

SM100-T-B-2 Multivariable Current Output

Operating instructions for the converter



Jiaxing Songmao Electronics Co., Ltd.

<http://www.smmeter.com>

E-mail:sales@smdznet.com

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Disclaimer:

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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 However, content may become outdated or invalid due to product/software upgrades.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 of SM100-T-B-2 Converter

1.1 Product Introduction

SM100-T-B-2 multi-variable current output converter is a high-tech product integrating HART protocol, RS485 communication and multi-variable current output. It is composed of interface chip, hardware watchdog circuit and embedded HART modem chip. It has the characteristics of stable performance and high cost performance.

The SM100-T-B-2 multivariable current output converter is structurally designed to fully comply with industrial standards. It is specially designed in terms of temperature range, vibration, electromagnetic compatibility and interface diversity to ensure stable operation in harsh environments and provide high quality assurance for your equipment.

1.2 Product Performance

- Equipped with RS485 communication interface, parameters can be configured.
- With special configuration software, it can communicate with HART protocol intelligent instrument.
- With 2 current outputs, it can transmit current to HART variables (optional function).
- Support single HART protocol intelligent instrument.
- Support a variety of special HART protocol intelligent instruments.
- With power-off memory function, parameters do not need to be reset after power off.

1.3 Main Parameters

- Mounting dimensions: 117 mm L × 35 mm W × 90 mm H.
- Working temperature: -20 °C ~ + 80 °C.
- Storage temperature: -25 °C ~ + 80 °C.
- Power input voltage: DC 12 ~ 24V.
- HART protocol sampling resistor: 250Ω.

2. Physical Drawing of SM100-T-B-2 Converter and Indicator Light Function

2.1 Physical Drawings

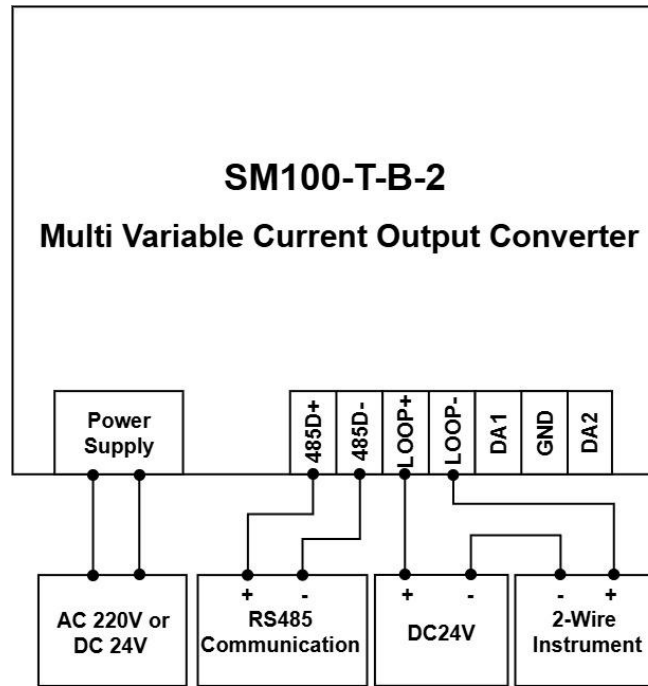


2.2 Product Selection

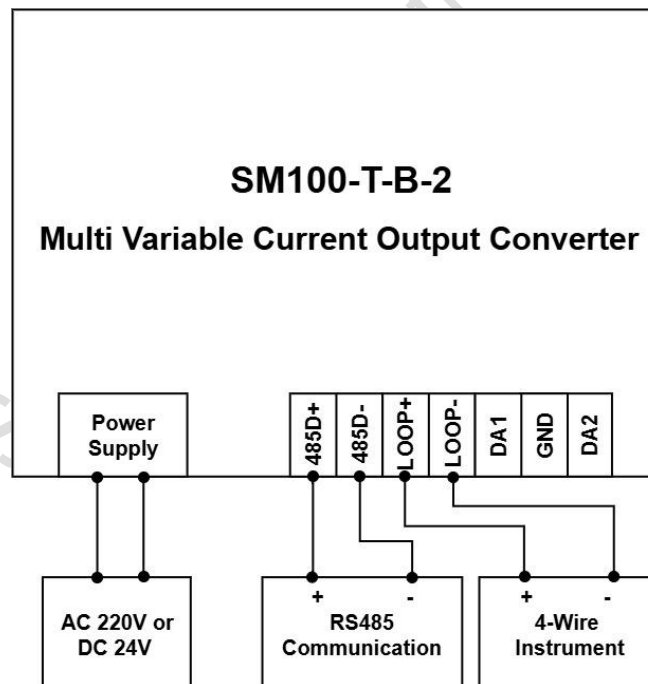
Serial number	Model	HART protocol interface	RS485 communication interface	DA	Power supply
1	SM100-T-B-2-A/DC24V	1	1	None	DC 24V
2	SM100-T-B-2-B/DC24V	1	1	1	DC 24V
3	SM100-T-B-2-C/DC24V	1	1	2	DC 24V
4	SM100-T-B-2-A/AC220V	1	1	None	AC 220V
5	SM100-T-B-2-B/AC220V	1	1	1	AC 220V
6	SM100-T-B-2-C/AC220V	1	1	2	AC 220V

