

SM101-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 However, content may become outdated or invalid due to product/software upgrades.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 SM101-W Smart Converter

1.1 Product introduction

SM101-W series HART smart converter is a product developed with ARM microprocessor, HART protocol modem 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, so 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. SM101 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.
- It is equipped with special configuration software, which can configure the parameters of SM101-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 four sets are connected, the data will be updated in 3.2 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.
- Shell size: length 75 mm × width 80 mm × height 41 mm.
- Working temperature: -20 °C ~ + 80 °C.
- Relative humidity: 10% ~ 80%.

2. SM101- W Smart Converter Physical Diagram and Indicator Function

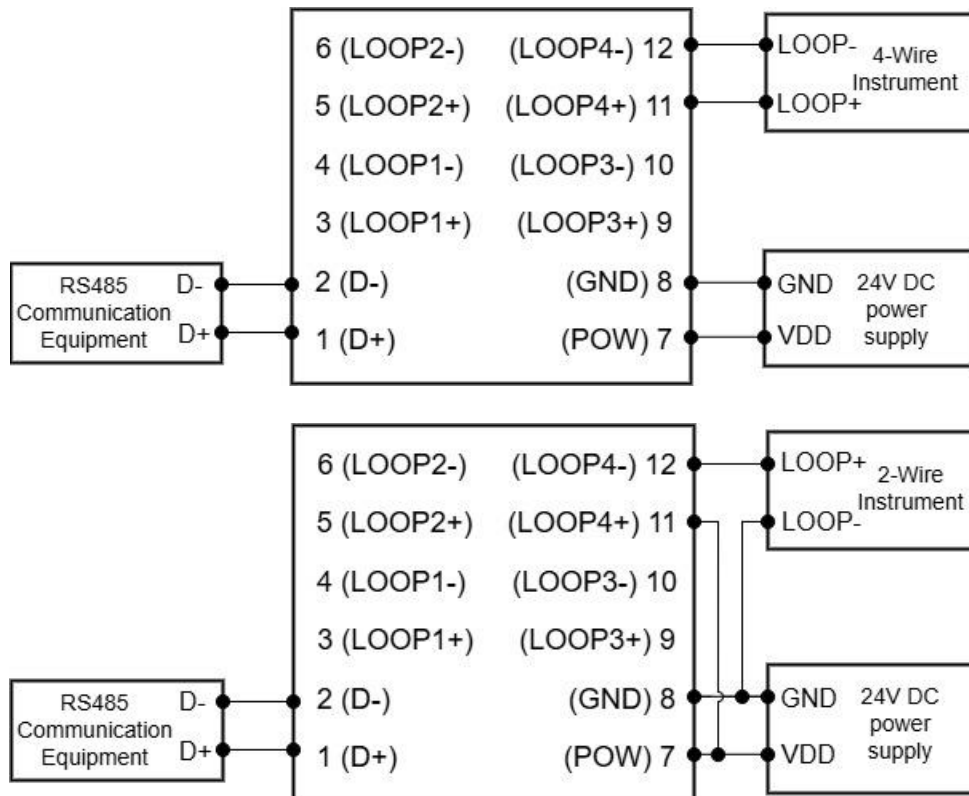
2.1 Physical drawings



2.2 Product selection

Product model	RS485	Ethernet	HART channel	Applicable occasions
SM101-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, an SM101-W intelligent converter is adopted to directly take out a HART protocol digital signal, the signal is converted into an RS485 interface, and the MODBUS _ RTU protocol is sent to a collector system.
SM101-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 SM101-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.

2.3 Wiring diagram



2.4 Port Introduction

Port number	1	2	3	4	5	6
Port name	D+	D-	Loop1+	Loop1-	Loop2+	Loop2-
Function/access device	RS485 communication		HART Instrumentation 1		HART Instrumentation 2	
Port number	7	8	9	10	11	12
Port name	Loop3+	Loop3-	Loop4+	Loop4-	POW	GND
Function/access device	HART Instrumentation 3		HART Instrumentation 4		Power source	

- D +, D-: RS485 communication interface wiring terminal.
- Loop1 +, Loop1- ~ Loop4 +, Loop4-: four groups of HART instrument communication interface terminals.
- 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.

2.5 Indicator light description

- PWR power indicator: always on after the power is turned on.
- NET indicator light: Ethernet interface receiving and sending data indicator light.
- MOD indicator: RS485 interface receiving and sending data indicator.
- CH1 indicator lamp: the converter communicates with No.1 HART meter.
- CH2 indicator light: the converter communicates with the No.2 HART meter.
- CH3 indicator lamp: the converter communicates with No.3 HART meter.
- CH4 indicator lamp: the converter communicates with No.4 HART meter.

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.

