SM200-A HART Data Display
Instruction Manual

Jiaxing Songmao Electronics Co., Ltd.

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http://www.smdznet.com

http://www.hart-rs232.com

Catalog

1. Introduction to SM200-A Data Display Instrument .....
1.1 Product Introduction .....
1.2 Product Performance .....
1.3 Main Parameters .....
2. Actual product image and indicator light functions of SM200-A data display instrument .....
2.1 Actual Product Image .....
2.2 Wiring Diagram .....
2.3 Port Introduction .....
2.4 Indicator Light Description .....
3. Configuration software function introduction and operation steps .....
3.1 Communication Connection .....
3.2 System Parameters .....
3.3 Transparent Working Method .....
3.4 MODBUS Parameter Configuration .....
4. Modscan32 software .....
5. Service and Warranty .....

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1. Introduction to the SM200-A Data Display Instrument

1.1 Product Introduction

The SM200-A HART data display is a high-tech product integrating HART protocol and RS232/RS485 communication, and is a miniature RTU system. It uses a high-end ARM microcontroller as its core and consists of a high-precision operational amplifier, interface chip, hardware watchdog circuit, input/output loops, etc., and embeds a communication module and HART modem chip, featuring stable performance and extremely high cost-effectiveness.

The SM200-A HART data display's hardware structure is fully compliant with industry standards. It features special designs in terms of temperature range, vibration, electromagnetic compatibility, and interface diversity, ensuring stable operation in harsh environments and providing a high-quality guarantee for your equipment.

1.2 Product Performance

- Equipped with standard RS232 and RS485 communication interfaces, allowing for parameter configuration, baud rate adjustment, and parity setting. This is independent of the 1200MHz communication speed on the HART bus, thus improving the overall system speed.
- Equipped with dedicated configuration software, the SM200-A HART data display instrument can be configured with parameters and can communicate with HART protocol smart meters.
- Supports the standard MODBUS_RTU protocol.
- Supports various smart meters with special HART protocols and can customize the reading of instructions from special HART meters.
- Equipped with 4-channel LED display for easy data reading.
- It has a power failure memory function, so there is no need to reset the parameters after a power failure.

1.3 Main Parameters

- Dimensions of the casing: 164 mm (length) × 102 mm (width) × 50 mm (height).
- Operating ambient temperature: -20℃ ~ +75℃.
- Relative humidity: 10% ~ 80%.
- Power input voltage: DC 12 ~ 24V, or AC 220V (mains power, please specify when ordering).
- Analog input impedance: 250Ω, capable of acquiring 4 ~ 20mA, 0 ~ 5V DC signals.
- HART protocol sampling resistor: 250Ω.

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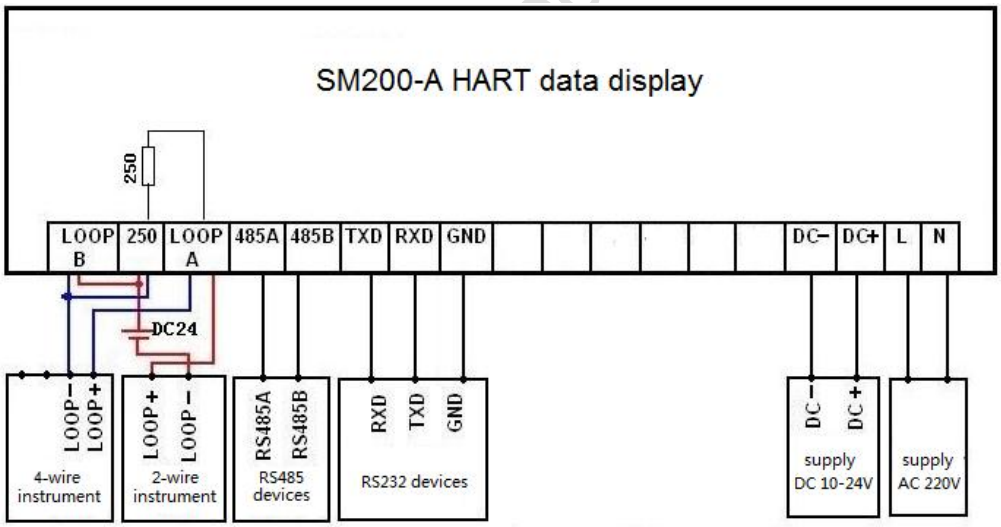
2. Actual product image and indicator light functions of SM200-A data display instrument

2.1 Actual Product Image

2.2 Wiring Diagram



2.3 Port Introduction

port name	LOOP B	250	LOOP A	485A	485B	TXD	RXD	GND	GND	POW	L	N
Functional/Access Devices	HART Instrument			RS485 communication		RS232 communication			DC power supply		AC power	

- LOOPA, LOOPB, 250: Connect to HART instruments and read HART instrument data.
- 485A, 485B: RS485 communication. Refer to the connection diagram to connect the instrument

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and equipment to realize data transmission between the data display instrument and the equipment.