2.3 Wiring Diagram

2.3.1 Wiring Diagram of Two-Wire Instrument



2.3.2 Four-Wire Instrument Wiring Diagram



2.4 Port Introduction

Port name	24V+/L	24V-/N	485D+	485D-	LOOP+	LOOP-	DA1	GND	DA2
Function/access device	Power source		RS485 communication		HART instrument		Current 1		Current 2

- 24V +/L, 24V-/N: power supply, select the input power supply according to the purchased model, and connect to the corresponding terminal respectively.

- 485D +, 485D -: RS485 communication interface, read HART instrument real-time data, current output value, range and other parameters.
- LOOP +, LOOP -: connect HART instrument and read HART instrument data.
- DA1, GND ~ DA2, GND: 2 channels of 4 ~ 20mA current output, with sampling resistance of 250Ω

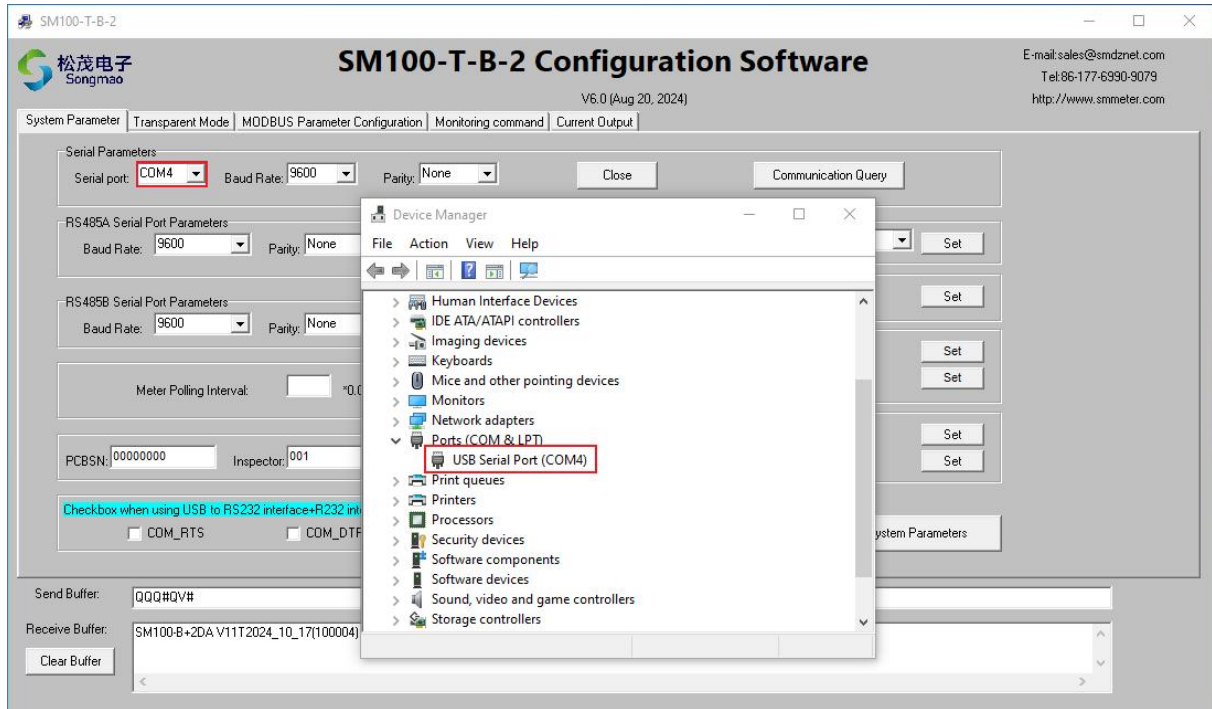
2.5 Indicator Light Description

- POW: Power indicator. The power indicator is always on when the converter works normally.
- RS485: RS485 communication interface indicator, which flashes when RS485 interface receives and sends data.
- HART: HART interface indicator. This indicator flashes when the converter is communicating with the HART instrument.