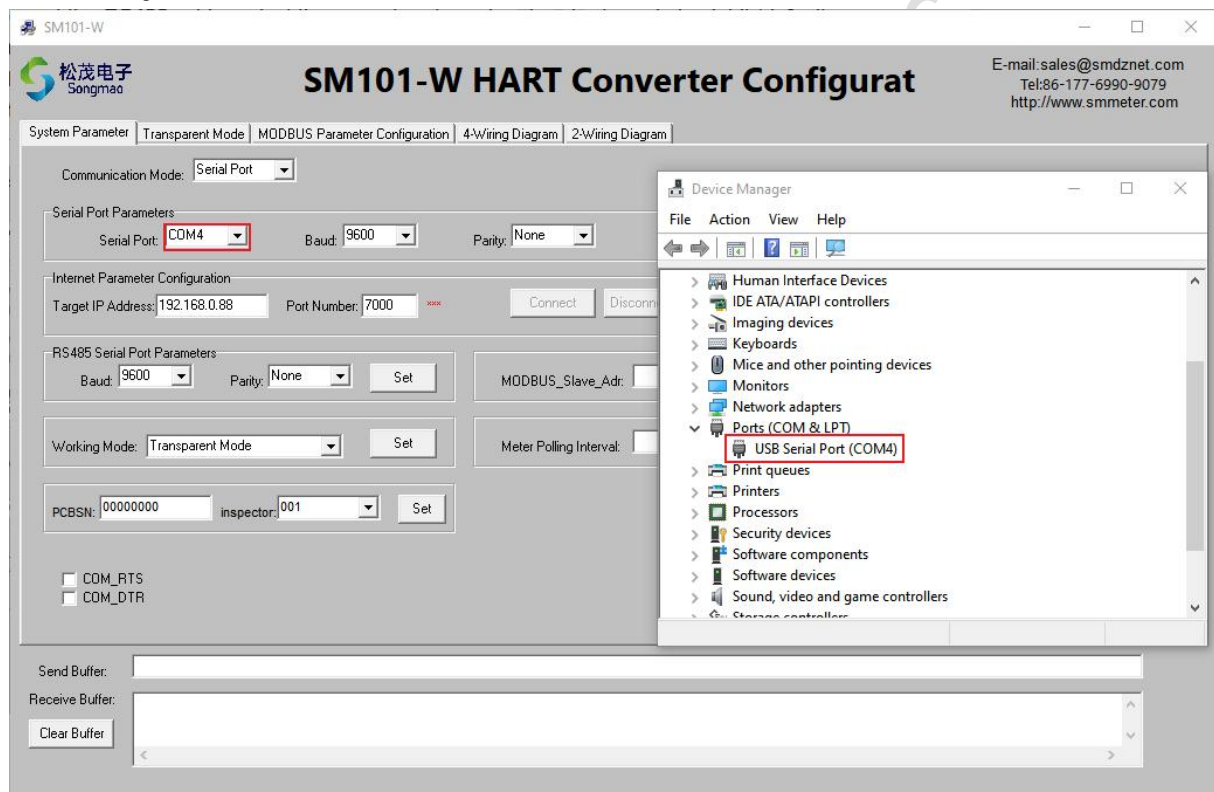
2) Open the configuration debugging software and select the communication connection mode: COM serial port communication and IP network communication.

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

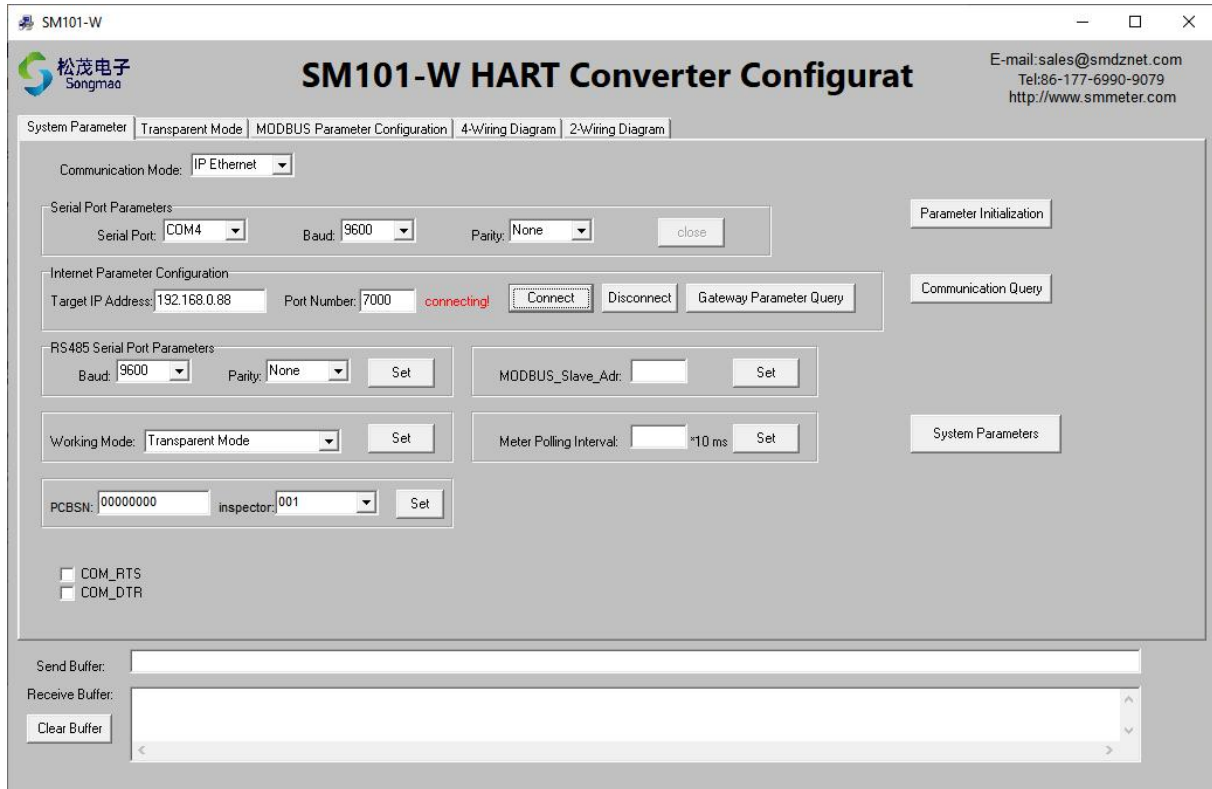
Connect the RS485 cable, select the correct port number, baud rate and check bit (default baud rate: 9600, check bit: None), then open the serial port, click "Communication Query", and query the version number of the converter in the "Receiving Buffer" below. At this time, the connection is successful.



