

SM100-G HART Intelligent Alarm Controller

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 However, content may become outdated or invalid due to product/software upgrades.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-G Alarm Controller

1.1 Product Introduction

SM100-G HART intelligent alarm controller is a product developed with ARM microprocessor, HART protocol mode m 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 alarm controller is equipped with a standard RS485 interface, which can transparently transmit data with the intelligent instrument with HART protocol or convert the data into MODBUS _ RTU protocol to read the data, and output the data in the form of 4 ~ 20ma current. At the same time, the real-time data is monitored, and the alarm action is executed in time when the alarm limit is reached.

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-G intelligent alarm controller is an intelligent controller with two-way modulation and demodulation of digital signal and analog signal.

1.2 Product Features

- Equipped with standard RS485 communication interface for parameter configuration, communication baud rate and parity check. 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 SM100-G intelligent alarm controller, and can communicate with HART protocol intelligent instrument through the intelligent alarm controller.

Support for standard MODBUS _ RTU protocols.

- Support a variety of special HART protocol intelligent instruments, and can customize the instructions for reading special HART instruments.
- Output interface in the form of 2/4-channel DO relay.
- With 1/2 4 ~ 20 mA current output.
- With power-off memory function, parameters do not need to be reset after power off.
- The status indicator can clearly indicate the working status of the alarm controller.
- 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. Physical Drawing and Indicator Light Function of SM100-G Alarm Controller