- RS T, TXD , RXD : RS232 communication. Refer to the connection diagram to connect the instrument and equipment to realize data transmission between the data display instrument and the equipment.
- POW, GND: DC power supply. The positive and negative terminals (+, -) of the power supply line are connected to the corresponding (POW, GND) terminals respectively.
- L, N: AC power supply (must be specified when ordering) , power cords are connected to the corresponding (L, N) terminals respectively.

2.4 Indicator Light Description

- HART communication indicator light: Flashes when the HART instrument exchanges data, and also flashes when power is connected.
- RS485 communication indicator: Flashes during RS485 serial port data exchange.
- RS232 communication indicator: Flashes during RS232 serial port data exchange.

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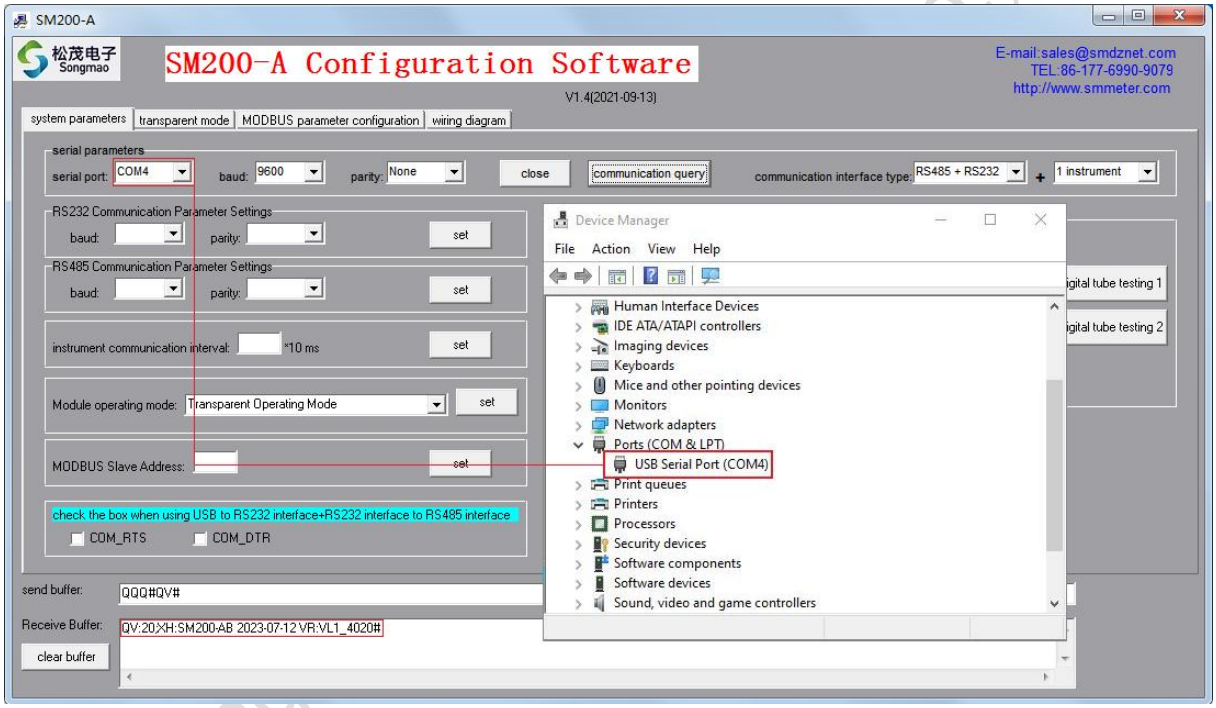
3. Configuration software function introduction and operation steps

3.1 Communication Connection

1) Based on the port description above, connect the power supply and RS232 or RS485 communication cable.
2) Open the configuration and debugging software and configure the interface parameters, that is, select the correct serial port number, baud rate and parity bit (factory default baud rate 9600, parity bit None).
3) Open the serial port, click "Communication Query", and find the version number of this data display instrument in the "Receive Buffer" below. At this time, the connection is successful.



