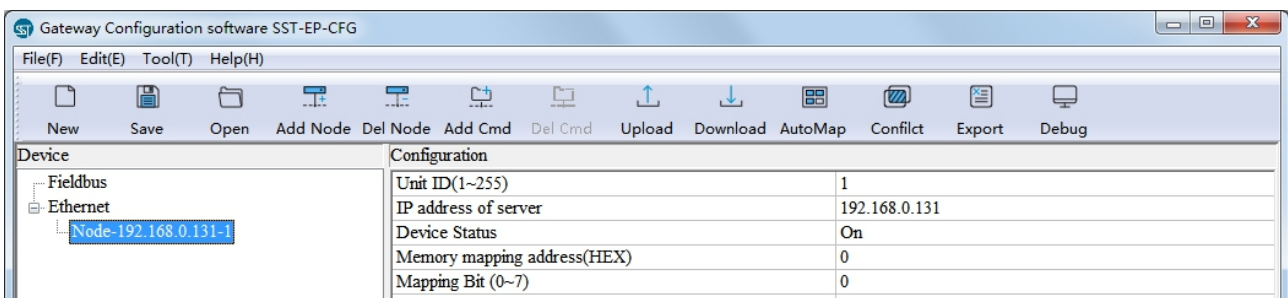
Note: If you select “Modbus TCP Master” for the Ethernet configuration, the GT200-DP-MT will act as a Modbus TCP Master. The following steps will be for that scenario.

# GT200-DP-MT PROFIBUS DP/Modbus TCP Gateway

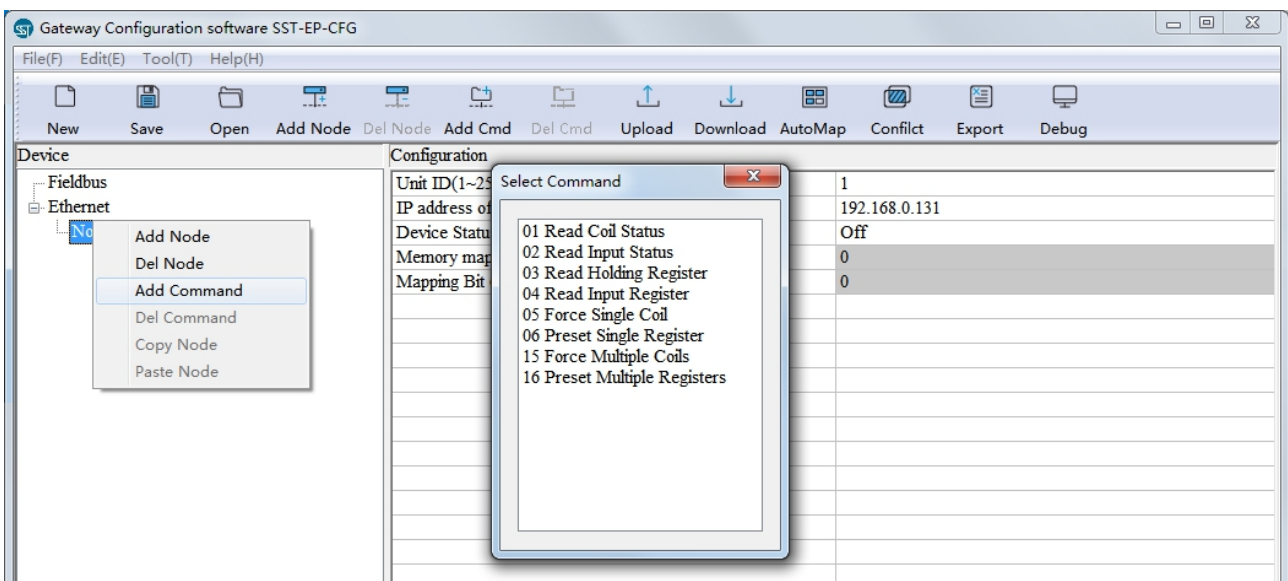
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5. Right Click “Ethernet” and Select “Add Node”. Click the newly created node and configure the Server parameters.



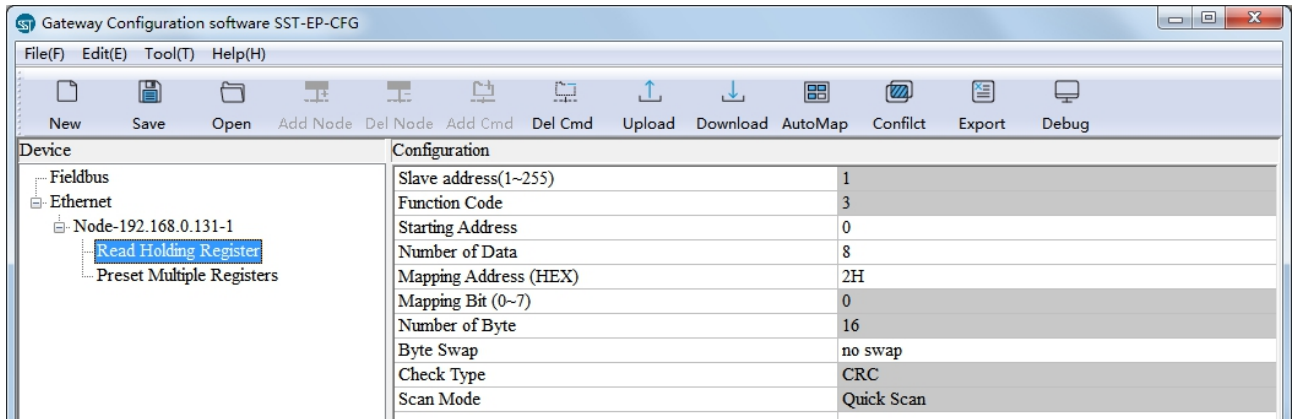
6. Right Click “New node”. Select “Add Command”. In the Select Command window, double click the command you wish to add.



7. Click the Command you wish to configure and configure the parameters in the Configuration Section to meet

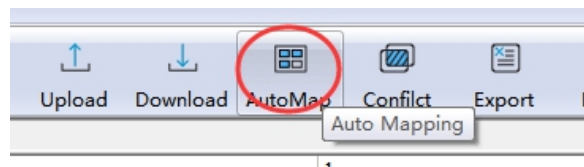
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the needs of your project.

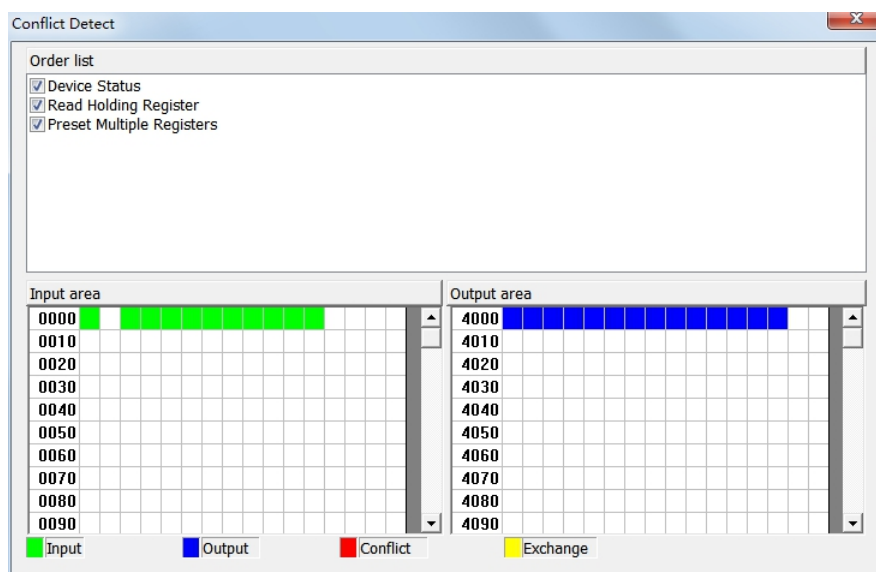
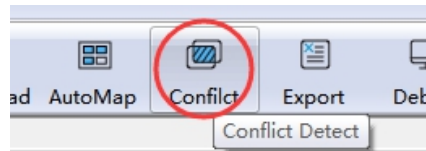


8. Once the “Fieldbus”, “Ethernet”, Node(s), and Command(s) are configured, click the “AutoMap” icon on the toolbar to map the Modbus data to the PROFIBUS DP network.

