

Serial /PROFIBUS DP Converter GT100-DP-RS

User Manual

V5.0



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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1 Product Overview

1.1 Product Function

The converter GT100-DP-RS implements data communication between serial port and PROFIBUS DP. Four serial devices can be connected to PROFIBUS DP network and converted to PROFIBUS DP network devices. GT100-DP-RS has RS232/RS485 serial interface, which can be specified by the user when purchasing.

1.2 Product Feature

- **Wide application:** All devices based on modbus protocol with RS485/RS232 interface are able to be connected to PROFIBUS DP network through GT100-DP-RS. Such as frequency converters with Modbus protocol interface, motor start-up protector, intelligent high/low-voltage electrical apparatus, measuring devices, transmitters, intelligent field measuring instruments, etc.
- **Easy implementation:** Users do not need to know the technical details of PROFIBUS and Modbus, just complete configuration as required refer to this manual and the application cases, connection and communication can be realized in a short time without complex programming.
- **Transparent communication:** Users can establish transparent data communication between PROFIBUS DP and Modbus according to the mapping relationship between PROFIBUS DP data communication area and Modbus data communication area.

1.3 Technical Specification

[1] GT100-DP-RS acts as a PROFIBUS DP device at the side of PROFIBUS DP, while it acts as a Modbus Master or universal mode at the side of serial port;

[2] When GT100-DP-RS acts as a Modbus Master at the side of serial port:

- Transparent communication between PROFIBUS DP and Modbus can be established through the mapping relationship between PROFIBUS DP data communication area and Modbus data communication area;
- 01H, 02H, 03H, 04H, 05H, 06H, 0FH and 10H functions are supported;



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- Up to 48 Modbus commands can be configured;
- Modbus function codes 03H and 04H support function of “Byte-Swapping”, which can easily solve the problem of large-end and small-end format between two networks;

[3] When GT100-DP-RS is set in universal mode, the control modes of time interval between characters, frame length and delimiter are supported with automatic transmission function;

[4] Completes PROFIBUS DP V0 device functionality according to EN50170 (IEC61158): Measuring and control digital data communication industrial control system by using the third part of field bus: PROFIBUS standard;

[5] As a PROFIBUS DP device: automatic baud rate detection on PROFIBUS DP (9600 bit/s - 12 Mbit/s);

[6] PROFIBUS input/output bytes number can be free to set through STEP7, the maximum number of bytes:

①Max Input Bytes ≤ 224 Bytes

②Max Output Bytes ≤ 224 Bytes

③Max Data Bytes ≤ 448 Bytes

[7]Max Module: 50

Modules: Status/Control (Optional)—Occupy one input-byte and one output-byte.

Bit 0 of input-byte: Serial device fault indication, 0 indicates that there is no fault in Modbus server, 1 indicates that there is fault with Modbus server. The other 7 bits are reserved.

Bit 0 of output-byte: Set 1 to hold the fault status of device, set 0 to refresh the status of server in real time, the other 7 bits reserved.

Notes: this module is only valid on the mode of Modbus master!

4 Words Input, 4 Words Output

8 Words Input, 8 Words Output

16 Words Input, 16 Words Output

32 Words Input, 32 Words Output

64 Words Input, 64 Words Output

1 Byte Input

1 Word Input

8 Words Input

1 Byte Output

- 1 Word Output
- 8 Words Output
- 2 Words Input Consistent
- 4 Words Input Consistent
- 8 Words Input Consistent
- 16 Words Input Consistent
- 2 Words Output Consistent
- 4 Words Output Consistent
- 8 Words Output Consistent
- 16 Words Output Consistent

When using “Status /Control (Optional)” module in STEP7 configuration, putting it at the bottom of all data modules is a better choice.

The Module will occupy one input byte and one output byte of GT100-DP-RS memory mapping, if you put it at the top of the memory or in the middle of the memory, you should reserve the input and output bytes when you configure Modbus parameters in SST-MPG-CFG;

- [8]** Serial port is able to support 2 models of electrical interfaces: RS232 and RS485 ;
- [9]** Multiple formats of serial port communication parameters are supported. Baud rate: 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200bps can be selected. Parity check mode: None, Odd, Even, Mark and Space can be selected;
- [10]** Power supply: 24VDC (11V-30V), 80mA (24VDC);
- [11]** Working temperature: -40°F -140°F (-40°C-60°C), Humidity: 5%-95%;
- [12]** External dimensions (W*H*D): 1 in*4 in *3.5 in (25mm*100mm*90mm);
- [13]** Installation: 35mm DIN rail;
- [14]** Protection Level: IP20;
- [15]** CE marked.

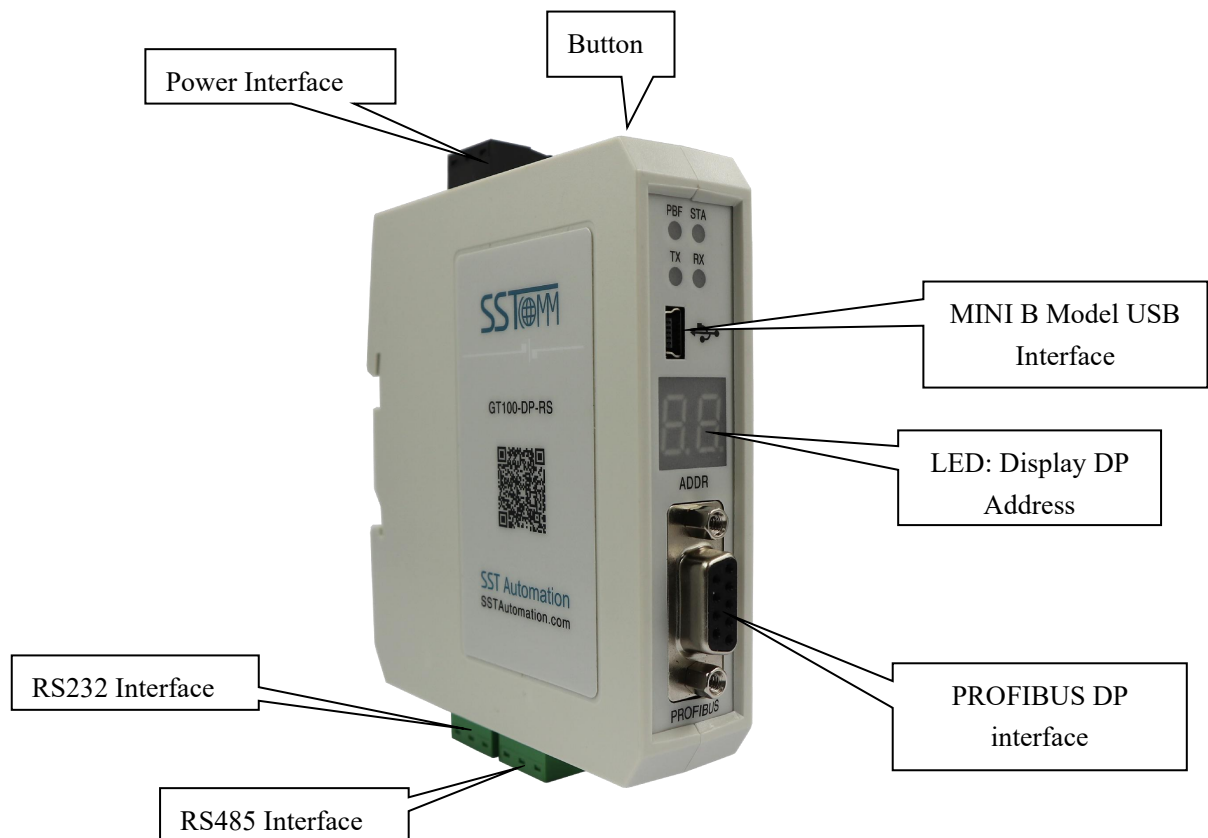


1.4 Revision History

Revision	Date	Chapter	Description
V5.0	1/8/2024	ALL	New release
V4.1	08/11/2020	ALL	New release

2 Hardware Descriptions

2.1 Product Appearance





2.2 Indicators

Indicator	Status	Description
STA	Green Blinking	PROFIBUS DP is communicating
	Green Off	No data communication
PBF	Red On	PROFIBUS DP communication fails
	Red Off	Normal data communication
RX	Green Blinking	Serial port is receiving data
	Green Off	No data receiving
TX	Green Blinking	Serial port is sending data
	Green Off	No data sending

2.3 Button and LED

- Button: 1. Mode switch. 2. Modify the PROFIBUS DP address.
- LED: Display the current PROFIBUS DP address and the configuration state.

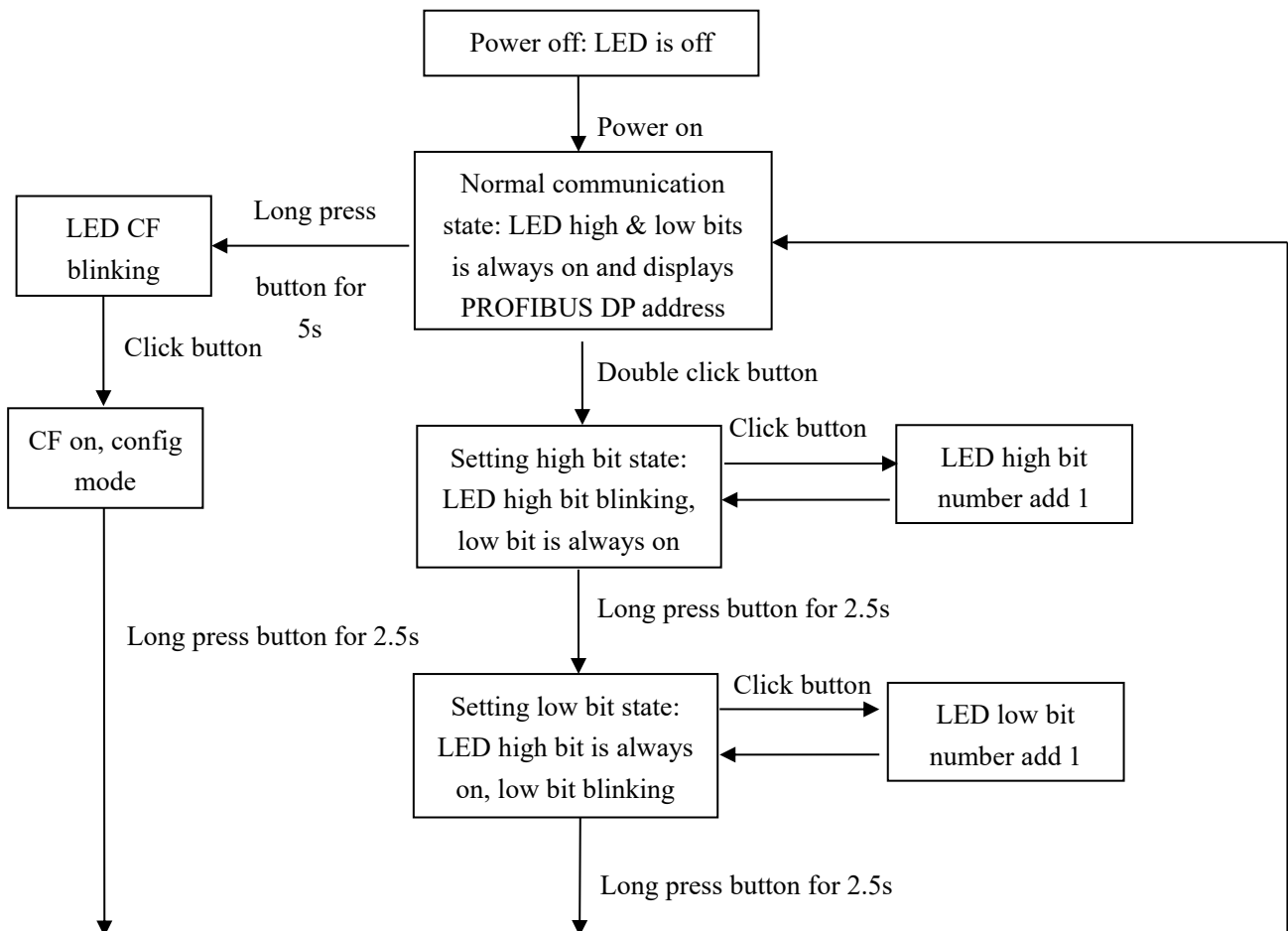
The default mode of GT100-DP-RS is normal communication mode after powering on, LED (always on) displays PROFIBUS DP address.

- 1) Mode switch: After powering on, LED shows the GT100-DP-RS's PROFIBUS DP address when acting as a device. Long press the button for 5 seconds -> CF blinking; Click the button -> CF on and enter the configuration mode; Use USB connector line to connect USB port of GT100-DP-RS and PC in order to finish uploading and downloading, and choose whether to enter into the communication mode according to software hints. Use any one of RS232/RS485 serial ports to connect to the serial port of PC (When using RS485, users need to convert it to RS232 with relevant converter first) in order to finish configuration uploading and downloading. After downloading, long press the button for 2.5 seconds to enter the normal communication mode; .
- 2) Modify the address of PROFIBUS DP: After powering on, LED shows the GT100-DP-RS's PROFIBUS DP address when acting as a device. Double click the button to enter the PROFIBUS DP address modifying state, the high bit of DP address starts blinking and low bit is always on. Press the button to

make the number add one; long press the button over 2.5 seconds to change to low bit setting state.

When setting the low bit state, LED high bit is always on and low bit starts blinking. Press button to make the number add one; long press button over 2.5 seconds to save the new address and enter the normal communication state, the high bit and low bit of LED are always on.

