

PROFIBUS DP/CAN Gateway GT200-DP-CA

User Manual

REV 4.2

Rev A



SST Automation

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Important Information

Warning


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

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Catalog

1 Product Overview.....	1
1.1 Product Function.....	1
1.2 Product Features.....	1
1.3 Technical Specifications.....	1
1.4 Related Products.....	2
1.5 Revision History.....	2
2 Hardware Descriptions.....	3
2.1 Product Appearance.....	3
2.2 Indicators.....	4
2.3 LED Display.....	4
2.4 Button.....	4
2.5 DIP Switch.....	5
2.6 Interface.....	7
2.6.1 Power Interface.....	7
2.6.2 CAN Interface.....	7
2.6.3 PROFIBUS DP Interface.....	8
2.6.4 RS232 Interface.....	8
3 Installation.....	9
3.1 Machine Dimension.....	9
3.2 Installation Method.....	10
4 Quick Start Guide.....	11
5 Working Principle.....	12
6 Troubleshooting and Suggestions.....	18
Appendix A: Using STEP 7 to Configure PROFIBUS DP.....	19

1 Product Overview

1.1 Product Function

Support connecting the devices with CAN (including CAN2.0A and CAN2.0B) to PROFIBUS DP bus, that is to say CAN bus network devices can be converted to PROFIBUS DP bus network devices. PROFIBUS DP interface of GT200-DP-CA is slave. It supports using bit 8 of DIP switch to decide that the mode of GT200-DP-CA is 15-byte mode or 16-byte mode.

1.2 Product Features

- Wide application: Support connecting the devices with CAN bus interface to PROFIBUS DP bus.
- Easy to use: Complete network communication through simple operations in a short time.
- Powerful function: Support connecting with multiple CAN devices, support CAN2.0A/2.0B, and support the two modes working together.
- User can easily realize single read/write and periodically visit of CAN devices.
- Support receive confirm function, more complete and reliable data transmission.

1.3 Technical Specifications

[1] Communication rate:

- ◆ CAN baud rate: 1M, 500K, 250K, 125K, 100K, 62.5K, 31.25K, 20K, 10K.
- ◆ PROFIBUS baud rate: Baud rate is self-adaptive and can be up to 12M.

[2] Module provides PROFIBUS DP slave interface with 2.5KV photoelectric isolation and CAN interface.

[3] Two types of input/output bytes number at the side of PROFIBUS are optional: 16 bytes input/output, 15 bytes input/output.

[4] GT200-DP-CA can buffer at most 200 CAN frame numbers.

[5] Power supply: 24VDC (9~30VDC).

[6] Working temperature: -40°F~140°F (-40°C~60°C), Humidity: 5%~95% (non-condensing).



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

[8] Installation: 1.4 in (35 mm) DIN RAIL.

[9] Protection level: IP20.

1.4 Related Products

The related products include: GT200-DP-CO, GT200-CO-EI and GT200-CA-EI etc.

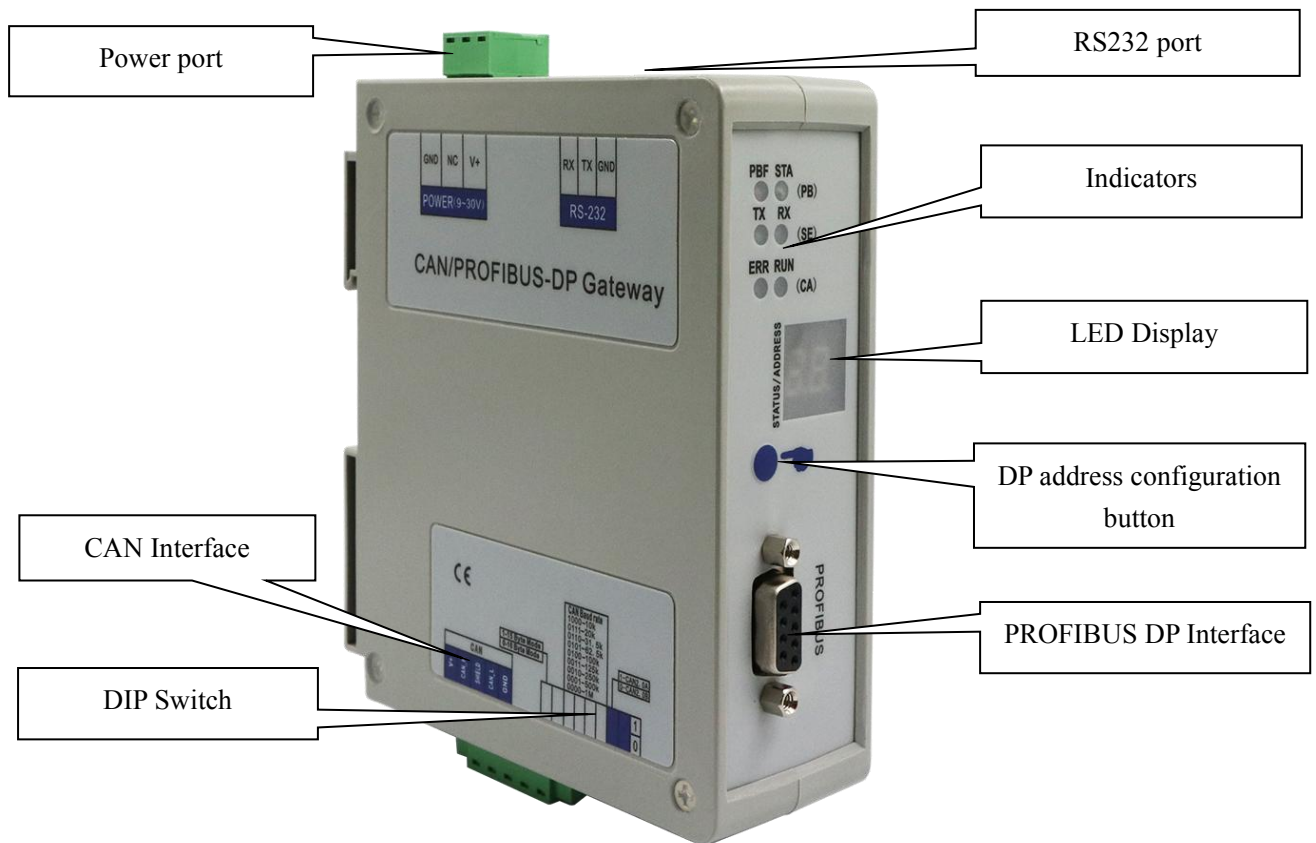
To get more information about related products, please visit SSTCOMM website: www.sstcomm.com.

1.5 Revision History

Revision	Date	Chapter	Description
V4.2, RevA	1/27/2022	ALL	Update the format.

2 Hardware Descriptions

2.1 Product Appearance



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

2.2 Indicators

Indicator	Status	Instruction
PBF	Red on	PROFIBUS DP no connection or fails.
	Red off	PROFIBUS DP port communicates normally.
STA	Green on or off	No data transmission in PROFIBUS DP.
	Green blinking	PROFIBUS DP data transmission.
ERR	Red on	The gateway is in the CAN network offline status.
	Red blinking	CAN network communication is not well or the gateway is in the CAN passive error status.
	Green on	CAN communicates normally.
RUN	Green blinking	CAN port data sending or receiving.
	Green on or off	No data sending or receiving in CAN port.
TX	Green blinking	Serial port data sending.
	Green off	No data is sending.
RX	Green blinking	Serial port data receiving.
	Green off	No data is receiving.

2.3 LED Display

In normal condition of GT200-DP-CA, LED only displays PROFIBUS DP address. With configuration button, it will help user to change the PROFIBUS DP address and can rightly display the DP address, the details can refer to [Chapter 2.4](#) and [Chapter 2.5](#).