4) IP network communication

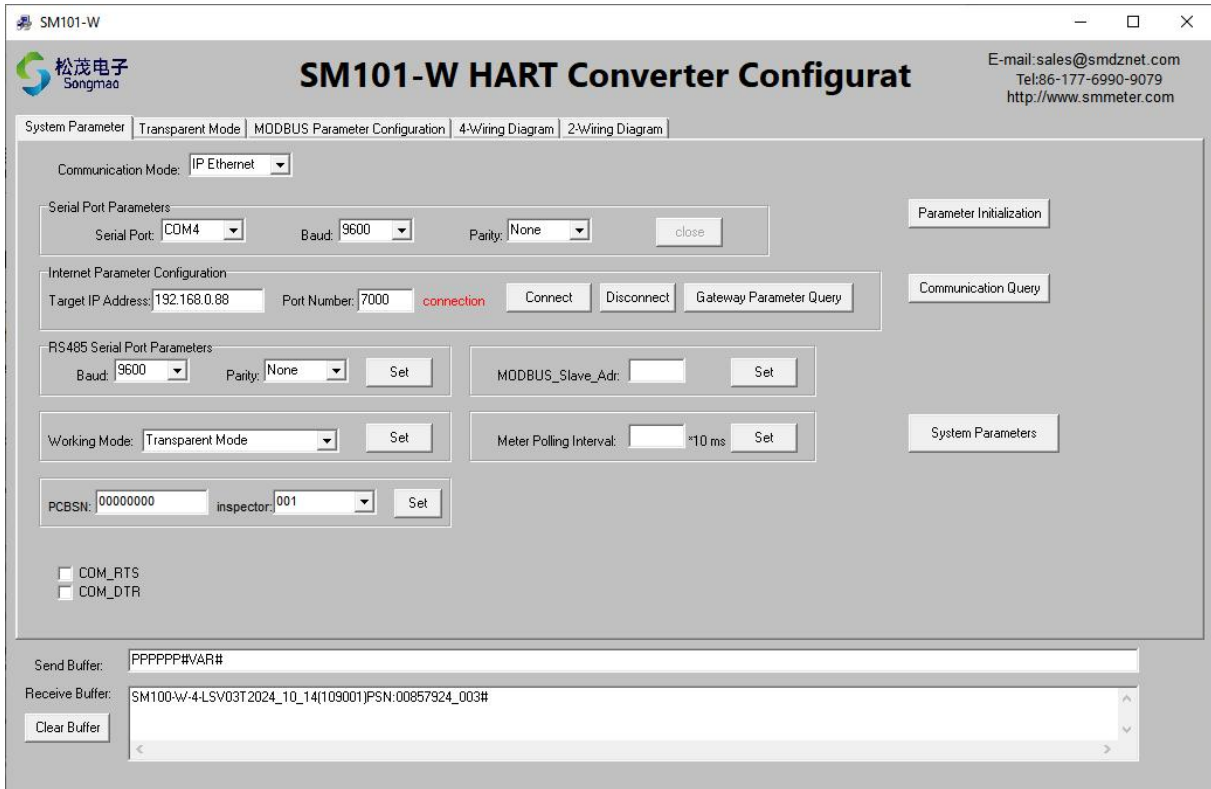
Connect the network cable, configure the Ethernet parameters by clicking "Gateway Parameter Query", then input the correct target IP address and port number, and click "Connect". When "Connected" is displayed, it indicates that the connection is successful.