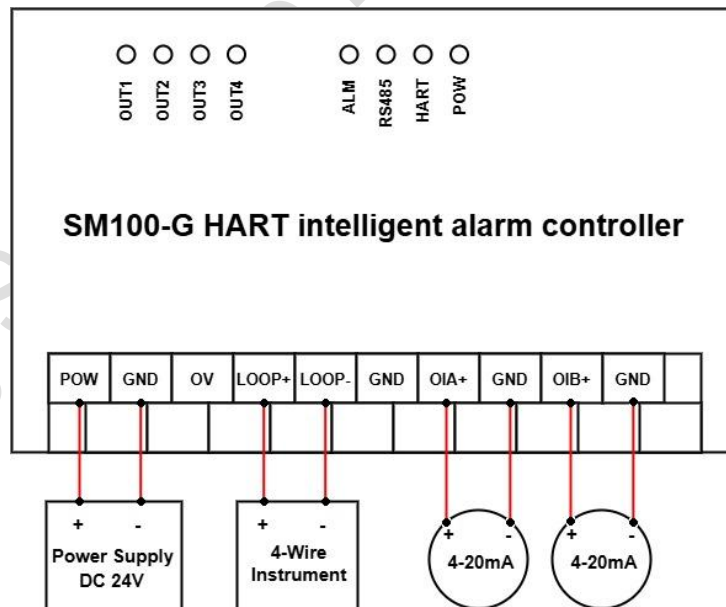
2.1 Physical Drawings

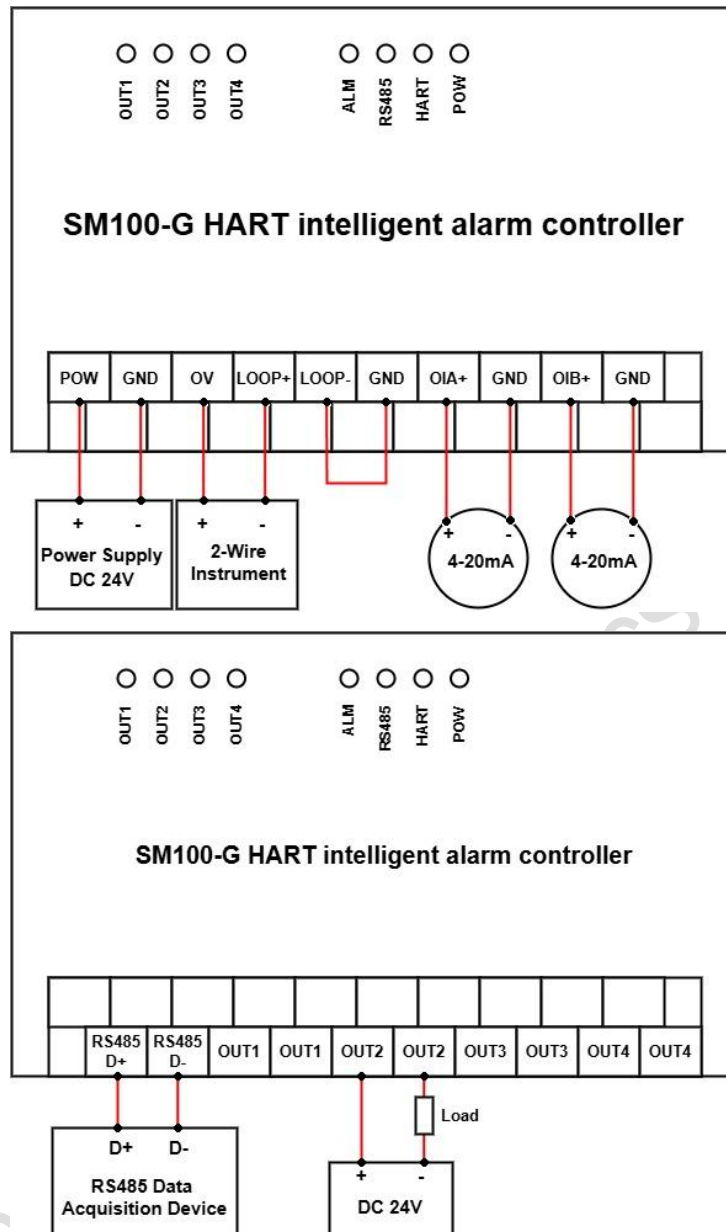


2.2 Product Selection

Serial number	Model	RS485 interface	HART interface	IA OUT	IB OUT	OUT1	OUT2	OUT3	OUT4
1	SM100-G-A	√	√	√		√	√		
2	SM100-G-B	√	√	√	√	√	√	√	√

2.3 Wiring Diagram





2.4 Port Introduction

Port name	POW	GND	OV	LOOP+	LOOP-	GND	OIA+	GND	OIB+	GND
Function/access device	DC power supply		HART instrument				Analog output 1		Analog output 2	
Port name	RS485D+	RS485D-	OUT1	OUT1	OUT2	OUT2	OUT3	OUT3	OUT4	OUT4
Function/access device	RS485 communication		Relay 1		Relay 2		Relay 3		Relay 4	

- 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.
- OV, LOOP +, LOOP-, GND: connect HART instrument and read HART instrument data.
- OIA +, GND: the first analog output, output 4 ~ 20mA DC current signal.
- OIB +, GND: the second analog output, output 4 ~ 20 mA DC current signal.
- RS485D +, RS485D-: RS485D + connected to RS485 A, RS485D- connected to RS485 B.

- OUT1 ~ OUT4: 4-way relay output. If relay output is set for controller alarm, random equipment can be controlled through relay signal output when the controller alarms.