3. Function Introduction and Operation Steps of Configuration Software

3.1 Communication Connection

- 1) Connect the power supply and the 485 serial port cable according to the description of the port in the previous section.
- 2) Open the configuration debugging software, select the correct port number and open the serial port.
- 3) Click "Communication Query" to query the version number of this converter in the "Receive Buffer" below. At this time, the connection is successful.



3.2 System Parameter

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

- 1) Communication Query: You can query the version number of the converter.
- 2) RS485A Serial Port Parameters: the user selects the baud rate and check bit (default baud rate 9600, check bit None) for RS485 interface 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.
- 3) Meter Polling Interval: It is the time period for the converter to communicate with the HART instrument. Enter the interval time and click "Set". Interval time = input time * 0.1S.
- 4) Module Operation Mode:
 - ① Transparent mode: when the working mode is set, the converter has no current and MODBUS protocol data output. The converter uses HART protocol communication and can read the basic information and dynamic variable data of HART instrument in the "transparent working mode" interface.
 - ② Single Meter MODBUS Mode: when the working mode is set, the converter can perform protocol conversion on the collected HART instrument data and output standard MODBUS protocol data.
 - ③ Monitoring to MODBUS RTU (custom): When other devices collect HART instrument data at the same time, the working mode of the module is set to "Monitor to MODBUS RTU (custom)" to meet the condition that two devices collect HART instrument data at the same time.
 - ④ Monitoring data output: When other equipment collects HART instrument data at the same time, the working mode of the module is set as "monitoring data output", which can monitor the command receiving and sending of other equipment and HART instrument communication, and the customer can set the converter monitoring command parameters according to the monitored commands.
- 5) MODBUS slave address: Enter the 3-digit slave address and click "Set".
- 6) RS485A Response Time: set the delay return time of RS485 interface data according to the system accessed by the back-end.
- 7) RS485A Base Address: The register address range of MODBUS data output by the converter is 40001 ~ 40010. If there is a requirement for the register address of output data, the register address range of data can be modified by setting the address base address.
- 8) Parameter Initialization: The parameters of the converter can be restored to the initialized state.
- 9) System Parameters: read communication parameters, module working mode, MODBUS slave address, HART instrument communication interval and other parameter information.

SM100-T-B-2

松茂电子
Songmao

SM100-T-B-2 Configuration Software

V6.0 (Aug 20, 2024)

E-mail: sales@smdznet.com
Tel: 86-177-6390-9079
http://www.smmeter.com

System Parameter | Transparent Mode | MODBUS Parameter Configuration | Monitoring command | Current Output