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



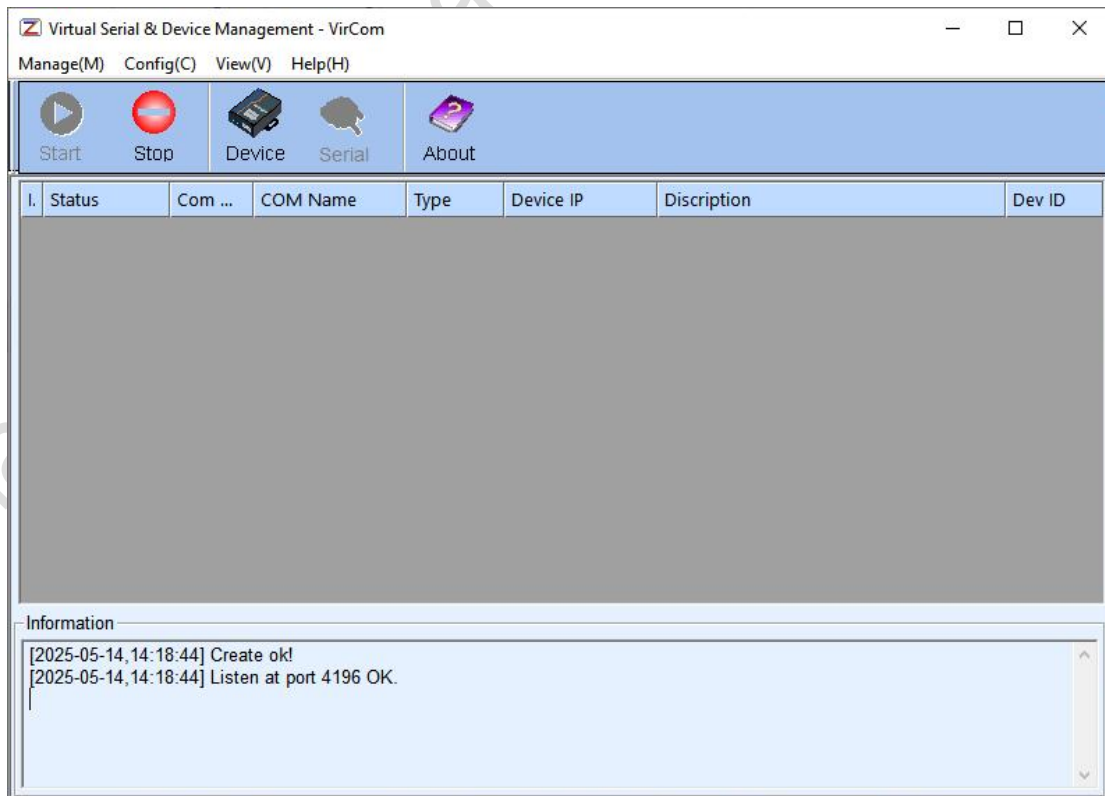
3.2 Configure Ethernet parameters

- 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.

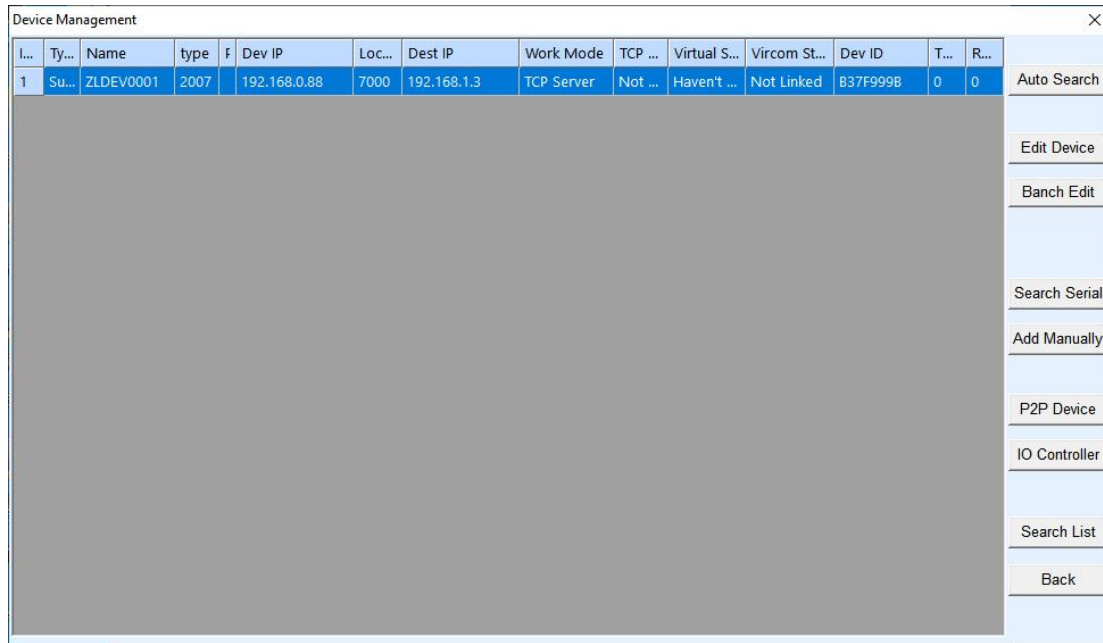


The screenshot shows the "SM101-W HART Converter Configuration" window. It has a title bar with "SM101-W" and standard window controls. The window contains several tabs: "System Parameter", "Transparent Mode", "MODBUS Parameter Configuration", "4-Wiring Diagram", and "2-Wiring Diagram". The "System Parameter" tab is active. It features a "Communication Mode" dropdown set to "IP Ethernet". Below this are "Serial Port Parameters" (Serial Port: COM4, Baud: 9600, Parity: None) and "Internet Parameter Configuration" (Target IP Address: 192.168.0.88, Port Number: 7000). There are buttons for "Parameter Initialization", "Connect", "Disconnect", "Gateway Parameter Query", and "Communication Query". Other sections include "RS485 Serial Port Parameters" (Baud: 9600, Parity: None), "MODBUS_Slave_Adr.", "Working Mode" (set to Transparent Mode), "Meter Polling Interval" (set to 10 ms), "PCBSN" (00000000), "Inspector" (001), and checkboxes for "COM_RTS" and "COM_DTR". At the bottom, there are "Send Buffer" and "Receive Buffer" text areas with a "Clear Buffer" button.