Note: If you set the memory mapping address for the node, it will be remapped by the “AutoMap” function.



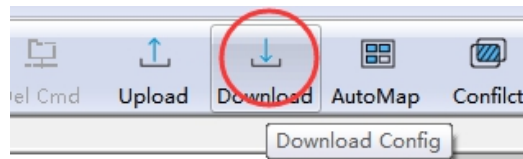
9. Check the mapping address in the Conflict Detection window, to confirm that there is no conflict.



10. Click “Download” to download your configurations into the GT200-DP-MT.

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**Note:** The GT200-DP-MT will apply the new configuration after restarting. After downloading the software will ask to restart the gateway remotely.

11. Configure the GT200-DP-MT into the PROFIBUS DP system. Please refer to [chapter 7](#) and [Appendix: Configure GT200-DP-MT in STEP7](#). The GSD file can be downloaded at [sstcomm.com](http://sstcomm.com).

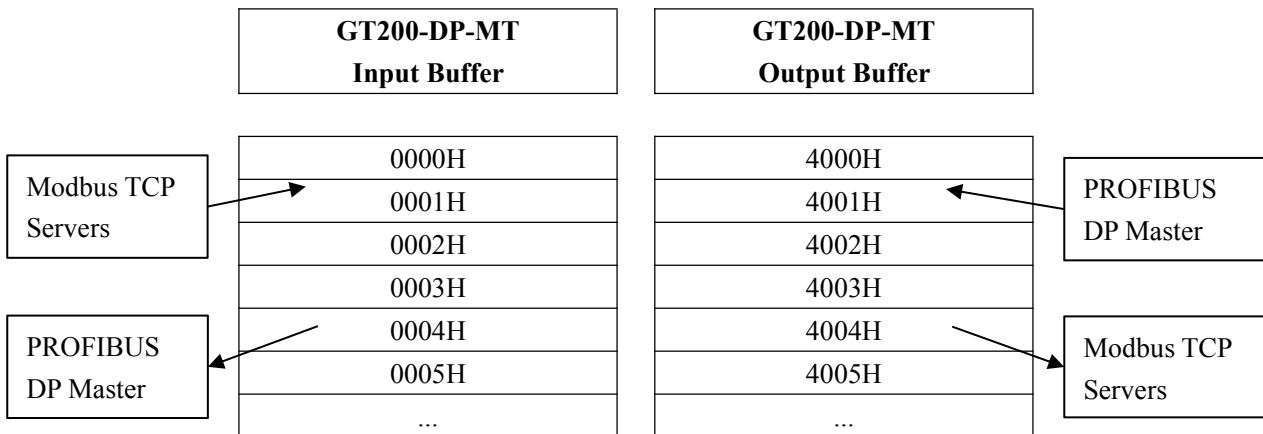




## 5 Working Principle

### 5.1 As Modbus TCP Client

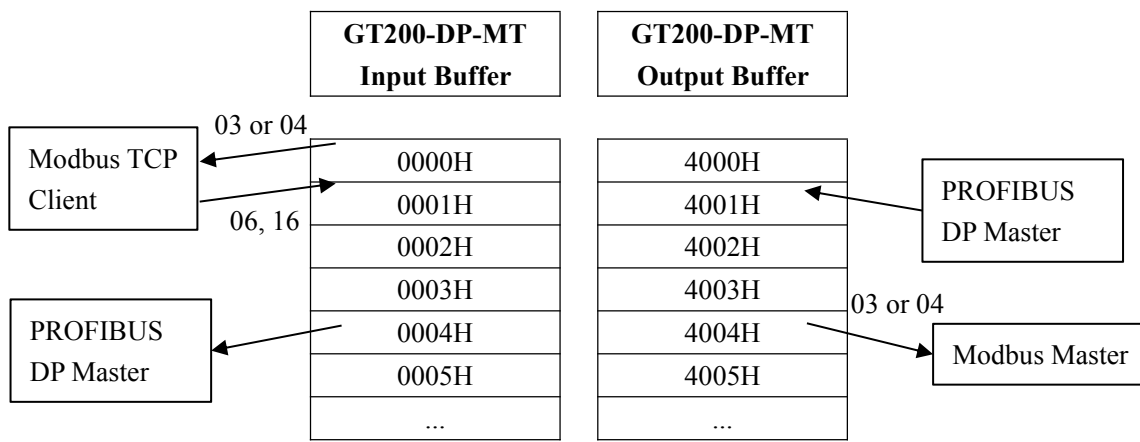
When the GT200-DP-MT is configured as a Modbus TCP client, the data transmission between the Modbus TCP servers and the PROFIBUS DP master through the GT200-DP-MT is established by mapping address. The GT200-DP-MT has an input buffer and an output buffer. The data read from Modbus servers by function code 01, 02, 03 or 04 is stored in the input buffer then transmitted to PROFIBUS DP master. The data written by PROFIBUS DP master is stored in the output buffer, then sent to the Modbus servers by function code 05, 06, 15 or 16.



## 5.2 As Modbus TCP Server

When the serial interface of the GT200-DP-MT is configured as a Modbus slave, it allows a Modbus master to communicate with the user's PROFIBUS DP master.

The data is stored in GT200-DP-MT's input buffer and output buffer first.



The Modbus TCP client writes the data to the GT200-DP-MT input buffer for PROFIBUS DP master accessing. The PROFIBUS DP master outputs data to the GT200-DP-MT output buffer and then exports to the Modbus TCP client.

The gateway acts as a Modbus TCP slave, supporting function: 03, 04, 06 and 16. Users can select 03 or 04 function code in order to read the data in the GT200-DP-MT input buffer or output buffer ([chapter 5.4.2](#)).

### 5.3 Data Mapping in Software Configuration Mode

In the “Software Configuration” mode, the data mapping address can be manually configured. The data mapping relationship between GT200-DP-MT buffer and PROFIBUS DP is shown below. The address N and M (or X and Y) can be discontinuous number.

