# Modbus / CAN Gateway
# GT100-CA-MS485

# User Manual

## REV 2.1

# *SST Automation*

**E-mail: SUPPORT@SSTCOMM.COM**

**WWW.SSTCOMM.COM**

# Catalog

# 1 About This Document

## 1.1 General

This manual describes every parameter of the gateway GT100-CA-MS485 and provides using methods and some announcements that help users use the gateway. Please read this document carefully before using the gateway.

## 1.2 Important User Information

The data and examples in this document cannot be copied without authorization. SSTCOMM maybe upgrade the product without notifying users.

SST@MM is the registered trade mark of SST Automation.

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

## 1.3 Terms

PROFIBUS DP: PROFIBUS DP protocol

Modbus: Modbus Protocol

RS-485/RS-422/RS-232: There kind of hardware specification of serial interface

GT100-CA-MS485: Modbus /CAN gateway

## 1.4 Related Products

Other related products in SSTCOMM: GT200-DP-RS, GT200-DN-RS, GT200-DP-CA and so on.

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

# 2 Product Overview

## 2.1 Product Function

The gateway GT100-CA-MS485 can connect multiple devices with Modbus master interface to CAN networks, and establish the communication between them. Modbus/RS-485 network devices can be converted to CAN network devices.

## 2.2 Product Features

➢ Wide Application: Modbus master can visit devices with CAN interface;

➢ Easy to use: Easy configuration and finish network communication in a short period;

➢ Transparent Communication: Every frame of Modbus input/output message must include 8 registers;

## 2.3 Technical Specifications

**[1]** Modbus side
   ➢ One Modbus slave interface, support 03, 04, 16 function codes;
   ➢ Serial port baud rate: 300, 600, 1200, 2400, 9600, 19200, 38400, 57600 and 115200bps;
   ➢ Input register start address is 0, support 04 function code;
   ➢ Output register start address is 0, support 03, 16 function codes;
   ➢ Every 8 registers (16 bytes) is 1 CAN frame;
   ➢ Every Modbus command includes 1 CAN frame;

**[2]**CAN side
   ➢ Support bidirectional data communication, also can be used as CAN receive and transmit;
   ➢ Support CAN2.0A and CAN2.0B;
   ➢ CAN Baud rate support 1M, 500K, 250K, 125K, 100K, 62.5K, 31.25K, 20K, 10Kbps;
   ➢ The FIFO of CAN transmit and receive are both 16 CAN frames;

**[3]** Operating Environmental Conditions:

   ➢ Rel. Humidity: 5%-95% RH non-condensing

   ➢ Operating Temp.: -4°F to 140°F (-20ºC to 60ºC)

WWW.SSTCOMM.COM

SST©MM

➢   Class of pollution: ≤ Level 3

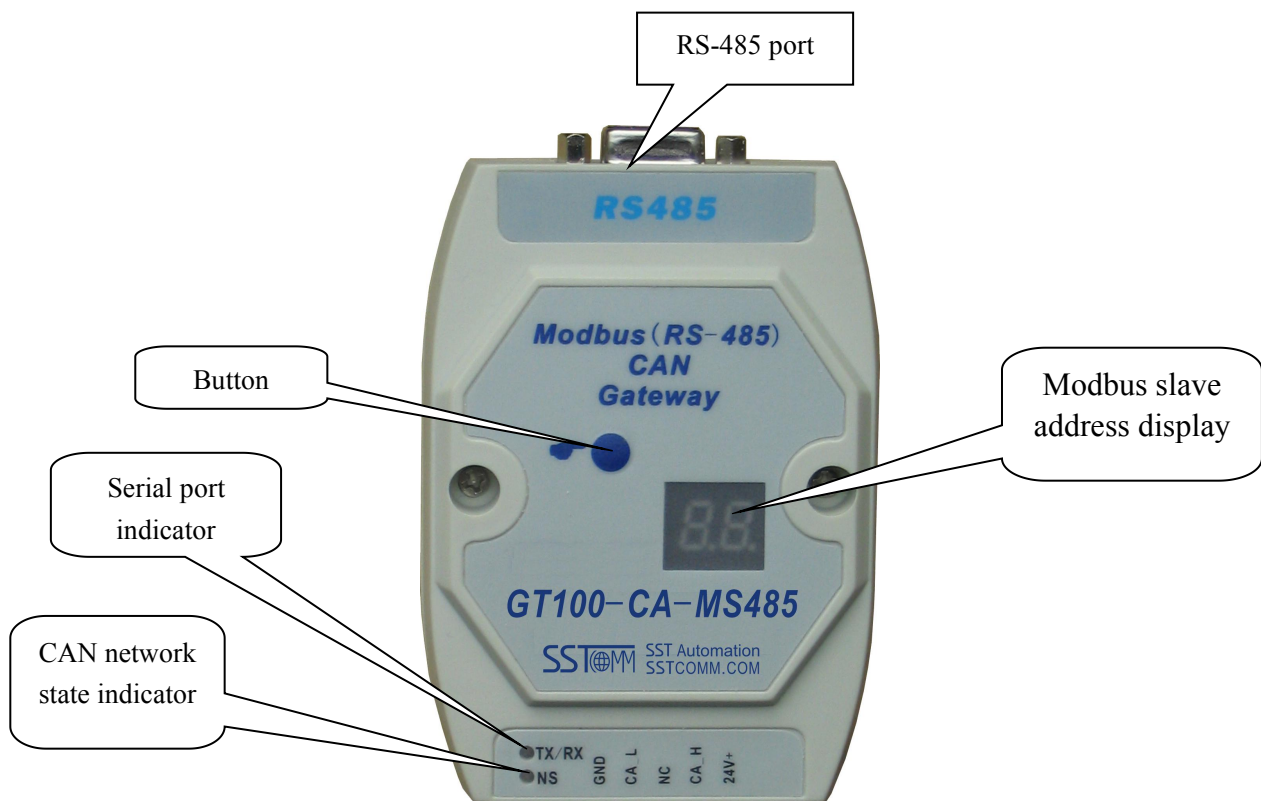**[4]** Power Supply: DC 24V (11V~30V), maximum current consumption: 80mA (24V)