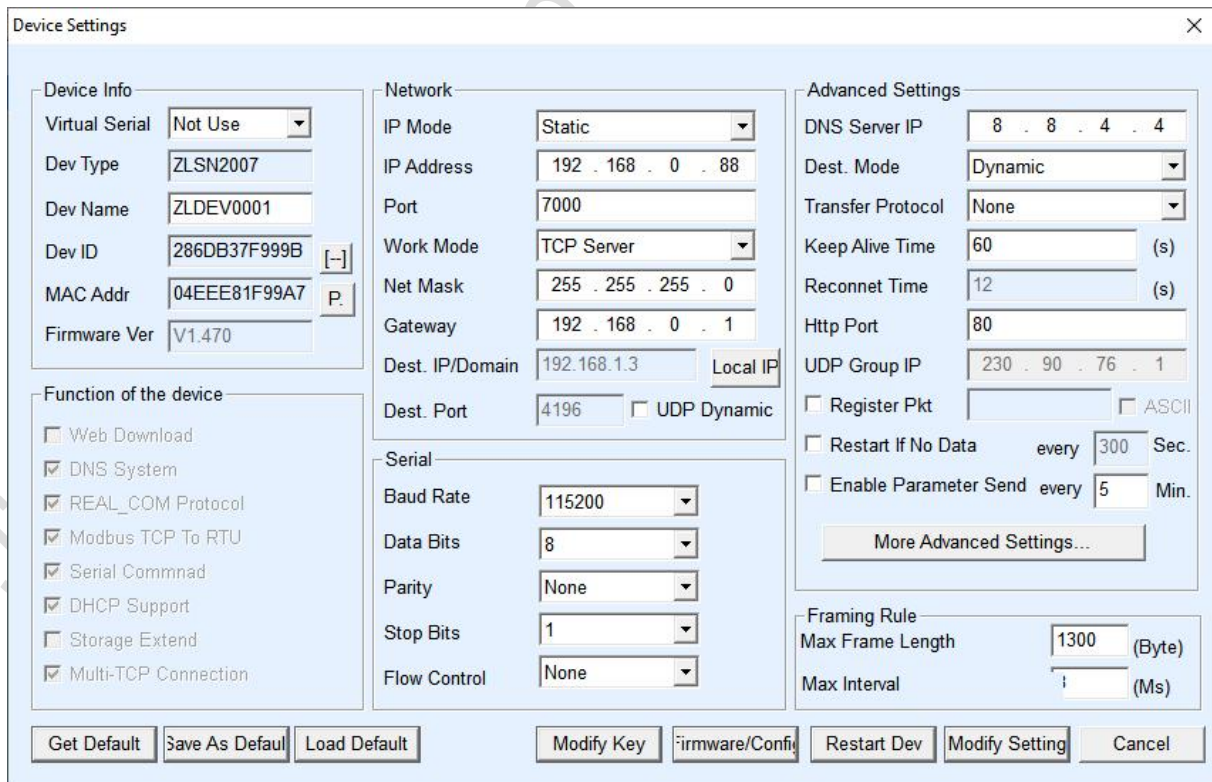
- 2) Click "Device Management" in the pop-up window, and the "Device Management" window will pop up. The software will automatically search the gateway devices of this collector, and the search results will be displayed in the main window.



The screenshot shows the "Virtual Serial & Device Management - VirCom" window. It has a title bar with "Virtual Serial & Device Management - VirCom" and standard window controls. The window contains a menu bar with "Manage(M)", "Config(C)", "View(V)", and "Help(H)". Below the menu bar is a toolbar with icons for "Start", "Stop", "Device", "Serial", and "About". The main area is a table with columns: "I.", "Status", "Com ...", "COM Name", "Type", "Device IP", "Discription", and "Dev ID". The table is currently empty. At the bottom, there is an "Information" section with a log of events: "[2025-05-14, 14:18:44] Create ok!" and "[2025-05-14, 14:18:44] Listen at port 4196 OK."



- 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 Settings

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
☐ UDP Dynamic

Serial

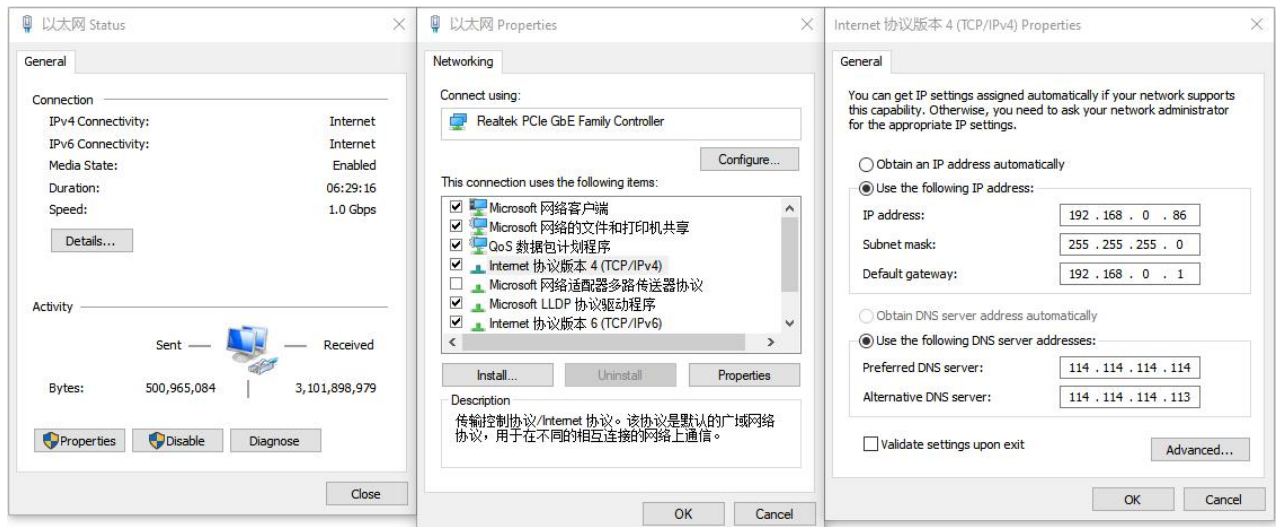
Baud Rate: 115200
 Data Bits: 8
 Parity: None
 Stop Bits: 1
 Flow Control: None