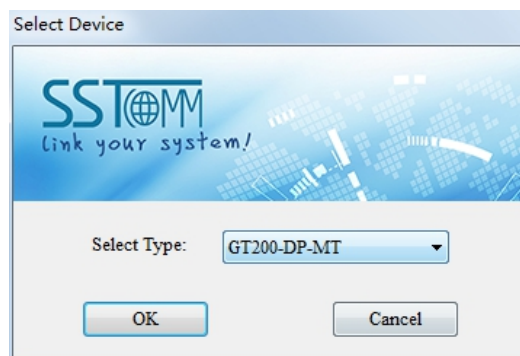
<b>PROFIUS DP Input Address</b>		<b>GT200-DP-MT Input Buffer</b>	<b>PROFIUS DP Output Address</b>		<b>GT200-DP-MT Output Buffer</b>
Module 1	N	0000H	Module 3	X	4000H
	N+1	0001H		X+1	4001H
Module 2	M	0002H		X+2	4002H
	M+1	0003H		X+3	4003H
	M+2	0004H	Module 4	Y	4004H
M+3	0005H	Y+1		4005H	
...	...	...	...	...	...

## 6 Instructions of Configuration Software

### 6.1 Notes before Configuration

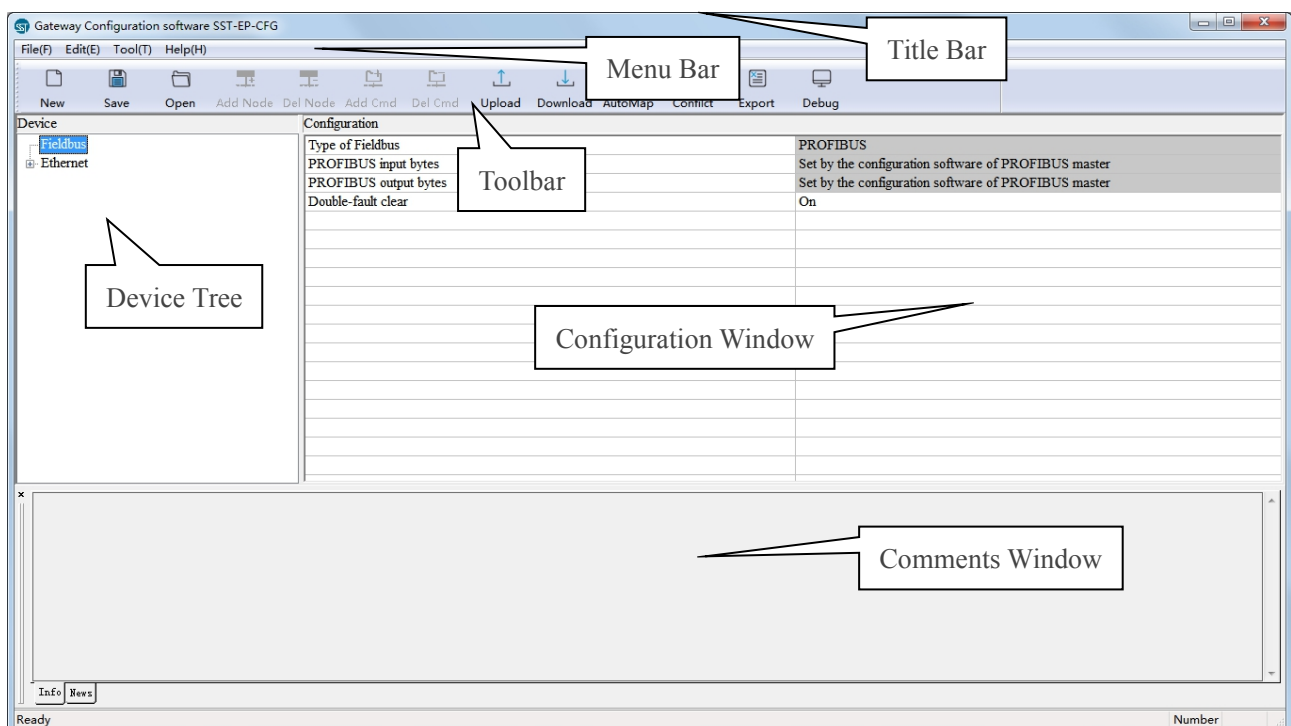
SST-EP-CFG is a Windows-based platform, used to configure GT200-DP-MT and GT200-DP-EI.

Run the SST-EP-CFG, select GT200-DP-MT then click OK.



### 6.2 User Interface

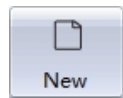
**Note:** Gray parts cannot be modified.



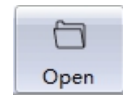
# GT200-DP-MT PROFIBUS DP/Modbus TCP Gateway

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Toolbar is shown as below:



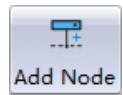
New: Create a new project.



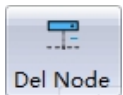
Open: Open a project.



Save: Save the project.



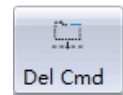
Add Node: Add a Modbus TCP slave node.



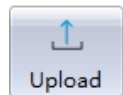
Delete Node: Delete a Modbus TCP slave node.



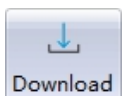
Add Command: Add a Modbus command.



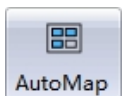
Delete Command: Delete a Modbus command.



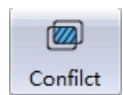
Upload: Read the configuration information from the module and shown in the software.



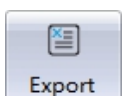
Download: Download the configuration into the gateway.



AutoMap: Automatically map the data of Modbus TCP commands.



Conflict: To check whether there are conflicts of data mapping address in the memory data buffer.



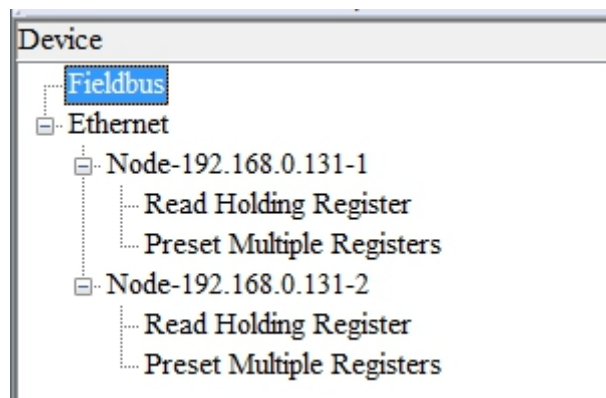
Export: Export current configuration to the local hard disk, saved as .xls file.



Debug: Monitor the gateway memory buffer data.

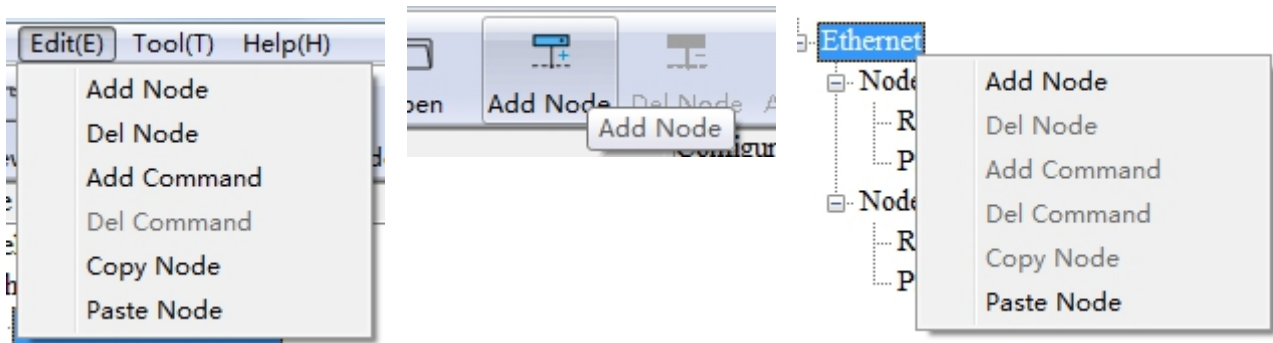
## 6.3 Equipment View Operation

### 6.3.1 Equipment View Interface



### 6.3.2 Equipment View Operation Mode

The equipment interface supports three operation modes: edit menu, edit toolbar and right click edit menu.