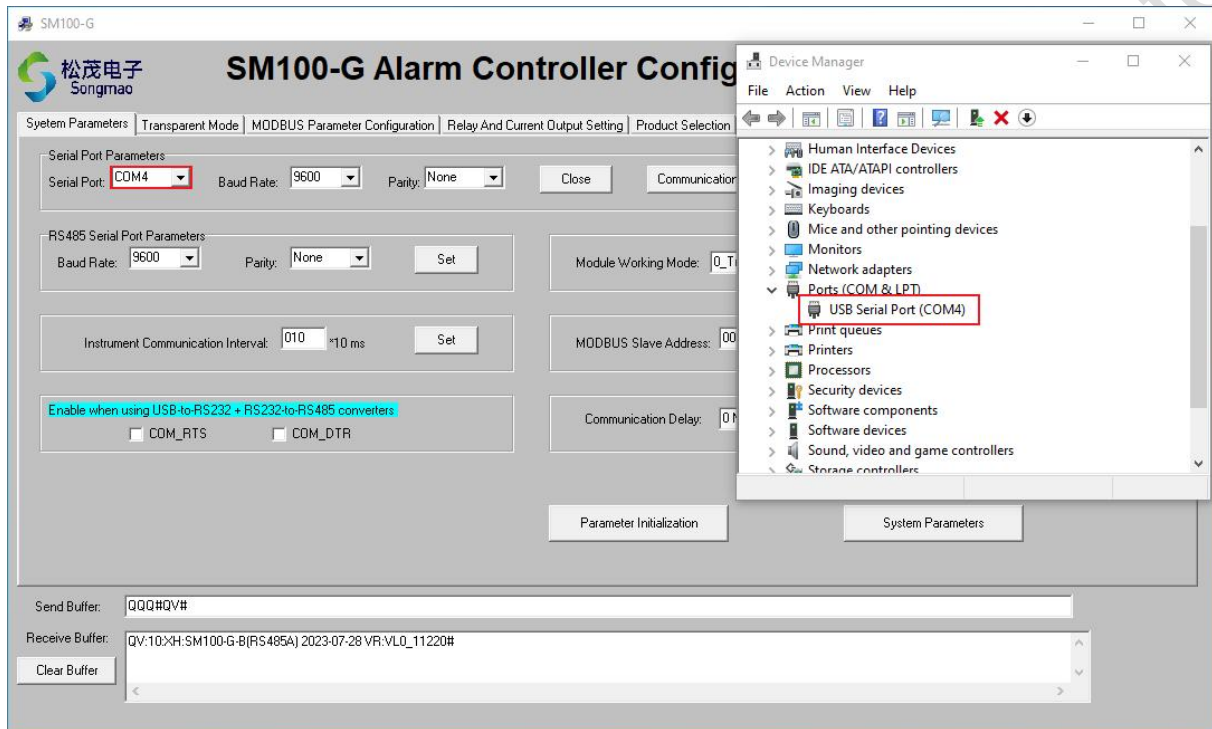
2.5 Indicator Light Description

- OUT1 indicator: normally on when relay 1 is closed.
- OUT2 indicator: normally on when relay 2 is closed.
- OUT3 indicator light: it is on when relay 3 is closed.
- OUT4 indicator light: it is always on when relay 4 is closed.
- ALM indicator: the intelligent alarm controller is always on when it is in the alarm state.
- RS485 indicator: RS485 interface flashes when receiving and sending data.
- HART indicator light: it flashes when the intelligent alarm controller communicates with the HART instrument.
- POW power indicator: always on after the power is turned on.

3. Function Introduction and Operation Steps of Configuration Software

3.1 Communication Connection

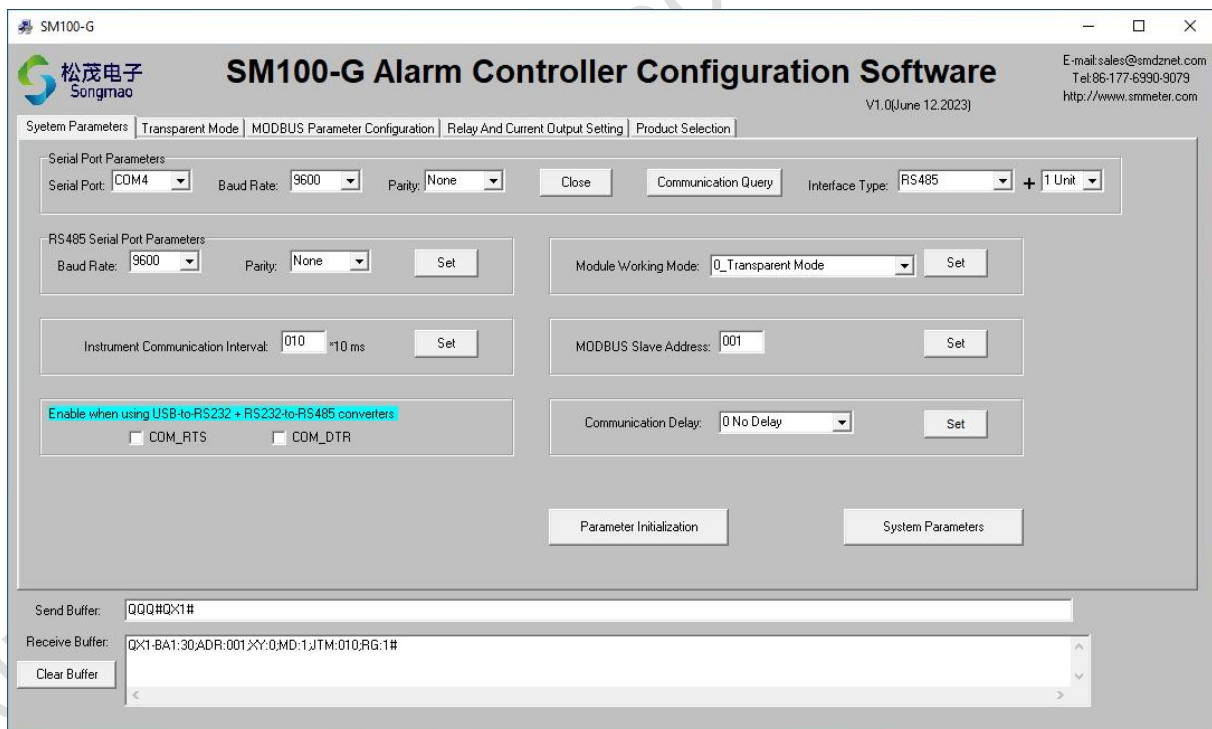
- 1) According to the introduction of the port in the above part, the alarm controller is connected to the power supply, RS485 cable and HART instrument, and the parameter configuration can be carried out after the POW power indicator is always on.
- 2) Open the configuration debugging software, select the correct port number, baud rate and check bit (default baud rate 9600, check bit None), and open the serial port.
- 3) Click "Communication query" to query the version number of the alarm controller in the "receive buffer" below, and the connection is successful.