Advanced Settings

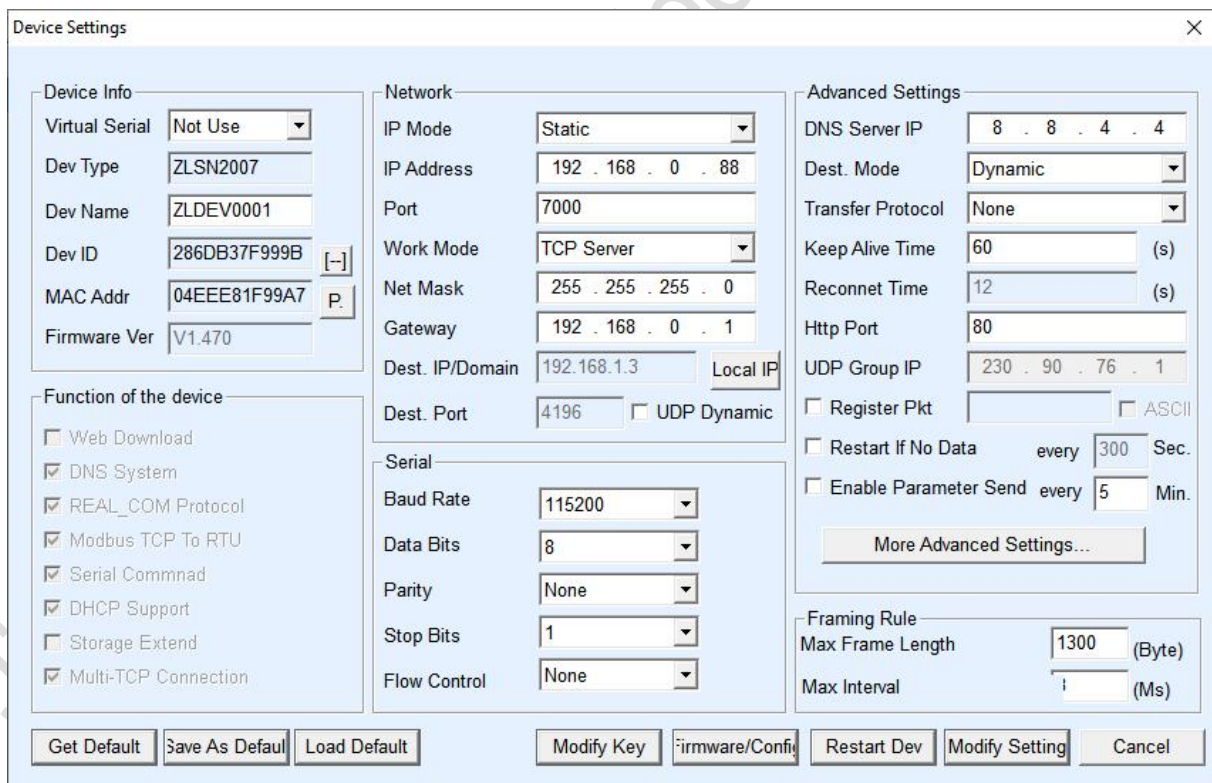
DNS Server IP: 8 . 8 . 4 . 4
 Dest. Mode: Dynamic
 Transfer Protocol: None
 Keep Alive Time: 60 (s)
 Reconnet Time: 12 (s)
 Http Port: 80
 UDP Group IP: 230 . 90 . 76 . 1
☐ Register Pkt
☐ ASCII
☐ Restart If No Data every 300 Sec.
☐ Enable Parameter Send every 5 Min.
 More Advanced Settings...
 Framing Rule
 Max Frame Length: 1300 (Byte)
 Max Interval: (Ms)

Buttons at the bottom: 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.