Serial Parameters

Serial port: COM4 Baud Rate: 9600 Parity: None Close Communication Query

RS485A Serial Port Parameters

Baud Rate: 9600 Parity: None Set

Module Operation Mode: 1_Single Meter MODBUS Mode Set

RS485B Serial Port Parameters

Baud Rate: 9600 Parity: None Set

Modbus Slave Address: 001 Set

RS485A Response Time: 4 400ms Set

RS485B Response Time: 4 400ms Set

Meter Polling Interval: 010 *0.02s Set

PCBSN: 00000000 Inspector: 001 Set

Checkbox when using USB to RS232 interface+R232 interface to RS485 interface

☐ COM_RTS ☐ COM_DTR

Parameter Initialization System Parameters

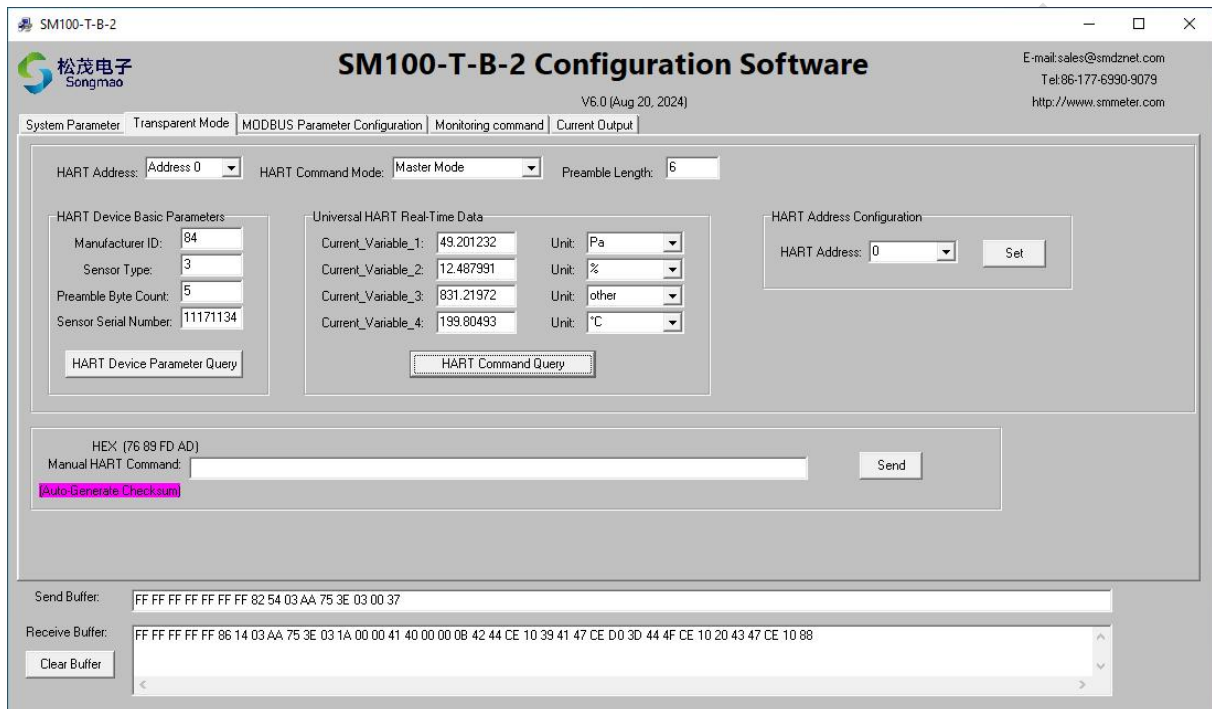
Send Buffer: QQQ#QX#

Receive Buffer: QX-1BA1:30.BA2:30.ADR:001.XY1:4.XY2:4.MD:1.JTM:010.AADR:00000.00000.RG:1#

Clear Buffer

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 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) HART Address: 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.



The screenshot shows the SM100-T-B-2 Configuration Software interface. The title bar indicates the software is for SM100-T-B-2. The main window has a menu bar with options: System Parameter, Transparent Mode (selected), MODBUS Parameter Configuration, Monitoring command, and Current Output. The version is V6.0 (Aug 20, 2024). Contact information is provided in the top right: E-mail: sales@smdznet.com, Tel: 86-177-6990-9079, and http://www.smmeter.com.

The interface is divided into several sections:

- HART Address Configuration:** HART Address: Address 0, HART Command Mode: Master Mode, Preamble Length: 6. A "Set" button is present.
- HART Device Basic Parameters:** Manufacturer ID: 84, Sensor Type: 3, Preamble Byte Count: 5, Sensor Serial Number: 11171134. A "HART Device Parameter Query" button is present.
- Universal HART Real-Time Data:** Four variables are displayed with their units: Current_Variable_1: 49.201232 Pa, Current_Variable_2: 12.487991 %, Current_Variable_3: 831.21972 other, Current_Variable_4: 199.80493 °C. A "HART Command Query" button is present.
- Manual HART Command:** A text input field for the command, a "Send" button, and a link to "Auto-Generate Checksum".
- Send Buffer:** A text area showing the hex data: FF FF FF FF FF FF 82 54 03 AA 75 3E 03 00 37.
- Receive Buffer:** A text area showing the hex data: FF FF FF FF FF 86 14 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 20 43 47 CE 10 88. A "Clear Buffer" button is present.

3.4 MODBUS Parameter Configuration

1) When entering the "MODBUS parameter configuration" interface to read the data information, first set the module working mode in the "System Parameter" interface to "Single Meter MODBUS Mode", and then click "MODBUS Parameter Query" to read the parameter information in this interface.

2) Customize HART command and resolution mode

- ① Meter ID: select "Device 0".
- ② Enable: connect the HART instrument and turn on the enable, i.e. select "Open".
- 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 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.

6) Module Operation 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 "System Parameter" 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 the approval of the received data.

8) 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.