2.4 Button

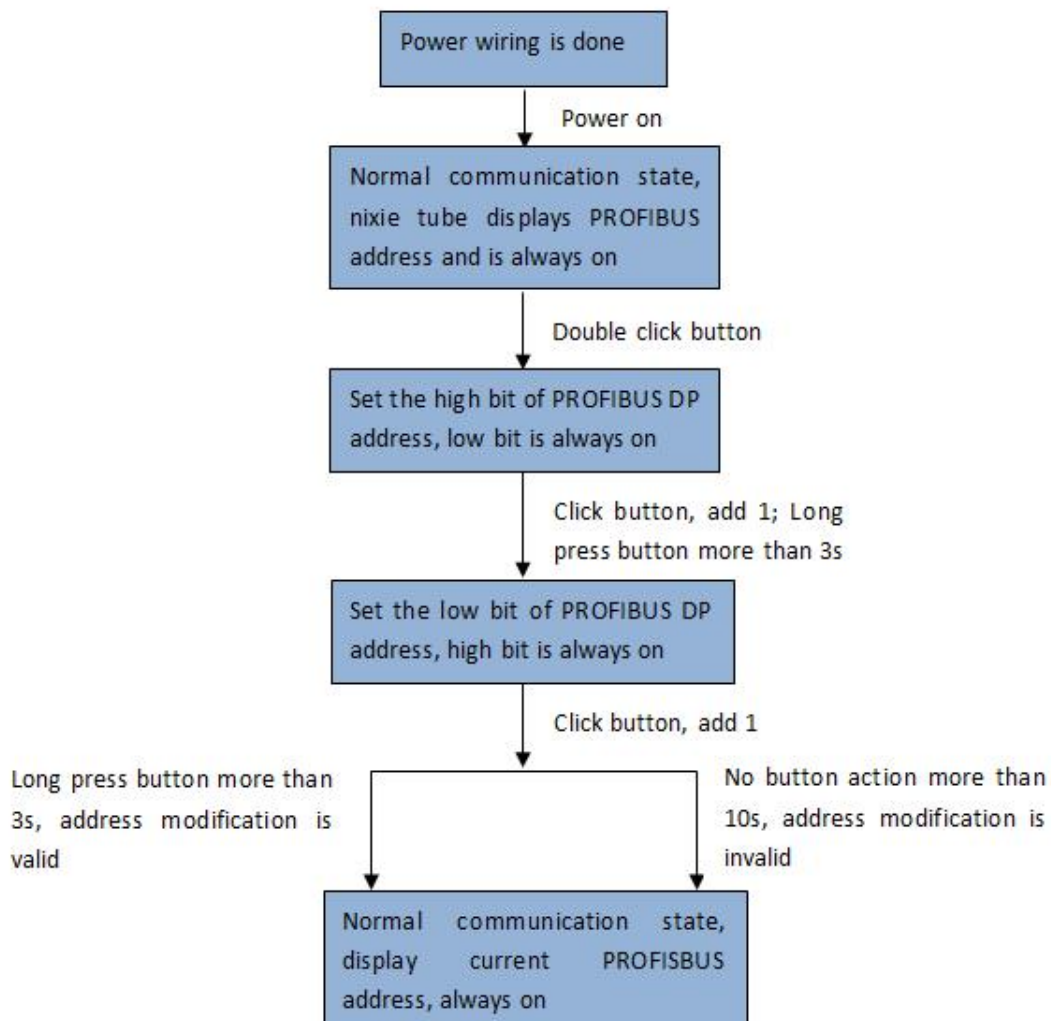
The configuration button on the panel can set the PROFIBUS DP slave address.

1. In normal working condition of GT200-DP-CA, LED is always on and displaying the current PROFIBUS DP address.
2. Quickly press (double-click) the button twice in succession, the high bit starts to flash, and the low bit is always on, click the button to add 1 to start setting the high bit of PROFIBUS DP address.
3. Long-press the button for 3 seconds, the high bit is always on, and the low bit starts to flash.
4. Click the button to add 1 to start setting the low bit of PROFIBUS DP address.
5. At last, long-press the button again for 3 seconds, the address flashing three times shows that the address is set

successfully.

6. If no button action within ten seconds, the gateway exits the status of setting address and continues to display the original address.

The configurable range of PROFIBUS DP address is 0 to 99 (Decimal). PROFIBUS DP address setting method is as follow:

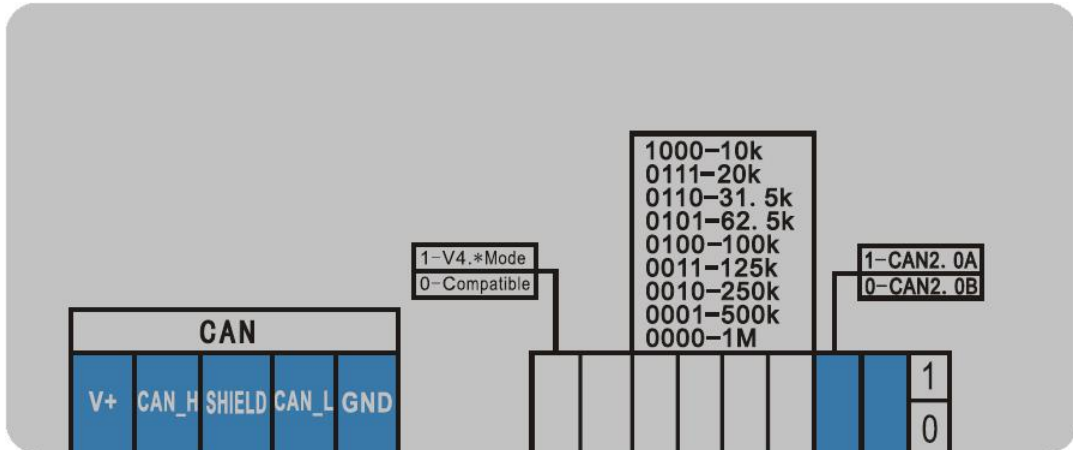


2.5 DIP Switch

Use DIP switch to configure the input/output bytes, type of CAN frame, CAN baud rate.

GT200-DP-CA PROFIBUS DP/CAN Gateway

User Manual



First bit: Reserved.

Second bit: CAN2.0A/2.0B configuration. On (1) indicates CAN2.0A, Off (0) indicates CAN2.0B.

3rd bit to 6th bit: CAN baud rate configuration, bit6, bit5, bit4, bit3: 0000 indicates 1Mbps, 0001 indicates 500Kbps, 0010 indicates 250Kbps, 0011 indicates 125Kbps, 0100 indicates 100Kbps, 0101 indicates 62.5Kbps, 0110 indicates 31.5Kbps, 0111 indicates 20Kbps and 1000 indicates 10Kbps.

DIP switch configuration as follow:

Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Instruction
X	Off	X	X	X	X	X	X	CAN2.0B
X	On	X	X	X	X	X	X	CAN2.0A
X	X	Off	Off	Off	Off	X	X	1MbpsCAN baud rate
X	X	On	Off	Off	Off	X	X	500KbpsCAN baud rate
X	X	Off	On	Off	Off	X	X	250KbpsCAN baud rate
X	X	On	On	Off	Off	X	X	125KbpsCAN baud rate
X	X	Off	Off	On	Off	X	X	100KbpsCAN baud rate
X	X	On	Off	On	Off	X	X	62.5KbpsCAN baud rate
X	X	Off	On	On	Off	X	X	31.25KbpsCAN baud rate
X	X	On	On	On	Off	X	X	20KbpsCAN baud rate
X	X	Off	Off	Off	On	X	X	10KbpsCAN baud rate

Note: X indicates random number, On indicates “1”, Off indicates “0”.

Users can refer to the product surface paste.

7th bit: Not used.

8th bit: ON (1) indicates GT200-DP-CA works under 15-byte mode (firmware version above V4.0). Off (0) indicates GT200-DP-CA works under 16-byte mode (compatible with firmware version under V4.0).

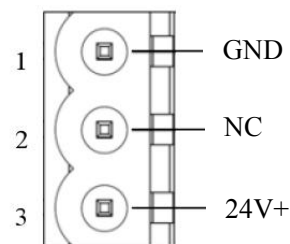
Note: After changing the DIP switch state, it is a must to restart the gateway (power off and on) and make the settings take effect.

Remark: If the mapped data are multi-byte variable, then PROFIBUS DP high valid bytes send firstly and CAN high valid bytes send firstly too. That is to say: MSB is of high priority.