LED display state block diagram is shown as below:

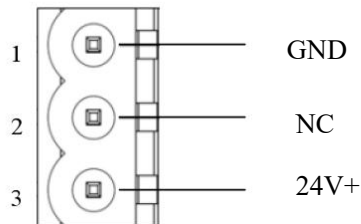


Notes: while changing the DP address, LED will automatically recover to normal communication state if there is no operation of button over 10 seconds, the previous operation is invalid.



2.4 Interface

2.4.1 Power Supply Interface



Pin	Function
1	GND
2	NC, not connected
3	24V+, DC 24V power positive, range: 9-30V

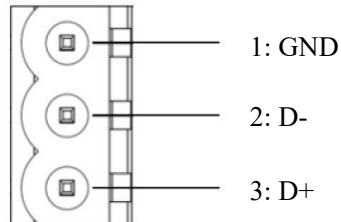
2.4.2 RS485 Interface

The RS485 interface of GT100-DP-RS is a standard one. The RS485 characteristic of the product is described as below:

- The basic characteristics of RS-485 transmission technology
 - ①Network topology: Linear bus, and there are active bus termination resistors at both sides;
 - ②Baud rate: 600 bps-115.2Kbps;
 - ③Media: Shielded twisted-pair cable and also can cancel the shielding, depending on environmental conditions (EMC);
 - ④Site number: 32 stations per subsection (without repeater), and up to 127 stations (with repeater).
 - ⑤Plug connection: 3-pin pluggable terminal.
- The main points on RS-485 transmission equipment installation
 - ① All the equipment are connected with RS-485 bus;
 - ② There is a bus terminal resistor at each farthest end of the bus—120Ω 1/2W to ensure reliable operation

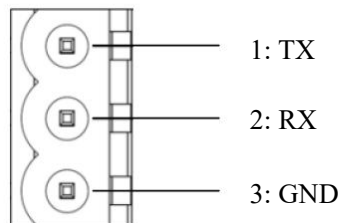
of the network.

Serial interface has 3-pin pluggable terminal and users can wire it according to the instructions on the panel.



Pin	Function
1	GND
2	D-, RS485 Data Negative
3	D-, RS485 Data Positive

2.4.3 RS232 Interface

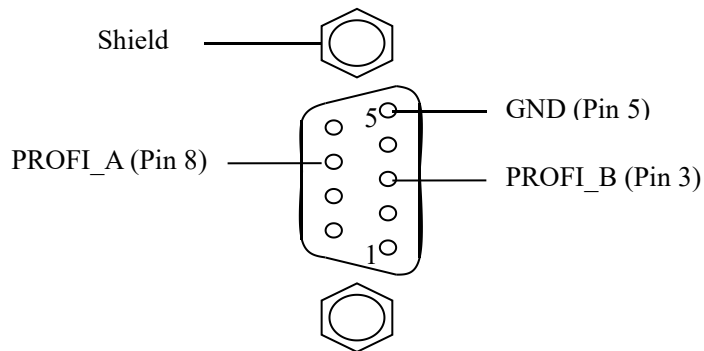


Pin	Function
1	TX, GT100-DP-RS serial port transmit, connect serial receive RX of user device
2	RX,GT100-DP-RS serial port receive, connect serial transmit TX of user device
3	GND

2.4.4 PROFIBUS DP Interface

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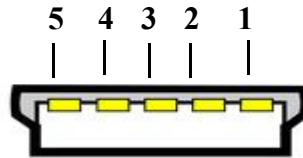
PROFIBUS DP uses DB 9 hole pattern interface, the pin definition is shown as below:

Pin	Definition
3	PROFI_B, Data + (required)
4	RTS
5	GND
6	+5V Output
8	PROFI_A, Data- (required)
Bolt	SHIELD

PROFI_B (PIN3), PROFI_A (PIN8) and Shied must be connected; RTS (PIN4) can be used to determine the transmit direction by some devices; +5V (PIN6) and GND (PIN5) are used in the bus termination or as power supply for Fiber Optical Transceiver (FOT). Maximum output current of PIN5 and PIN6 is 80mA.



2.4.5 MINI-B USB Interface

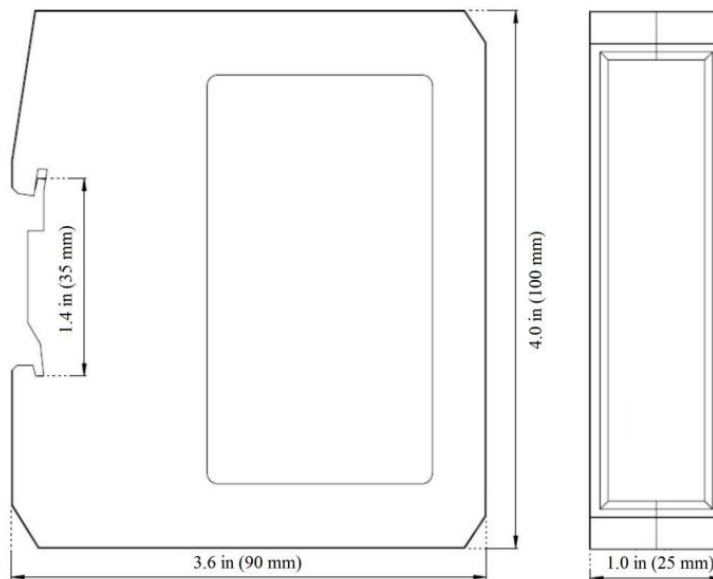


Pin	Definition	Description
1	VBUS	+5V
2	D-	Data Negative
3	D+	Data Positive
4	ID	No connection
5	GND	Signal Ground

3 Hardware Installation

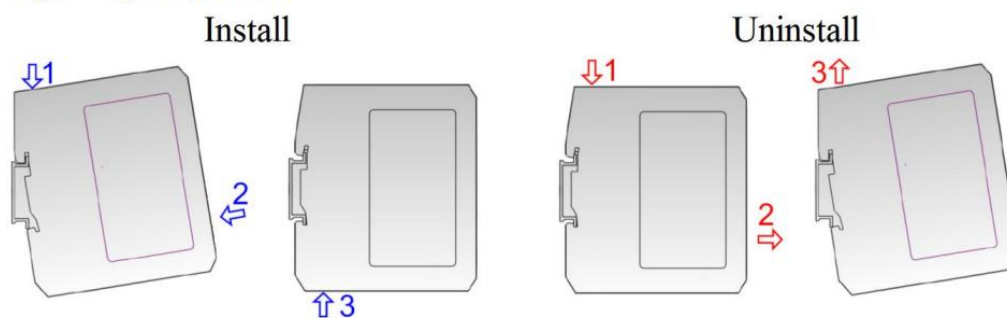
3.1 Machine Dimension

Size: 1 in (width)*4 in (height)*3.6 in (depth) / (25mm * 100mm * 90mm)



3.2 Installation Method

Using 1.38 in (35mm) DIN RAIL.





4 Quick Start Guide

The following steps will help users to quickly configure GT100-DP-RS:

1. Connect the power: Wire according to the correct method of connecting power, and be noticed that it's the 24V DC power. PC and GT100-DP-RS: Connect GT100-DP-RS USB interface to PC USB interface by using USB cable (USB standard A model to USB Mini B model).
2. Configure GT100-DP-RS: Use configuration software SST-MPG-CFG to configure serial port parameters (subnet) and Modbus read/write command (see chapter 6 Instructions of configuration software). There are two ways to upload/download configuration of GT100-DP-RS: (1) Use USB cable to configure. Connect the converter and PC with software SST-MPG-CFG installed with SSTCOMM USB cable. Power on the device. Click upload/download in the software and finish the configuration according to the instruction. After upload/download, the converter will enter normal communication mode. (2) Use serial port to configure. Connect any one of RS232/RS485 serial ports of GT100-DP-RS with PC with software SST-MPG-CFG. Power on the device and LED will show DP address. Long press the button over 5s -> CF blinking. Click the button -> CF on and enter the configuration mode. Click upload/download in the software, choose correct COM port to finish upload/download. After upload/download, long press the button over 2.5s to enter the communication mode. It is suggested to use USB to configure GT100-DP-RS.
3. Modify GT100-DP-RS PROFIBUS DP address: (1) Modifying by software. In configuration software SST-MPG-CFG, select custom for PROFIBUS address in the fieldbus. Write DP address and download the configuration to the converter. (2) Modifying by button. Double press the button to enter PROFIBUS DP address setting state (LED high bit is blinking and low bit is on). Click the button to make number add 1. Long press the button over 2.5s to switch to low bit address setting state. Click button to make number add 1. Long press the button over 2.5s to save and make new address take effect.
4. Hardware configuration: In PROFIBUS master modeling software, first install GSD file, then drag input/output module to the slot as required. Compile and download.
5. Connect GT100-DP-RS with serial port devices: According to the instructions of RS485/RS232 interface in chapter 2, turn off the power and correctly connect the terminals.



GT100-DP-RS **Serial/PROFIBUS DP Converter**

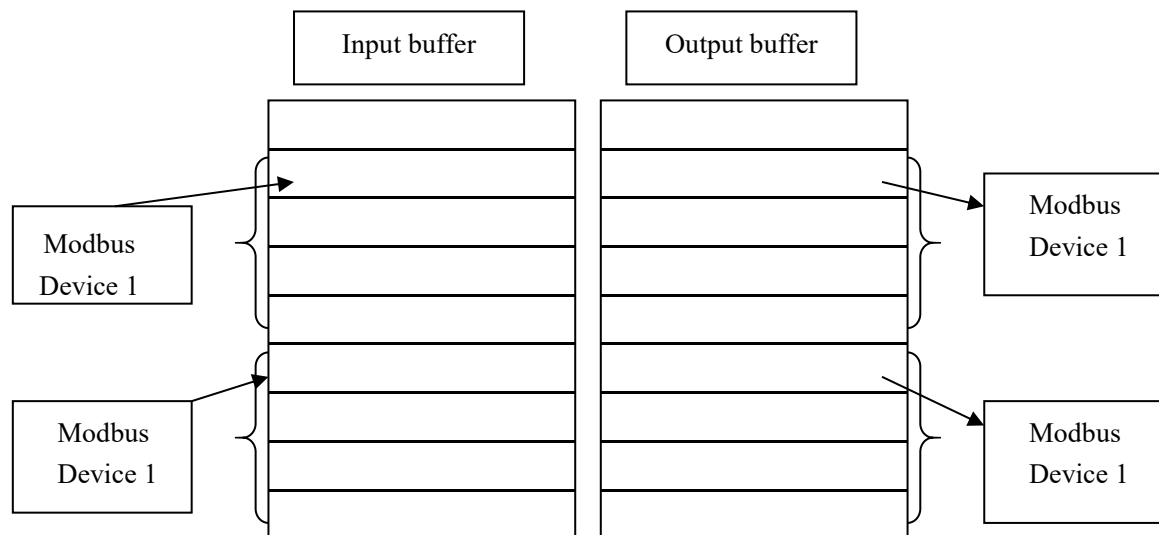
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6. Connect GT100-DP-RS with PROFIBUS DP master station: According to the instructions of PROFIBUS DP interface in chapter 2, connect at least PIN3 and PIN8 correctly.
7. Power on GT100-DP-RS, then enter the normal communication state.



5 Working Principle of Modbus Master Station

The data conversion between Modbus and PROFIBUS of GT100-DP-RS is established by mapping relation. GT100-DP-RS has two data buffers: one is PROFIBUS network input buffer with address of 0x00-0xa7; the other is PROFIBUS network output buffer with address of 0x4000-0x60a7. Command 1, 2, 3 and 4 of Modbus write the data read from Modbus server station into the network input buffer, then the data will be reading by PROFIBUS network; Command 5, 6, 15 and 16 of Modbus write the data from the network output buffer into Modbus server station. The data saved in network output buffer is the data PROFIBUS master station write to the GT100-DP-RS.



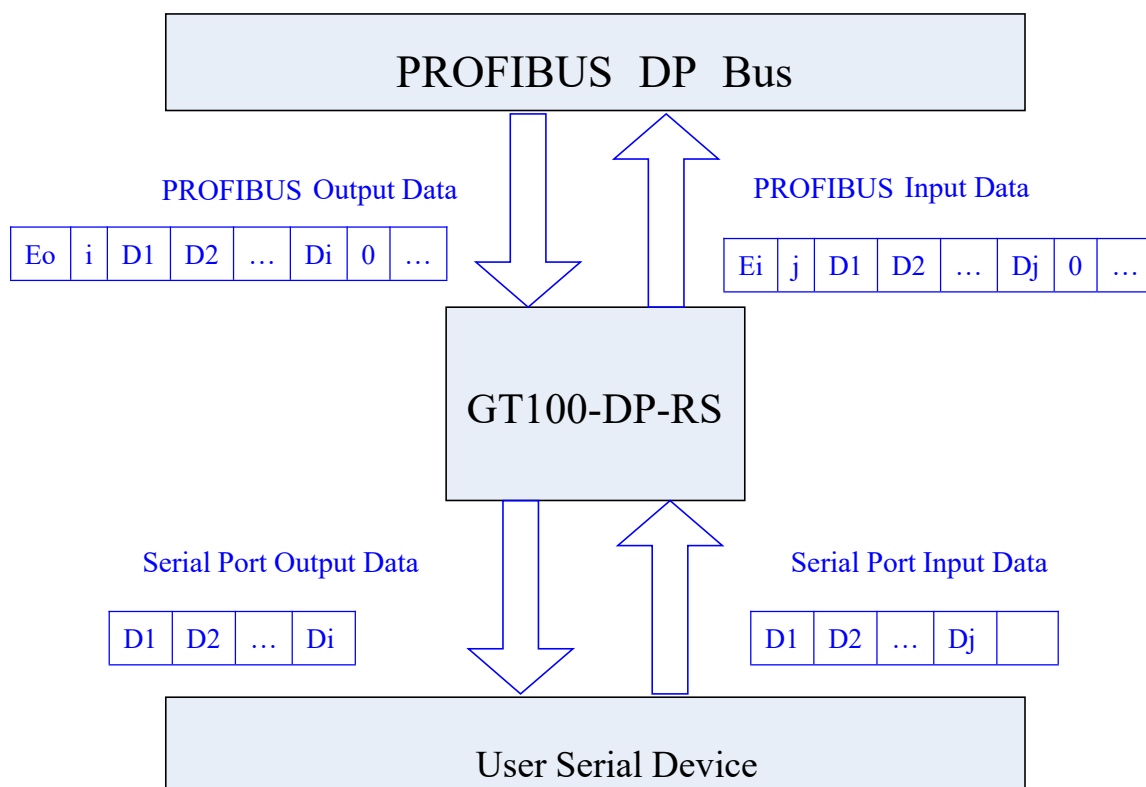
Users can configure 48 commands. Every command can read a set of continuous Modbus registers.