3.2 System Parameters

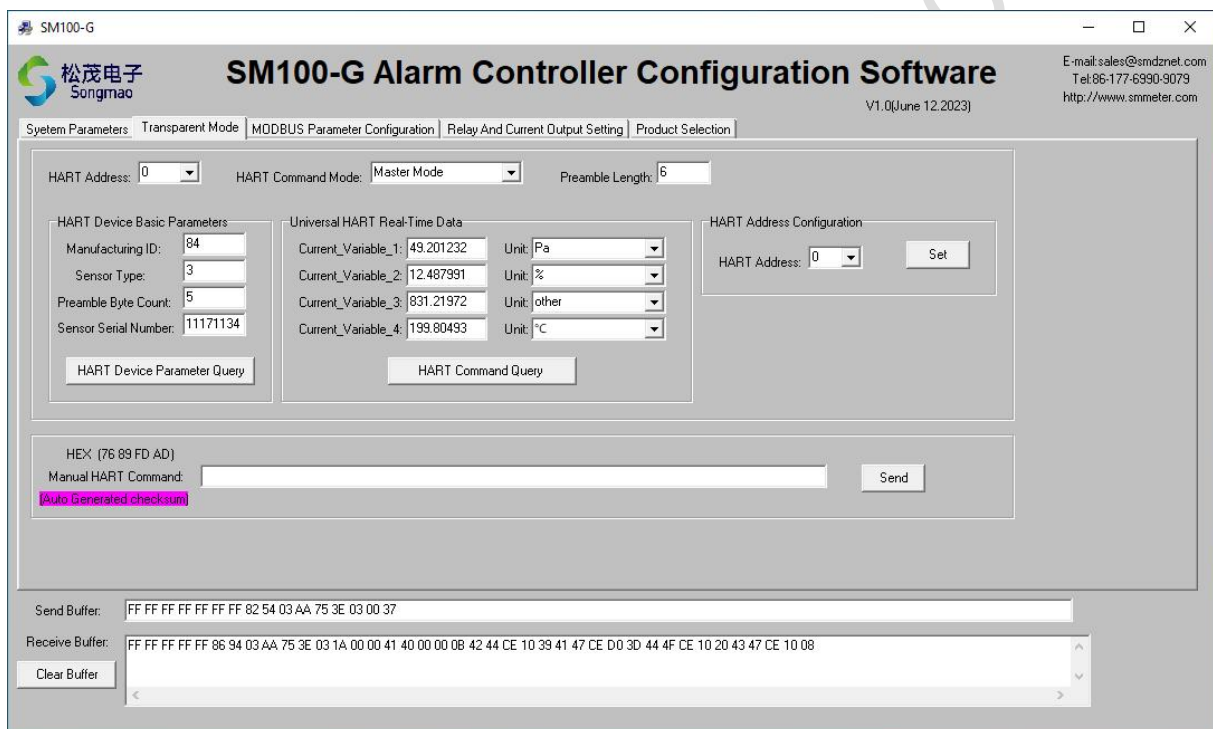
This interface is used to set and query basic parameters such as RS485 communication parameters, module working mode, MODBUS slave address and HART command interval.