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3.2 System Parameters

This interface is used to set and query basic parameters such as communication para meters, communication interval, module working mode, MODBUS slave address, and displa y parameters.

1) System Parameters: Click "System Parameters" and read the basic parameter configuration information such as communication parameters, communication interval time, MODBUS slave address, and display parameters in the "Receive Buffer" below.
2) Parameter initialization: Click “Parameter initialization” to restore the parameters of the data display to the initial state.
3) RS232 Communication Parameter Settings: Users select the baud rate and parity bit for RS232 communication according to their actual situation (default baud rate 9600, parity bit None), and then click "Set". After successful setting, the configuration software will automatically close the serial port. At this time, you need to reselect the set baud rate and parity bit and open the serial port for normal communication.
4) RS485 Communication Parameter Settings: Users select the baud rate and parity bit for RS485 communication according to their actual situation (default baud rate 9600, parity bit None), and then click "Set". After successful setting, the configuration software will automatically close the serial port. At this time, you need to reselect the set baud rate and parity bit and open the serial port for normal communication.
5) HART instrument communication interval time: Enter the communication interval time, and then click "Set".
6) Module operating mode: Select transparent operating mode when reading data from the "Transparent Operating Mode" interface; select MODBUS single instrument operating mode when reading data from the "MODBUS Parameter Configuration" interface, and then click "Settings".

Note: The module working mode setting box in the "MODBUS Parameter Configuration" interface has the same function as the module working mode setting box here.

7) MODBUS Slave Address: Enter a 3-digit slave address and click "Settings".
8) Display Parameter Configuration: The SM200-A data display can display four data digits: the left four digits of the upper row, the right four digits of the upper row, the left four digits of the lower row, and the right four digits of the lower row. Users configure the display parameters and data types according to the position of the digital tubes, and then click "Save" in sequence.

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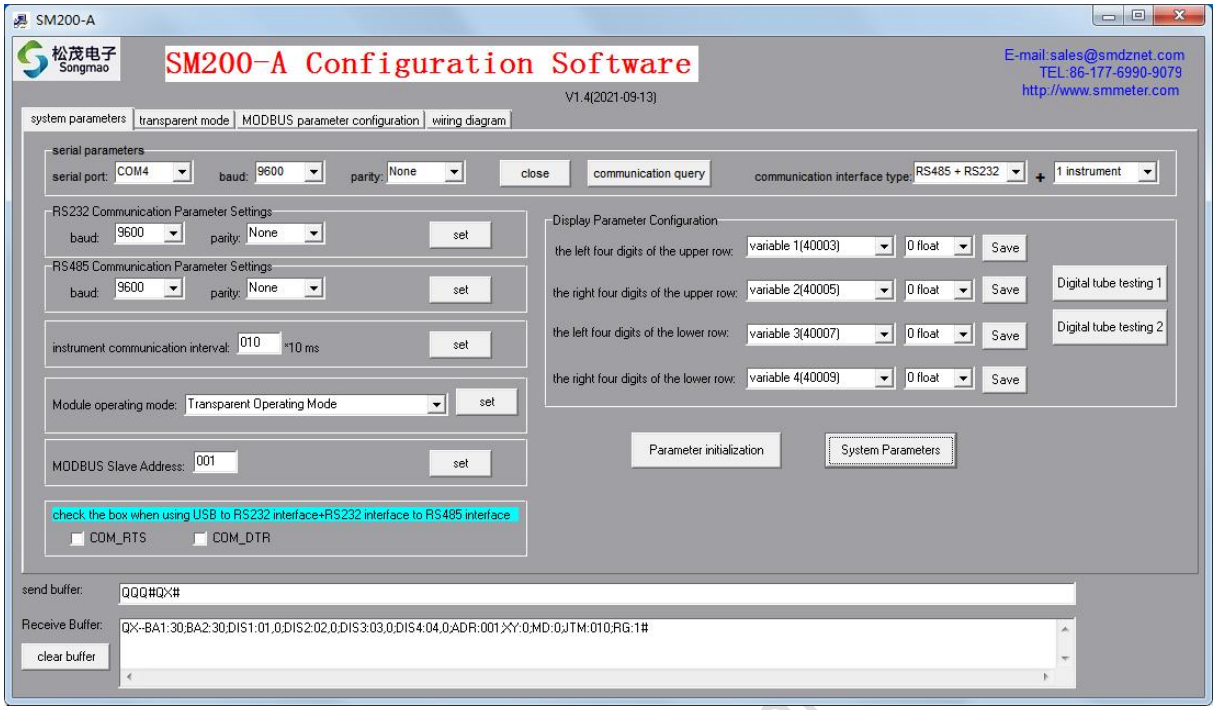

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3.3 Transparent Working Method

1) In the “System Parameters” / “MODBUS Parameter Configuration” interface, set the module working mode to “Transparent Working Mode”.