  Internal DC/DC convert, lowest convert rate: ≥ 70%

**[5]** External dimension (W*H*D): 3.94 in*2.76 in*0.98 in (100mm* 70mm * 25mm)

**[6]** Protection Level: IP20

# 3 Hardware Descriptions

## 3.1 Product Appearance



RS-485 port

Button

Modbus slave address display

Serial port indicator

CAN network state indicator

## 3.2 Indicators

| Indicators | State | Description |
|---|---|---|
| TX/RX | Green Blinking | RS-485 port is sending data. |
| | Red Blinking | RS-485 port is receiving data. |
| NS | Always Green | CAN network normal |
| | Always Red | CAN network failure |

## 3.3 Configuration Button and LED Display

1. Double-click the button to enter into configuration mode.

2. LED display Modbus slave address under communication mode; display "CF" under configuration mode.

## 3.4 Communication Interface

## 3.4.1 Modbus Interface

DB9 female connector:
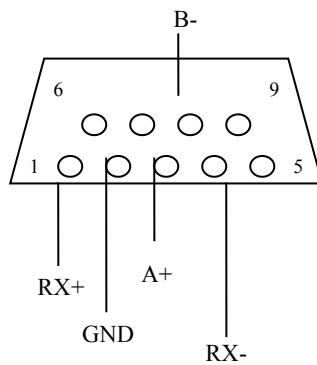


Modbus side wiring:

RS-485 connection:
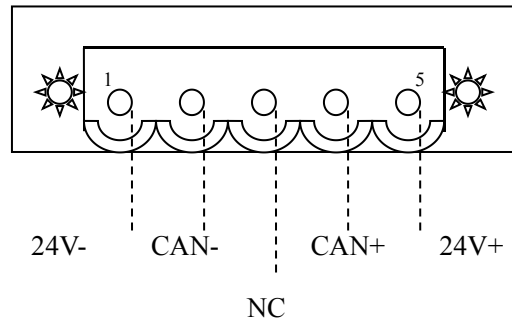
| Pin | Wiring |
|---|---|
| Pin 3 | A+ |
| Pin 8 | B- |
| Pin 2 | GND |

## 3.4.2 CAN Interface

CAN side connector:

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

# 4 Use Method

## 4.1 Quick Start Guide

1. Connect GT100-CA-MS485 with PC through RS-232/485 converter, checks the power and wiring correctly, and power on;

2. Under the configuration mode, use gateway configuration software SST-CAM-CFG to configure Modbus slave address, Modbus baud rate, check bit, CAN working mode and CAN baud rate, etc.

The way to enter configuration mode is: After powering on, the NS indicator is always on, double click the blue configuration button to switch to the configuration mode. Then, use SST-CAM-CFG to configure. After the configuration is done, restart the gateway (power off and power on) and start working.