- 1) Parameter initialization: The parameters of the alarm controller can be restored to the initialization state.
- 2) System parameters: RS485 communication parameters, module working mode, MODBUS slave address, HART instrument communication interval and other parameter information can be read.
- 3) 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.
- 4) Instrument communication interval: input the communication interval between intelligent alarm controller and HART instrument, and then click "Set".
- 5) Module working mode: select the transparent working mode when reading the data in the "Transparent Working Mode" interface, select the MODBUS single instrument working mode when reading the data in the "MODBUS Parameter Configuration" interface, and then click "Set". (Note: the function of the module working mode setting box in the "MODBUS parameter configuration" interface is the same as that of the module working mode setting box here)
- 6) MODBUS slave address: input 3-digit slave address and click "Set".
- 7) Communication delay: "No delay" means that the intelligent alarm converter will return information immediately after receiving the instruction sent by the host during RS485 communication. "100ms delay" means that the intelligent alarm converter will delay 100ms to return the information after receiving the instruction sent by the host during RS485 communication.



3.3 Transparent Mode

- 1) Before entering the "Transparent mode" interface, first set the module working mode to "Transparent mode".
- 2) Configure HART instrument parameters:
 - ① HART address: refers to the address of HART instrument.
 - 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 parameter query: basic parameter information of HART instrument can be queried.
- 4) HART command query: real-time data of general HART instruments can be read, but real-time data of other customized instruments cannot be displayed.
- 5) HART address configuration: when the connected HART instrument address is not address 0, the HART address shall be set as address 0.
- 6) Manual HART command: read the real-time data of HART instrument by manually inputting HART command.



SM100-G

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SM100-G Alarm Controller Configuration Software

V1.0(June 12, 2023)

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System Parameters | Transparent Mode | MODBUS Parameter Configuration | Relay And Current Output Setting | Product Selection

HART Address: 0 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

HART Address Configuration

HART Address: 0 Set

HEX (76 89 FD AD)
Manual HART Command: [Auto Generated checksum] Send

Send Buffer: FF FF FF FF FF FF FF 82 54 03 AA 75 3E 03 00 37

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 D0 3D 44 4F CE 10 2D 43 47 CE 10 08

Clear Buffer

3.4 MODBUS Parameter Configuration

1) Before entering the "MODBUS parameter configuration" interface, set the working mode of the module to "MODBUS single instrument working mode", and then click "MODBUS parameter query" to read the parameter information on this interface.

2) Configure HART instrument parameters

- ① Meter ID: select "Device 0".
- ② Enable: 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 Meter 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).

3) Data analysis format: there are four types, and the user needs to configure the corresponding analysis format according to the format of instrument data output.

- 0 IEE754 (FF4 FF3 FF2 FF1)-Floating-point, high-order inverted (default format)
- 1 IEE754 (FF2 FF1 FF4 FF3)-Floating-point, high-order
- 2 Uint32 (FF4 FF3 FF2 FF1)-unsigned long, high-order inverted
- 3 Uint32 (FF2 FF1 FF4 FF3)-Unsigned long, high order

4) Custom HART command parsing: When the instrument type is "Custom Instrument", the user can enable the command and read the HART instrument data by inputting the command code.

5) Custom HART data parsing format: set the start address, data length and address bit of the data read by instruction 1 and instruction 2.

- ① Command number: check the instrument protocol, and select the command number corresponding to the command code according to the instrument data to be analyzed.
- ② Start address: After sending the command corresponding to the command number, the HART instrument will return the corresponding data command code. For the returned instruction code, start parsing from the instruction code of the non-leader FF and count from 0. If the data to be parsed starts from the Nth byte, the data start address is set to N.
- ③ Data length: byte length of the data to be parsed.
- ④ Address bits: The address bit is used to calculate the data check bit to judge the correctness of the data. The default value is 8, and the common values are 4, 6 and 8, which can be set by the user according to the actual situation.

