

SM100-W Series HART Smart Converters (HART channel mutual quarantine) Instructions for use



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Before using the product, please read the manual intensively. First, please confirm which type of Instruments is used with the HART protocol, and then find out the appropriate using method in the manual. Before switching on the power, please confirm all interfaces are correctly connected. The company will not be held liable for any damage caused by improper use that violates the methods specified herein unless following the instructions.

This document serves as the official product description. However, content may become outdated or invalid due to product/software upgrades. We do not guarantee consequences arising from such changes. Please monitor version updates and ensure prompt updates.

For the latest information, please refer to our website: www.smmeter.com. If you have any questions about this document or the performance description of this product, please contact your supplier or contact us directly. E-mail : sales@smdznet.com or contact tel: [86-573-82623038](tel:86-573-82623038) for advice and answers.

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1. Introduction to SM100-W Smart Converter

1.1 Product introduction

SM100-W series HART smart converter is a product developed by using ARM microprocessor, HART protocol module chip and a lot of practical experience. It is designed according to the requirements of industrial products and has high reliability and stability. The intelligent converter is equipped with standard RS485 interface and gateway, which can transparently transmit data with intelligent instruments with HART protocol or convert to MODBUS _ RTU/MODBUS _ TCP protocol to read data, as to ensure real-time data transmission.

The HART protocol uses the Bell202 Frequency Shift Keying (FSK) standard to superimpose a modulated digital signal on a 4 to 20 mA basis, allowing the HART protocol instrument to allow bidirectional data communication without interfering with the 4 to 20 mA analog signal. SM100 series intelligent converter is an intelligent converter which can modulate and demodulate digital signals and analog signals in both directions.

1.2 Product features

- Equipped with standard RS485 communication interface and gateway, it can configure parameters, change communication baud rate and parity check bit. It is independent of the 1200 communication speed on the HART bus, thus improving the operation speed of the whole system.
- Adopt industrial universal module shell, which is convenient for installation and commissioning.
- Equipped with special configuration software, it can configure the parameters of SM100-W series intelligent converter, and can communicate with HART protocol intelligent instrument through the intelligent converter.
- Supports standard MODBUS _ RTU and MODBUS _ TCP protocols.
- Support simultaneous connection of multiple HART protocol intelligent instruments.
- Each HART channel is in quarantine with each other without affecting the instrument current output.
- Support a variety of special HART protocol intelligent instruments, and can customize the instructions for reading special HART instruments.
- The data update time is 0.8 seconds for one set. If eight sets are connected, the data will be updated in 6.4 seconds.
- Installation method: standard rail installation or fixed installation.

1.3 Main parameters

- Power supply input voltage: DC 12 ~ 24 V, the ripple of the power supply shall not be greater than 200 mA, and the current shall be 100mA.
- Enclosure dimensions: 145 mm L × 90 mm W × 73 mm H.
- Working temperature: -20 ℃ ~ + 80 ℃.
- Relative humidity: 10% ~ 80%.

2. SM100- W Smart Converter Physical Diagram and Indicator Function

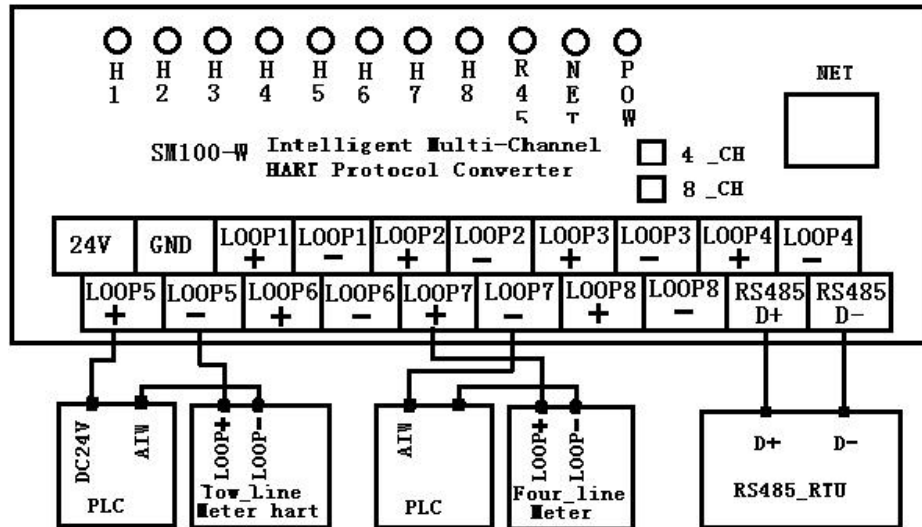
2.1 Physical drawings



2.2 Product selection

Product model	RS485	Ethernet	HART channel	Applicable occasions
SM100-W-4	Have	None	4	After a plurality of HART protocol intelligent instruments are collected by a DCS system or a PLC, under the condition that the original use is not affected, a SM100-W intelligent converter is adopted to directly take out a HART protocol digital signal, the HART protocol digital signal is converted into an RS485 interface, and the MODBUS _ RTU protocol is sent to a collector system.
SM100-W-8	Have	None	8	
SM100-W-N-4	Have	Have	4	After a plurality of HART protocol intelligent instruments are collected by a DCS system or a PLC, under the condition that the original use is not affected, an SM100-W-N intelligent converter is adopted to directly take out a HART protocol digital signal, and the HART protocol digital signal is converted into an RS485 interface MODBUS _ RTU protocol or an Ethernet interface MODBUS _ TCP protocol to be sent to a collector system.
SM100-W-N-8	Have	Have	8	

2.3 Wiring diagram



2.4 Port Introduction

Port name	POW	GND	LOOP1+	LOOP1-	LOOP2+	LOOP2-	LOOP3+	LOOP3-
Function/access device	Power source		HART Instrumentation 1		HART Instrumentation 2		HART Instrumentation 3	
Port name	LOOP4+	LOOP4-	LOOP5+	LOOP5-	LOOP6+	LOOP6-	LOOP7+	LOOP7-
Function/access device	HART Instrumentation 4		HART Instrumentation 5		HART Instrumentation 6		HART Instrumentation 7	
Port name	LOOP8+	LOOP8-	RS485D+	RS485D-	NET			
Function/access device	HART Instrumentation 8		RS485 communication		Network port			

- POW, GND: power interface terminal, POW is connected to the positive pole of the power supply, and GND is connected to the negative pole of the power supply.
- LOOP1 +, LOOP1- ~ LOOP8 +, LOOP8-: eight groups of HART instrument communication interface terminals.
- RS485D +, RS485D-: RS485 communication interface wiring terminal.
- NET: Ethernet interface.