2.6 Interface

2.6.1 Power Interface

Pin	Function
1	Power GND
2	NC(Not Connected)
3	24V+, DC Positive 24V

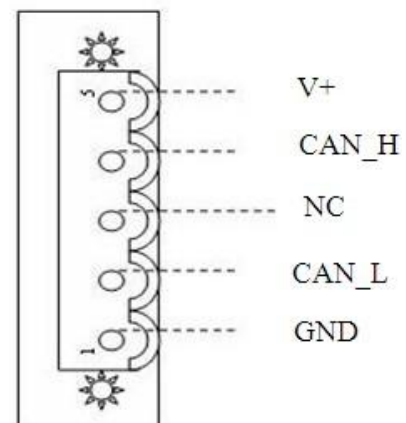


Note1: Here pin 1 and pin 3 are connected to the pin 1 and pin 5 of CAN port internally. And only one of them is required to connect. **If two power interfaces are connected at the same time, the gateway will be burned.**

2.6.2 CAN Interface

5-pin connector

Pin	Wire
1	GND, GND of 24V (optional)
2	CAN_L
3	NC (Not connected or shielding)
4	CAN_H
5	V+, 24VDC(optional)

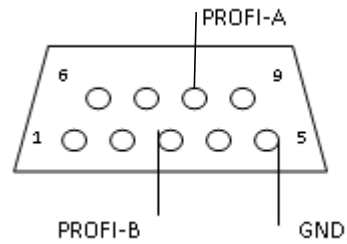


Note1: Here, shield (NC) port is optional. The CAN-L and CAN-H must be connected. Here pin 1 and pin 5 are connected to the pin 3 and pin 1 of power port internally. (chapter2.6.1)

Note2: Both the power terminal and the CAN terminal have power wiring, and only one of them is required to connect. **If two power interfaces are connected at the same time, the gateway will be burned.**

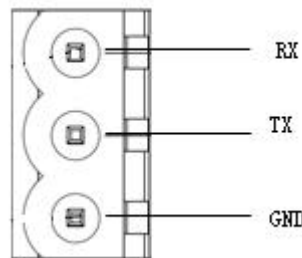
2.6.3 PROFIBUS DP Interface

Pin	Description
3	PROFI_B, positive data
5	GND
8	PROFI_A, negative data



PROFIBUS DP interface use DB9 connector, the pin is defined as follows:

2.6.4 RS232 Interface



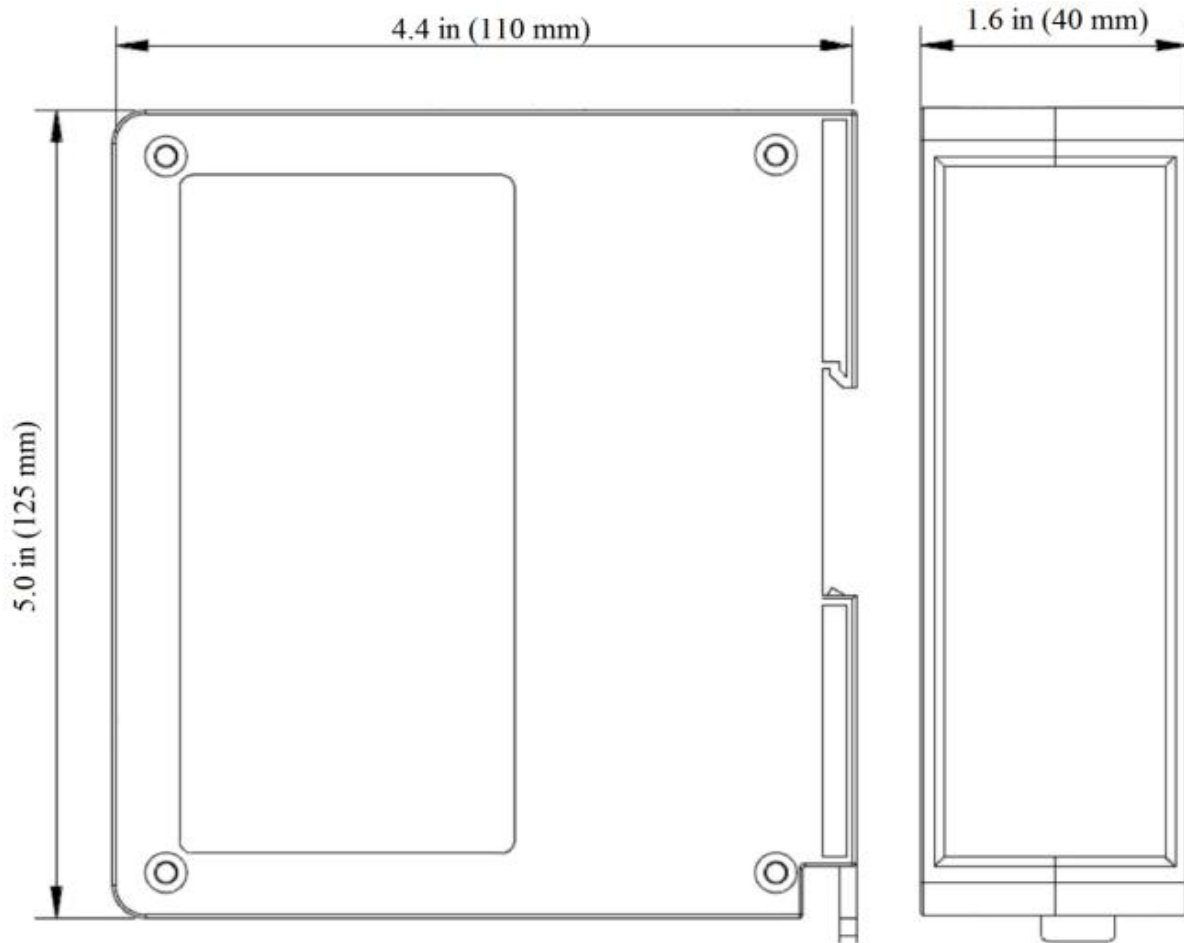
Remark: This port is used for product update and reading serial number, user can't use it.

3 Installation

3.1 Machine Dimension

Size (width * height * depth):

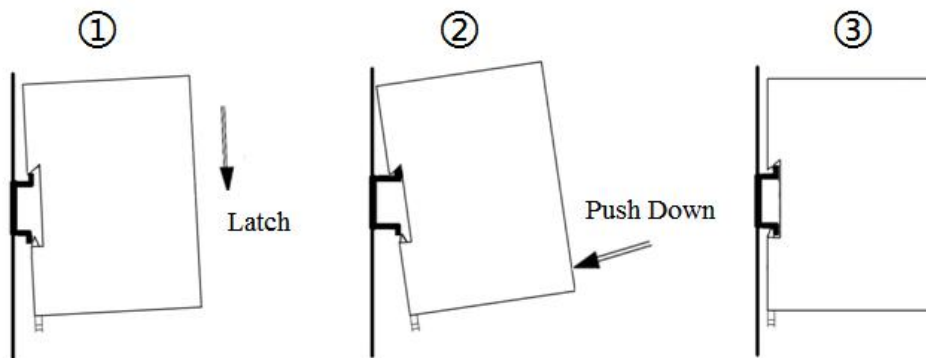
1.6 in * 5.0 in 4.4 in (40 mm * 125 mm * 110 mm)



3.2 Installation Method

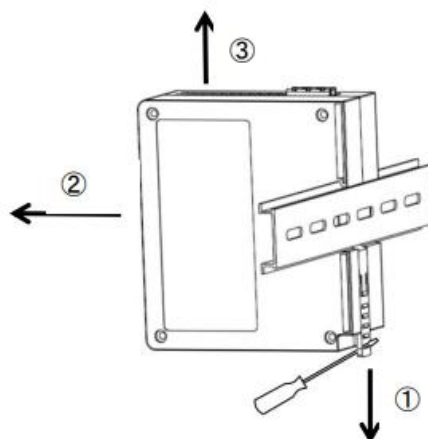
Using 1.4 in (35mm) DIN RAIL.

Install the gateway



Uninstall the gateway

1. Use a screwdriver to pass through the DIN RAIL bar, pull down and hold.
2. Pull out the gateway.
3. Lift up the gateway.