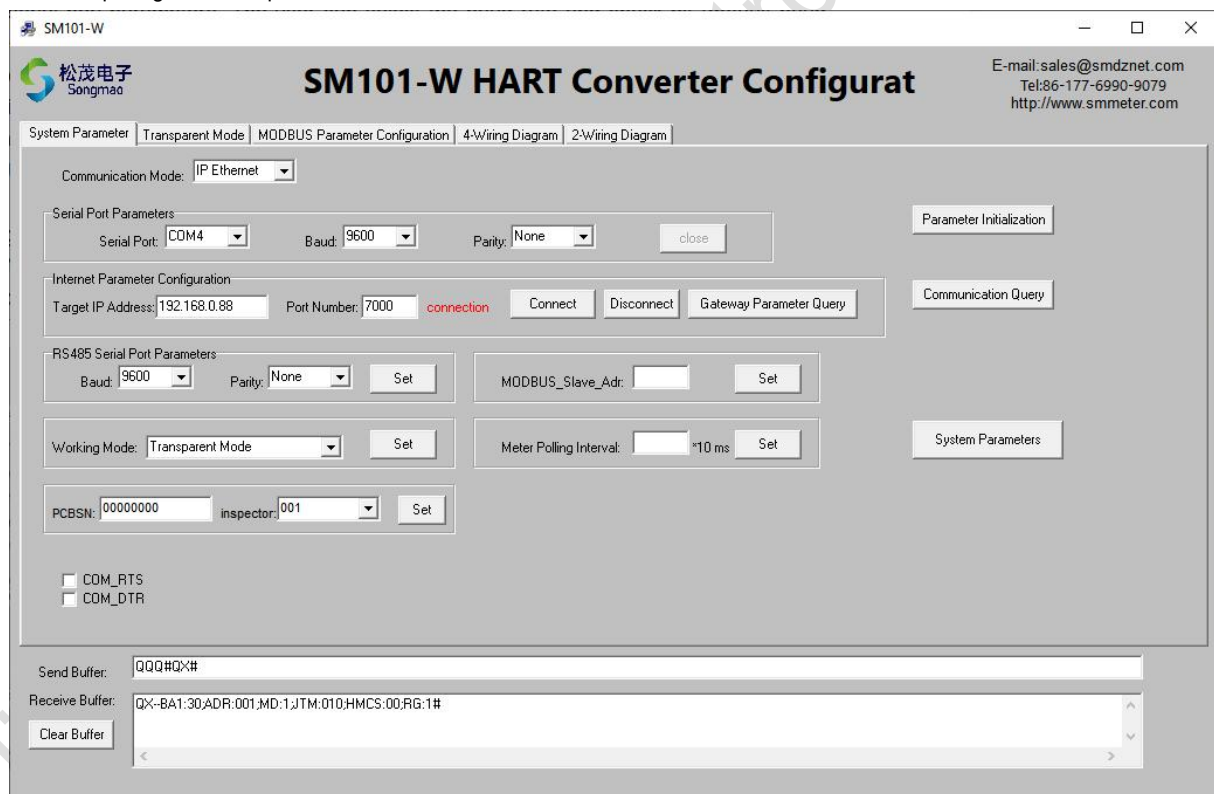
- 5) After changing the parameters, click "Modify Settings" to save the configured Ethernet network parameters. Finally, close the gateway parameter configuration software. At this time, all parameters of the gateway have been configured.



3.3 System parameters

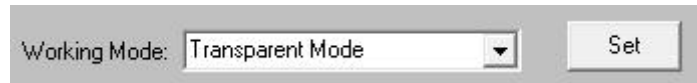
This interface is used to set and query basic parameters such as RS485 communication parameters, module working mode, MODBUS slave address and HART command interval.

- 1) Communication mode: The communication mode of the converter can be selected, which are "com serial port communication" and "IP network communication".
- 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 time, and then click "Set".



3.4 Transparent way of working

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



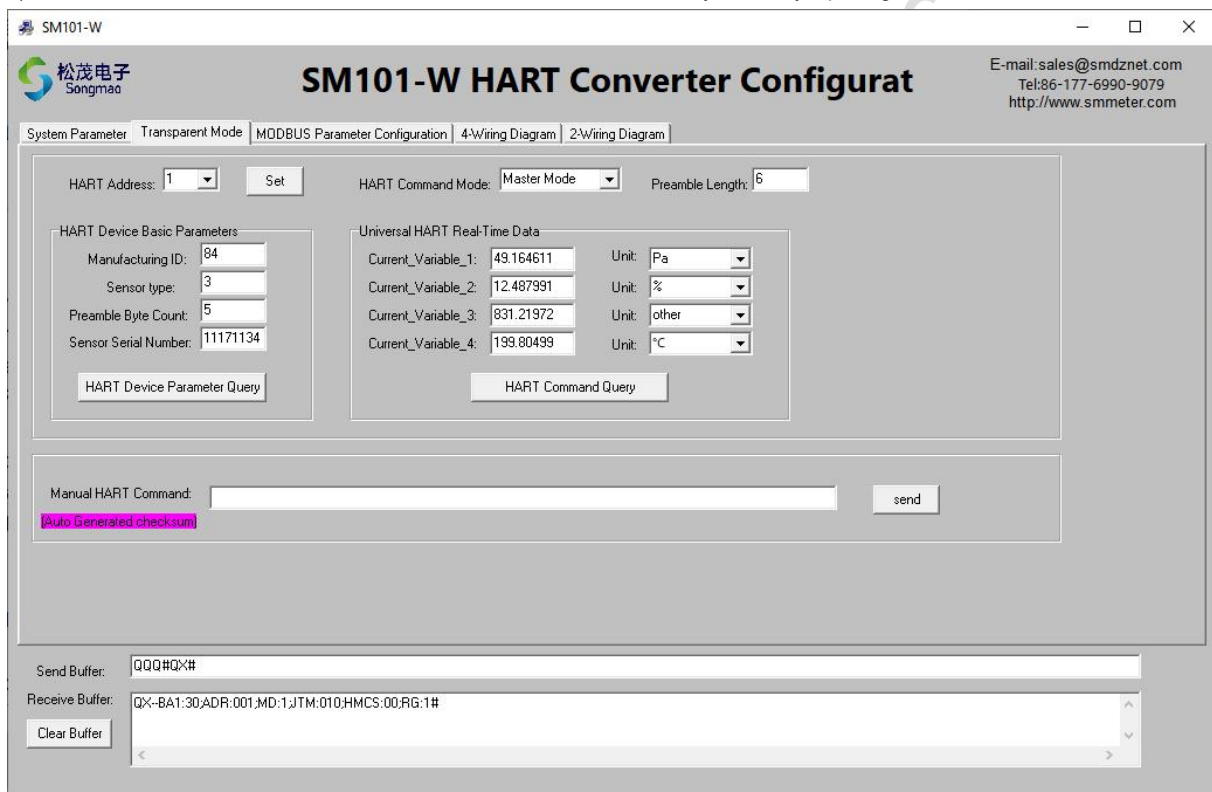
2) Configure HART instrument parameters:

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

3) Parameter query of HART instrument: basic parameter information of HART instrument can be queried.