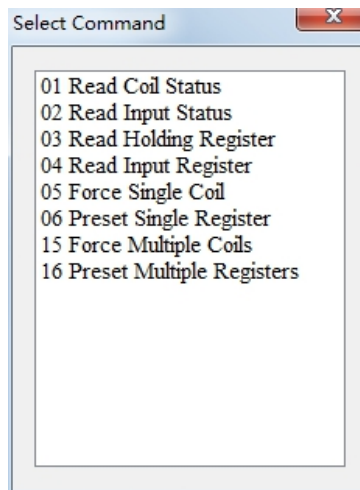
### 6.3.3 Equipment View Operation Types

1. Add node operation: Left click on Ethernet or existing nodes, and then perform the operation of adding a new node. Then there will be a new node named "New node" under Ethernet.
2. Delete node: Left click on the node to be deleted, and then perform the operation of deleting the node. The

node and all commands will be deleted.

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

Select the command: Double click command item



4. Delete commands: Left click on the command to be deleted, perform the operation of deleting the command.
5. Edit node: Left click the node needs to be reset, and then set parameters of this node in configuration interface.
6. Copy node: Left click the existing node, choose the node and execute the operation of copying nodes (include all commands under the node)
7. Paste node: Left click and choose any existing node, execute operation of paste node. Then at the Ethernet rear part you can see a new node (include all commands under the node). The node parameters of the new node will be the default setting, it will need to be configured to your needs.

## 6.4 The Operation of Configuration Interface

### 6.4.1 Fieldbus Configuration

Click the fieldbus in the equipment view interface, this will display the configuration view interface as follows:

Device	Configuration	
Fieldbus	Type of Fieldbus	PROFIBUS
Ethernet	PROFIBUS input bytes	Set by the configuration software of PROFIBUS master
	PROFIBUS output bytes	Set by the configuration software of PROFIBUS master
	Double-fault clear	On

**Type of Fieldbus:** PROFIBUS DP.

**PROFIBUS DP input bytes:** Set through the Hardware Configuration of PROFIBUS DP.

**PROFIBUS DP output byte:** Set through the Hardware Configuration of PROFIBUS DP.

**Double-fault clear:** open and close optional.

## 6.4.2 Ethernet Configuration

Click Ethernet in configuration view interface.

**Type of Protocol:** Modbus TCP Master and Modbus TCP Slave are optional.

When selecting Modbus TCP Master:

Device	Configuration	
Fieldbus Ethernet	Type of Protocol	Modbus TCP Master
	Assign IP Mode	Manually Assign
	IP Address	192.168.0.10
	Subnet Mask	255.255.255.0
	Default Gateway	192.168.0.1
	DNS1	0.0.0.0
	DNS2	0.0.0.0
	Check Unit ID	Off
	Unit ID(1~255)	
	Response timeout(300~60000ms)	1000
	Delay between polls(0~2500ms)	0
	Output Mode	Change of Value
	Scan Rate(1~255)	10

**Assign IP Mode:** Manual Assign, BOOTP and DHCP optional. In DHCP mode, the gateway needs to connect to a DHCP server or switch to get valid IP address.

**IP Address:** The IP address of the gateway.

**Subnet Mask:** The subnet mask of the network.

**Default Gateway:** The default gateway of the network.

**DNS1/ DNS2:** Reserved.

**Check Unit ID:** Invalid in Modbus TCP Master mode. Whether to check the Unit ID.

**Unit ID:** Invalid in Modbus TCP Master mode. Configurable when the “Check Unit ID” is On. The Unit ID of the Modbus TCP Server. When accessing the Modbus TCP Server at the same IP address, the slave address cannot be the same.

**Response timeout:** After the gateway sends request, it waits for the Modbus slave's response for max time, which is in ms. The range of the parameter value is 300~60000ms.



**Delay between polls:** Delay between polls means delay between a response has been received and sending next request. The range of the parameter value is 0~2500ms.

**Output Mode:** There are three types of outputs:

Cycle: The write command will be sent periodically.

Forbidden: The gateway will not send a write command.

Change of Value: When the output data changes, the write command will be sent.

**Scan Rate:** Reserved. Scan Rate is ratio of quick scan to slow scan. Every Modbus command can be set to quick scan or slow scan. If this parameter value is set to 10 then every quick scan command will be sent 10 times and those slow commands will be sent once.

When selecting Modbus TCP Slave:

Device	Configuration	
Fieldbus	Type of Protocol	Modbus TCP Slave
Ethernet	Assign IP Mode	Manually Assign
	IP Address	192.168.0.10
	Subnet Mask	255.255.255.0
	Default Gateway	192.168.0.1
	DNS1	0.0.0.0
	DNS2	0.0.0.0
	Check Unit ID	Off
	Unit ID(1~255)	1
	Response timeout(300~60000ms)	1000
	Delay between polls(0~2500ms)	0
	Output Mode	Change of Value
	Scan Rate(1~255)	10
	Monitor Network Status	Both ends network monitor each other
	Modbus TCP master reads the data function code	04 read data which DP wrote to the Ethernet,03 read the written data
	Starting address of read-only register(data flow from DP to Ethernet)	0
	Starting address of read/write register(data flow from Ethernet to DP)	0

**Monitor Network Status:** Mutual surveillance of both ends, PROFIBUS DP monitors the network state of Modbus TCP. Modbus TCP monitors the PROFIBUS DP network state and no indicating optional.

**Modbus TCP master reads data function code:** "04H read the data DP sent to the Ethernet, 03H read back the written data", "03H read the data DP sent to the Ethernet, 04 read back the written data" is optional. Among them: "04H reads the data DP sent to the Ethernet, 03H reads back the written data" means that Modbus TCP master is using the 04H function code to read the output data from the PROFIBUS DP master to the Ethernet side, then uses 03H to read back the written data of the PROFIBUS DP master. "03H reads the data DP sent to the Ethernet, 04 reads back the written data" means that Modbus TCP master is using the 03H function code to read the output data from the PROFIBUS DP master to the Ethernet side, then uses 04H to read back the written data of the PROFIBUS DP master.

**Starting address of read only register (data flow from DP to Ethernet):** Range 0 - 65535.

**Starting address of read/write register (data flow from Ethernet to DP):** Range 0 - 65535.

### 6.4.3 Node Configuration

In the Modbus TCP Master mode, after adding a node, select the node:

Device	Configuration	
Fieldbus	Unit ID(1~255)	1
Ethernet	IP address of server	192.168.0.131
Node-192.168.0.131-1	Device Status	On
	Memory mapping address(HEX)	0
	Mapping Bit (0~7)	0

**Unit ID:** Modbus TCP slave address, 1 to 255 optional.

**IP address of server:** IP address to access Modbus TCP slave.

**Device status:** Open and Close optional. When it is opened, the memory-mapped address and memory-mapped bits offset is available.

**Mapping address:** Address range that the equipment state is mapped to in the module memory, 0x0000~0x00F3. Calculate by clicking “Auto mapping”.