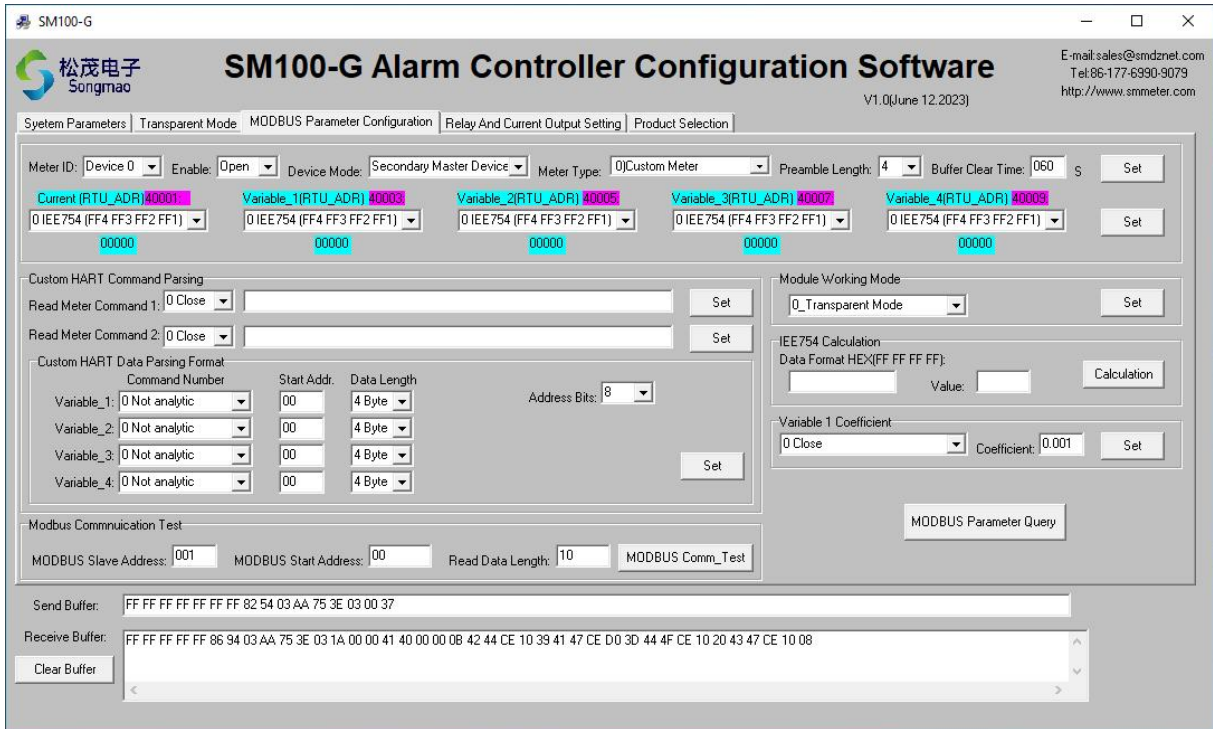
6) Module working mode: select the transparent working mode when reading the data in the "Transparent Mode" interface, select the MODBUS single instrument working mode when reading the data in the "MODBUS Parameter Configuration" interface, and then click "Set". (Note: the function of the module working mode setting box in the "System Parameters" interface is the same as that of the module working mode setting box here)

7) IEE754 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 viewing the received data.

8) Variable 1 coefficient: when the read unit of main variable 1 is inconsistent with the unit displayed on the HART instrument

header, the corresponding coefficient can be set for conversion between units.

- 9) MODBUS communication test: input the correct MODBUS slave address, initial register address of read data and data length, and then click "MODBUS communication test" to read MODBUS data information.



The image shows the SM100-G Alarm Controller Configuration Software interface. The title bar indicates the application is 'SM100-G'. The main window has a menu bar with 'System Parameters', 'Transparent Mode', 'MODBUS Parameter Configuration', 'Relay And Current Output Setting', and 'Product Selection'. The 'MODBUS Parameter Configuration' tab is active.

System Parameters:

- Meter ID: Device 0
- Enable: Open
- Device Mode: Secondary Master Device
- Meter Type: 0 Custom Meter
- Preamble Length: 4
- Buffer Clear Time: 060 s

MODBUS Parameter Configuration:

- Current (RTU_ADR) #0001: 0 IEE754 (FF4 FF3 FF2 FF1) → 00000
- Variable_1 (RTU_ADR) #0003: 0 IEE754 (FF4 FF3 FF2 FF1) → 00000
- Variable_2 (RTU_ADR) #0005: 0 IEE754 (FF4 FF3 FF2 FF1) → 00000
- Variable_3 (RTU_ADR) #0007: 0 IEE754 (FF4 FF3 FF2 FF1) → 00000
- Variable_4 (RTU_ADR) #0009: 0 IEE754 (FF4 FF3 FF2 FF1) → 00000

Custom HART Command Parsing:

- Read Meter Command 1: 0 Close
- Read Meter Command 2: 0 Close

Custom HART Data Parsing Format:

Variable	Command Number	Start Addr.	Data Length	Address Bits
Variable_1	0 Not analytic	00	4 Byte	8
Variable_2	0 Not analytic	00	4 Byte	8
Variable_3	0 Not analytic	00	4 Byte	8
Variable_4	0 Not analytic	00	4 Byte	8

Module Working Mode:

- 0 Transparent Mode

IEE754 Calculation:

- Data Format HEX (FF FF FF FF):
- Value:
- Calculation

Variable 1 Coefficient:

- 0 Close
- Coefficient: 0.001
- 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 FF FF 82 54 03 AA 75 3E 03 00 37

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 D0 3D 44 4F CE 10 2D 43 47 CE 10 08

Clear Buffer

MODBUS Parameter Query

3.5 Relay And Current Output Settings

1) Enter the "Relay And Current Output Settings" interface, click "Parameter Query" to read the parameter information on this interface.