6 Universal Mode

6.1 Data Conversion

The converter implements data conversion between PROFIBUS DP fieldbus protocol and serial port devices with RS232/RS485 serial interface. The conversion and transmission between PROFIBUS DP data and serial port data is bidirectional. Data conversion block diagram is shown as below:



In the block diagram above, “ E_o ” is the transaction ID of PROFIBUS output data; “ i ” is the number of serial port data which needs to be sent contained in output data; “ D_1 ” - “ D_i ” is the data that GT100-DP-RS converter send to serial devices; “ E_i ” is the transaction ID of PROFIBUS input data; “ j ” is the number of serial port data which has been received of input data; “ D_1 ” - “ D_i ” is the data GT100-DP-RS converter received from user serial devices.

As shown above, no matter what control mode serial port side use, when GT100-DP-RS converter receives a frame of correct data from serial device, the data is packaged as shown above” PROFIBUS Input Data” and



transmitted to PROFIBUS DP master station (normally PLC). If the length of data received from serial port is shorter than the length of DP conversion data, GT100-DP-RS converter will set other bytes to 0. For example, the data length of each conversion by DP is 10 bytes. If serial devices transmit 3 bytes data, except 2 frame headers and the 3 bytes data, GT100-DP-RS converter will set other 5 bytes data to 0 and saved DP data into buffer.

Notes: Control mode of universal mode is valid only for the data transmitted from serial devices to GT100-DP-RS. GT100-DP-RS only send raw data to serial devices without limited by control mode^[1].

After PROFIBUS DP master station sends data to GT100-DP-RS converter, according to the format of “PROFIBUS output data”, the first byte of DP output buffer is output transaction ID and the second byte is the length of output data marked as N. If any change happened to transaction ID^[3], GT100-DP-RS converter will transmit the N bytes data starting from the third byte of DP output buffer^[2] to serial devices regardless of what control mode the serial devices use to transmit data to GT100-DP-RS converter. For example, suppose the data length of DP master station output buffer is 6 bytes and the data sent from DP to GT100-DP-RS converter is (HEX)10 02 11 22 00 00, which means output data transaction number is 16. The real length of valid data is 2 bytes. Then GT100-DP-RS converter only sent (HEX) 11 22 to serial devices regardless of the control mode is time interval between characters or delimiter.

Notes:

[1] Control method including time interval between characters, frame length and delimiter.

[2] The data saved in DP input buffer is the data which is sent from GT100-DP-RS converter to DP master station. The data saved in DP output buffer is the data which is sent from DP master station to GT100-DP-RS converter.

[3] There are two ways to send data through serial port. The default one is transaction ID detection: data is sent out from serial port when transaction number changed. The other is automatic sending: data is sent out according to sending period.

6.2 Universal Mode

6.2.1 PROFIBUS Output Data Format

[Transaction ID] [Serial output data length n] [Serial output data 1] ... [Serial output data n] [0x00] ... [0x00]

|— n —| m —|



Notes:

The number of PROFIBUS output bytes should be selected as equal to or more than $n+2$;

m numbers of $[0x00]$ is padding data, $n+m+2$ equals to the number of PROFIBUS output bytes.

Transaction ID: transaction ID adds 1 means a new frame of data.

Case:

If PROFIBUS input/output byte selected by users is 8 bytes input and 8 bytes output, serial output data length is 3, data is 01 02 03, and the current transaction ID is 0.

Output data format: [01] [03] [01] [02] [03] [00] [00] [00]

6.2.2 PROFIBUS Input Data Format

[Transaction number] [Serial input data length n] [Serial input data 1] ... [Serial input data n] $[0x00]$... $[0x00]$
|— n —| |— m —|

Notes:

The number of PROFIBUS output bytes should be selected as equal to or more than $n+2$;

m numbers of $[0x00]$ is padding data, $n+m+2$ equals to the number of PROFIBUS input bytes.

Transaction ID: transaction ID adding 1 means a new frame of data.

Serial input data length: Select “Close” in input data length when configuring fieldbus part in software, it didn’t show the data length in DP input area. Instead, it showed transaction plus data. Select “Open” and DP input area shows data length.

Case:

If PROFIBUS input byte selected by user is 8 bytes input and 8 bytes output, serial output data length is 3, data is 04 05 06, and the current transaction number is 00.

Output data format: [01] [03] [04] [05] [06] [00] [00] [00]

6.2.3 Frame Type

What is frame type? Frame type is used for GT100-DP-RS converter judging the end of data frame sent from user serial device.



Frame type includes time interval between characters, frame length and delimiter.

6.2.3.1 Time interval between characters

When user serial device sends data to the GT100-DP-RS converter, the converter will start timing for every byte that user serial sends out. If the next byte's arrival time exceeds the set time interval (timeout time), GT100-DP-RS converter will consider the previous receiving N continuous bytes as a data frame. Then, it will combine this N or N-2 bytes into one "PROFIBUS input data frame" and send it to the PROFIBUS master. If users select "use CRC check", GT100-DP-RS will execute CRC check of the former N-2 bytes: if right, send to the PROFIBUS master; otherwise discard this data frame.

For example, time interval between characters is set 10ms, no CRC check, input and output bytes length of PROFIBUS master is 8 bytes. The user serial device will first send out one byte 0x11 first. After GT100-DP-RS receives 0x11, it will start characters interval timer. If GT100-DP-RS receives next byte within 10ms, it will restart the character interval timer. Otherwise, it will consider receiving one complete data frame. The data word is all HEX.

User serial device sends to GT100-DP-RS: 11 22 33 44 55 66

GT100-DP-RS sends to PROFIBUS master: 01 06 11 22 33 44 55 66

User serial device sends to GT100-DP-RS: F1 F2 F1

GT100-DP-RS sends to PROFIBUS master: 02 03 F0 F2 F1 00 00 00

When PROFIBUS master sends to GT100-DP-RS: 09 05 00 02 08 45 96 00

When GT100-DP-RS detects that transaction number changed, then it will send to serial device: 00 02 08 45

96

Notes: The data length that GT100-DP-RS sends to the user serial device depends on the data value in the frame that PROFIBUS sends to GT100-DP-RS.

6.2.3.2 Frame length

This frame type is suitable for receiving serial data frame of specific length. When receiving bytes from user's serial devices, GT100-DP-RS will automatically launch the time interval between characters function. Under the

following two conditions, GT100-DP-RS considers that it has received one frame data:

1. The adjacent bytes received from user serial devices don't time out; the receiving bytes number is equal to "frame length". Or,
2. The bytes received from user serial device characters times out.

When GT100-DP-RS has received one frame data, it will dispose of this frame if data numbers equals to the set frame length. Otherwise, discard the frame directly. If selecting "Use CRC Check", it will do the CRC check first and discard those that didn't pass the CRC check.

For example, set frame type to "frame length", the length of characters is 4 bytes, time interval between characters is 10ms, no CRC check, and input and output bytes length of PROFIBUS master is 8 bytes. If receiving 4 bytes continuously with no characters timeout, GT100-DP-RS will package this frame data into one "PROFIBUS input data" frame and send it to PROFIBUS master. If characters time out, it will directly discard the data less than 4 bytes. The data are HEX.

User serial device sends to GT100-DP-RS: 11 22 33 44

GT100-DP-RS sends to PROFIBUS master: 10 04 11 22 33 44 00 00

When PROFIBUS master sends to GT100-DP-RS:

02 06 66 55 44 33 22 11 (the data length is limited by the exchange length of PROFIBUS input and output bytes)

When GT100-DP-RS detects that transaction number changed, then it will send to serial device:

66 55 44 33 22 11

Notes: The data length that GT100-DP-RS sends to the user serial device depends on the data value in the frame that PROFIBUS sends to GT100-DP-RS.

6.2.3.3 Delimiter

This frame type is suitable for receiving the data frame with fixed frame header and end. It requires user serial devices first to send one "start byte" to indicate: user serial devices start to send one frame and continue to send one "end byte" when considering one frame data is over. If users select this frame type, GT100-DP-RS will



automatically launch the characters timeout function.

Under the following conditions, GT100-DP-RS considers that it has received one frame data:

1. No characters timeout happens in the process of receiving bytes; And,
2. One correct “start byte” is received; And
3. One correct “end byte” is received.

Under other conditions, GT100-DP-RS directly discards the incomplete data frame.

For example, set frame type to “delimiter”, “start character” is 0xff, “end character” is 0xfe, “time interval between characters” is 10ms, and input and output bytes length of PROFIBUS master is 8 bytes., GT100-DP-RS will receive the data correctly only if user serial devices send FF xx xx xx FE with no timeout. The data are all HEX.

User serial device sends: FF 11 22 33 44 55 FE

GT100-DP-RS sends to PROFIBUS master: 02 05 11 22 33 44 55 00

When PROFIBUS master sends to GT100-DP-RS: 01 02 61 96 00 00 00 00

When GT100-DP-RS detects that transaction number changed, then it will send to serial device: 6196

Notes: The data length that GT100-DP-RS sends to the user serial device depends on the data value in the frame that PROFIBUS sends to GT100-DP-RS.



7 Instructions of Configuration Software

7.1 Notes Before Configuring

SST-MPG-CFG is a software based on Windows, and used to configure a variety of fieldbus converter devices. It can set the related parameters and commands of Modbus and other bus.

This manual mainly introduces the using method of GT100-DP-RS.

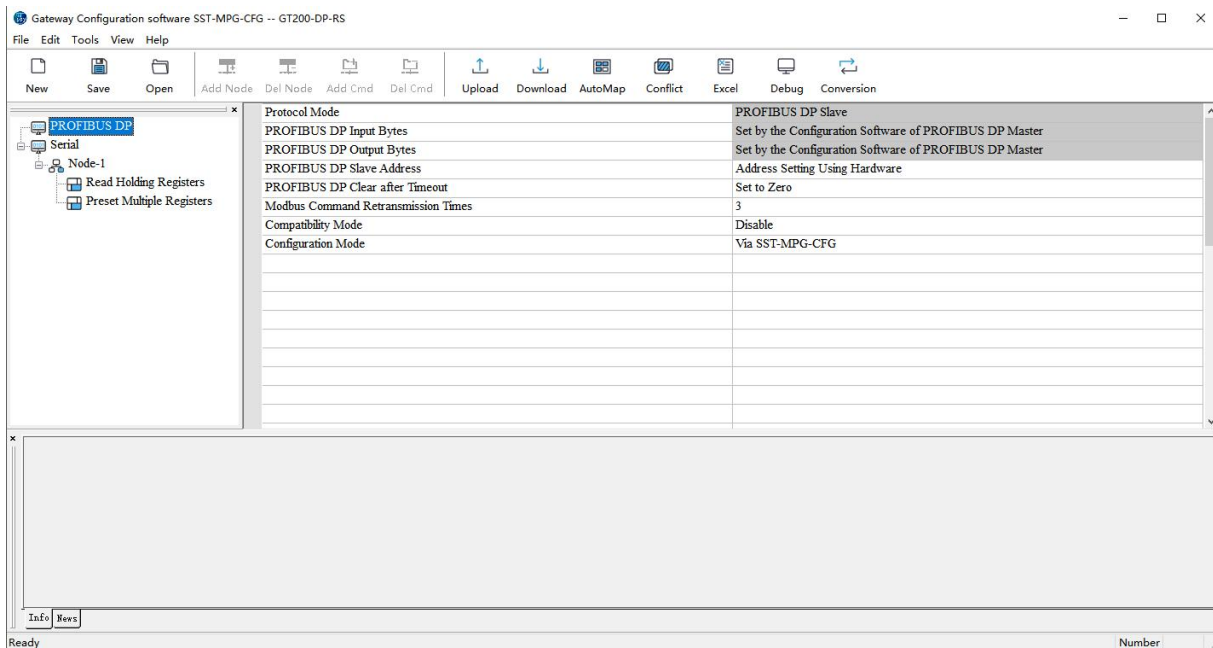
Double click the icon to enter the interface of “Select Device Type”:



Select "GT100-DP-RS" to enter configuration interface:

GT100-DP-RS Serial/PROFIBUS DP Converter

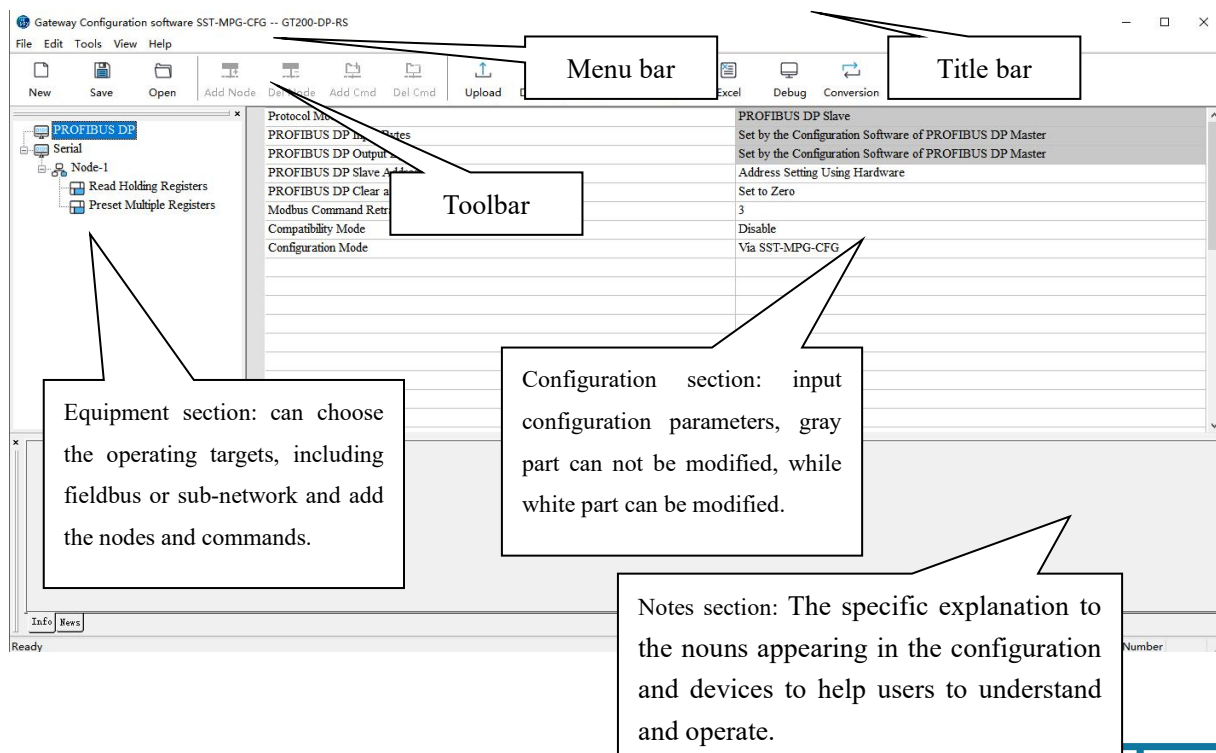
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7.2 User Interface

SST-MPG-CFG interface includes: title bar, menu bar, toolbar, status bar, equipment section, configuration section and notes section.

Notes: All the gray part in the software cannot be changed.



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Toolbar is shown as below:



Functions separately from left to right are: new, open, save, add nodes, delete nodes, add commands, delete commands, upload configuration, download configuration, auto mapping, conflict detect and export Excel.

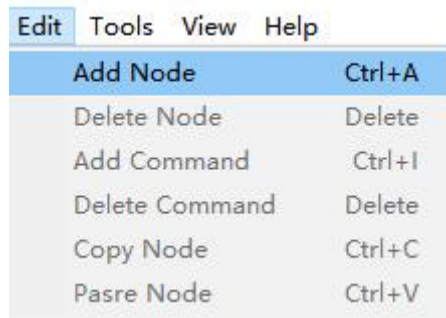
Among them,

The toolbar provides icon shortcuts to major functions.

-  **New** New: Create a new configuration project.
-  **Save** Save: Save the current configuration.
-  **Open** Open: Open a configuration project.
-  **Add Node** Add Node: Add a Modbus node.
-  **Del Node** Delete Node: Delete a Modbus node.
-  **Add Cmd** Add Command: Add a Modbus command.
-  **Del Cmd** Delete Command: Delete a Modbus command.
-  **Upload** Upload: Upload the configuration from the gateway.
-  **Download** Download: Download the configuration to the gateway.
-  **AutoMap** Auto Map: Automatically calculate the mapped data address of each command.
-  **Conflict** Conflict: Check the mapping address in the Conflict Detection.
-  **Excel** Export Excel: Export current configuration as a table and save it as *.xls file.
-  **Debug** Debug: For debugging Modbus communications, and defining the network fault.
-  **Conversion** Conversion: Supports converting GT200-DP-RS and GT100-DP-RS configurations.

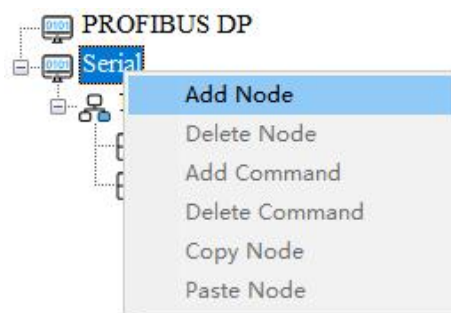
7.3 The Operation of Equipment View

7.3.1 Equipment View Interface



7.3.2 Operation Mode of Equipment View

The equipment view supports three types of operation: Edit Menu, Edit Toolbar and Right click edit Menu.

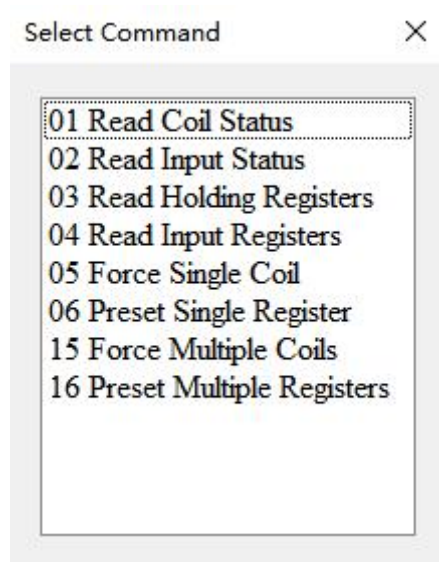


7.3.3 Operation Types of Equipment View

- 1) Add nodes: Left click on subnet or existing nodes, and perform the operation of adding a new node. Then there is a new node named "Node (0)" under subnet. **Notes: GT100-DP-RS supports configuring only four Modbus nodes.**
- 2) Delete nodes: select the node to be deleted, and then perform the operation of deleting node. The node and its all commands will be deleted.
- 3) Add commands: Left click on the node, and then perform the operation of adding command to add a command for the node. The dialog box will be shown as follow:

Currently it supports the command IDs: 01, 02, 03, 04, 05, 06, 15 and 16.

Select the command: Double click the command



4) Delete commands: Left-click on the command and perform the operation of deleting command.

5) Rename the node: Left-click on the node that needs to be renamed, and the node can be renamed in the corresponding configuration view interface

7.4 The Operation of Configuration View

7.4.1 Interface of Fieldbus Configuration View

In the device view interface, click fieldbus and the configuration view interface are shown as follows:

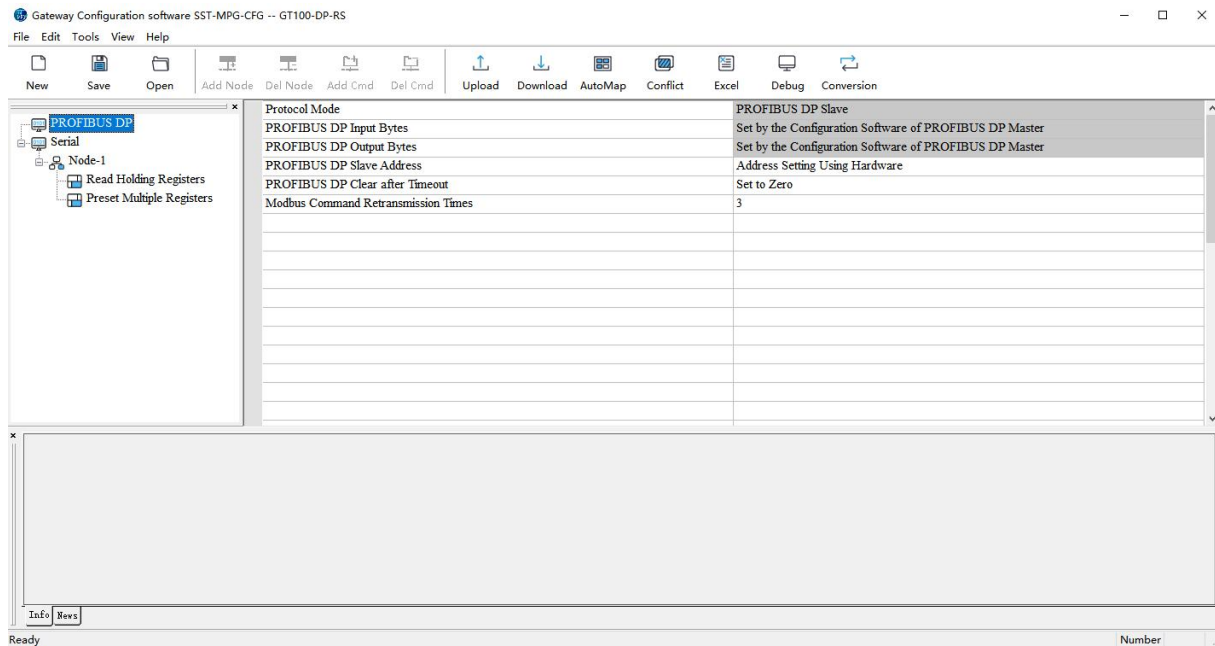
Configurable items including: input valid data length, PROFIBUS device station address.

“Input valid data length”: It’s valid only when subnet protocol type is “User Config”. Open: The first byte of PROFIBUS input data is used to indicate the length of serial port received data. Close: There are no bytes of the PROFIBUS input data which indicate the length of serial port received data.

“PROFIBUS address”: Two options of “Setting By Hardware” and “Customized” can be selected. “Setting by Hardware” means modifying the PROFIBUS DP device address through the top button of GT100-DP-RS;

“Customized” means DP address can be input in the textbox of “PROFIBUS Address”. **Notes:** the textbox on the

right of “PROFIBUS Address” is editable.



7.4.2 Interface of Subnet Configuration View

1) Set Protocol type to Modbus Master

Configurable parameters include:

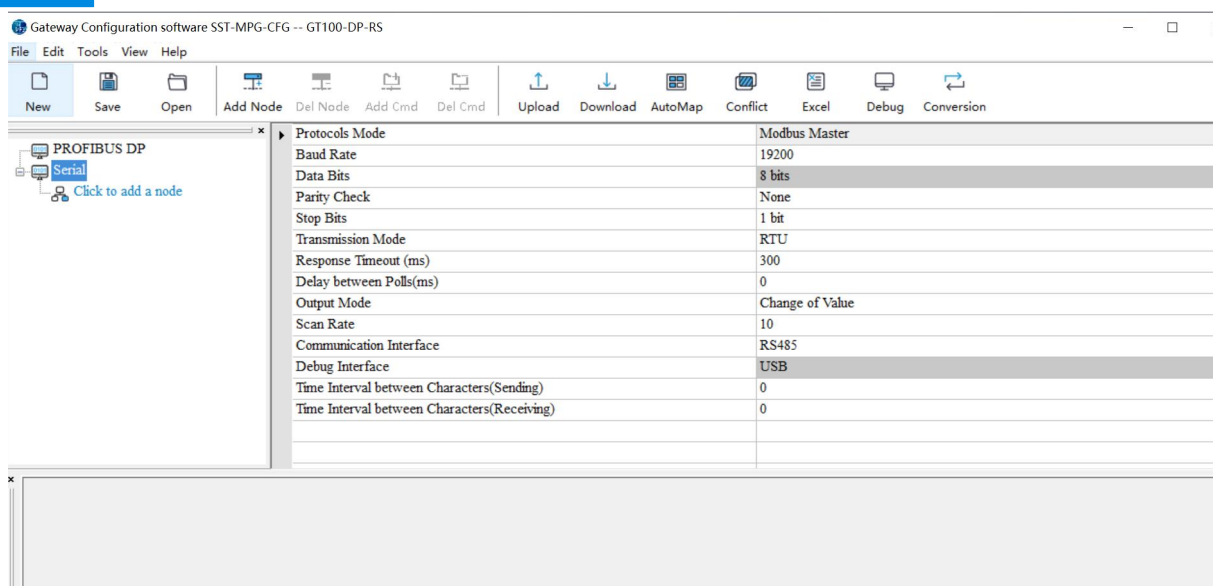
Modbus communication baud rate, Data bits, Parity check bit, Stop bits, Transmission mode, Response timeout, Delay between polls, Polling mode of outputting commands, Scan rate.

Interface of configuration view is shown as follow:

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Modbus communication baud rate: 300, 600, 1200, 2400, 9600, 19200, 38400, 57600 and 115200bps to be selected.

Data bits: 8 bits

Parity check mode: None, odd, even, mark and space are optional.

Stop bits: 1 and 2 are optional.

Transmission mode: RTU and ASCII are optional.

Response timeout: When the Modbus master send commands, the range of the time waiting for response from the server is 300-60000ms.