**Mapping offset:** Bit x where the equipment state is in memory mapping byte, 0~7.

### 6.4.4 Command Configuration

After adding commands under a node, select the command:

Device	Configuration	
Fieldbus	Slave address(1~255)	1
Ethernet	Function Code	3
Node-192.168.0.131-1	Starting Address	0
Read Holding Register	Number of Data	8
Preset Multiple Registers	Mapping Address (HEX)	2H
	Mapping Bit (0~7)	0
	Number of Byte	16
	Byte Swap	no swap
	Check Type	CRC
	Scan Mode	Quick Scan

**Starting Address:** The starting address for register/coil/status of Modbus slave device. Range: 0~65535.

**Number of Data:** The number of data.

Function code (3, 4, 16): The number of registers 1~122.

Function code (1, 2, 15): The number of switching value or coil 1~400.

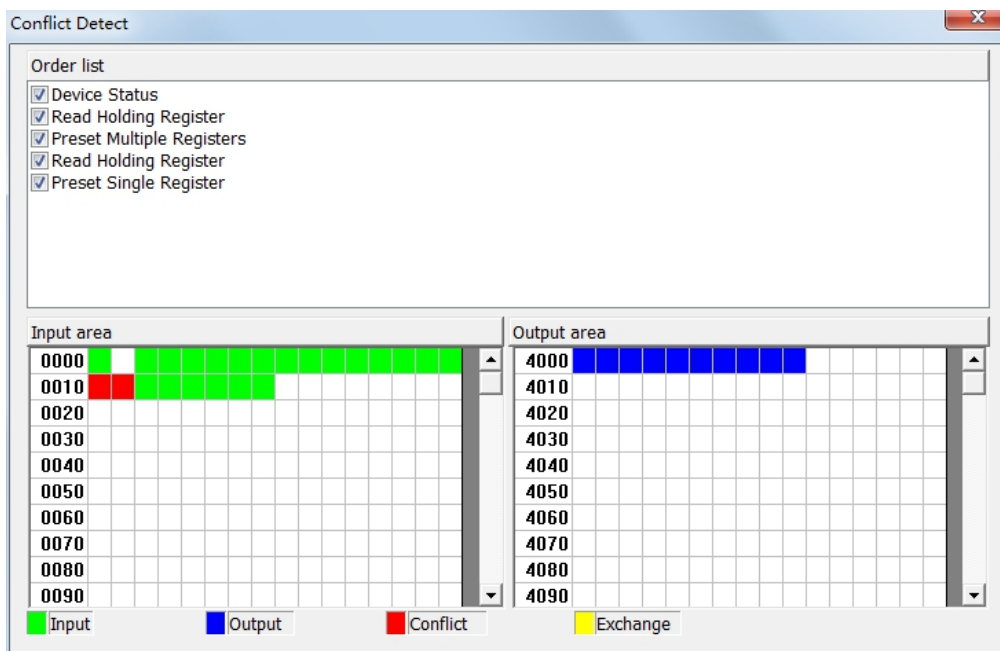
**Mapping Address (HEX):** The mapping address range of data in the memory module, users can click "Auto Mapping" to calculate the mapping address by software.

**Mapping Bit:** For Modbus function code 01, 02, 05 and 15, the length of data is measured by bit, the offset starts from the specific bit of the mapping address byte, the range: 0~7.

**Byte Swap:** There are three types: no swap, double-byte swap, four-byte swap. The byte order of Modbus, PROFIBUS DP is the most significant byte (MSB) first. Users may need to swap the byte order to get the right value.

## 6.5 Conflict Detection

The data is stored in the gateway's buffer. To check if there are conflicts in the data mapping address, open the conflict detection window by clicking the "Conflict" icon.



Input mapping address range: 0x0000~0x3FFFF.

Output mapping address range: 0x4000~0x7FFFF.

Each grid represents one byte address.

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

Yellow: Write command: When the address mapping area is located in the input area, it will be in yellow without

conflict.

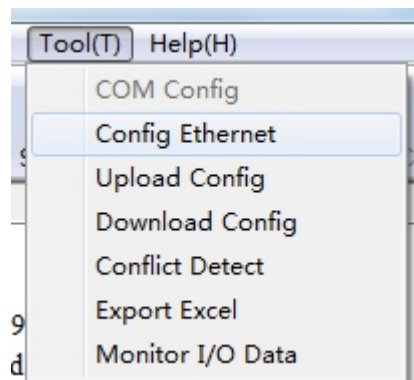
Blue: When the address mapping area is located in the output area, it will be in blue without conflict.

Red: In the input area or output area, when different commands occupy the same byte, this byte area will be in red.

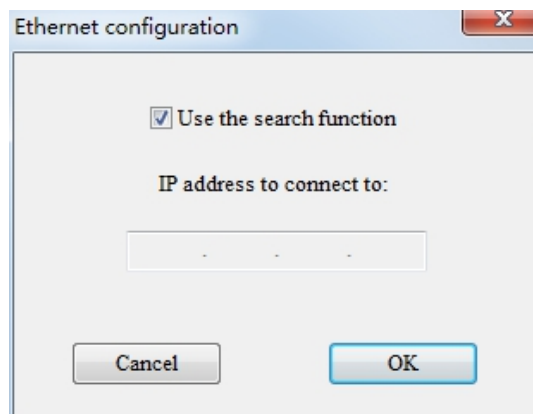
## 6.6 Hardware Communication

### 6.6.1 Ethernet Configuration

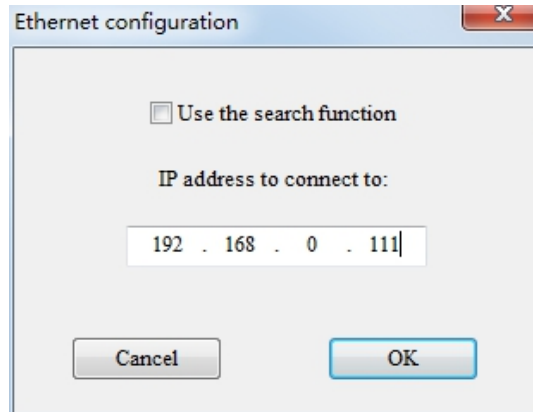
Select “Tool” >> “Config Ethernet” to set the search method.



When users use the search function, it will search all GT200-DP-MT equipment when uploading and downloading the configuration.

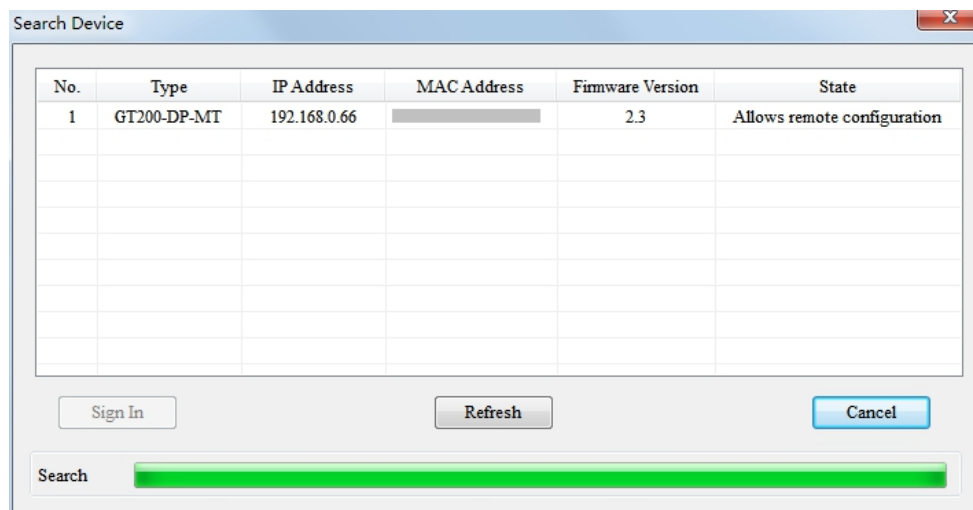


When users don't use the search function, users must appoint the IP address of the equipment which needs to be connected. It will only list one device when uploading and downloading the configuration function.