2.5 Indicator light and description of model mark

- H1 indicator light: the converter communicates with No.1 HART meter.
- H2 indicator lamp: the converter communicates with the No.2 HART meter.
- H3 indicator lamp: the converter communicates with No.3 HART meter.
- H4 indicator lamp: the converter communicates with No.4 HART meter.
- H5 indicator: the converter communicates with the No.5 HART meter.
- H6 indicator lamp: the converter communicates with No.6 HART meter.
- H7 indicator lamp: the converter communicates with the No.7 HART meter.
- H8 indicator lamp: the converter communicates with No.8 HART meter.
- R45 indicator light: RS485 interface sends data.

- NET indicator: Ethernet interface receives data.
- POW power indicator: always on after the power is turned on.
- R_485: RS485 interface.
- N_NET: Ethernet interface.
- 4CH: connected to 4 sets of HART intelligent instruments.
- 8CH: connected to 8 sets of HART intelligent HART instruments.

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3. Function introduction and operation steps of configuration software

3.1 Communication connection

1) According to the introduction of the port in the above part, connect the converter to the power supply and RS485 cable/network cable, and then configure the parameters after the POW power indicator is always on.

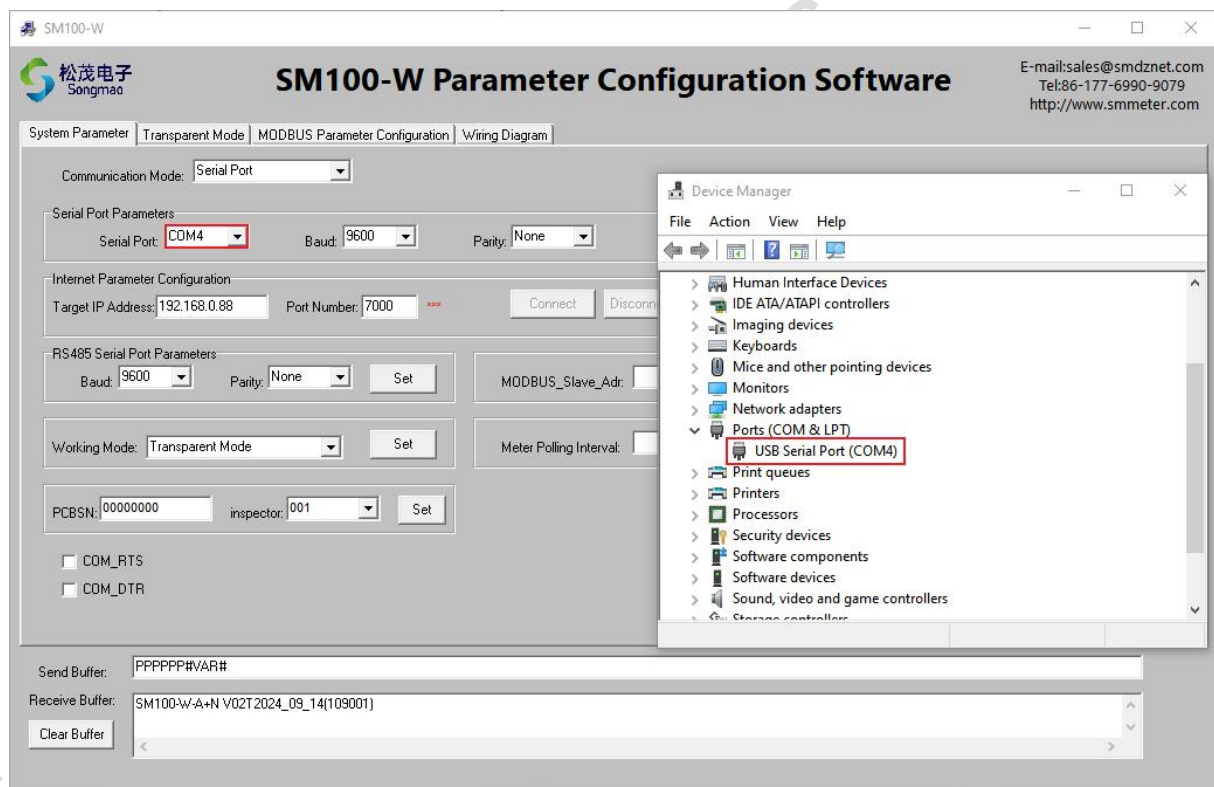
2) Open the configuration debugging software and select the communication connection mode: COM serial port communication and IP network communication.

When the converter is not configured with a gateway device, com serial port communication is selected as the communication connection mode;

When the converter is configured with a gateway device, both serial port communication and network communication modes can be selected.