Delay between polls: After one Modbus command has been sent and has received correct response,,or the response has timed out, the range of the delay time before next command being sent is: 0 - 2500ms.

Output mode:

Modbus writing command (output command) has 3 kinds of outputting modes: Cycle, Forbidden and Change of Value output.

Cycle: The same with Modbus read command, and output according to the scanning ratio.

Forbidden: Prohibit outputting Modbus write command.

Change of Value: When the output data has changed, it outputs the write command and stop outputting after receiving correct response.

Scan rate: Ratio of slow scan cycle to fast scan cycle. If the quick scan command sends 10 times, slow scan

command sends 1 time.

Time Interval between Characters(Sending):This is an advanced parameter. Default value is zero. If slave is always timeout you can increase the value of the parameter.

The range of the parameter value is 0 to 60000ms.

This parameter only supports GT100-DP-RS V5.0 and above.

Time Interval between Characters(Receiving):This is an advanced parameter. Default value is zero. If Time Interval between Characters of slave does not accord to the Modbus protocol you can increase the value of the parameter.

The range of the parameter value is 0 to 60000ms.

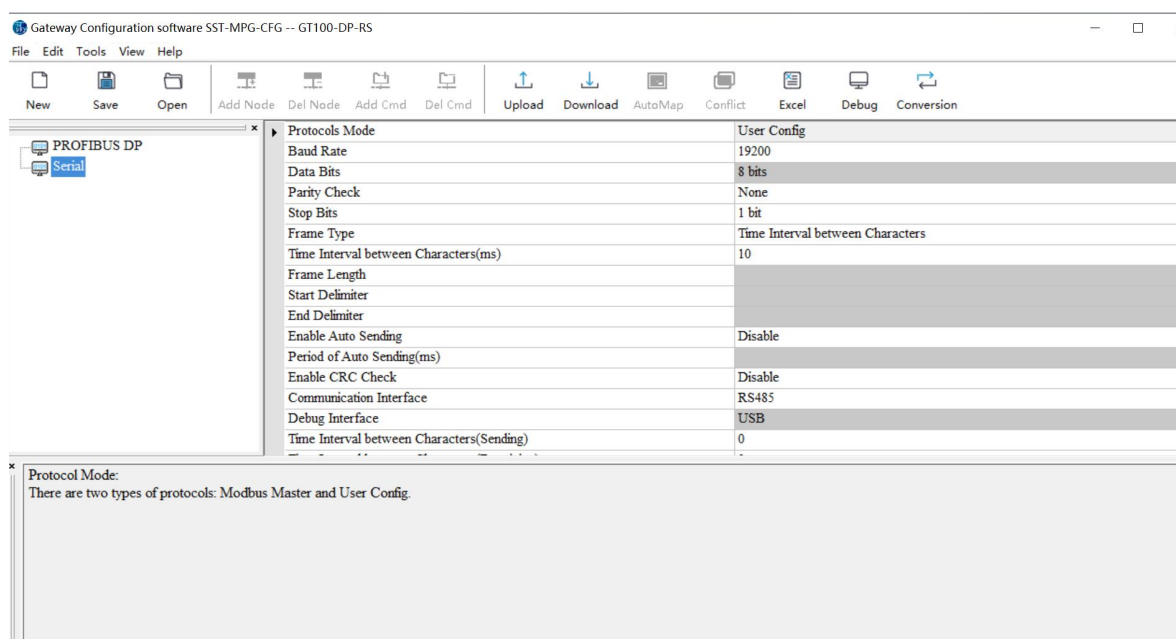
This parameter only supports GT100-DP-RS V5.0 and above.

2) Set Protocol type to User Config

Configurable parameters include:

Modbus communication baud rate, Data bits, Parity check bit, stop bits, Frame type, Time interval between characters, Frame length, Start delimiter, End delimiter, Enable auto sending, Period of auto sending, Enable CRC check.

Interface of configuration view is shown as follow:



Modbus communication baud rate: 300, 600, 1200, 2400, 9600, 19200, 38400, 57600 and 115200bps to be



selected.

Data bits: 8 bits.

Parity check mode: None, odd, even, mark and space are optional.

Stop bits: 1 and 2 are optional.

Frame type: It means the method of GT100-DP-RS serial port receiving data frame from user serial devices. Time interval between characters, frame length and delimiter are available to be selected. For more detail, see chapter 5.2.3.

Time interval between characters: The interval time among characters while transmitting data. Default value is 10, users can input the time with a range of 10-60000ms.

Frame length: It's valid only when the frame type is frame length. Users can input the time with a range of 1-166.

Start delimiter: It's valid when frame type is delimiter, range: 0-255.

End delimiter: It's valid when frame type is delimiter, range: 0-255.

Enable auto sending: the mode of GT100-DP-RS serial port sending data to user serial devices. Open and close can be selected.

Period auto sending: Default value is 1000, users can input the time with a range of 10-60000ms. It's valid only when auto sending is opened.

CRC check: It's valid when frame type is "time interval between characters" and "frame length". Open and close are optional.

Time Interval between Characters(Sending): This is an advanced parameter. Default value is zero. If slave is always timeout you can increase the value of the parameter.

The range of the parameter value is 0 to 60000ms.

This parameter only supports GT100-DP-RS V5.0 and above.

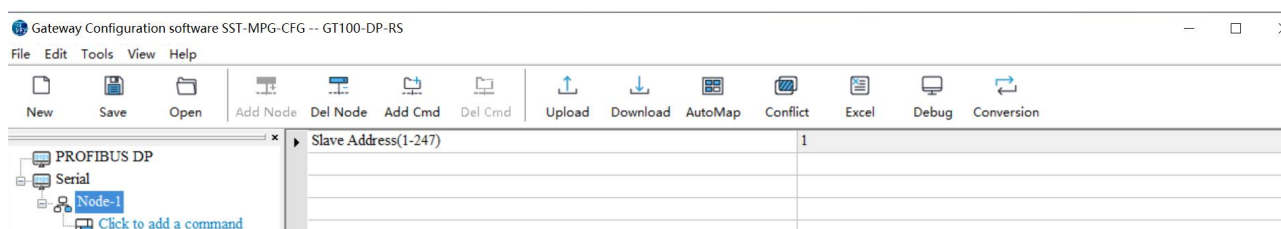
Time Interval between Characters(Receiving): This is an advanced parameter. Default value is zero. If Time Interval between Characters of slave does not accord to the Modbus protocol you can increase the value of the parameter.

The range of the parameter value is 0 to 60000ms.

This parameter only supports GT100-DP-RS V5.0 and above.

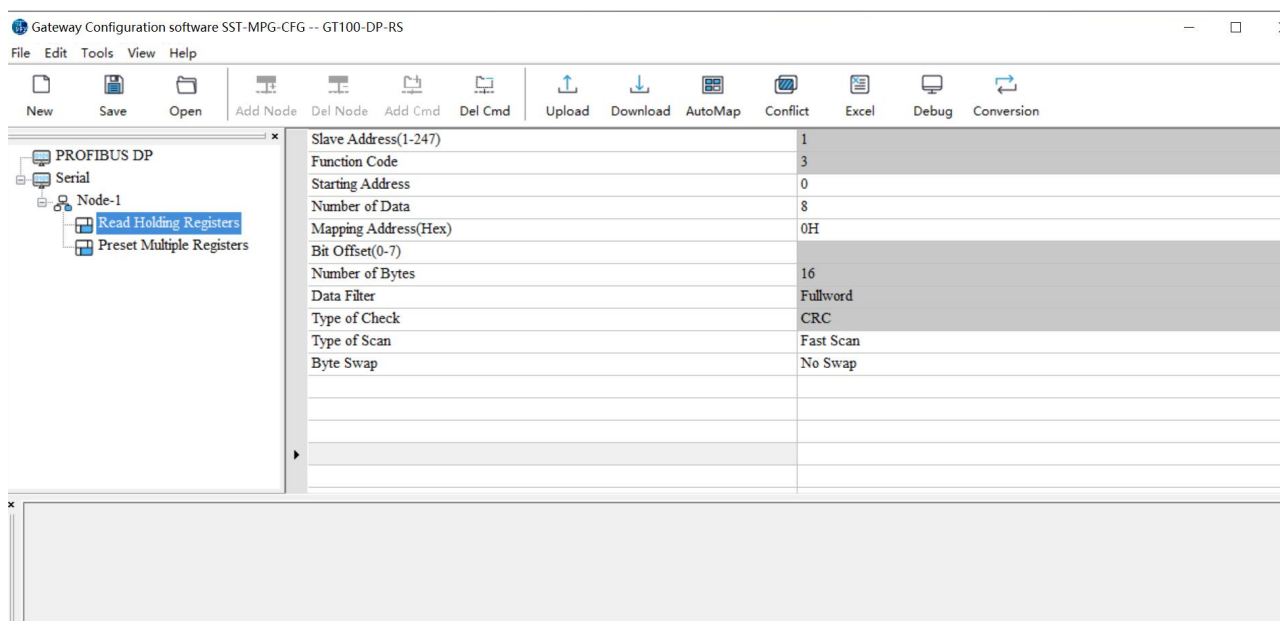
7.4.3 Interface of Node Configuration View

Under “Modbus master” mode, in the interface of device view, left click a node, and then configuration interface is shown as follow:



7.4.4 Interface of Command Configuration View

Under “Modbus master” mode, click a command and then configuration interface is shown as follow:



The starting address of Modbus register: The starting address of register/switching value/loop and so on in Modbus server in the range of 0-65535 (decimal). For example, if GT100-DP-RS needs to collect the flow of certain flow meter, and the flow corresponding Modbus register address is 40035, it should be set to 34. The address provided by corresponding table of data address of user device may be PLC address or protocol address. It should be filled with protocol address in SST-MPG-CFG. The following table shows the PLC address and

corresponding protocol address examples:

Command	PLC address examples	Corresponding protocol address
Coil state	00001~00010	00000~00009
Input state	10001~10010	00000~00009
Holding register	40001~40010	00000~00009
Input register	30001~30010	00000~00009

The number of data: The number of register/switching value/coil in Modbus device device. **Notes:** The maximum number of write registers is 45 under ASCII mode.

The starting address of memory mapping: The starting address of data read from devices or written to the devices in memory buffer of the module. The devices are the user devices connected at the serial side.

The address range of data mapping in the module memory:

Read command: 0x0000 - 0x00a7

Write command: 0x6000 - 0x60a7

Users can complete the function of mapping address without conflict by software through “calculate mapping address automatically”. **Notes:** When using “auto mapping function”, users need to configure corresponding Modbus register address and data numbers first.

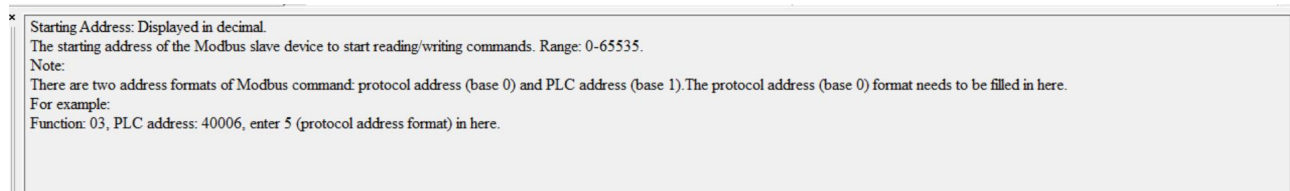
Mapping bit (0 - 7): For the bit operation commands, the position range of start-bit located in byte is 0 - 7.

Type of Scan: There are two kinds of scanning mode: quick-scan and slow-scan, meeting the requirements of users about quick-scan or slow-scan of different commands. Slow-scan is equal to quick-scan being multiplied by scan ratio. (Configure it in the subnet configuration interface)

Byte Swap: There are three kinds of types: Non-exchange, Double-byte-exchange and four-byte-exchange. Modbus and PROFIBUS DP byte order is that the most significant bit (MSB) takes precedence. DeviceNet byte order is that the least significant bit (LSB) takes precedence. Users may need to exchange byte order to get the correct value.

7.4.5 Notes View

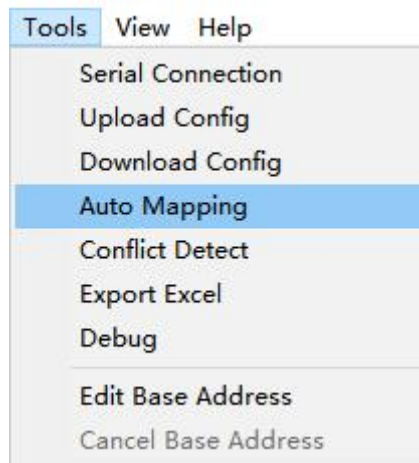
Notes view displays the explanation of configuration. The notes that show how to configure the starting address is shown as follow:



7.6 Auto Mapping

The automatic mapping function automatically calculates the mapping address and fills in the value. After automatic mapping, there are no address conflicts in the mapping buffer.

Users can select the function in the Tools menu or click the “AutoMap” icon.



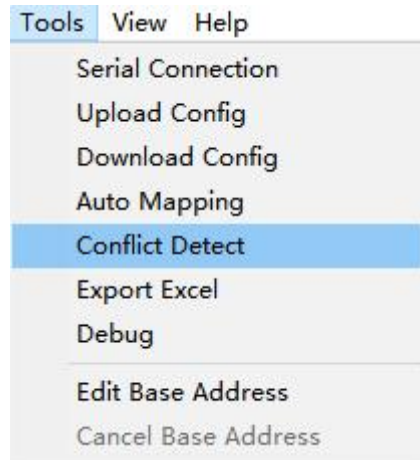
7.7 Conflict Detection

The data is stored in the gateway’s buffer. To check if there are conflicts in the data mapping address.