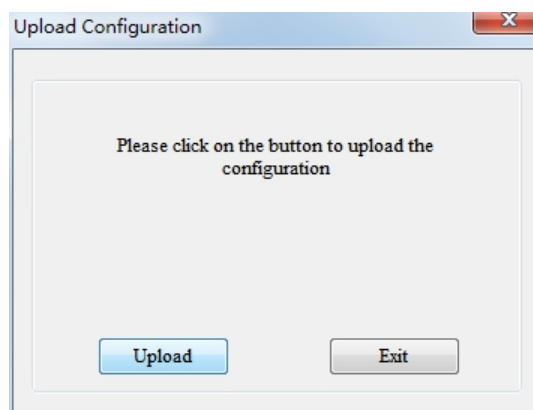


## 6.6.2 Upload Configuration

Choose upload configuration, it will pop up the dialog box of searching equipment:

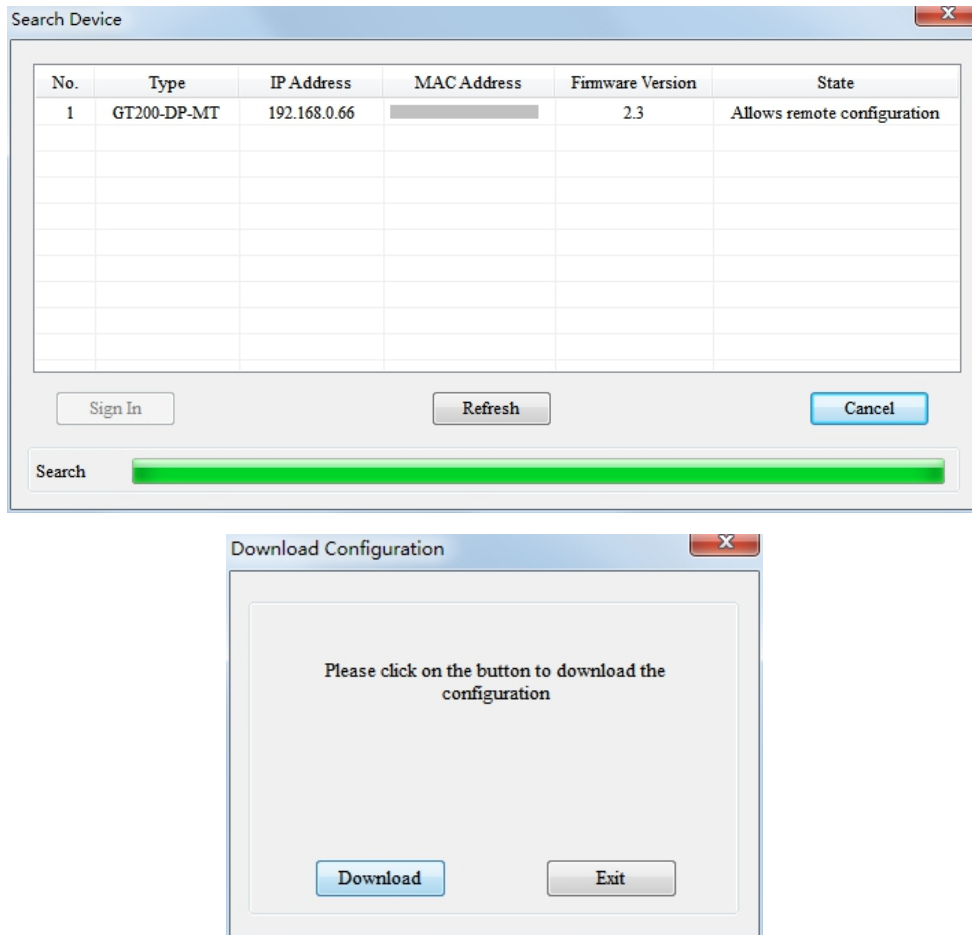


Select the equipment you want to configure and click “Sign In” to enter into the upload dialog box. Upload the configuration information from the equipment to the software, the interface is shown below:



### 6.6.3 Download Configuration

The operation of download configuration is the same as upload configuration:

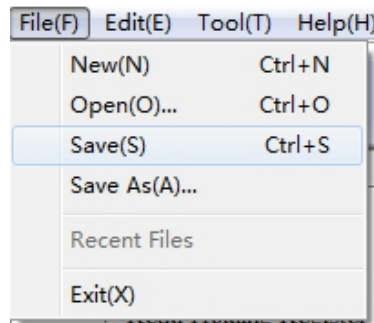


**Notes:** Before downloading, please confirm all configurations have been completed and right.

## 6.7 Load and Save Configuration

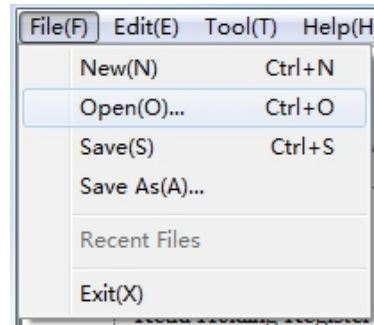
### 6.7.1 Save Configuration Project

Select "Save" and save the configured project as .chg file.



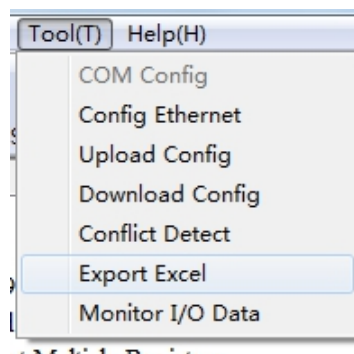
## 6.7.2 Load Configuration Project

Select “Open” and open the saved .chg file.



## 6.8 Export Excel

Excel configuration Excel file will help users to check the relevant configuration.