3) com serial communication

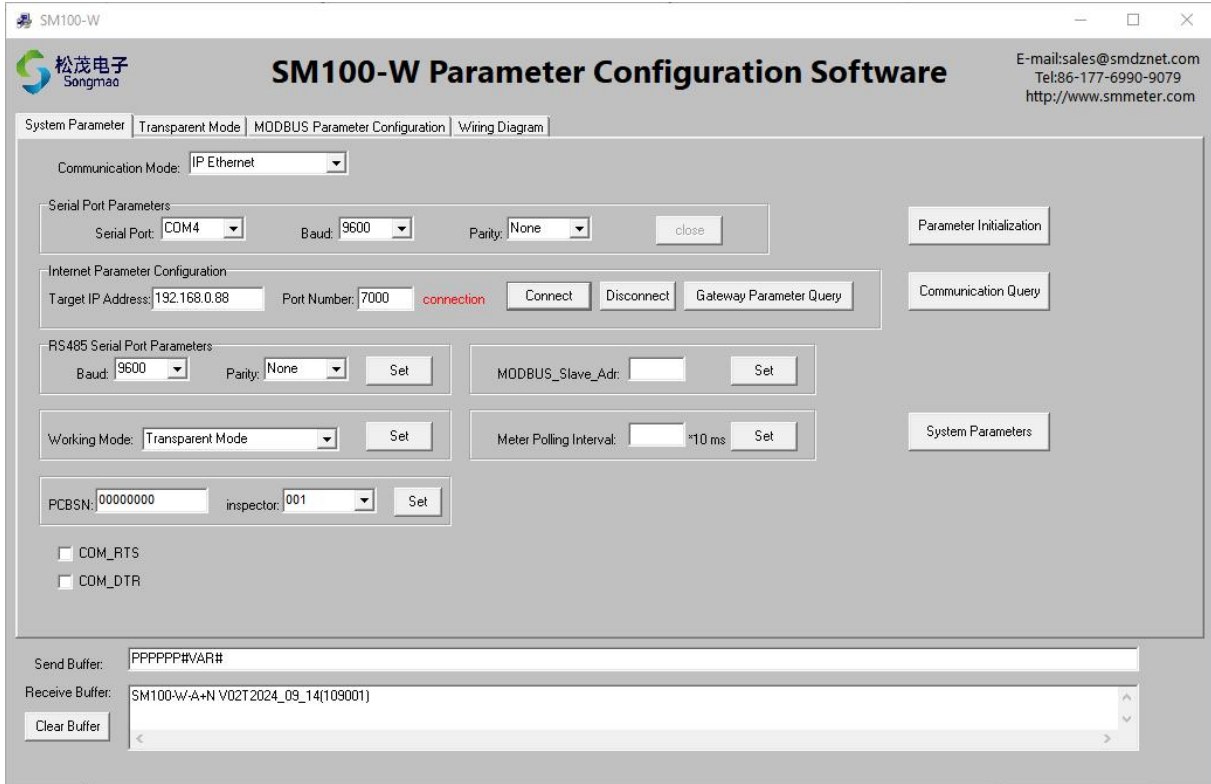
Connect the RS485 cable, select the correct port number, baud rate and check bit (default baud rate: 9600, check bit: None), then open the serial port, click "Communication Query", and query the version number of the converter in the "Receiving Buffer" below. At this time, the connection is successful.



4) IP network communication

Connect the network cable, configure the Ethernet parameters by clicking "Gateway Parameter Query", then input the correct target IP address and port number, and click "Connect". When "Connected" is displayed, it indicates that the connection is successful.

Note: Ethernet interface default IP: 192.168.0.88, port 7000. For Ethernet parameter configuration, see "3.2 Configuring Ethernet Parameters".



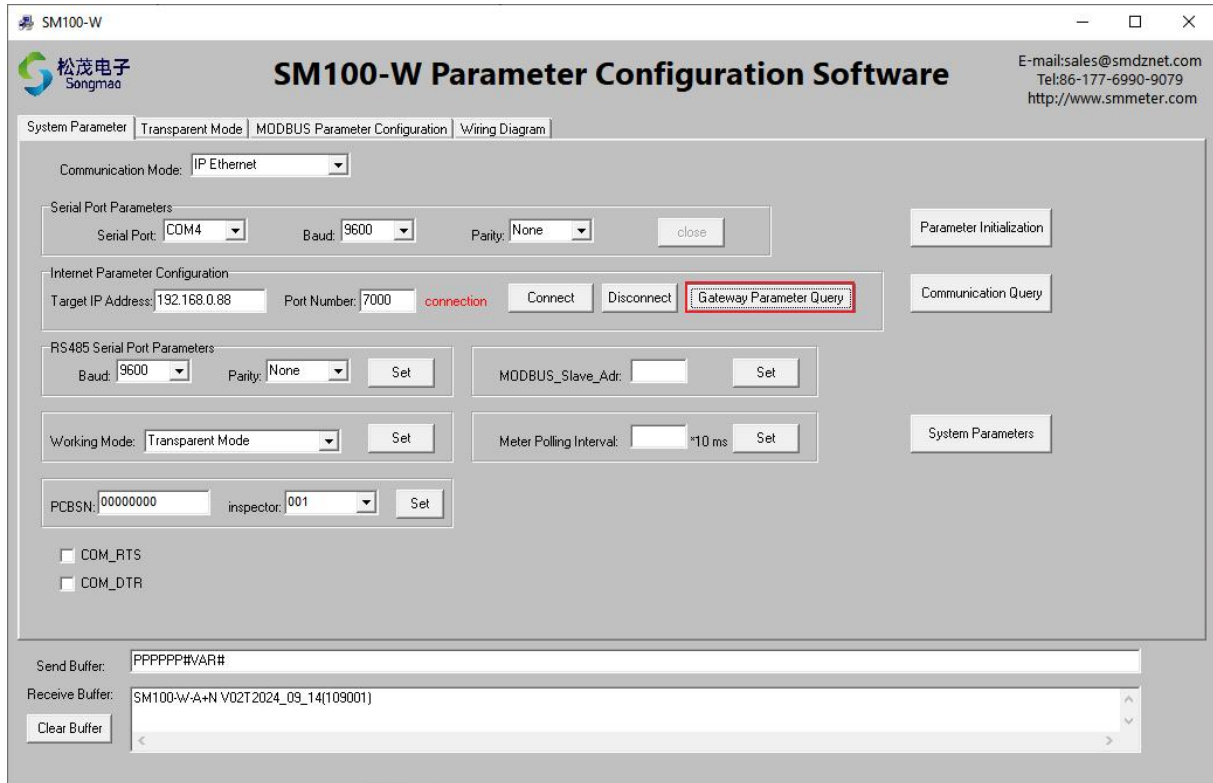
The screenshot shows the "SM100-W Parameter Configuration Software" window. The title bar includes the Songmao logo and the text "SM100-W". The window has a menu bar with "System Parameter", "Transparent Mode", "MODBUS Parameter Configuration", and "Wiring Diagram". The main area is divided into several sections:

- Communication Mode:** A dropdown menu set to "IP Ethernet".
- Serial Port Parameters:** Includes fields for "Serial Port" (COM4), "Baud" (9600), and "Parity" (None), with a "close" button.
- Internet Parameter Configuration:** Includes "Target IP Address" (192.168.0.88), "Port Number" (7000), and buttons for "Connect", "Disconnect", and "Gateway Parameter Query". A "connection" status indicator is shown.
- RS485 Serial Port Parameters:** Includes "Baud" (9600), "Parity" (None), and a "Set" button.
- MODBUS_Slave_Adr:** A field with a "Set" button.
- Working Mode:** A dropdown menu set to "Transparent Mode" with a "Set" button.
- Meter Polling Interval:** A field set to "10 ms" with a "Set" button.
- PCBSN:** A field set to "00000000" and "inspector" set to "001", both with "Set" buttons.
- COM_RTS** and **COM_DTR** checkboxes.
- Send Buffer:** A text field containing "PPPPPP#VAR#".
- Receive Buffer:** A text field containing "SM100-W-A+N V02T2024_09_14(109001)".
- Clear Buffer** button.