4 Quick Start Guide

The follow steps will tell you how to use GT200-DP-CA in short time:

1. Wiring: See also [Chaper 2.6](#) Interface.
 - (1) According to CAN port description, wire at least pin 2 and pin 4 correctly.
 - (2) Connect the PROFIBUS DP port of the gateway to the PLC for communication. It is recommended to use standard PROFIBUS DP connector to finish the wiring.
 - (3) Connect the gateway power supply and power on.

Note: Only one of the power wiring in the Power terminal and CAN terminal needs to be connected. If both are connected, the gateway will be burned out.
2. Use the configuration button to configure PROFIBUS DP address. Please refer to [Chapter 2.4](#) Button.
3. Use DIP switch to configure baud rate of CAN2.0A, CAN2.0B and CAN and work mode that you need. Please refer to [Chapter 2.5](#) DIP Switch.
4. Download GSD File from www.sstcomm.com/Download1/.
5. Install the GSD file in the PROFIBUS DP Master device configuration tool. Then drag input/output module to the slot as required, complete the relevant parameter settings. Compile and download programs to PLC. (If you use Step7 software, please refer to appendix A) After the configuration is complete, please perform data communication debugging.

5 Working Principle

5.1 Data Exchange way of 16-byte mode

Configuring data transmitting mode at the side of PROFIBUS DP, engineers can easily modify the corresponding location data. For example, modifying the second byte outputting from node 3 only need to modify the corresponding location parameter without complex PLC programming.

Note: Need to set the bit 8 of DIP switch to “OFF” when using 16-byte mode, and restart the gateway (Power off and power on).

PROFIBUS DP network output -> CAN

The meaning of 16 respective bytes is as follow: 16 bytes only can include one CAN frame.

Byte	0	1	2	3	4-7	8-15
Meaning	Single/repeat control	The data number of CAN frame including	Sequence Number	Reserved	Frame header and CAN frame mode control	CAN frame data

Explanation:

◆ Byte 0 to byte 3 are controlling bytes

Byte 0: Indicates sending this sequence number CAN frame once if it is zero, and it indicates sending this sequence number of CAN frame periodically if it isn't zero, the cycle value is decided by this byte value: period of transmission=the value of byte 0 * 10ms. For example, if the value of byte 0 is 10, the period of transmission is 100ms, that is to say sending the frame one time every 100ms.

Byte 1: Indicates the data number of CAN frame including, the range is 0~8. If the number of data frame is less than 8, the value is 0.

Byte 2: Sequence number. The initial value of sequence number in output frame is non-zero (any value except zero), if the mode is single transmission mode, the number must add 1 when sending a new frame, the gateway will recognize that it is single transmission data, if the number reaches 255, the number will be 0 when adding 1. If the mode is periodical mode, the sequence number will not add 1. If you want to turn single sending mode to periodical mode, sequence number should add 1 once, and byte 0 is non-zero. If you want to turn periodical mode to single sending mode, sequence number should add 1, and the value of byte 0 is 0.

- ◆ Byte 4 to 7 are CAN frame header and CAN frame mode control (29 bit CAN ID)

The format of byte 4 is as follow:

Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Meaning	Reserved	RTR	Reserved	The top five bits of frame header				

Bit 6: RTR, 0 stands for data frame, 1 stands for Remote frame.

Bit 0 to 4 of byte 4 to byte 7, CAN2.0A/2.0B frame header.

Byte 5:

Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Meaning	The second high 8 bits of frame header							

Byte 6:

Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Meaning	The second low 8 bits of frame header							

Byte 7:

Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Meaning	The lowest 8 bits of frame header							

- ◆ Byte 8 to 15 are the frame data, the range of byte number is 0~8.

PROFIBUS DP network input <- CAN

The meaning of 16 respective bytes is as follow:

Byte	0	1	2	3	4-7	8-15
Meaning	0xFF	Data number of CAN frame including	Sequence number	no meaning (Any value)	Frame header and CAN frame mode control	CAN frame data

If GT200-DP-CA has received new CAN frames from CAN network, the sequence number of input frame adds 1, user can decide whether to use these CAN frames according to requirements.

If sending one CAN frame, the sequence number is 10, use data frame of 2.0A working mode, ID=0x123, data is 01 02 03 04 05 06 07 08. One time sending, so the output format is as follow (hexadecimal):

00 08 | 0A | 00 | 00 00 01 23 | 01 02 03 04 05 06 07 08

Note:

The default initial value of single sending is 0, so the relevant byte is 0.

ID=0x123, the last bit aligns, the front omitting bits are replaced by 0, so the relevant binary form is 0000 0000 0000 0000 0001 0010 0011, that is 0x00 0x00 0x01 0x23

5.2 Data exchange way of 15-byte mode

The main features of 15-byte mode are: When bit0 of PROFIBUS DP send control word is set to 0, once the bit6 of send control word of CAN turns over at the PLC side, then PLC will turn over the bit1 of PROFIBUS DP send control word. In this way, it indicates that data exchange process has happened in PLC. If both need to send data, turning over relevant data valid bit will realize that. When bit0 of PROFIBUS DP send control word is set to 1, CAN will send data to PLC after receiving one frame data regardless of whether PLC has got last frame data.

Note: When using 15-byte mode, you need to set bit8 of DIP switch to “ON”, and restart the gateway (power off and power on).

15-byte input/15-byte output

PROFIBUS DP network output-> CAN

The meaning of 15 respective bytes is as follow: 15-byte only can include one CAN frame

Byte	0	1	2	3-47
Meaning	Send timer	PROFIBUS DP sending control word	CAN frame Header and control	CAN frame data

◆ Byte 0: When Bit 7 in PROFIBUS DP sends control word is 0, this byte has no meaning. Otherwise, CAN network will send out the data from PROFIBUS periodically according to the value of this byte. The setting range of this byte is 1~255, the rest is regarded as 1, timer unit is 10ms.

◆ Byte 1: PROFIBUS DP send control word

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Meaning	Single/Repeat mode	Reserved	Reserved	CAN2.0 A/B	Clear CAN offline counter	PROFIBUS DP data update label flag	PROFIBUS DP receive flag	PROFIBUS receive mode

Bit7: 0: Single mode, determine whether it is the new data according to Bit 2’s turning over.

1: Repeat mode, now the gateway will set the time inside of sending timer as interval and send out the data received from PROFIBUS DP periodically.

Bit 6-Bit 5: Reserved

Bit 4: When the gateway is configured as CAN2.0B, this bit is valid, otherwise invalid.

1: CAN2.0A frame

0: CAN2.0B frame

Bit 3: Turning over indicates to clear the Offline counter of CAN, meanwhile to reset the CAN controller (Only

works when it happens to Offline of CAN network)

Bit 2: Turning over indicates this frame data is valid, otherwise invalid.

Bit 1: When Bit 0 of PROFIBUS DP sending control word is 1, this bit is invalid. Otherwise, reversal of this bit indicates PROFIBUS DP side had participated in data exchange.

Bit 0: 1: Cover the input buffer area of PROFIBUS DP when CAN network has data.

0: CAN will not transmit the data to PROFIBUS DP side (PROFIBUS DP master) until Bit 1 of PROFIBUS DP sending control word starts to reverse.

◆ Byte 2: Data bytes number, range 0~8, the rest is 8.

◆ Byte 3:

Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Meaning	Reserved	RTR	Reserved	The highest 5 bits of frame header				

Bit 6 of byte 3: RTR, 0 indicates data frame, 1 indicates remote frame.

Bit 0~4 of byte 3 to byte 6: Frame header of CAN2.0A/2.0B.

◆ Byte 4: The second highest 8 bits of frame header

◆ Byte 5: The second lowest 8 bits of frame header

◆ Byte 6: The highest 8 bits of frame header

◆ Byte 7~byte 14: CAN data

PROFIBUS DP network input <-CAN

Byte	0	1	2-6	7-14
Meaning	Offline counter	CAN send control word	CAN frame header and control	CAN data sending

◆ Byte 0: CAN is offline once, this value will add 1 until 255.

◆ Byte 1: CAN send control word

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Meaning	Bus status	CAN fetch PROFIBUS DP data flag	CAN receive buffer full flag	CAN data update flag	CAN2.0 A/B	Reserved	Reserved	Reserved

Bit 7: 1: CAN is in the Offline status

0: CAN is in the Online status



Bit 6: The reversal of this bit indicates the gateway has got the PROFIBUS DP data.