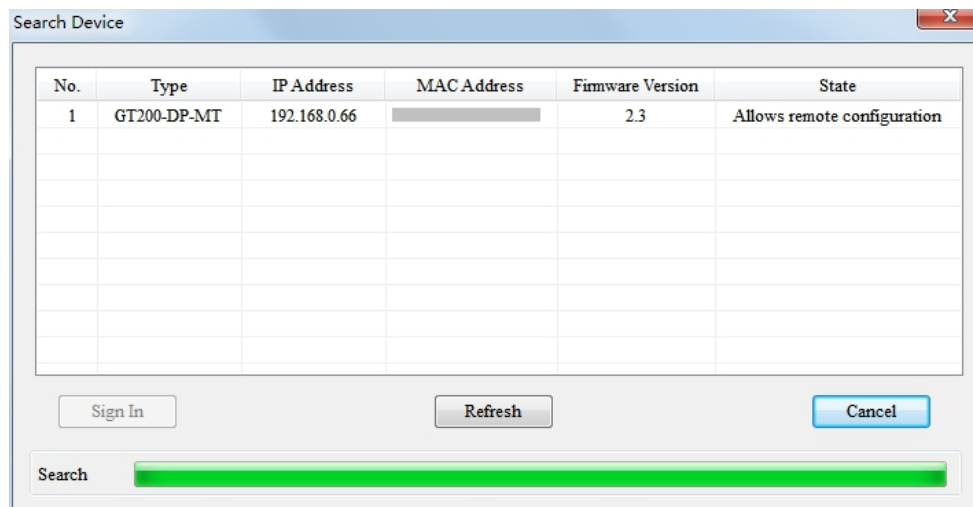


## 6.9 Monitor I/O Data

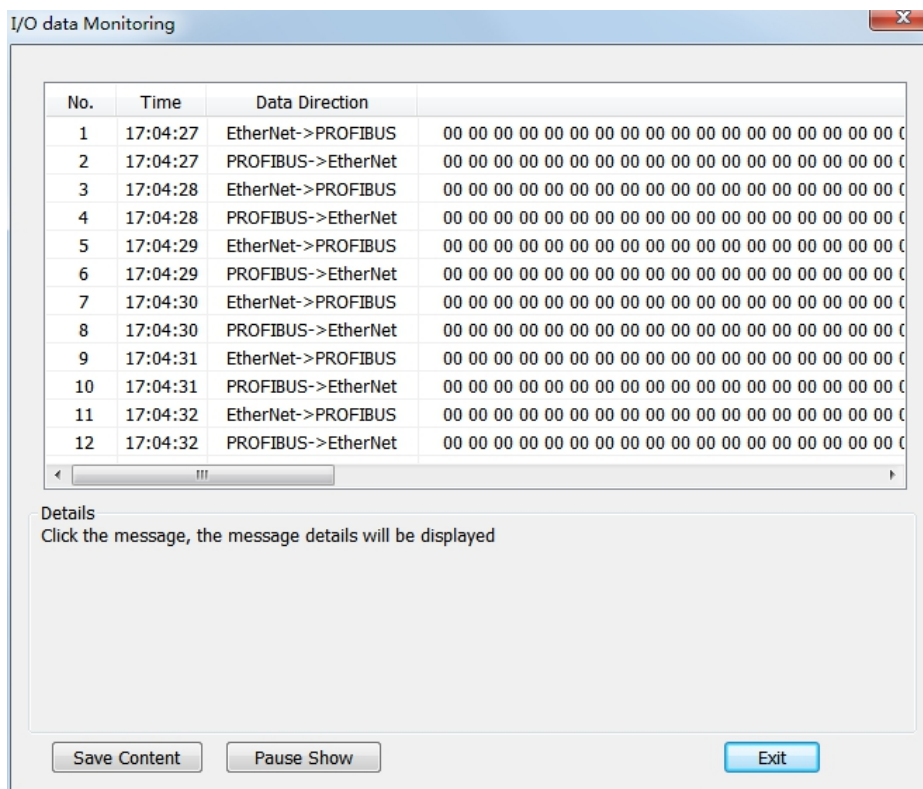
This function is used to monitor the buffer data, click “Debug” button on the toolbar and the dialog box of searching equipment will pop up:

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Click “Sign In”, it will pop up the I/O data monitor dialog box below:



Clicking the “Save Content” button can save relevant content to the PC hard disk. This button becomes “Stop saving”. If you want to finish saving, you can press “Stop saving” button. It can pause displaying buffer data by clicking “Pause Show”.



## 7 PROFIBUS DP Modules

The GT200-DP-MT supports different consist modules.

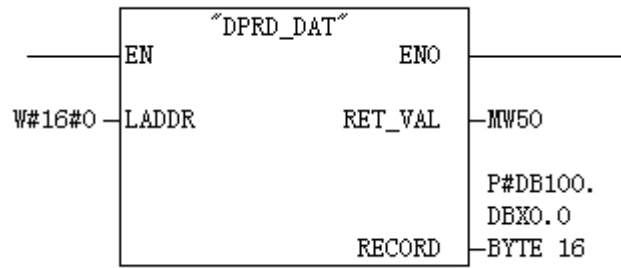
Module	Integrity
4 Words Input, 4 Words Output	Word Integrity
8 Words Input, 8 Words Output	Word Integrity
24 Words Input, 24 Words Output	Word Integrity
56 Words Input, 56 Words Output	Word Integrity
1 Byte Input	Byte Integrity
1 Word Input	Word Integrity
2 Words Input	Word Integrity
4 Words Input	Word Integrity
8 Words Input	Word Integrity
16 Words Input	Word Integrity
32 Words Input	Word Integrity
64 Words Input	Word Integrity
2 Words Input Consistent	length Integrity
4 Words Input Consistent	length Integrity
8 Words Input Consistent	length Integrity
16 Words Input Consistent	length Integrity
1 Byte Output	Byte Integrity
1 Word Output	Word Integrity
2 Words Output	Word Integrity
4 Words Output	Word Integrity
8 Words Output	Word Integrity
16 Words Output	Word Integrity
32 Words Output	Word Integrity
64 Words Output	Word Integrity
2 Words Output Consistent	Total length Integrity
4 Words Output Consistent	Total length Integrity
8 Words Output Consistent	Total length Integrity
16 Words Output Consistent	Total length Integrity

For the data modules of word/byte integrity, the data can be used by the “MOVE” command in STEP7 or other general programs.

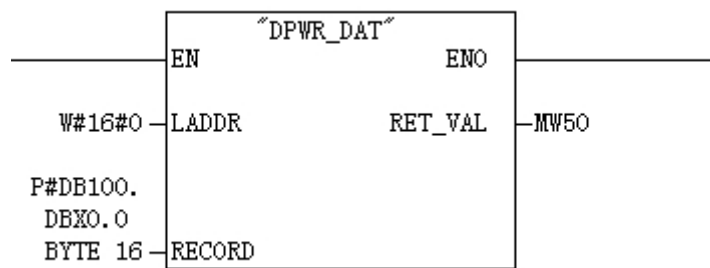
For the data modules of length integrity, the data should be compressed and sent. In STEP, it mainly uses “SFC 14” and “SFC 15”. Please refer to the appropriate documents of the PROFIBUS DP PLC program.

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SFC14 (Receive)