Buttons for "Parameter Initialization", "Communication Query", and "System Parameters" are also present on the right side of the main area.

3.2 Configure Ethernet parameters

- 1) Open the configuration software, select IP network communication as the communication connection mode, and then click "Gateway parameter query". At this time, the gateway parameter configuration window will pop up.



- 2) Click "Device Management" in the pop-up window, and the "Device Management" window will pop up. The software will automatically search the gateway devices of this collector, and the search results will be displayed in the main window.

Virtual Serial & Device Management - VirCom

Manage(M) Config(C) View(V) Help(H)

Start Stop Device Serial About

I.	Status	Com ...	COM Name	Type	Device IP	Discription	Dev ID

Information

[2025-05-14,14:18:44] Create ok!
[2025-05-14,14:18:44] Listen at port 4196 OK.

Device Management

I...	Ty...	Name	type	F	Dev IP	Loc...	Dest IP	Work Mode	TCP ...	Virtual S...	Vircom St...	Dev ID	T...	R...
1	Su...	ZLDEV0001	2007		192.168.0.88	7000	192.168.1.3	TCP Server	Not ...	Haven't ...	Not Linked	B37F999B	0	0

Auto Search

Edit Device

Banch Edit

Search Serial

Add Manually

P2P Device

IO Controller

Search List

Back

- 3) Select the searched gateway device and click "Edit Settings". The "Device Settings" window will pop up and the current configuration information of the module will be displayed in this window.

Device Info

Virtual Serial: Not Use
Dev Type: ZLSN2007
Dev Name: ZLDEV0001
Dev ID: 286DB37F999B
MAC Addr: 04EEE81F99A7
Firmware Ver: V1.470

Function of the device

☐ Web Download
☒ DNS System
☒ REAL_COM Protocol
☒ Modbus TCP To RTU
☒ Serial Commnad
☒ DHCP Support
☐ Storage Extend
☒ Multi-TCP Connection

Network

IP Mode: Static
IP Address: 192 . 168 . 0 . 88
Port: 7000
Work Mode: TCP Server
Net Mask: 255 . 255 . 255 . 0
Gateway: 192 . 168 . 0 . 1
Dest. IP/Domain: 192.168.1.3
Dest. Port: 4196

Serial

Baud Rate: 115200
Data Bits: 8
Parity: None
Stop Bits: 1
Flow Control: None

Advanced Settings

DNS Server IP: 8 . 8 . 4 . 4
Dest. Mode: Dynamic
Transfer Protocol: None
Keep Alive Time: 60 (s)
Reconnet Time: 12 (s)
Http Port: 80
UDP Group IP: 230 . 90 . 76 . 1
☐ Register Pkt
☐ ASCII
☐ Restart If No Data every 300 Sec.
☐ Enable Parameter Send every 5 Min.

Framing Rule

Max Frame Length: 1300 (Byte)
Max Interval: 1 (Ms)

More Advanced Settings...