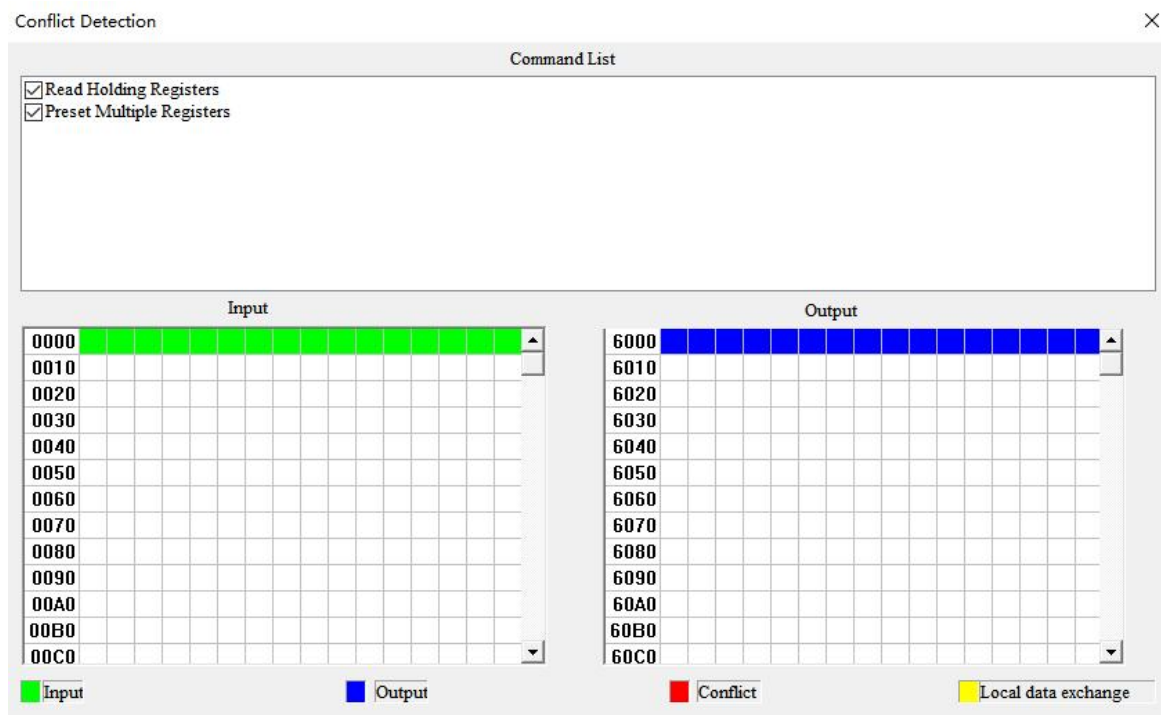
Users can select the function in the Tools menu or click the “Conflict” icon.

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When the base address is not edited the view show as follows:



When editing the base address: the number of data blocks is 1, the base address is 0, and the number of bytes is the default bytes, the show as follows:



Each grid represents one byte address.

Green: Read command show in the input-mapping area; no conflict.

Yellow: Write command show when the mapping addresses in the input area; no conflict.

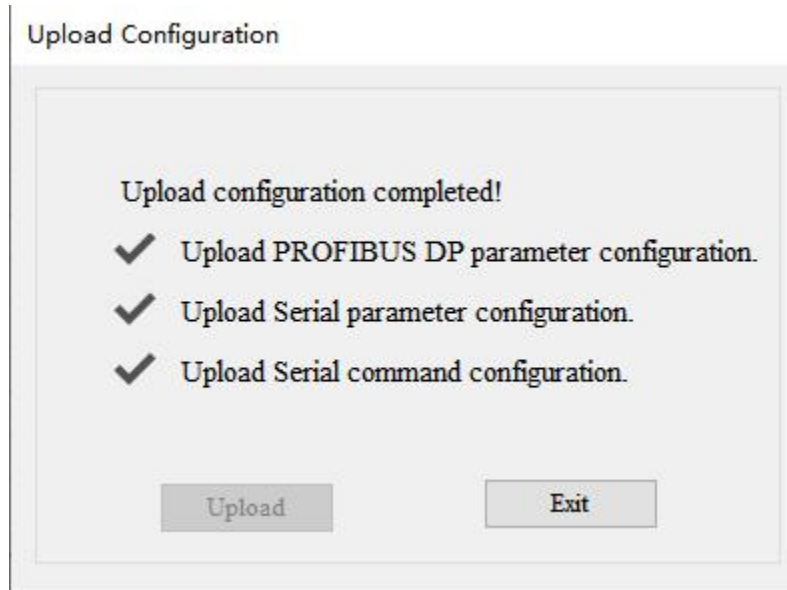
Blue: When the address mapping area is located in the output area; no conflict.

Red: Output area or input area, different commands occupy the same byte address, the byte is shown as red.

7.8 Upload Configuration



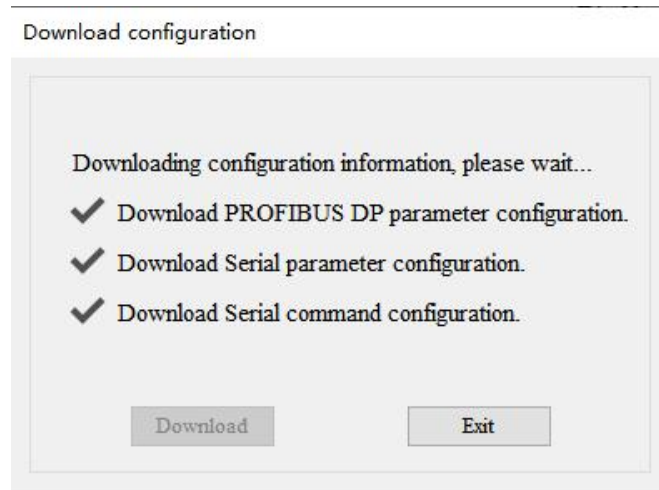
Click upload **Upload** icon to upload the gateway configuration from the gateway to the software. The display interface is as follows:



7.9 Download Configuration



Click download **Download** icon to download the configuration from the configuration software to the gateway.
The display interface is as follows:



Note 1: Before downloading the configuration, please check whether the "serial port configuration" is the available port.

Note 2: Before downloading the configuration, make sure that all configurations has been completed.

7.10 Debug

This function is for debugging Modbus network communications. Version 5.0 and above support debugging interfaces.

The screenshot shows a window titled "Monitor/Modify" with a close button (X) in the top right corner. Inside the window, there is a table with the following columns: Index, Status, Slave Address, Function Code, Starting Address, and Data/Exception Code. The table contains 10 rows of data, all with "Response timeout" in the Status column. Below the table, there are several input fields and buttons. The "Read Data:" field is empty. The "Memory Mapping Address:" field contains the value "6000". The "Data:" field contains the value "00 01 02 03". At the bottom of the window, there are six buttons: "Save Content", "Stop Displaying", "Clear data", "Send", "Stop debug and exit", and "Exit".

Index	Status	Slave Address	Function Code	Starting Address	Data/Exception Code
10	Response timeout	4	3	0	
9	Response timeout	5	3	0	
8	Response timeout	3	3	0	
7	Response timeout	2	3	0	
6	Response timeout	1	3	0	
5	Response timeout	4	3	0	
4	Response timeout	5	3	0	
3	Response timeout	3	3	0	
2	Response timeout	2	3	0	
1	Response timeout	1	3	0	

Read Data:

Memory Mapping Address:

Data:

Buttons: Save Content, Stop Displaying, Clear data, Send, Stop debug and exit, Exit

Status: shows communication state with server: respond correctly, response timeout, respond abnormally and response error

Slave Address: slave address in the configuration file (only master, HEX)

Function Code (Command): Modbus command in the configuration file (only master, HEX)

Starting Address: "Modbus register starting address" (HEX) in the configuration file (only master, HEX)

Data/Exception Code: display the slave data or exception code (HEX)

Notes: When the gateway is configured as Modbus master, it will show slave address, function code and starting address.

Read Data: show the latest read data (HEX)

Memory mapping address: Starting address of data writing in the gateway

Data: Data writing into the gateway

Save Content/Stop Saving: the software supports saving data to local disk. When saving is over, users need to



click "Stop Saving" to save it.

Stop Displaying/Continue to Display: the software supports dynamic or static data debugging.

Clear Data: click this button, it will clear the data in the debug interface.

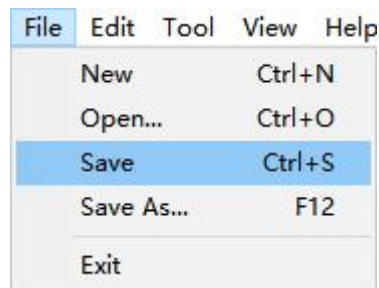
Stop debug and exit: click the button or the exit button to close the debug interface.

Exit: Force quit.

7.11 Open and Save Configuration

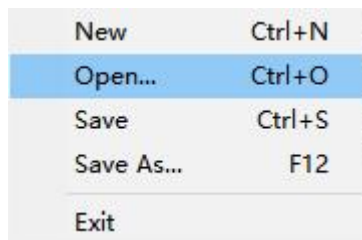
7.11.1 Save Configuration Project

Select "Save", or directly click "Save" in the tool bar the configuration project can be saved as .xml document.



7.11.2 Open Configuration Project

Select "Open", or directly click "Open" in the tool bar the configuration project can be saved as .xml document.



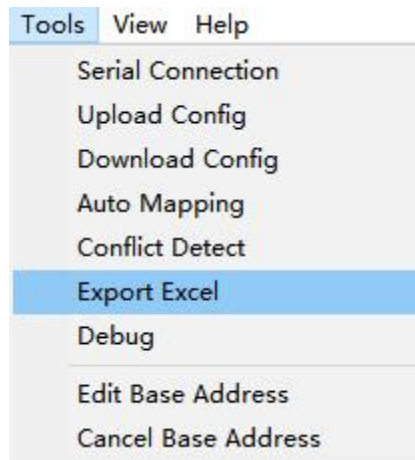
7.12 Export Excel

Excel document helps users to examine the configuration related.

Choose the icon , save the configuration as a excel document under the proper path.

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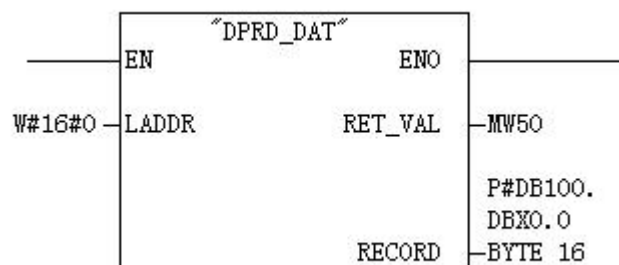


8 How STEP7 Read and Write Converter Data

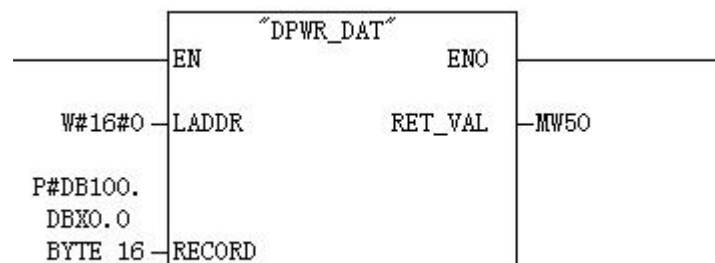
The data modules of full length supported by GT100-DP-RS are shown below:

- 2 Words Input Consistent
- 4 Words Input Consistent
- 8 Words Input Consistent
- 16 Words Input Consistent
- 2 Words Output Consistent
- 4 Words Output Consistent
- 8 Words Output Consistent
- 16 Words Output Consistent

Packing method is used in data sending and receiving in STEP7 programming. The packing method mainly use SFC15 (pack sending) and SFC14 (pack receiving).



SFC14



SFC15



Caution: It is strongly recommended that use complete-length data module to ensure the integrity of serial port frame while using universal mode of serial port protocol.

The data modules of word integrity supported by GT100-DP-RS are shown below:

- 4 Words Input, 4 Words Output
- 8 Words Input, 8 Words Output
- 16 Words Input, 16 Words Output
- 32 Words Input, 32 Words Output
- 64 Words Input, 64 Words Output
- 1 Word Input
- 8 Words Input
- 1 Word Output
- 8 Words Output

Users can apply “MOVE” command to read and write data in STEP7 programming.

The data modules of byte integrity supported by GT100-DP-RS are shown below:

- Status/ Control (Optional)
- 1 Byte Input
- 1 Byte Output

Users can apply “MOVE” command to read and write data in STEP7 programming.