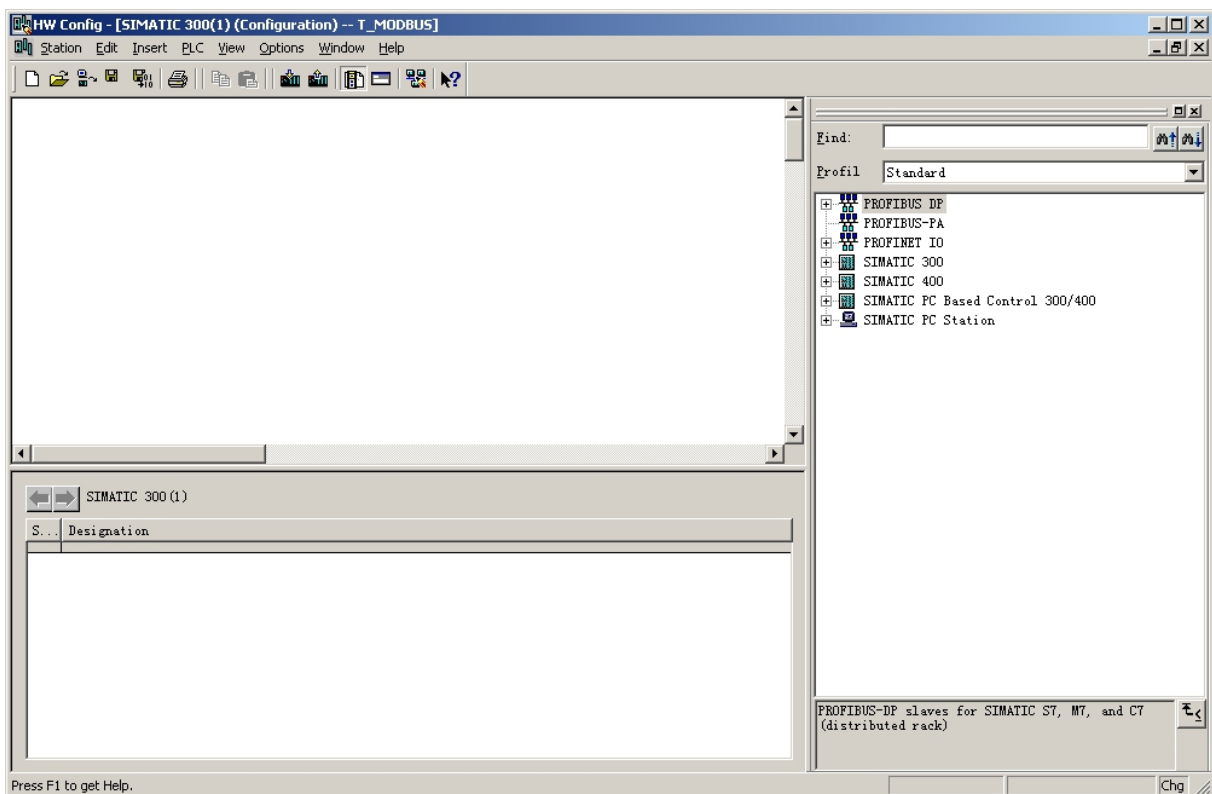
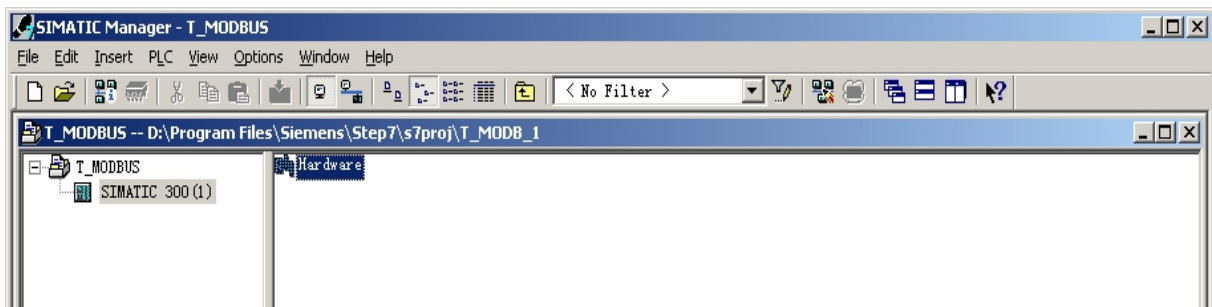


SFC15 (Send)

## Appendix: Configure GT200-DP-MT in STEP7

Before the configuration, the GSD file should be imported in the STEP7. Please refer to the appropriate documents of the STEP7.

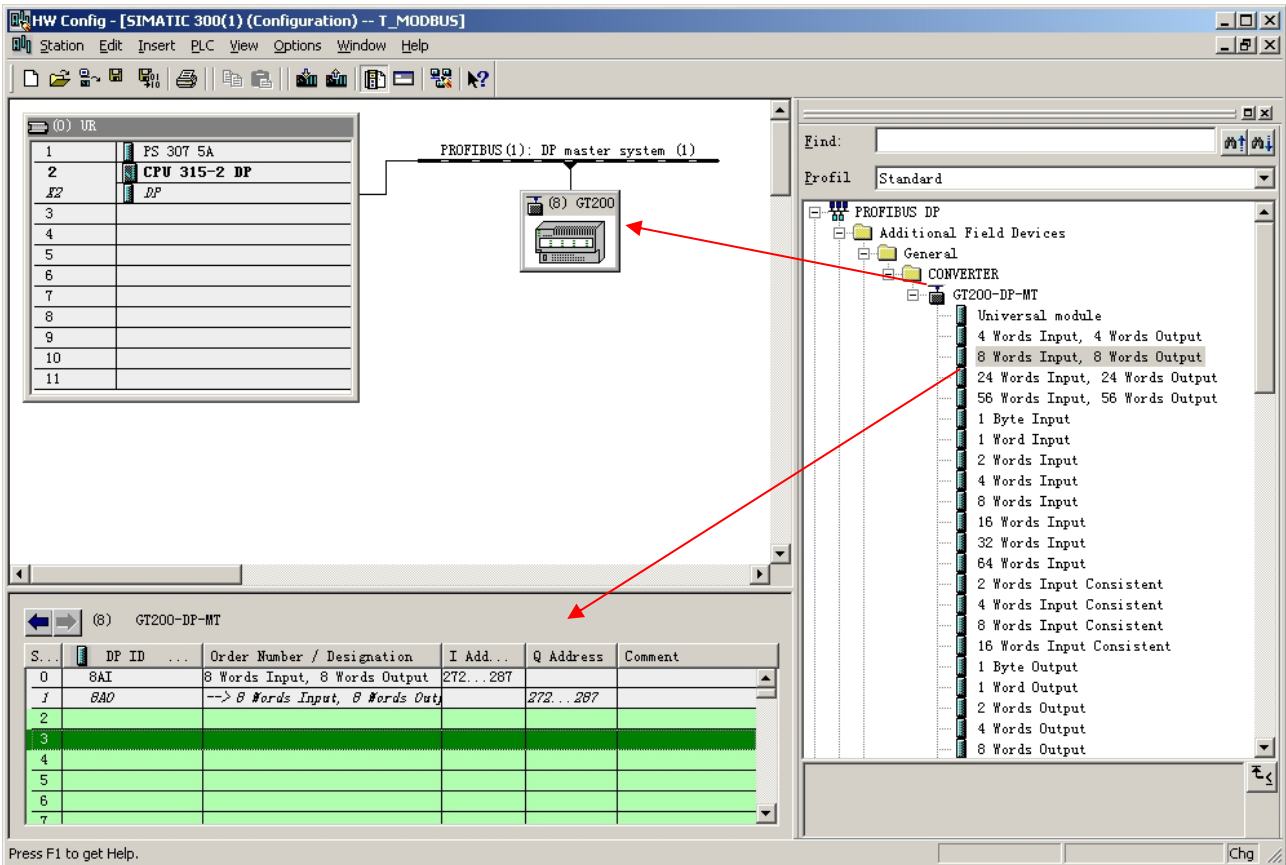
1. Open the S7 PLC hardware configuration of your project. For example, double click on “SIMATIC 300(1)” >> “Hardware” to enter HW Config window as shown below.



2. Find the GT200-DP-MT in the device catalog and drag a GT200-DP-MT onto the PROFIBUS DP bus. Add some modules on the slot.

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3. Double click on the GT200-DP-MT device and the modules to set the DP parameters.
4. Compile and download the configuration into PLC.