Get Default

Save As Default

Load Default

Modify Key

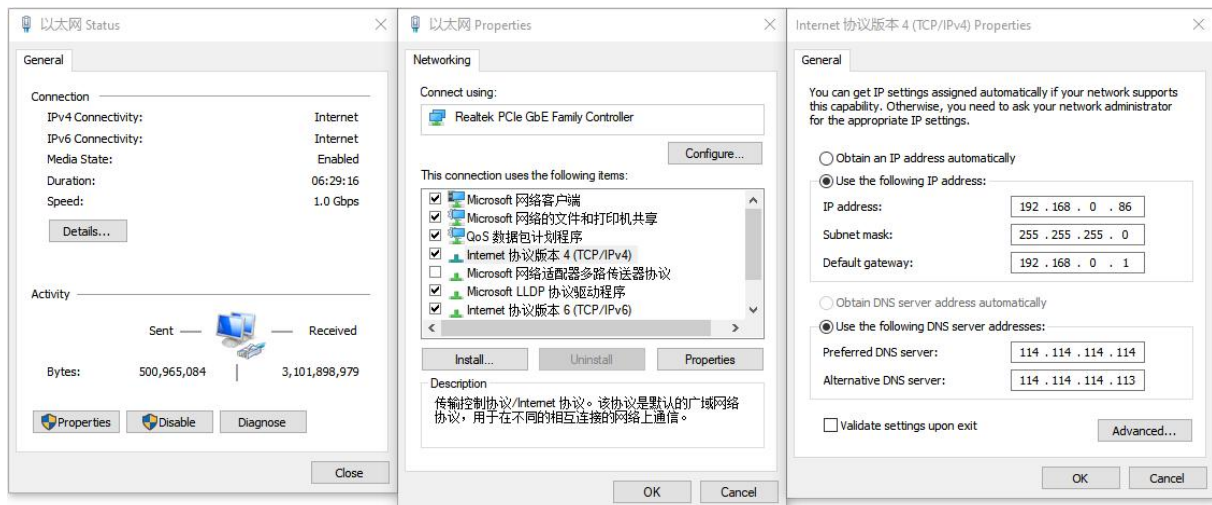
Firmware/Config

Restart Dev

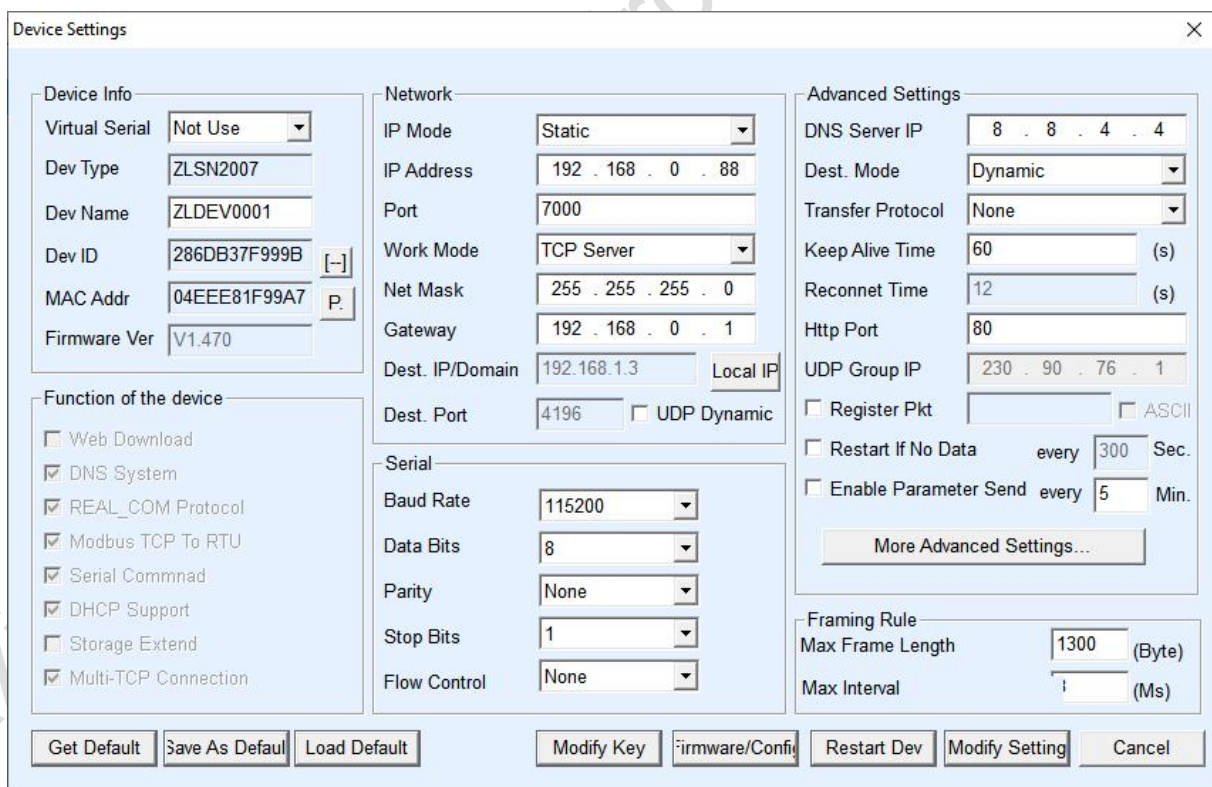
Modify Setting

Cancel

- 4) The user queries the local Internet protocol (TCP/IP) attribute in the computer, and sets the Ethernet parameters according to the query result. Among them, serial port baud rate — 115200, check/data/stop — None, 8, 1 are fixed values and cannot be changed. The last byte of the IP address is different and can be defined by the user.



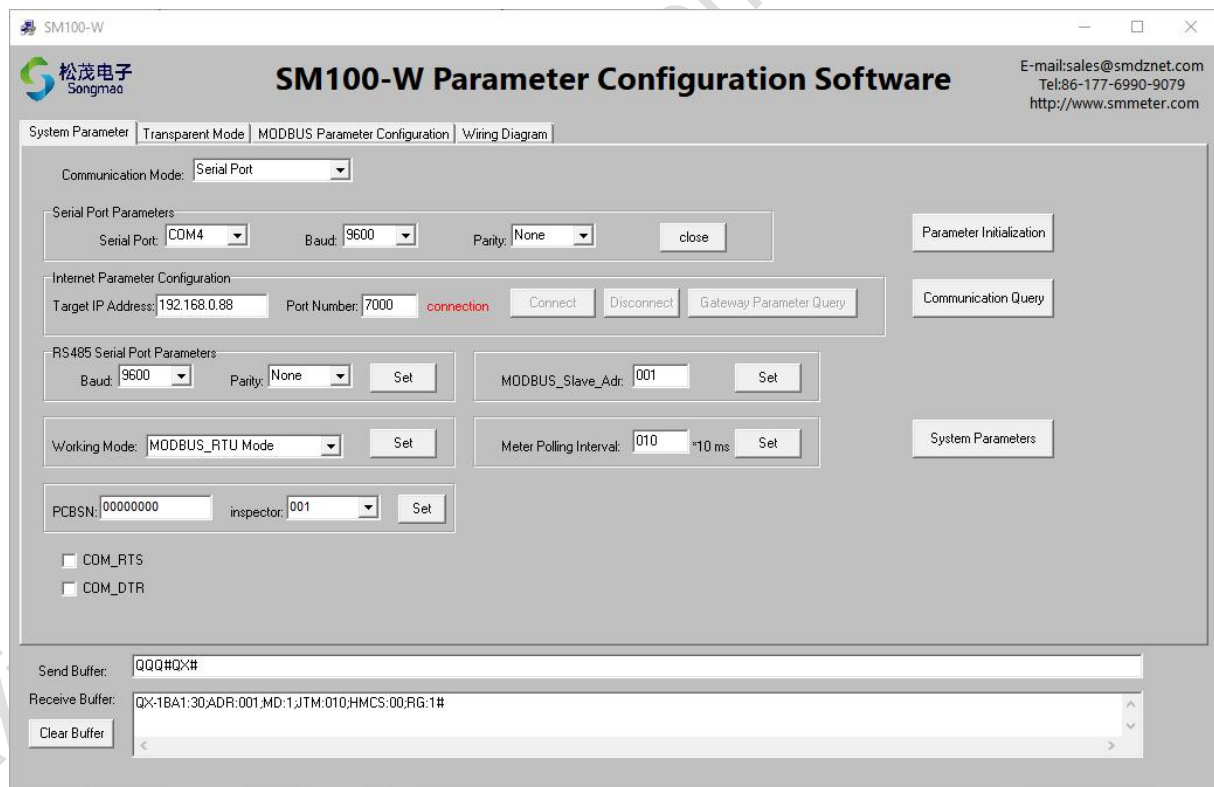
- 5) After changing the parameters, click "Modify Settings" to save the configured Ethernet parameters. Finally, close the gateway parameter configuration software. At this time, all parameters of the gateway have been configured.