2) Configure HART meter parameters:

①HART address: This is the address of the HART instrument.

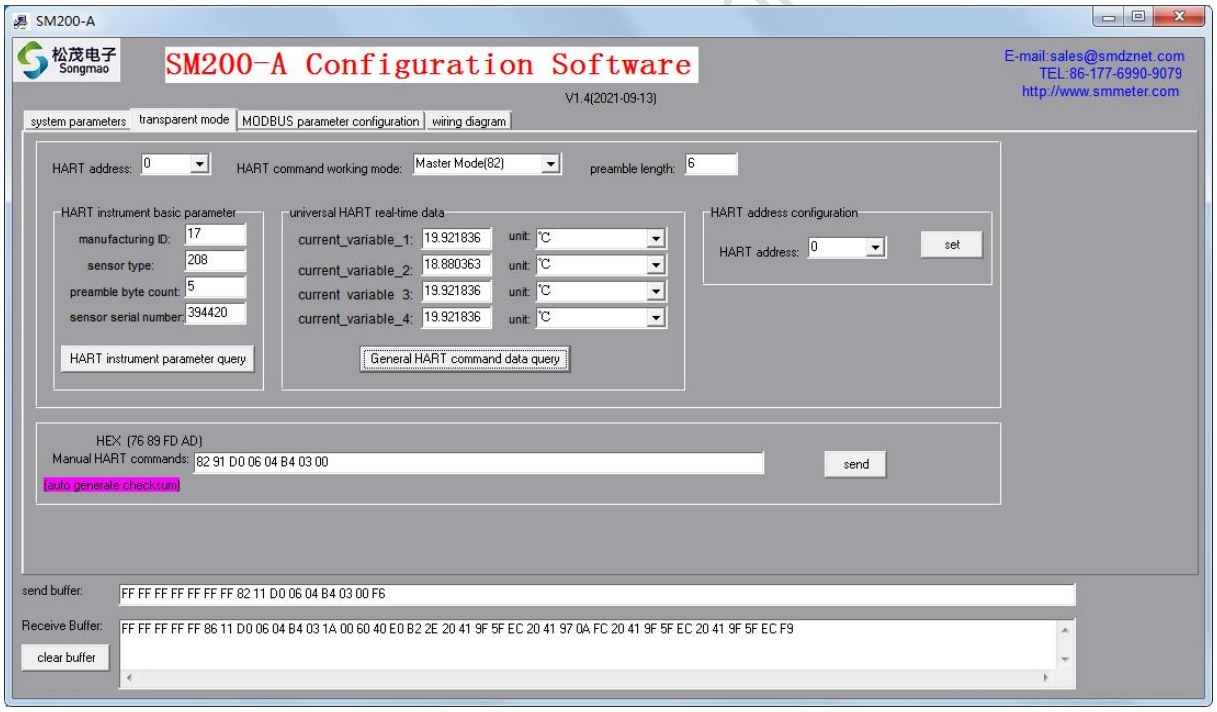
②HART command working mode: There are master mode and sub-master mode available. You can choose according to the needs of the instrument.

③ Preamble length: The number of 'FF' preambles in a HART instruction, typically 6 bytes.

3) HART instrument parameter query: You can query the basic parameter information of HART instruments.

4) General HART command data query: It can read real-time data from general HART instruments, but cannot display real-time data from other customized instruments.

5) Manual HART commands: Real-time data from HART instruments can be read by manually entering HART commands.



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3.4 MODBUS Parameter Configuration

1) In the “System Parameters” / “MODBUS Parameter Configuration” interface, set the module working mode to “MODBUS Single Instrument Working Mode”.

2) MODBUS Parameter Query: Click "MODBUS Parameter Query" to read the parameter configuration information of the software interface.

3) Instrument parameters:

① Instrument Number: Select the corresponding instrument number based on the HART address set in the "Transparent Working Mode" interface.