3. Correctly wire the Modbus and CAN interface, and check the wiring.

4. Power on, the module enter into run mode.

## 4.2 Hardware Wiring

1. According to the CAN interface instructions in chapter 3, properly wires every pin of 5-pin terminal. Noted it is not the right time to power on.

2. According to the Modbus interface instructions in chapter 3, if it is RS-485 communication, properly wires at least pin 3 and 8, pin 2 is optional. Because configuration port and Modbus port shares RS-485, other Modbus nodes have to be power off or disconnected with RS-485 of GT100-CA-MS485, or that will affect configuration.

3. Check the wiring is correct in manual instructions.

4. Power on the module, enter into the run mode.

## 4.3 Software Configuration

Users can connect GT100-CA-MS485 to PC with RS-485 converter. They can configure the Modbus and CAN parameters through gateway configuration software SST-CAM-CFG. After powering on, double click the button to

9

configuration mode.

As shown below, 5 Modbus and CAN parameters are configurable: serial baud rate, check bit, Modbus slave address, CAN baud rate, CAN protocol (CAN2.0A or CAN2.0B).
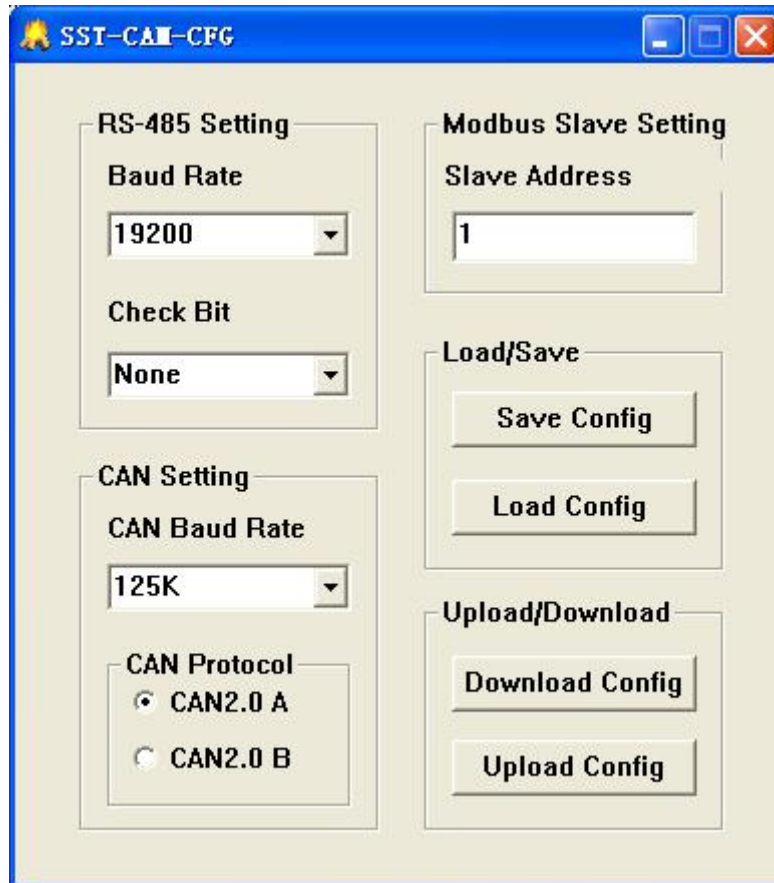


Configuration Software SST-CAM-CFG

## 4.3.1 Load/Save

Users can open and save configuration information as .txt file in order to check the configuration.

## 4.3.2 Upload/Download

Users can upload configuration through COM port in the PC, choose the correct port number and finish upload/download, the upload/download interface is shown as below:
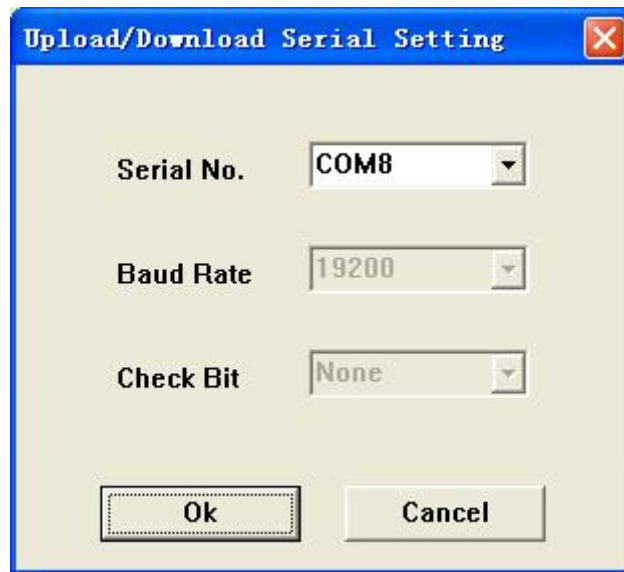
## 4.4 Working Principle

## 4.4.1 Data Exchange

The receiving and sending of CAN is FIFO, the FIFO of CAN sending and receiving is all 16 frames CAN.