Bit 5: 1: CAN receive buffer is full

0: Not full

Bit 4: The reversal of this bit indicates this frame data is valid, otherwise is invalid.

Bit 3: 1: CAN2.0A frame

0: CAN2.0B frame

Note: Valid when the gateway is configured as CAN2.0B

Bit 2-Bit 0: Reserved

◆ Byte 2: Data bytes number, range 0~8, the rest is 8

◆ Byte 3:

Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Meaning	Reserved	RTR	Reserved	The highest 5 bits of frame header				

Bit 6 of byte 3: RTR, 0 indicates data frame, 1 indicates remote frame.

Bit 0~4 of byte 3 to byte 6: Frame header of CAN2.0A/2.0B.

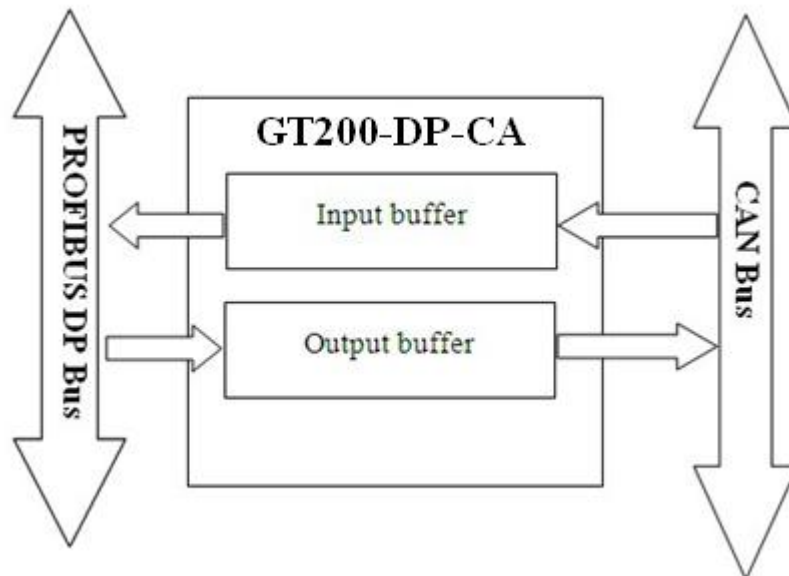
◆ Byte 4: The second highest 8 bits of frame header.

◆ Byte 5: The second lowest 8 bits of frame header.

◆ Byte 6: The highest 8 bits of frame header.

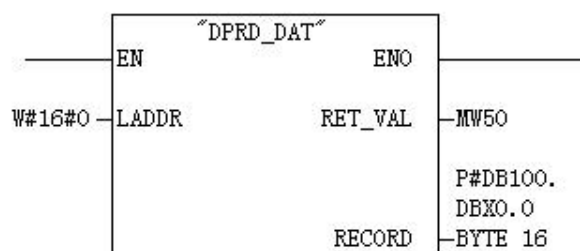
◆ Byte 7~byte 14: CAN data.

5.3 Working mode of GT200-DP-CA

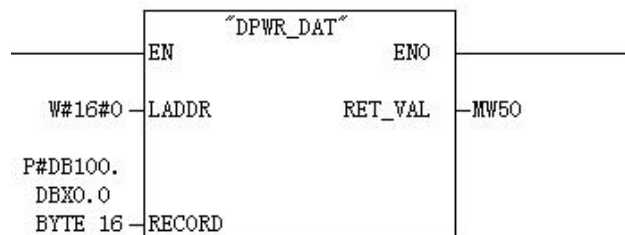


5.4 Step 7 Read and Write Data to Gateway

GT200-DP-CA data consistency at the side of PROFIBUS uses “Total length” mode, so sending and receiving must apply packed way in Step 7 programming. Sending and receiving by packed mode mainly use SFC15 (packed sending) and SFC14 (packed receiving).



SFC14



SFC15



6 Troubleshooting and Suggestions

Number	Description	Explanation or suggestion
1	PBF (PROFIBUS DP Failure) Red on	PROFIBUS DP network communication fails.
2	PBF (PROFIBUS DP Failure) Red off	PROFIBUS DP network communication is OK.
3	ERR indicator red on or blinking at running mode	CAN bus is Off or error counter of send/receive beyond alert value. Check CAN baud rate of gateway and the baud rate must be the same with other nodes of CAN network. Configure terminal resistor ¹ for CAN bus.

Note: Terminal resistance:

CAN is a kind of differential level communication. There exists echo noise on the communication line when communication distance is long or communication baud rate is high. User needs a terminal resistor (120Ω/2W) in both terminals of communication lines.

Appendix A: Using STEP 7 to Configure PROFIBUS DP

The following show how to use STEP7 to configure GT200-DP-CA:

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

1 Open SIMATIC Manager , Figure 1:

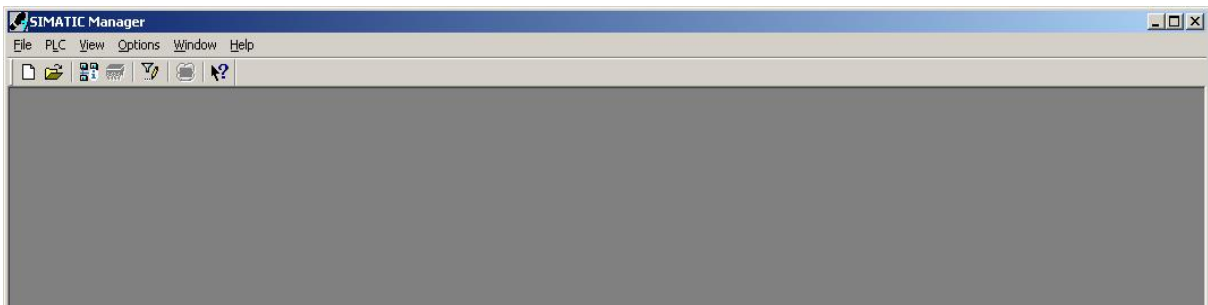


Figure 1

2 Click File, and then select New, create a new project. Figure 2:

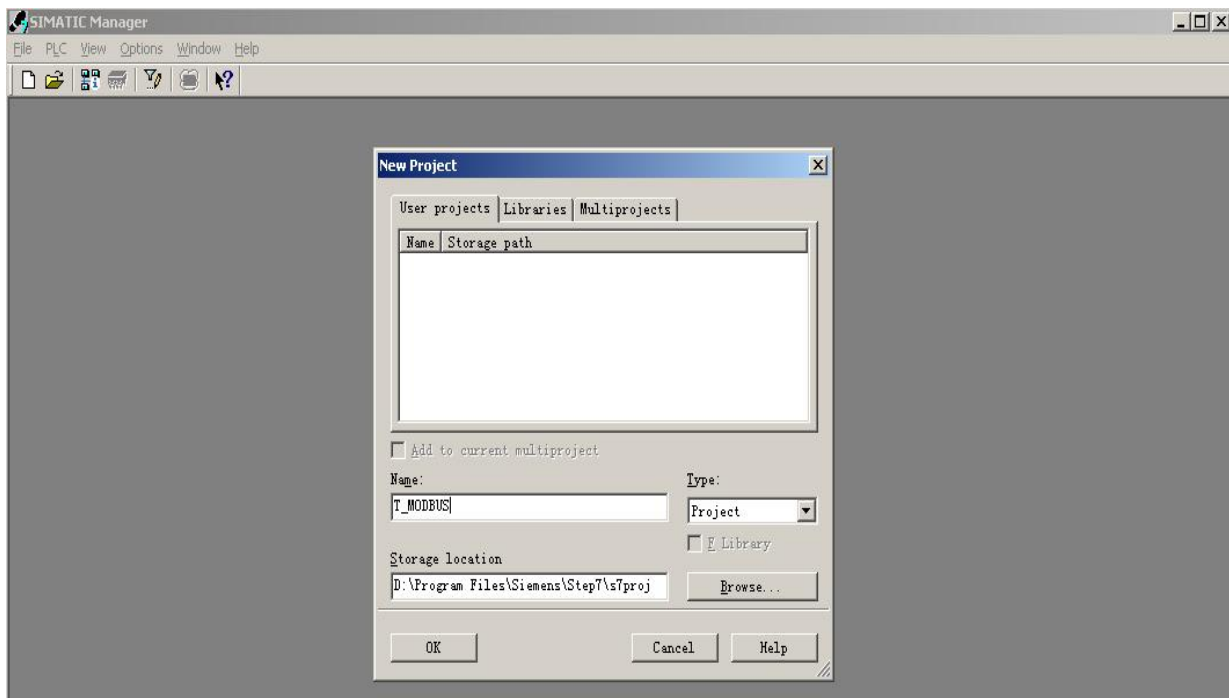


Figure 2

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

GT200-DP-CA PROFIBUS DP/CAN Gateway

User Manual

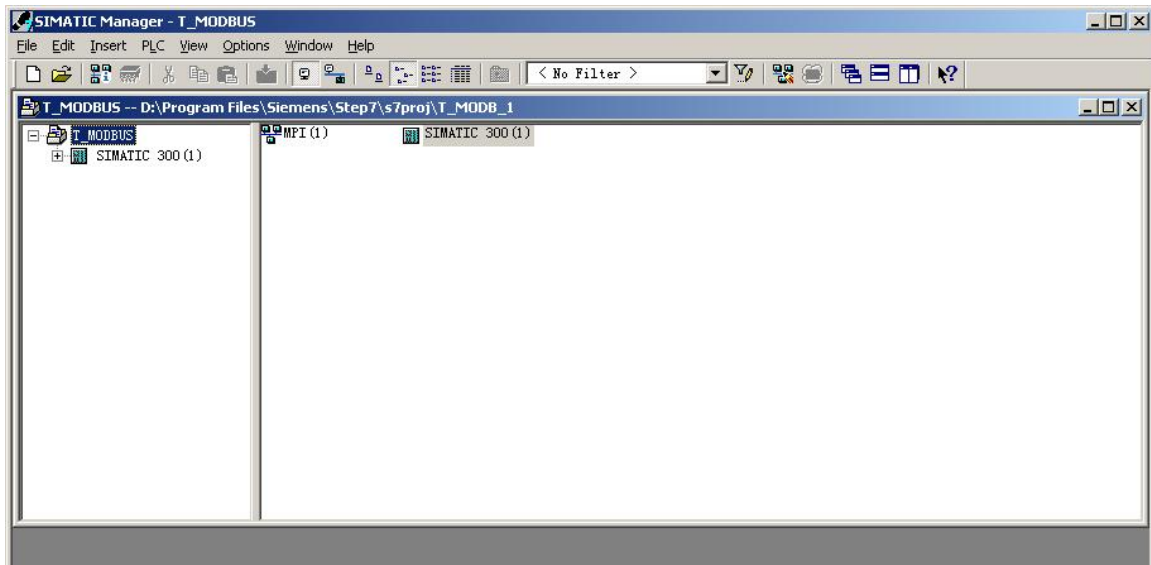


Figure 3

4 Open S7 PLC hardware configurations

Open SIMATIC 300(1) and then double-click Hardware. Figure 4:

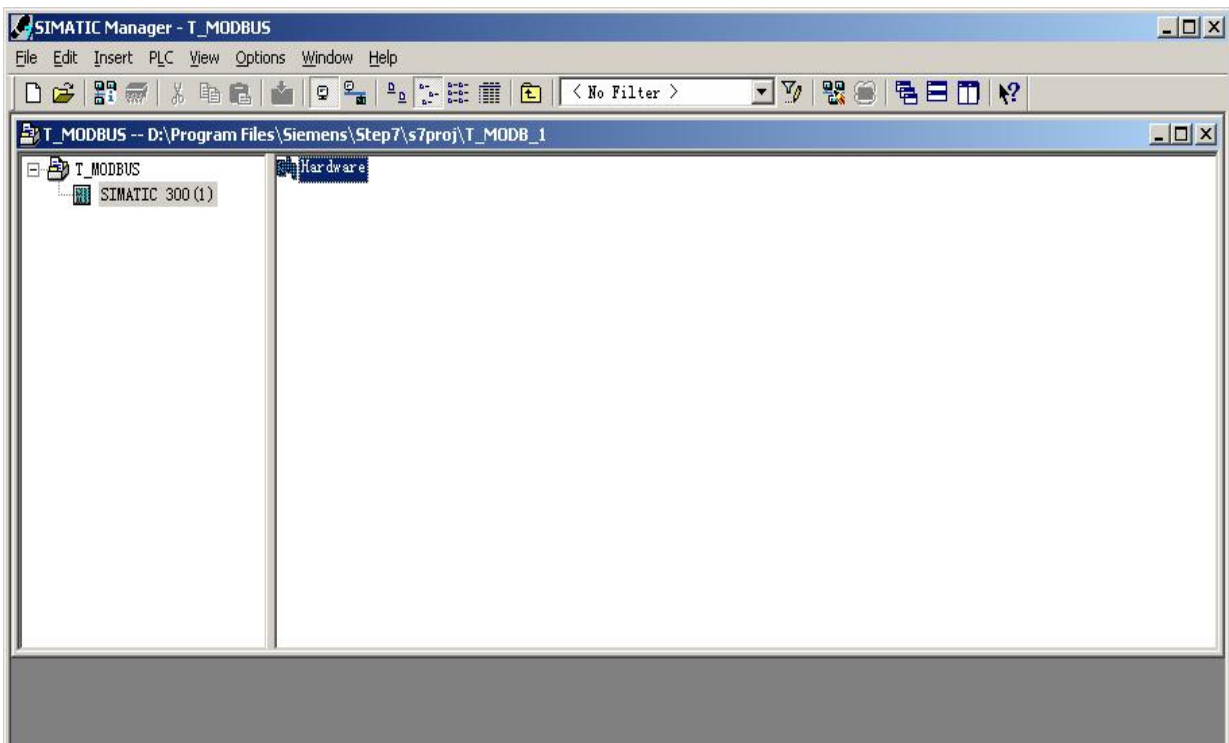


Figure 4

5 In the menu, select Options and Install GSD file, Update GSD in the device catalog, Figure 5:

GT200-DP-CA PROFIBUS DP/CAN Gateway

User Manual

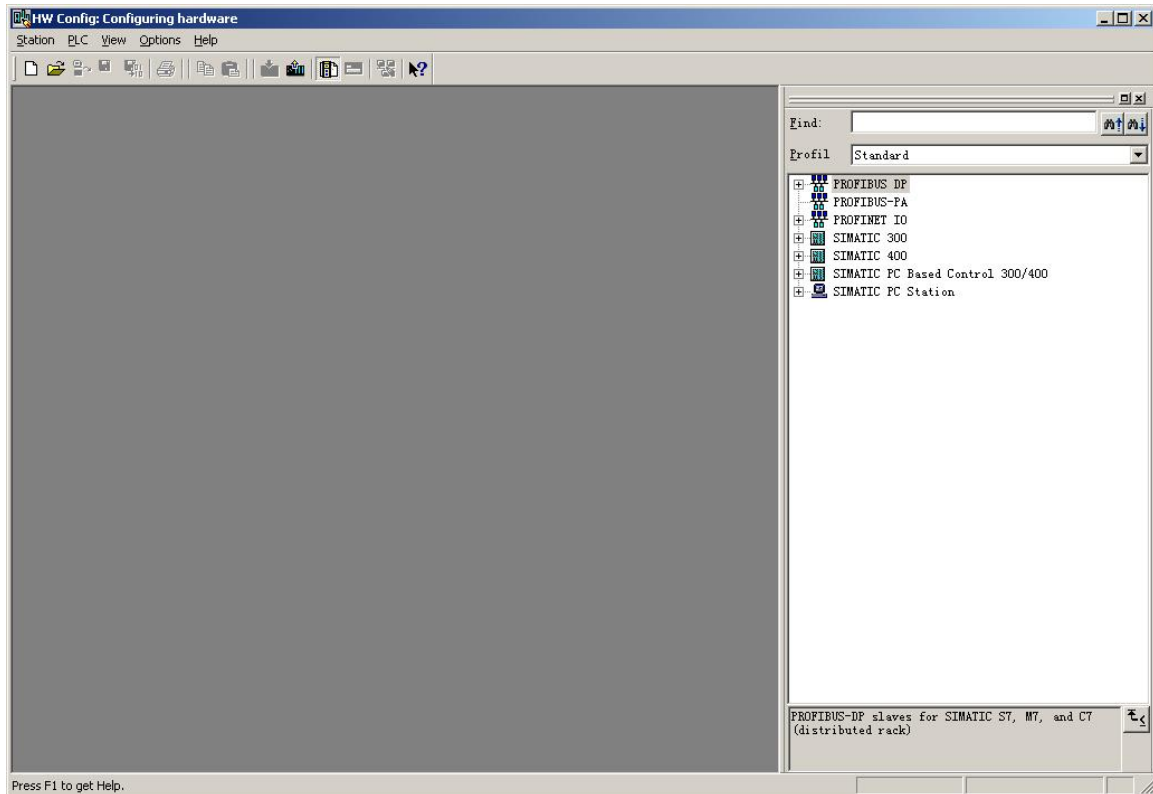


Figure 5

6 Here you can find your equipment in the right side of the window /PROFIBUS DP/Additional Field Devices/Converter/GT200-DP-CA/, Figure 6:

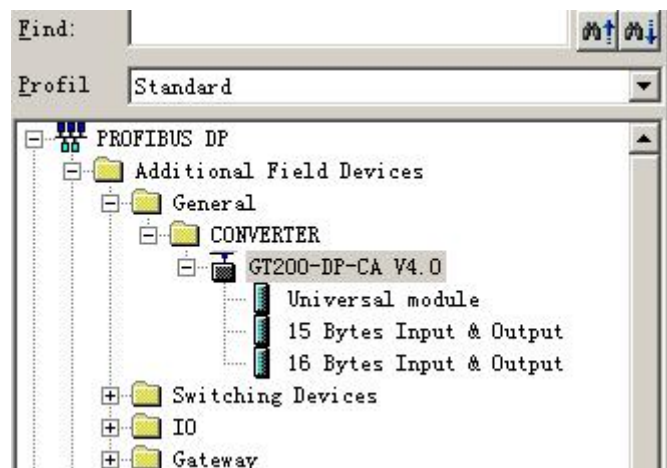


Figure 6

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

GT200-DP-CA PROFIBUS DP/CAN Gateway

User Manual

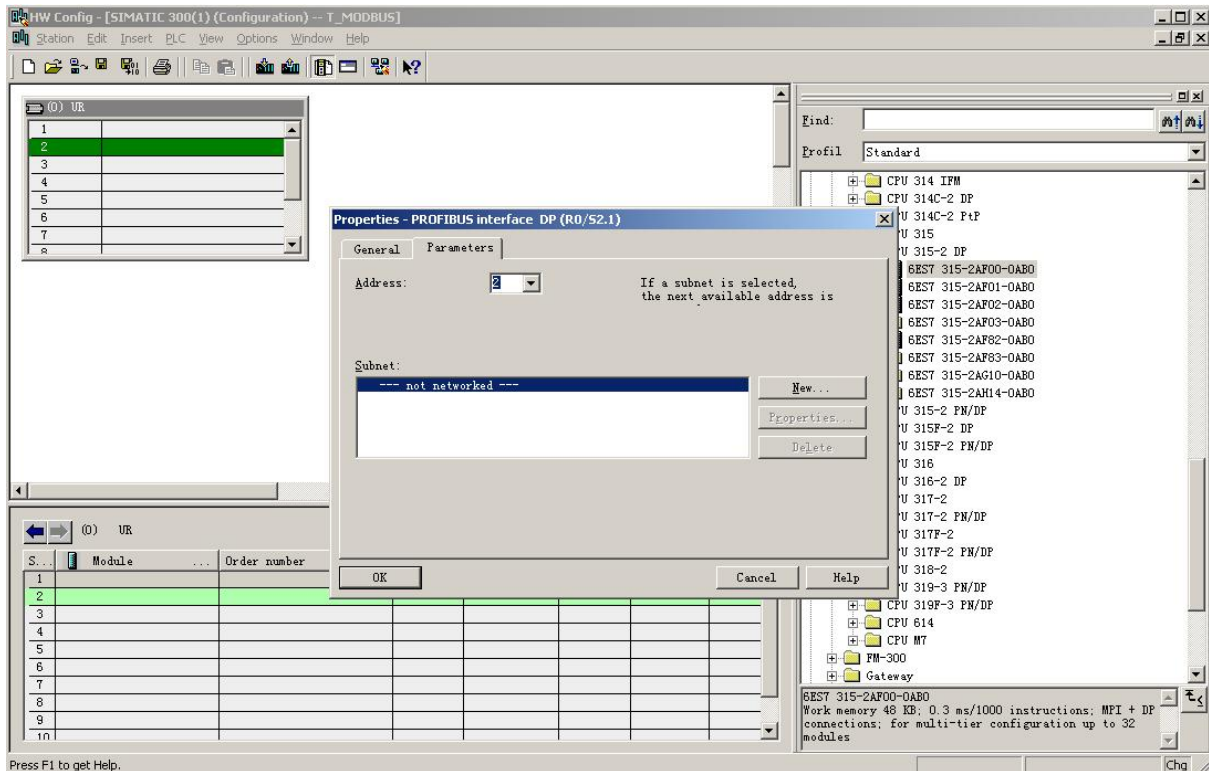


Figure 7

8 Set CPU module and select the corresponding device type and the occupied slots.

9 Create PROFIBUS DP network and configure PROFIBUS DP: Click New and then Network settings, select DP, select a baud rate such as 187.5Kbps, then “OK”. Double-click it. Figure 8:

GT200-DP-CA PROFIBUS DP/CAN Gateway

User Manual

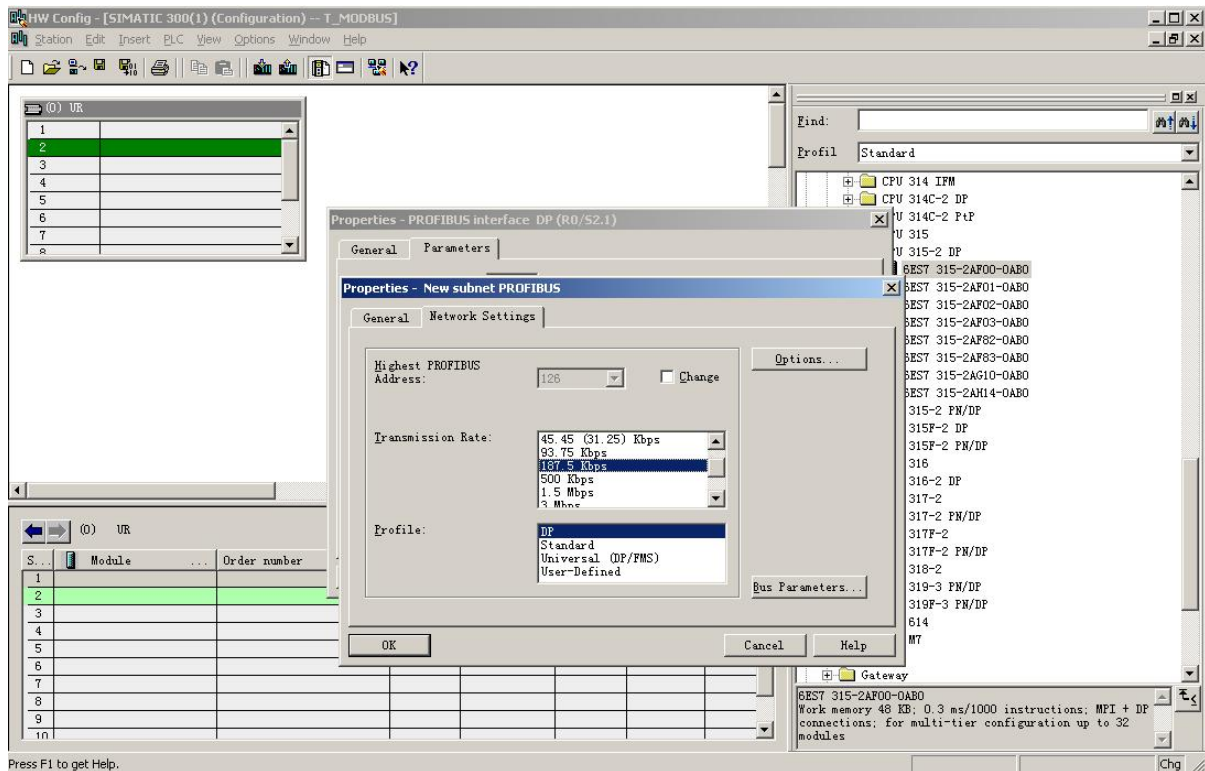


Figure 8

10 Select PROFIBUS DP Master address. Figure 9:

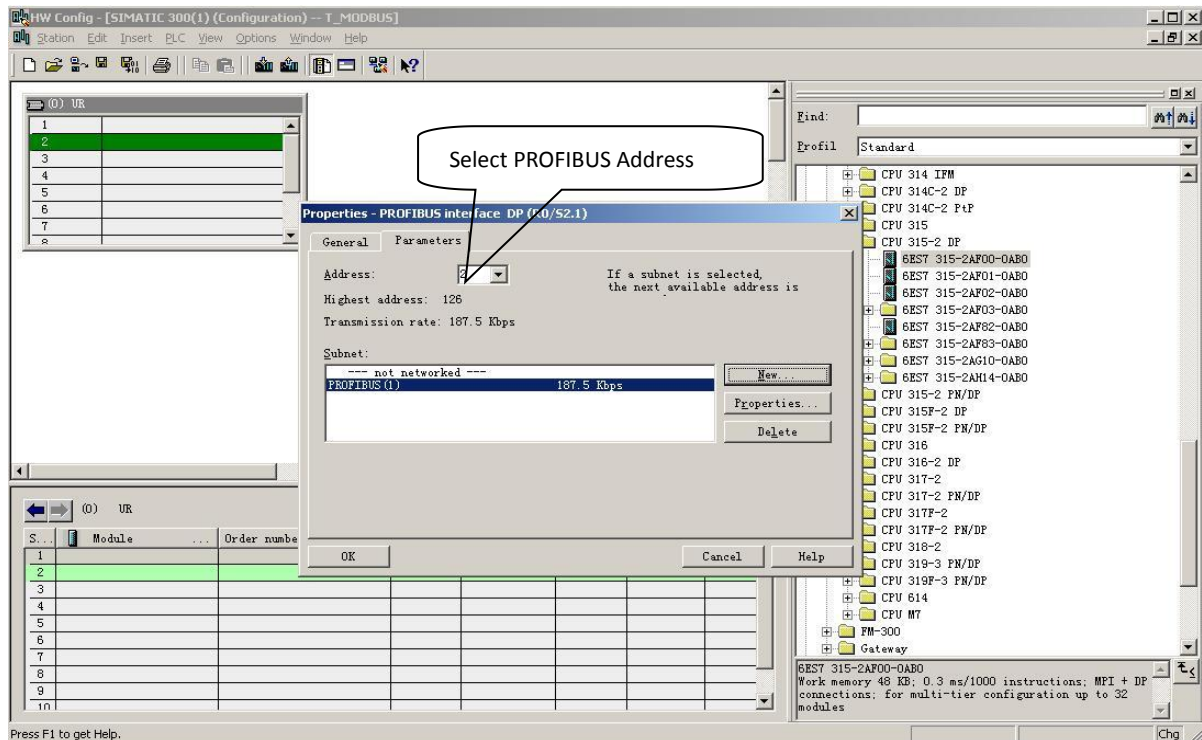


Figure 9

11 Drag GT200-DP-CA slave station configuration into PROFIBUS DP network, and map the input and output

GT200-DP-CA PROFIBUS DP/CAN Gateway

User Manual

data block into S7-300 or other controller's memory, Figure 10:

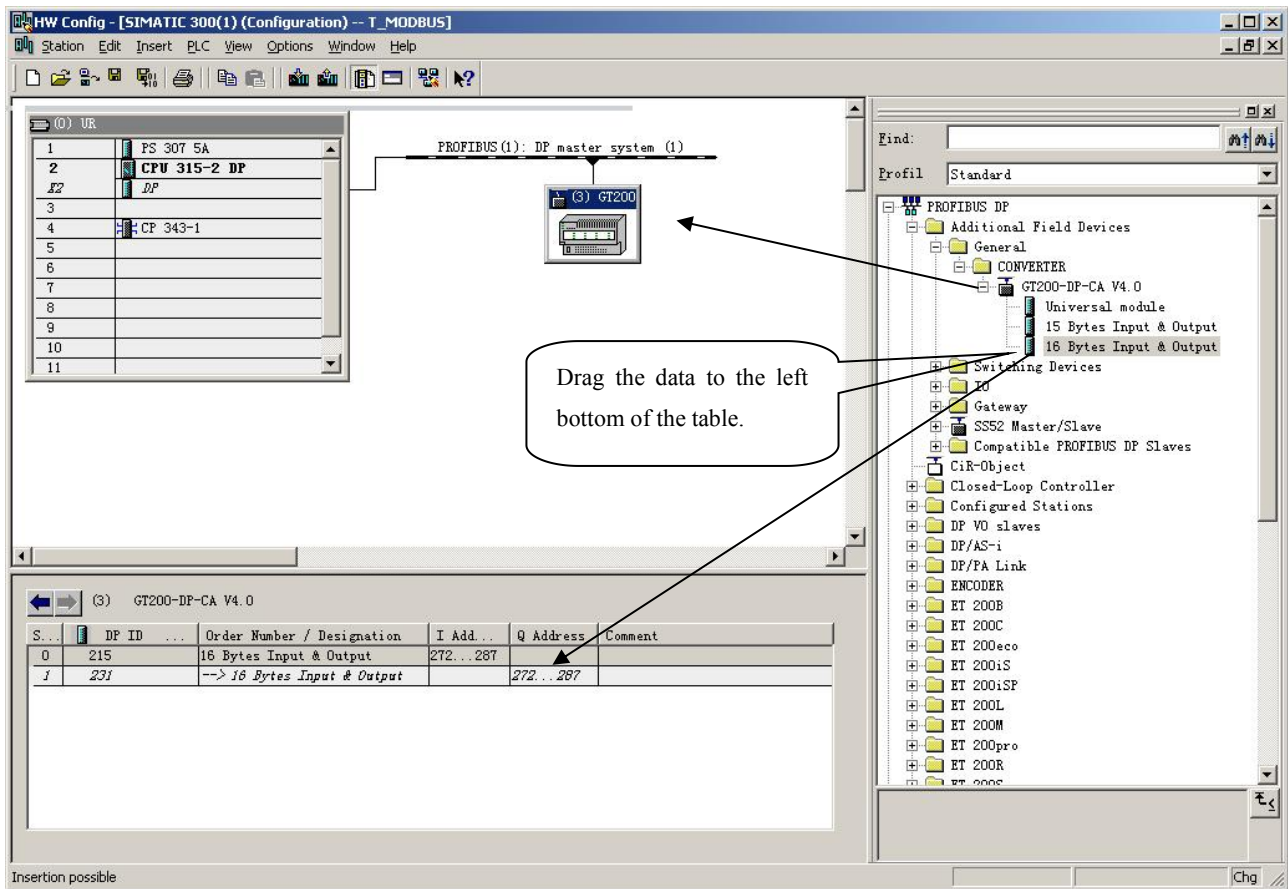


Figure 10

Operation is divided into two steps, the first step is dragging GT200-DP-CA into the network configuration on the upper left, the mouse will change shape, and that is to say it can be placed. The second step is dragging data block into the data mapping table at the bottom left, the table will change to green, and that is to say it can be placed, mapping relevant bytes to the PLC memory.

Remark1: User uses DIP switch to configure input/output bytes of GT200-DP-CA, if user configures 15 bytes input/output, drag "15 Byte Input & Output" to data mapping table. If the data block dragged to the table doesn't match the gateway configuration, PROFIBUS DP will not connect. If user does not modify the default configuration byte number, the maximum of factory configuration is "16 Byte Input & Output".

Remark2: The PROFIBUS DP slave address must be the same with display setting of the LED (Configure through the setting button on the panel)!

12 Comply, download into PLC and configuration is done.