3.3 System parameters

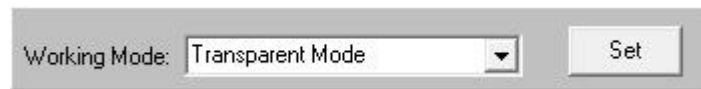
This interface is used to set and query basic parameters such as RS485 communication parameters, module working mode, MODBUS slave address and HART command interval.

- 1) Communication mode: The communication mode of the converter can be selected, which are "Serial Port" and "IP Ethernet".
- 2) Parameter initialization: The parameters of the converter can be restored to the initialized state.
- 3) Communication query: You can query the version number of the converter.
- 4) System parameters: can read RS485 communication parameters, module working mode, MODBUS slave address, HART command read data speed and other parameter information.
- 5) RS485 serial port parameters: The user can select the baud rate and check bit (default baud rate 9600, check bit None) for RS485 communication according to the actual situation, and then click "Set". After the setting is successful, the configuration software automatically closes the serial port. At this time, it is necessary to re-select the set baud rate and check bit, and open the serial port for normal communication.
- 6) MODBUS slave address: input 3-digit slave address and click "Set".
- 7) Working mode: Select the transparent working mode when reading the data in the "Transparent Working Mode" interface, select the MODBUS _ RTU instrument mode when reading the data in the "MODBUS Parameter Configuration" interface, and then click "Set".
- 8) Meter polling interval: input the command interval, and then click "Set".



3.4 Transparent mode

1) Set the working mode of the module: set the working mode of the module as "Transparent Working Mode" in the "System Parameters" interface.



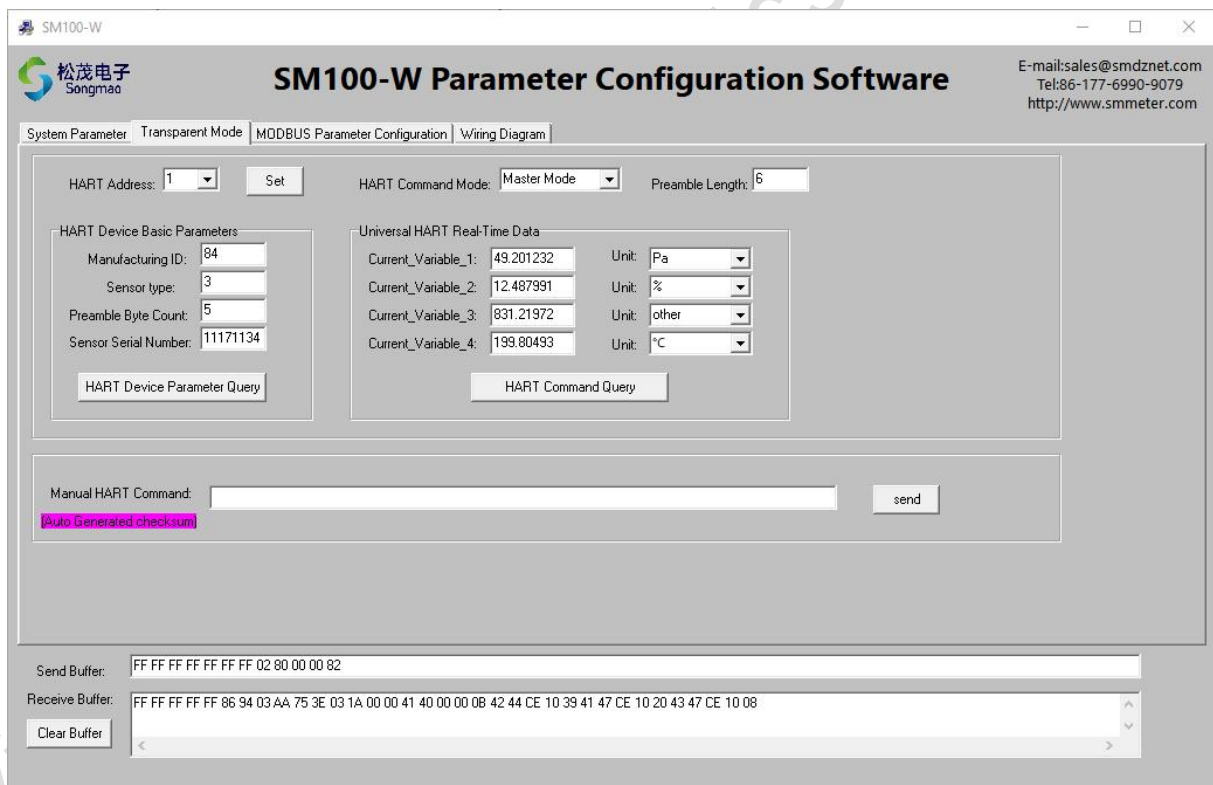
2) Configure HART instrument parameters:

- ① HART address: refers to the channel number of HART instrument connected to the converter.
- ② HART command mode: main mode and auxiliary main mode are available for selection, which can be selected according to the requirements of the instrument.
- ③ Preamble length: the 'FF' quantity of the leader of the HART instruction, which is generally 6 bytes.

3) HART device basic parameters: basic parameter information of HART instrument can be queried.

4) Universal HART real-time data: real-time data of general HART instruments can be read, but real-time data of other customized instruments cannot be displayed.

5) Manual HART command: read the real-time data of HART instrument by manually inputting HART command.



SM100-W Parameter Configuration Software

System Parameter | Transparent Mode | MODBUS Parameter Configuration | Wiring Diagram

HART Address: 1 Set HART Command Mode: Master Mode Preamble Length: 6

HART Device Basic Parameters

Manufacturing ID: 84
Sensor type: 3
Preamble Byte Count: 5
Sensor Serial Number: 11171134
HART Device Parameter Query

Universal HART Real-Time Data

Current_Variable_1: 49.201232 Unit: Pa
Current_Variable_2: 12.487991 Unit: %
Current_Variable_3: 831.21972 Unit: other
Current_Variable_4: 199.80493 Unit: °C
HART Command Query

Manual HART Command: [Auto Generated checksum] send

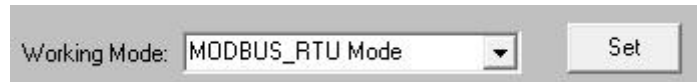
Send Buffer: FF FF FF FF FF FF FF FF 02 80 00 00 82

Receive Buffer: FF FF FF FF FF FF 86 94 03 AA 75 3E 03 1A 00 00 41 40 00 00 0B 42 44 CE 10 39 41 47 CE 10 20 43 47 CE 10 08

Clear Buffer

3.5 MODBUS parameter configuration

1) Set the working mode: Set the working mode of the module as "MODBUS _ RTU Mode" in the "System Parameters" interface.