In the below picture, FC means function code.

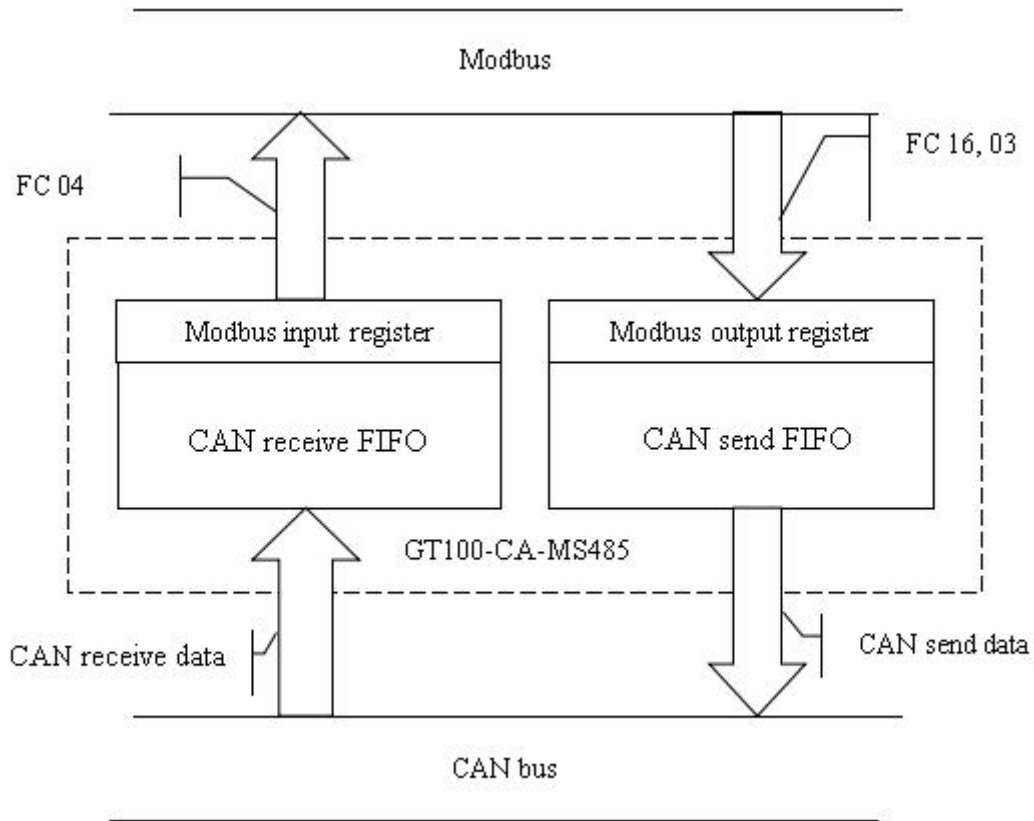## 4.4.2 The Relationship between Modbus Data and CAN Frame

**a) Modbus input register**

Use function code 04 to read the Modbus input register, that is CAN receive data.

The starting address is 0.

Every frame has to read 8 registers (16 bytes), or it will return Modbus exception response.

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

If GT100-CA-MS485 received CAN frame on CAN network, the sequence number of input frame will add 1. Users decide whether to use these CAN frame according to the needs.

**b) Modbus output register**

Use function code 16 to write the data to Modbus output register of GT100-CA-MS485, that is the CAN frame needs to send.

The starting address is 0.

Every frame must include 8 register (16 bytes), or it will return Modbus exception response.

| 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 |

**c) Bytes Definition**

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 is non-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.

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 of byte 4: 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 |
|---|---|---|---|---|---|---|---|---|

WWW.SSTCOMM.COM

| 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 CAN frame data, if the data number of CAN frame is less than 8 bytes, then it is 0.

**d) Modbus message examples:**

i. Get the received CAN frame

For example: Modbus slave address is 1, the sequence number is 10, CAN2.0A, CAN frame ID is 0x123, CAN frame data is 0x01, 0x02, 0x03, 0x04, 0x05, 0x06, 0x07, 0x08.