Appendix A: Using STEP 7 to Set PROFIBUS-DP

The following shows how to use STEP7 to configure GT100-DP-RS:

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

1. Open SIMATIC Manager  :

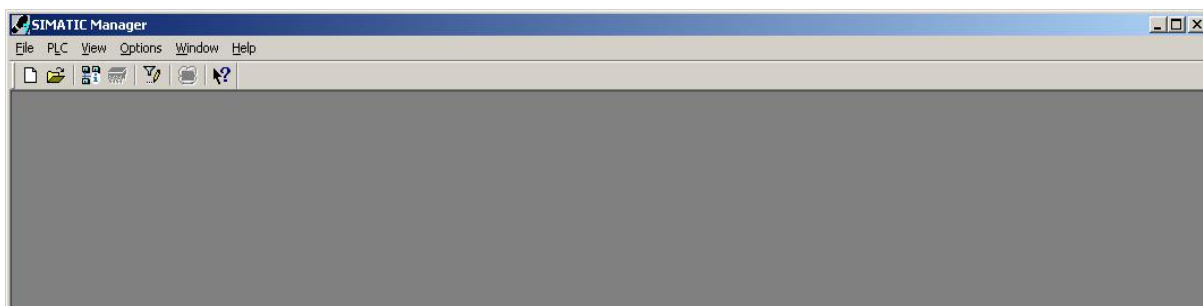


Figure 1

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

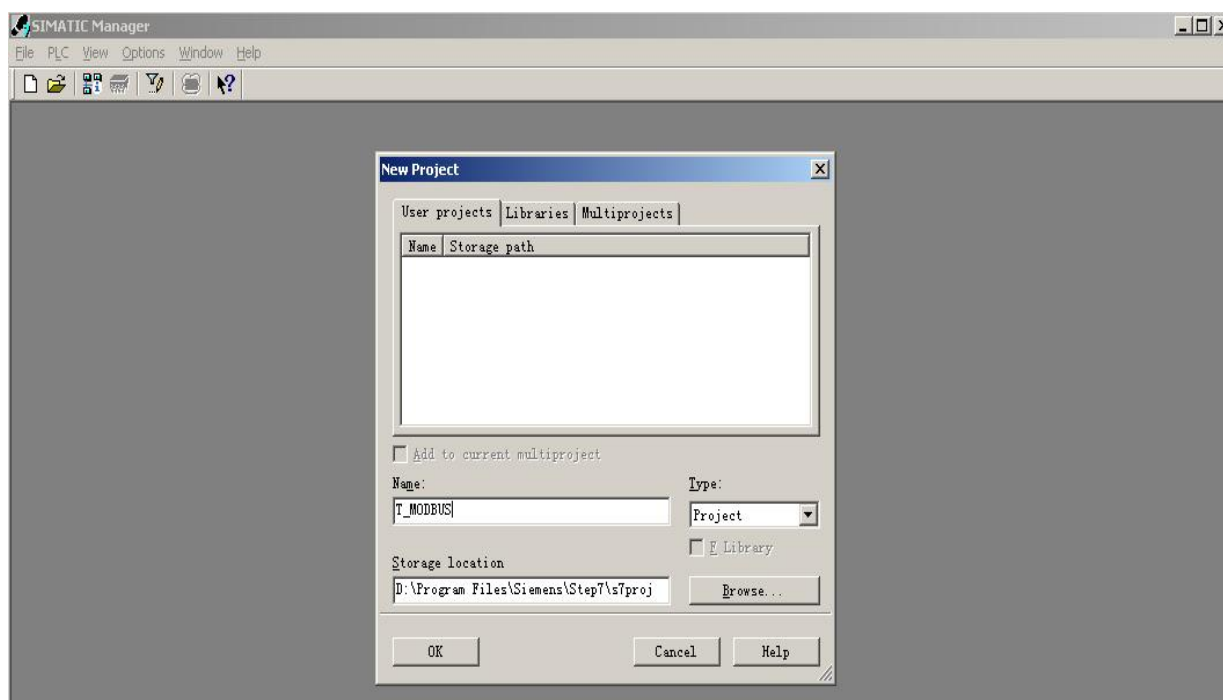


Figure 2

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

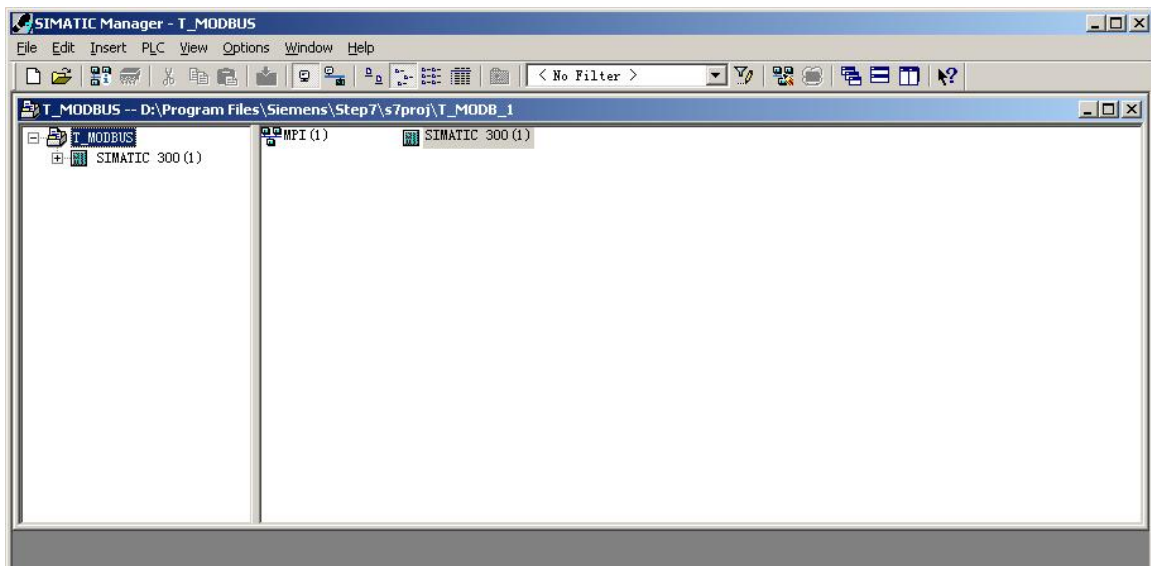


Figure 3

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

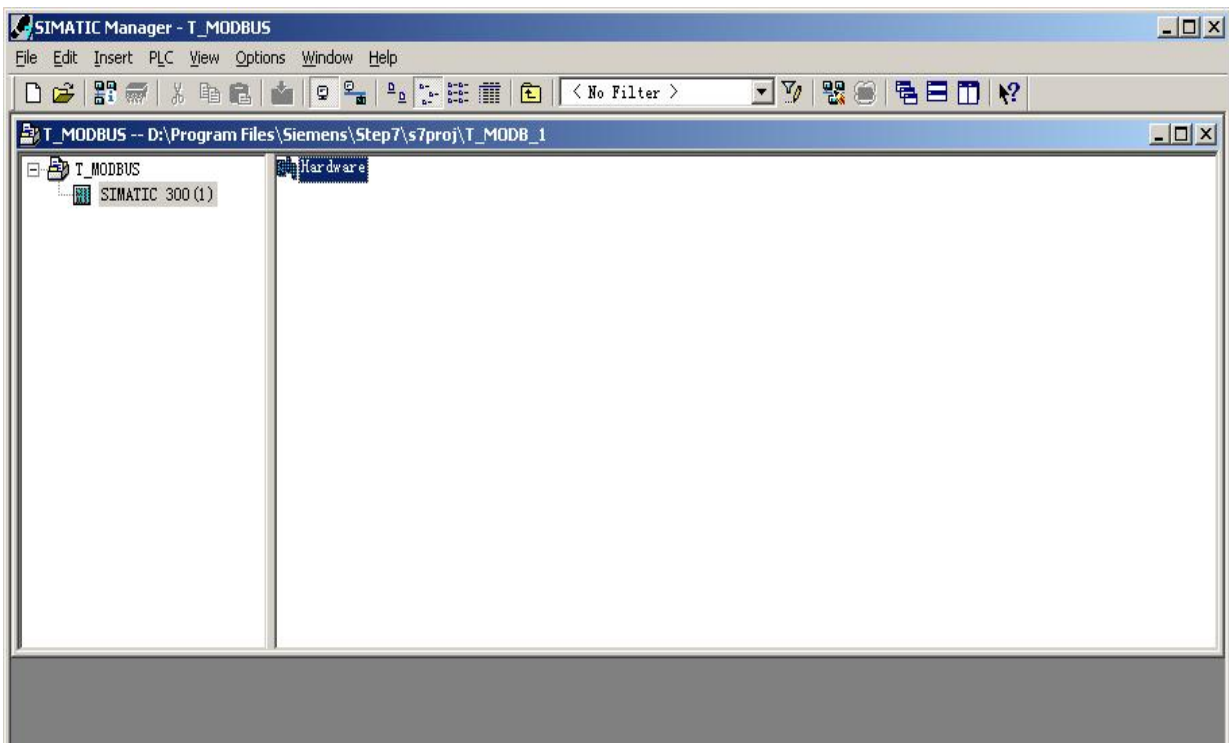


Figure 4

5. Choose Option->Update Catalog in the menu, update GSD in Device catalog

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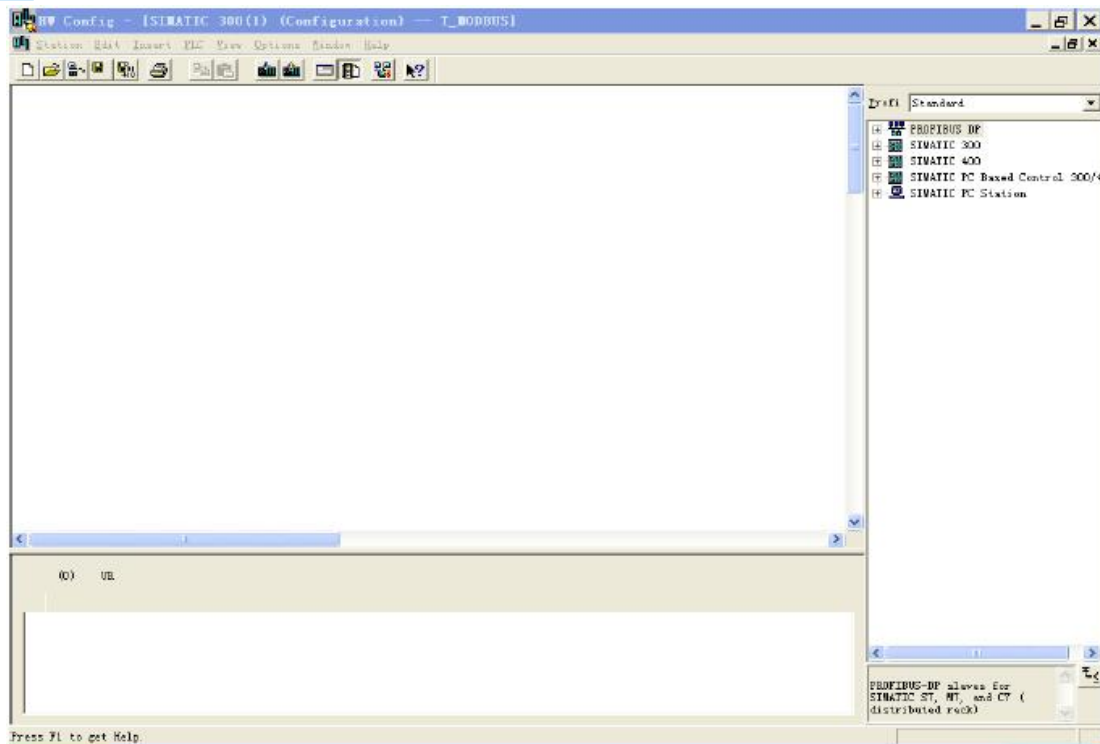


Figure 5

6. Here you can find your equipment in the right side of the window/PROFIBUS DP/Additional Field Devices/Converter/GT100-DP-RS/, as Figure 6 shown:

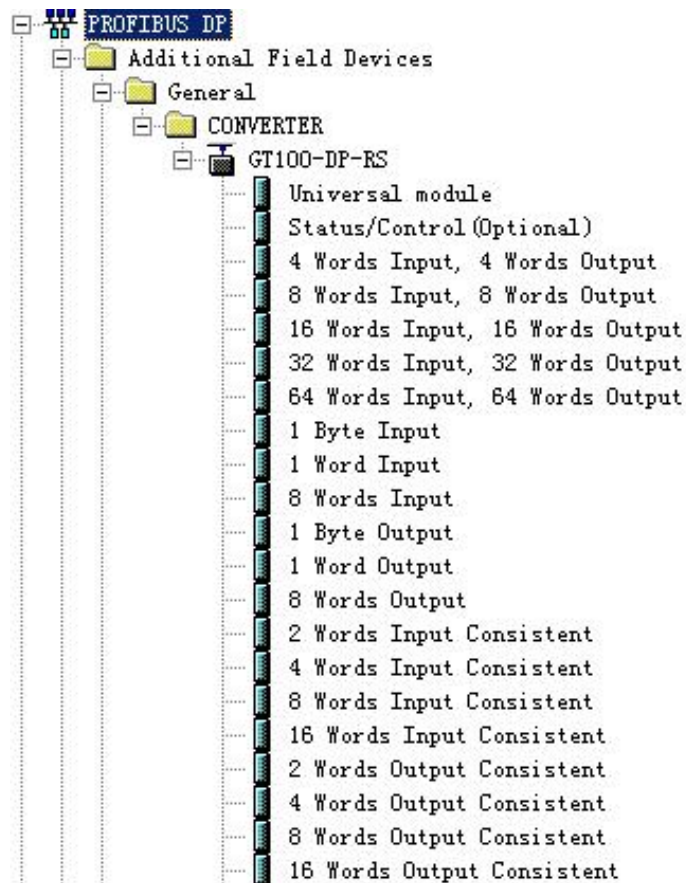


Figure 6

7. Set PLC rack, double click the “Hardware Catalog\SIMATIC 300\RACK-300\Rail”, as Figure 7 shown:

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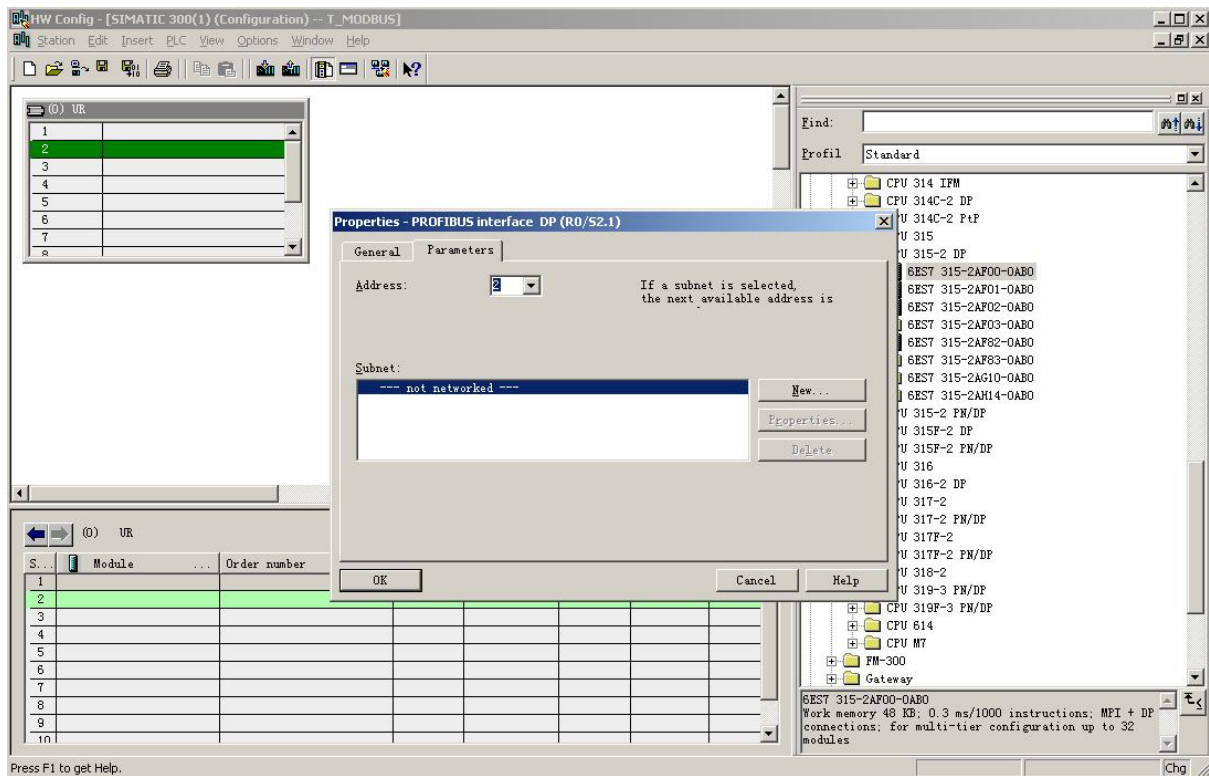


Figure 7

8. Set CPU module and select the corresponding device type and the occupied slots.
9. Create PROFIBUS DP network and set PROFIBUS DP: Click New -> Network settings. Select DP and select a baud rate such as 187.5Kbps. Then select "OK". Double-click it. As Figure 8 shown:

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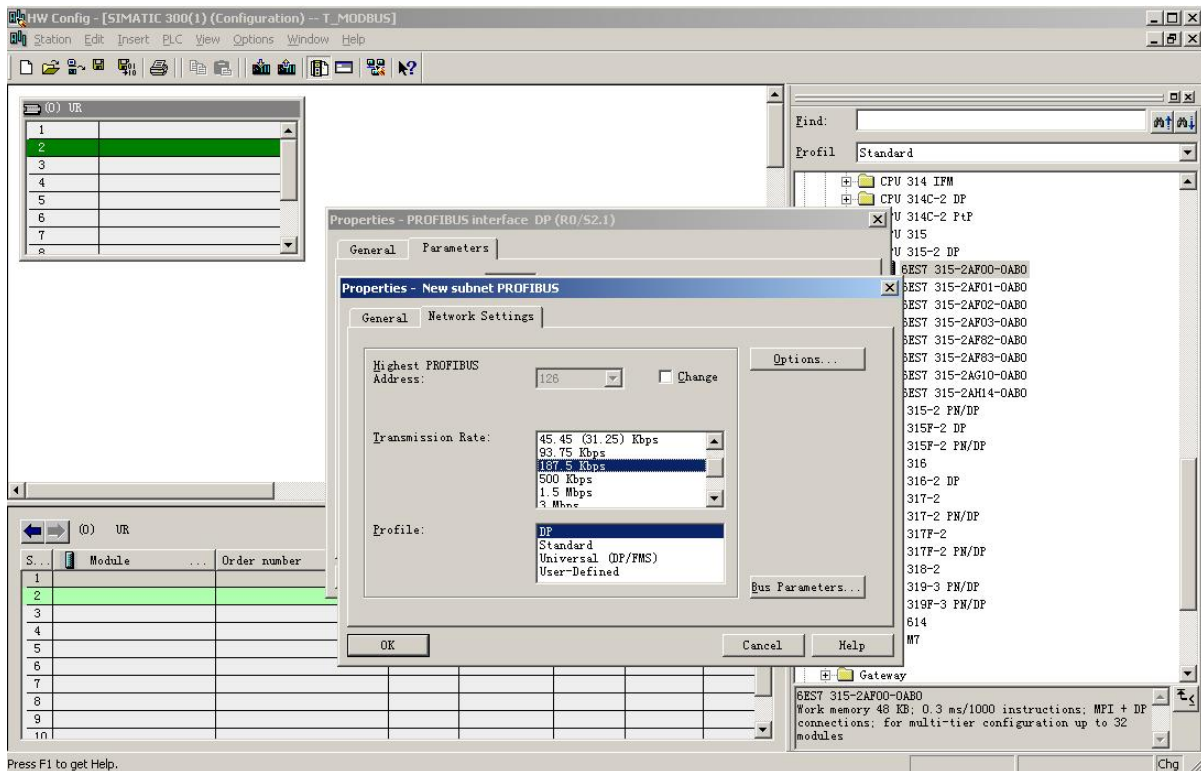


Figure 8

10. Select PROFIBUS DP Master address; As Figure 9 shown:

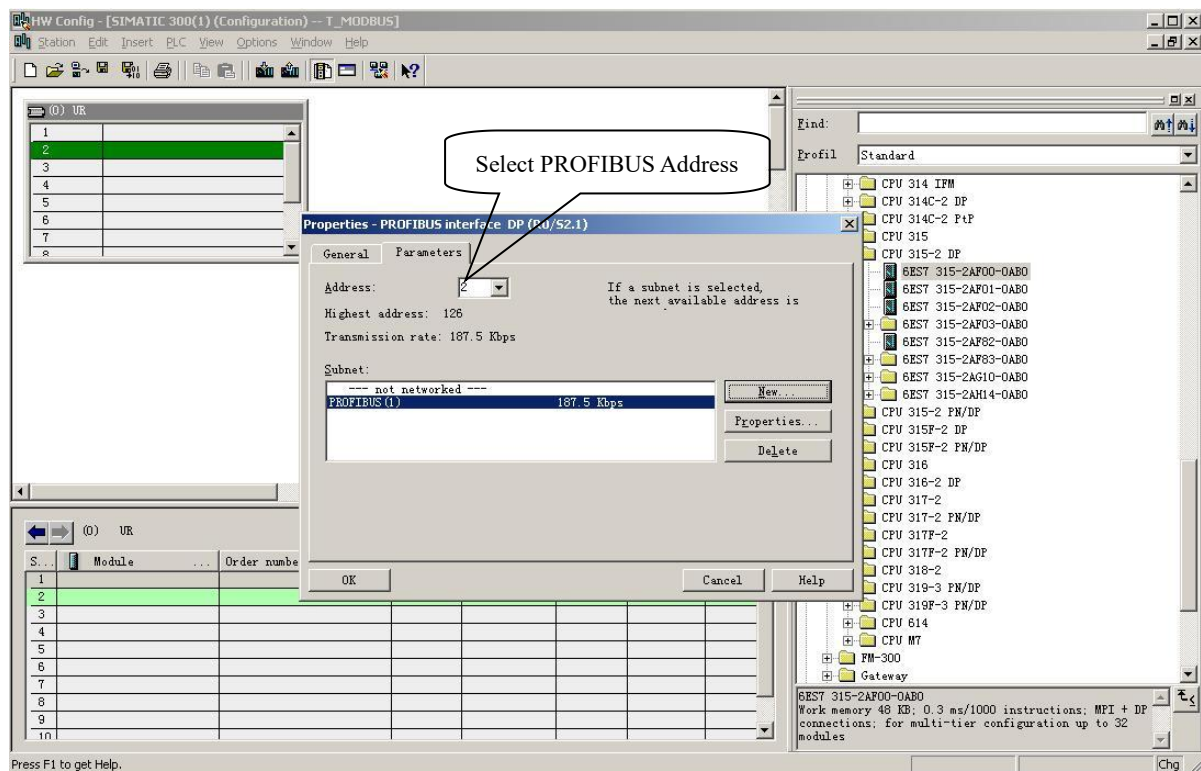


Figure 9

11. Configure GT100-DP-RS device station into PROFIBUS DP network, and map the input and output data block to S7-300 or other controller's memory, As Figure 10 shown:

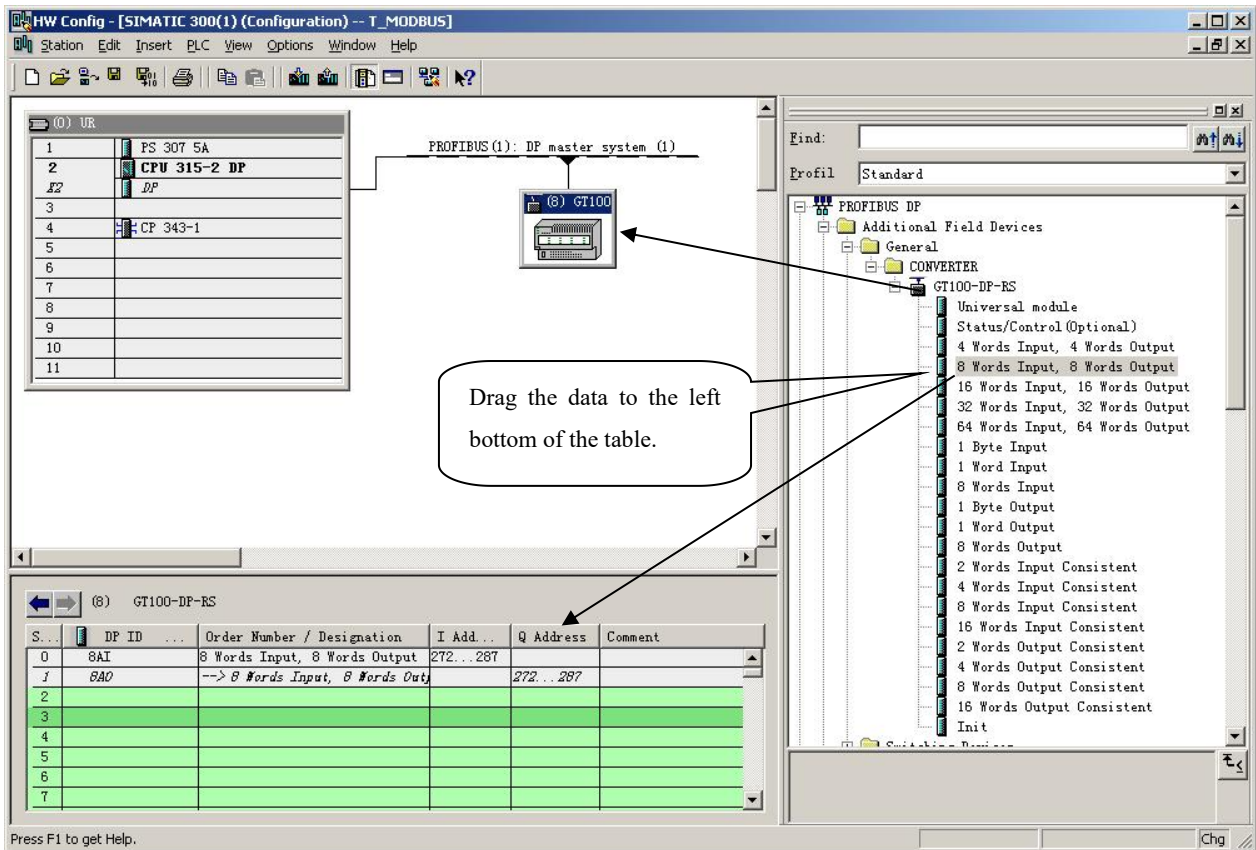


Figure 10

Operation is divided into two steps: the first step is to drag GT100-DP-RS into the network configuration on the upper left and drag on the PROFIBUS DP bus. The mouse will change its shape, which is to say it can be placed. The second step is to drag data block into the data mapping table at the bottom left, then the table will change to green, which is to say it can be placed and map corresponding bytes to the PLC memory.

Note1: When requiring full word, drag data block to the left bottom of table where requires the full word data block, the location must correspond to converter memory area where need full word in SST-MPG-CFG configuration software.

Note2: The setting of PROFIBUS DP device station address must be consistent with the settings of configured button!

12. Compile and download the configuration into PLC.