2) Relay output delay: set the relay output delay time, and click "Set" in turn.

0000 indicates that when there is an alarm, the relay keeps acting all the time, and when the alarm is released, the relay stops acting;

0010 indicates that when there is an alarm, the relay operates for 10 seconds, and the relay stops after 10 seconds (equivalent to pulse alarm);

-010 indicates that the corresponding relay is opened 10 seconds in advance before sending data.

3) Relay output test: the use of the relay can be detected. First select the actuation of the relay (On/Off/no control) and then click "Execute".

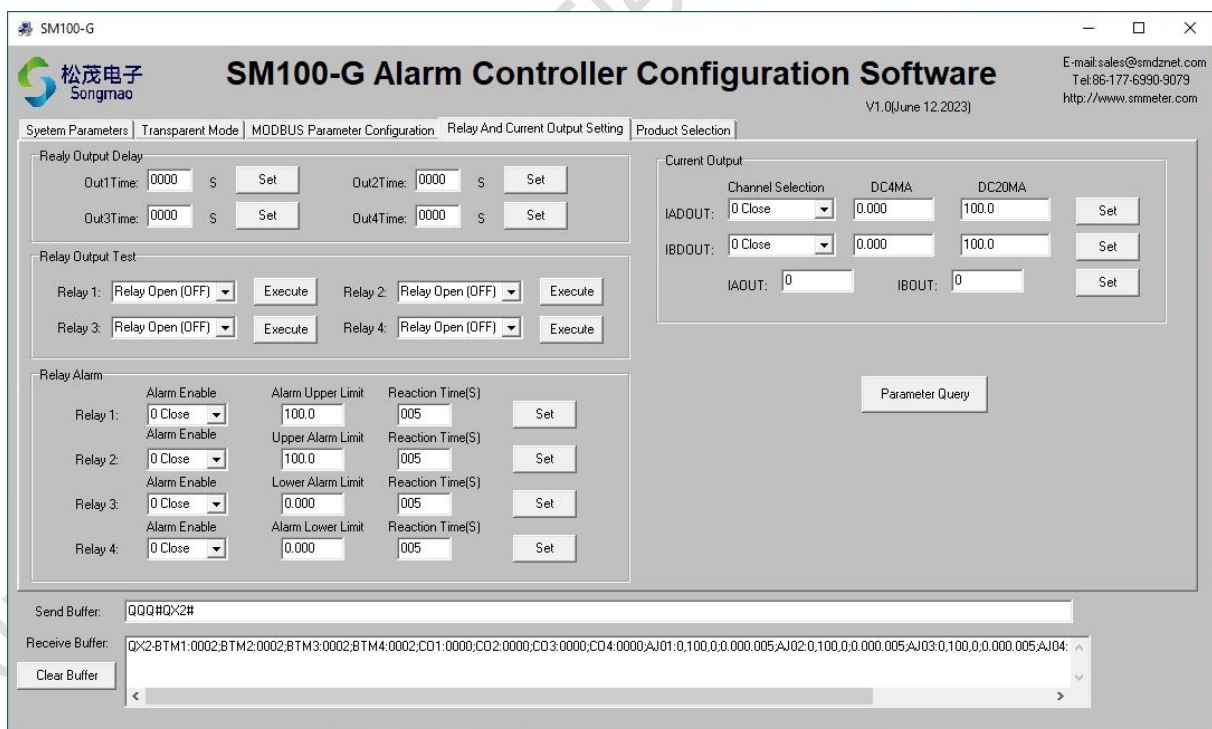
① If "On" is selected, the two ports should be open when measured with a multimeter before the original working state is restored;

② If "Off" is selected, the two ports shall be short-circuited when measured with a multimeter before the original working state is restored;

③ If "No control" is selected, the working state of the two ports remains unchanged when the multimeter is used to measure them.