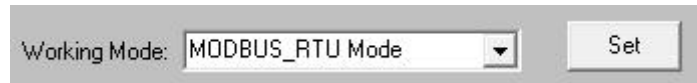
4) General HART command data query: real-time data of general HART instruments can be read, but real-time data of other customized instruments cannot be displayed.

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



3.5 MODBUS parameter configuration

1) Set the working mode of the module: 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. Connect the HART instrument and turn on the enable, i.e. select "Enable".
 - ③ Read 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: the instrument type shall be selected according to the actually connected instrument.
 - Custom Instrumentation-Inrequently used HART protocol instrumentation is accessed. 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 Clear cache 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.

SM101-W


SM101-W HART Converter Configur

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System Parameter Transparent Mode MODBUS Parameter Configuration 4-Wiring Diagram 2-Wiring Diagram

Meter ID: 1 Channel Test Enable: Close Read Mode: first Instrument Type: 0Custom_Meter Preamble Length: Buffer Clear Time: S Set

Variable_1(RTU_ADR) 40001

Variable_2(RTU_ADR) 40003

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)

Variable 1 Coefficient 1.000

Variable 2 Coefficient 1.000

Variable 3 Coefficient 1.000

Variable 4 Coefficient 1.000

Custom HART Command Parsing

Read Meter Command 1: Set

Read Meter Command 2: Set

Custom Data Parsing Format

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

IEE754 Calculation

Data Format HEX(FF FF FF FF)

Value: Calculation

MODBUS_RTU parameters

Modbus Communication Test

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

Send Buffer: QQQ#QX#

Receive Buffer: QX-BA1.30;ADR.001;MD:1;JTM:010;HMCS:00;RG:1#

Clear Buffer

3.6 Mod Scan32 Communication Test

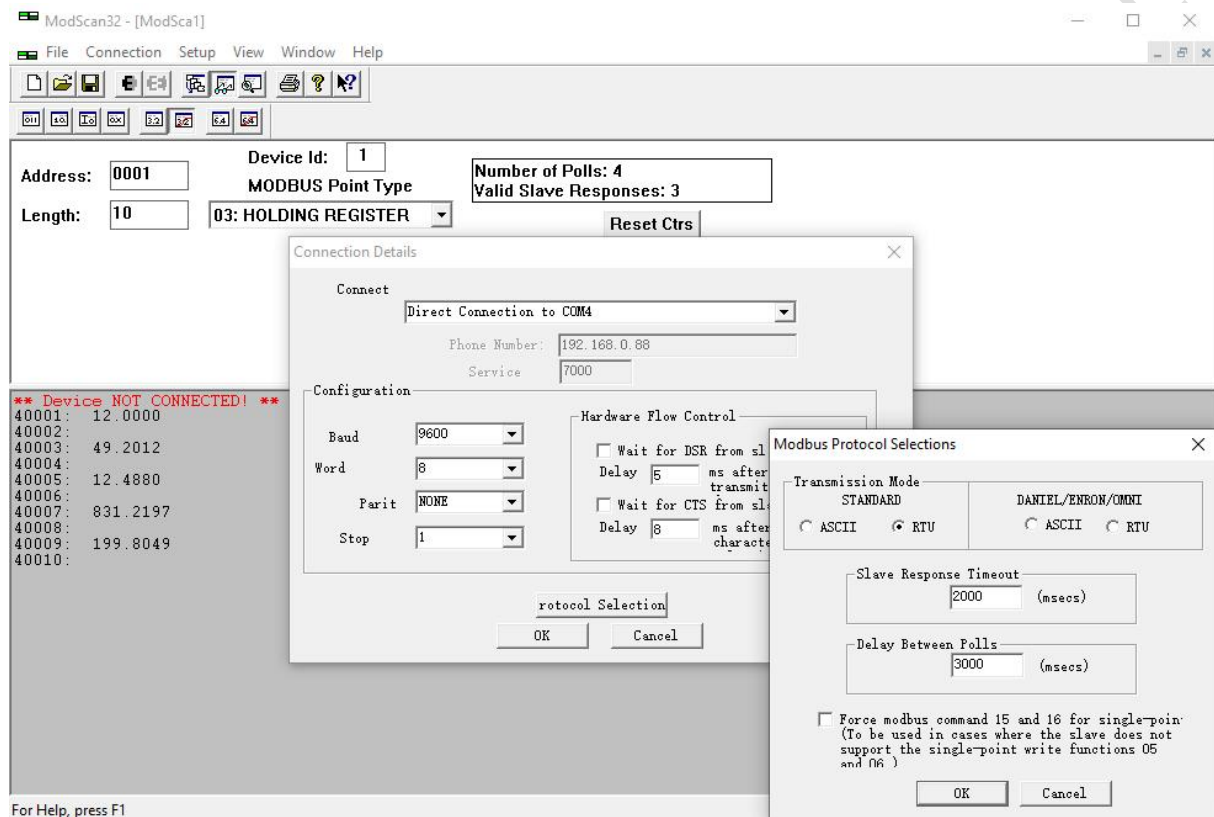
- 1) Close the serial port of the configuration software, open the Modscan32 software, click "connection", configure the appropriate parameters in the pop-up dialog box according to the arrow in the figure below, and then click OK.
- 2) Select the appropriate data format in the main window of modscan32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

SM101-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.

Use Considerations for SM101-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