2) MODBUS_RTU parameters: parameter information such as instrument enable, instrument type and user-defined command on this interface can be read.

3) Configure HART instrument parameters

① Meter ID: refers to the instrument number in the "transparent working mode" interface, which is consistent with the channel number of the instrument connected to the converter.

② Enable: refers to the enabling state of instrument MODBUS communication. Only when the enabling state is turned on, the instrument can perform MODBUS communication.

Communication. Connect the HART instrument and turn on the enable, i.e. select "Enable".

③ Device mode: main equipment and auxiliary main equipment are available for selection, which can be selected according to the requirements of the instrument.

④ Instrument type: select according to the actually connected instrument.

Customized instrument-the instrument connected is not commonly used HART protocol instrument, which may be old HART protocol instrument or special HART command protocol instrument. The user can define the resolution mode according to the HART command, and can directly convert the MODBUS _ RTU protocol without upgrading the program.

General Purpose Instruments-Suitable for most HART protocol instruments.

Special instrument-the instrument connected is not the instrument that the general HART command reads the data. If the model corresponds to the special instrument model, just select the model.

⑤ Preamble length: the 'FF' quantity of the leader of the HART instruction.

⑥ Buffer clear time: input 3-digit clear cache time (unit: S).

4) Data analysis format: there are four data analysis formats, and the user configures the corresponding analysis format according to the format requirements of MODBUS data output.

0 IEEE754 (FF4 FF3 FF2 FF1)-Floating-point, reverse high-low order (default format)

1 IEEE754 (FF2 FF1 FF4 FF3)-Floating-point, high-low order

2 Uint32 (FF4 FF3 FF2 FF1)-unsigned long, high and low in reverse order

3 Uint32 (FF2 FF1 FF4 FF3)-Unsigned long, high and low order not reversed

5) Variable 1 ~ variable 4 coefficient: when the read variable unit is inconsistent with the unit displayed on the HART instrument header, the corresponding coefficient can be set for conversion between units.

6) Custom HART command parsing: when the instrument type is "custom instrument", the user can open the command enable and read the HART instrument data by inputting the command code.

7) Custom data parsing format: set the read instrument command number, data start address, data length and address bit. The address bit (data length) is used to calculate the data check bit to determine the correctness of the data. The default value is 8, and the common values are 4, 6 and 8. The user can choose according to the actual situation.

8) IEEE754 calculation: Input the received data instruction code and click "Calculation" to convert the hexadecimal data format into the decimal data format, which is convenient for the approval of the received data.

9) MODBUS communication test: input the correct MODBUS slave address, start register address for reading data and data length, and then click "MODBUS communication test" to read MODBUS data information.

SM100-W

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SM100-W Parameter Configuration Software

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System Parameter | Transparent Mode | MODBUS Parameter Configuration | Wiring Diagram

Meter ID: 1 Enable: Close Device Mode: Secondary Master Dev Instrument Type: 0 Custom_Meter Preamble Length: Buffer Clear Time: S Set

Channel Test: 40001 Variable_1(RTU_ADR) 40003 Variable_2(RTU_ADR) 40005 Variable_3(RTU_ADR) 40007 Variable_4(RTU_ADR) 40009

0 IEE754 (FF4 FF3 FF2 FF1) 0 IEE754 (FF4 FF3 FF2 FF1) 0 IEE754 (FF4 FF3 FF2 FF1) 0 IEE754 (FF4 FF3 FF2 FF1) 0 IEE754 (FF4 FF3 FF2 FF1) Set

Variable 1 Coefficient: 1.000 Variable 2 Coefficient: 1.000 Variable 3 Coefficient: 1.000 Variable 4 Coefficient: 1.000 Set

Custom HART Command Parsing

Read Meter Command 1: Set

Read Meter Command 2: Set

Custom Data Parsing Format

Variable	Command Number	Star_Adr	Data Length
Variable_1	0 Not analytic		4 byte
Variable_2	0 Not analytic		4 byte
Variable_3	0 Not analytic		4 byte
Variable_4	0 Not analytic		4 byte

Address Bits: 8 Set

MODBUS Communication Test

MODBUS Slave Address: 001 MODBUS Start Address: 00 Read Data Length: 10 MODBUS Comm Test

Send Buffer: FF FF FF FF FF FF 02 80 00 00 82

Receive Buffer: FF FF FF FF FF 86 94 03 AA 75 3E 03 1A 00 00 41 40 00 00 0B 42 44 CE 10 39 41 47 CE 10 20 43 47 CE 10 08

Clear Buffer

MODBUS_RTU parameters

IEE754 Calculation

Data Format HEX(FF FF FF FF)