4) Relay Alarm: the user sets the alarm enable state, upper and lower alarm limits and alarm response time of the corresponding variables according to the alarm requirements of each variable, and then clicks "set" in turn.

5) Current output: select the variable to output the current according to the demand, and configure its range. The current at the output varies depending on the range. Click "Query" to read the current value of the configuration variable.



3.6 Mod Scan32 Communication Test

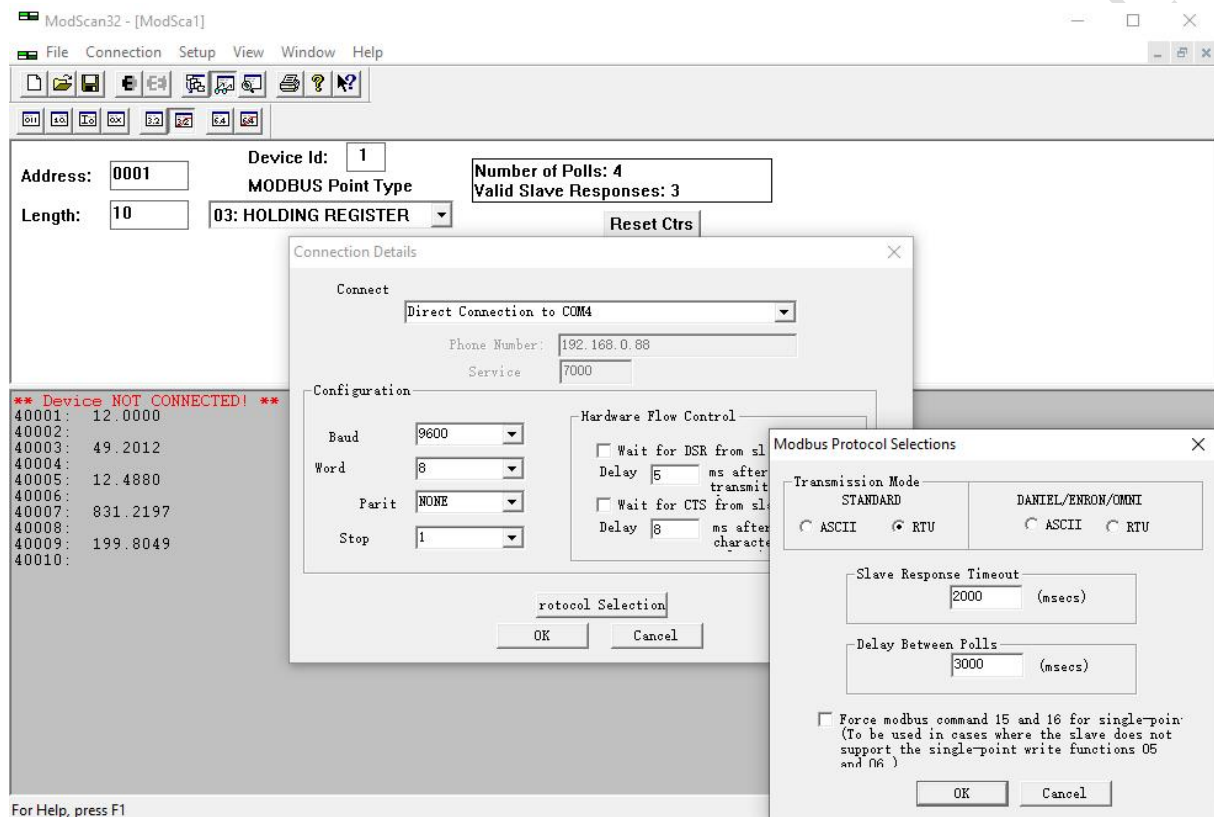
- 1) Close the serial port of the configuration software, open the Modscan32 software, click "connection", configure the appropriate parameters in the pop-up dialog box according to the arrow in the figure below, and then click OK.
- 2) Select the appropriate data format in the main window of modscan32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

Serial number	Data name	Data address	Data type	Data format (default)
1	Current value	40001 40002	IEE754	4321
2	Primary variable 1	40003 40004	IEE754	4321
3	Variable 2	40005 40006	IEE754	4321
4	Variable 3	40007 40008	IEE754	4321
5	Variable 4	40009 40010	IEE754	4321

5. Service and Warranty

SM100-G HART Intelligent Alarm Controller 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 using SM100-G HART intelligent alarm controller

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: 86-177-6990-9079

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