User's Modbus master send request frame:

01 04 00 00 00 08 F1 CC

The response frame of GT100-CA-MS485:

01 04 10 FF 08 0A 00 00 00 01 23 01 02 03 04 05 06 07 08 7A A0

ii. Write CAN frame needs to send

For example: Modbus slave address is 1, single time sending, sequence number is 5, CAN2.0A, CAN frame ID is 0x123, CAN frame data is 0x01, 0x02, 0x03, 0x04, 0x05, 0x06, 0x07, 0x08.

User's Modbus master send request frame:

01 10 00 00 00 08 10 00 08 05 00 00 00 01 23 01 02 03 04 05 06 07 08 38 FE

The response frame of GT100-CA-MS485:
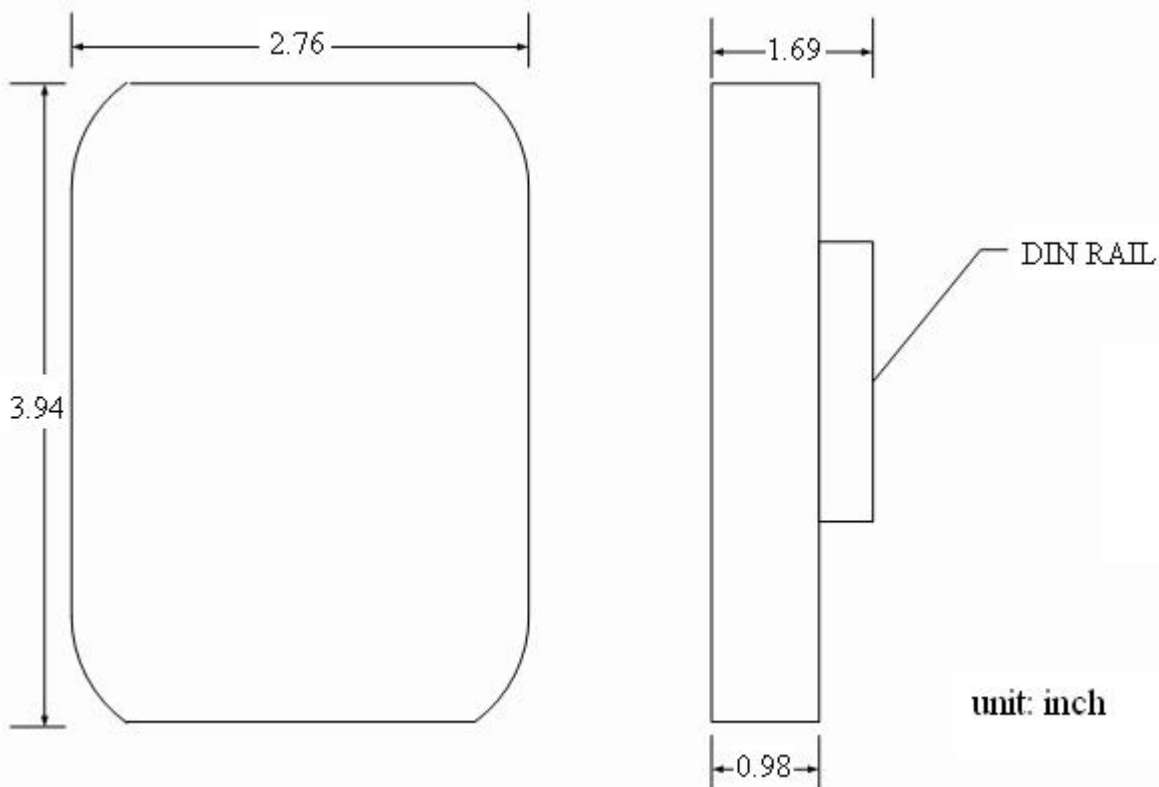
01 10 00 00 00 08 C1 CF

# 5 Installation

## 5.1 Machine Dimension

Size: 3.94in (width)*2.76 in (height)*0.98 in (depth) (not including DIN RAIL connector)

## 5.2 Installation Method

Using 35mm DIN RALL

# 6 Operation Maintenance and Cautions

➢ Prevent great pressure or it will damage the panel.

➢ Prevent collision or it may damage the inside elements.

➢ Supply voltage is DC 9V-30V, it must be controlled within the range of manual demand to prevent the module burned.

➢ Prevent water or it will affect the normal work.

➢ Please check on the wiring before powering on. Make sure there is no wrong wiring or short circuit.

WWW.SSTCOMM.COM