Value: Calculation

3.6 Mod Scan32 Communication Test

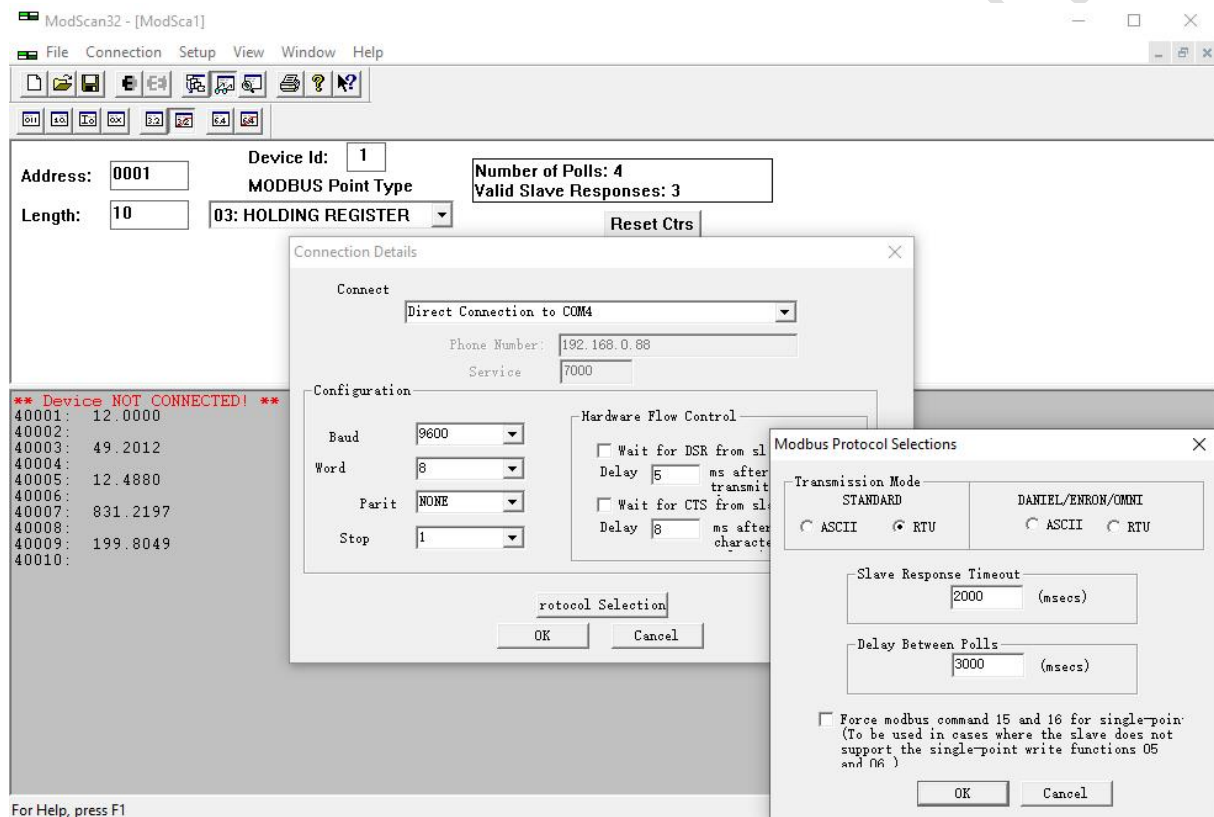
- 1) Close the serial port of the configuration software, open the Modscan32 software, click "connection", configure the appropriate parameters in the pop-up dialog box according to the arrow in the figure below, and then click OK.
- 2) Select the appropriate data format in the main window of modscan32 software, input the correct parameter information, and then click the "Connect" button to read the instrument data information.

Address-Address of MODBUS data start register

Device Id-MODBUS slave address

Length-read data length

MODBUS Point Type-Function Code



4. Data register address

Factory default parameters: station address 001, baud rate 9600, check bit None, data bit 8, stop bit 1. 03 function code is used when reading data.

HART channel	Data name	Data address	Data type	Data format (Default)
1	Current value	40001 40002	IEE754	4321
	Primary variable 1	40003 40004	IEE754	4321
	Variable 2	40005 40006	IEE754	4321
	Variable 3	40007 40008	IEE754	4321
	Variable 4	40009 40010	IEE754	4321
2	Current value	40011 40012	IEE754	4321
	Primary variable 1	40013 40014	IEE754	4321
	Variable 2	40015 40016	IEE754	4321
	Variable 3	40017 40018	IEE754	4321
	Variable 4	40019 40020	IEE754	4321
3	Current value	40021 40022	IEE754	4321
	Primary variable 1	40023 40024	IEE754	4321
	Variable 2	40025 40026	IEE754	4321
	Variable 3	40027 40028	IEE754	4321
	Variable 4	40029 40030	IEE754	4321
4	Current value	40031 40032	IEE754	4321
	Primary variable 1	40033 40034	IEE754	4321
	Variable 2	40035 40036	IEE754	4321
	Variable 3	40037 40038	IEE754	4321
	Variable 4	40039 40040	IEE754	4321
5	Current value	40041 40042	IEE754	4321
	Primary variable 1	40043 40044	IEE754	4321
	Variable 2	40045 40046	IEE754	4321
	Variable 3	40047 40048	IEE754	4321
	Variable 4	40049 40050	IEE754	4321
6	Current value	40051 40052	IEE754	4321
	Primary variable 1	40053 40054	IEE754	4321
	Variable 2	40055 40056	IEE754	4321
	Variable 3	40057 40058	IEE754	4321
	Variable 4	40059 40060	IEE754	4321
7	Current value	40061 40062	IEE754	4321
	Primary variable 1	40063 40064	IEE754	4321
	Variable 2	40065 40066	IEE754	4321
	Variable 3	40067 40068	IEE754	4321
	Variable 4	40069 40070	IEE754	4321
8	Current value	40071 40072	IEE754	4321

	Primary variable 1	40073 40074	IEE754	4321
	Variable 2	40075 40076	IEE754	4321
	Variable 3	40077 40078	IEE754	4321
	Variable 4	40079 4080	IEE754	4321

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5. Service and warranty

SM100-W Series HART Smart Converter Quality Assurance

1. This product is guaranteed for three years under normal use conditions.
2. During the warranty period, our company will provide you with warranty service for any failure caused by product technology.
3. The following circumstances are not within the scope of free warranty:
 - ① Products that are disassembled and repaired without the consent of the Company;
 - ② Damage caused by external force and other natural disasters.
4. If the user thinks that the product of our company needs to be repaired, please call our company to contact us in time, and we will repair and send it back as soon as possible.
5. The warranty liability is limited to the fault maintenance of the product during the warranty period, and does not assume other responsibilities.

Precautions for SM100-W Series HART Smart Converters

1. Please read the instructions carefully before use.
2. Confirm whether the power supply meets the working requirements of equipment.
3. Check whether the distance from the HART instrument equipment is more than 200 m. If it is beyond this range, please use a thicker wire and add a shielded cable. When using a shielded wire, connect one end to ground.
4. Whether there is a large inductive load nearby, which seriously interferes with the signal, and appropriate shielding measures should be taken.

After-sales service hotline: 86-573-82623038

Email: service@smdznet.com