② Enable the instrument: Connect the HART instrument and turn on the enable function, i.e., select "Enable".

③HART mode: There are master devices and sub-master devices to choose from, and you can choose according to the needs of the instrument.

④ Instrument type: Custom instruments, general instruments, and specific model instruments are available for selection. Choose according to the instrument being connected.

⑤ Prefix length: Number of HART instruction prefixes 'FF'.

⑥ Clear cache time: Enter a 3-digit clear cache time (in seconds). When the HART instrument sends data information, the data display instrument will clear the sent data after this cache time.

4) Custom HART commands and parsing methods: When the instrument type is "custom instrument", the user can enable commands and read HART instrument data by entering command codes.

5) Customize the HART data parsing format: Set the instrument command number, data start address, data length, and address bits. The address bits (data length) are used to calculate the data check bits to determine the data's correctness. The default value is 8, but common values are 4, 6, and 8; users can choose according to their needs.

6) IEE754 Calculation: Enter the received data instruction code and click "Calculate" to convert the hexadecimal data format to the decimal data format, which is convenient for verifying the received data.

7) Variable 1 coefficient: When the coefficient of Variable 1 needs to be processed, select the appropriate option and set the corresponding coefficient according to the situation, and click "Set".

8) MODBUS Communication Test: Enter the MODBUS slave address, data start address, and data length, then click "MODBUS Communication Test" to read the MODBUS data information. The data register addresses for each variable are shown in the table below.

Display Channel	Register address (IEE754)
Current value	40001
Variable 1	40003
Variable 2	40005

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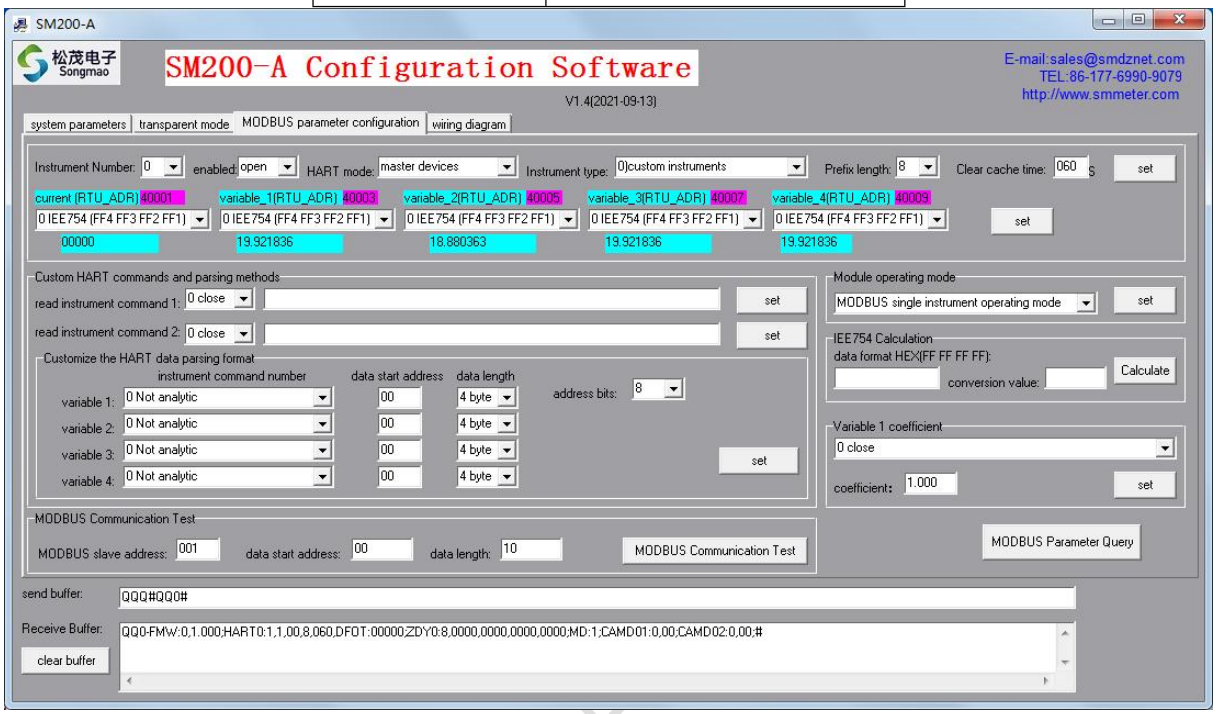
Variable 3	40007
Variable 4	40009
Variable 5	40011
Variable 6	40013
Variable 7	40015



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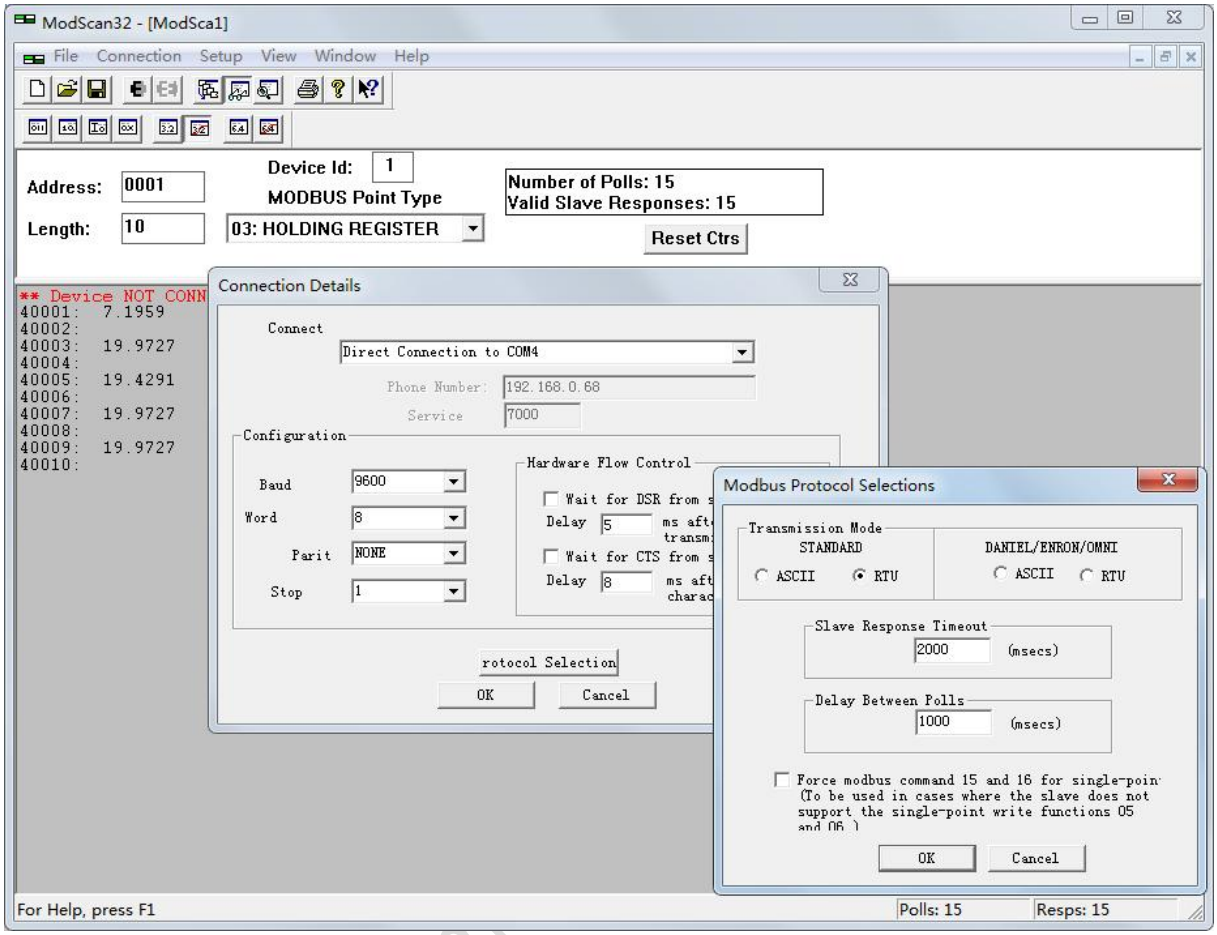
4. Modscan32 software



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5. Service and Warranty

1. This product is covered by a three-year warranty under normal use conditions.
2. During the warranty period, our company will provide warranty service for any malfunctions caused by product technical reasons.
3. The following situations are not covered by the free warranty:
   ① Products that have been disassembled or repaired without the company's consent;
   ② Damage caused by external forces and other natural disasters.
4. If you believe our products need repair, please call us immediately. We will repair them and return them as soon as possible.
5. This warranty liability is limited to the repair of product malfunctions during the warranty period and does not assume any other liability.

After-sales service hotline: 4007-803-803

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