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

SM100-T-B-2 Configuration Software

V6.0 (Aug 20, 2024)

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http://www.smmeter.com

System Parameter | Transparent Mode | MODBUS Parameter Configuration | Monitoring command | Current Output

Meter ID: Device C Enable: Close Devise Mode: Master Device Meter Type: 0 Custom Meter Preamble Length: 4 Buffer Clear Time: 060 S Set

Current(RTU_ADR) 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

00000 49.201232 12.487991 831.21972 199.80493

Custom HART Command Parsing

Read Meter Command 1: Set

Read Meter Command 2: Set

Custom HART Data Parsing Format

Read Command No: Data Start Address: Data Length: Address Bits (Data Len: 8) Set

Variable_1: 0 Not analytic 4-bit

Variable_2: 0 Not analytic 4-bit

Variable_3: 0 Not analytic 4-bit

Variable_4: 0 Not analytic 4-bit

Module Operation Mode

MODBUS Single Meter Operation Mode Set

IEEE754 Calculation

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

Variable 1 Coefficient

0 Close Coefficient: 0.001 Set

variable 2 coefficient variable 3 coefficient variable 4 coefficient

1.000 1.000 1.000 Set

Modbus Communication Test

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

Send Buffer: 01 03 00 00 00 0A C5 CD

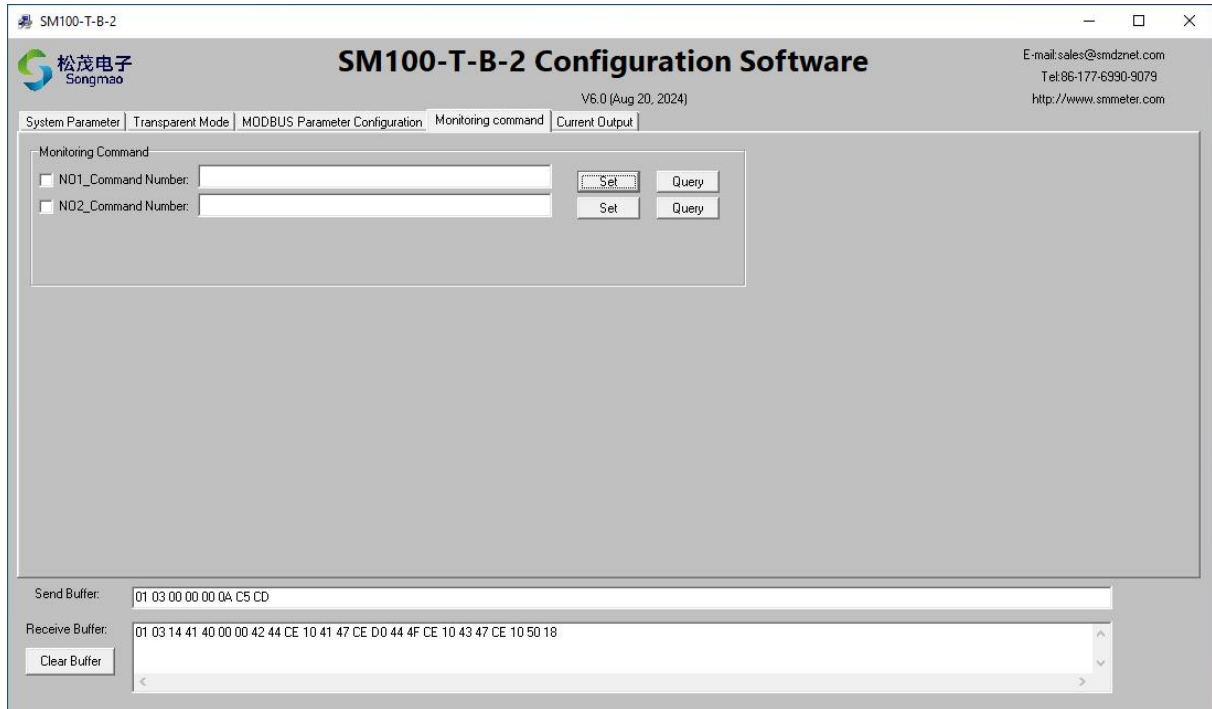
Receive Buffer: 01 03 14 41 40 00 00 42 44 CE 10 41 47 CE D0 44 4F CE 10 43 47 CE 10 50 18

Clear Buffer

3.5 Monitoring command

When other devices collect HART instrument data at the same time, the working mode of the module shall be set as "Monitoring to MODBUS RTU (Custom)" to meet the condition that two devices collect HART instrument data at the same time.

The converter can set two monitoring commands. When the set monitoring command appears during the communication between other equipment and HART instrument, the converter will convert the intercepted data into standard MODBUS protocol output.



3.6 Mod Scan32 Communication Test

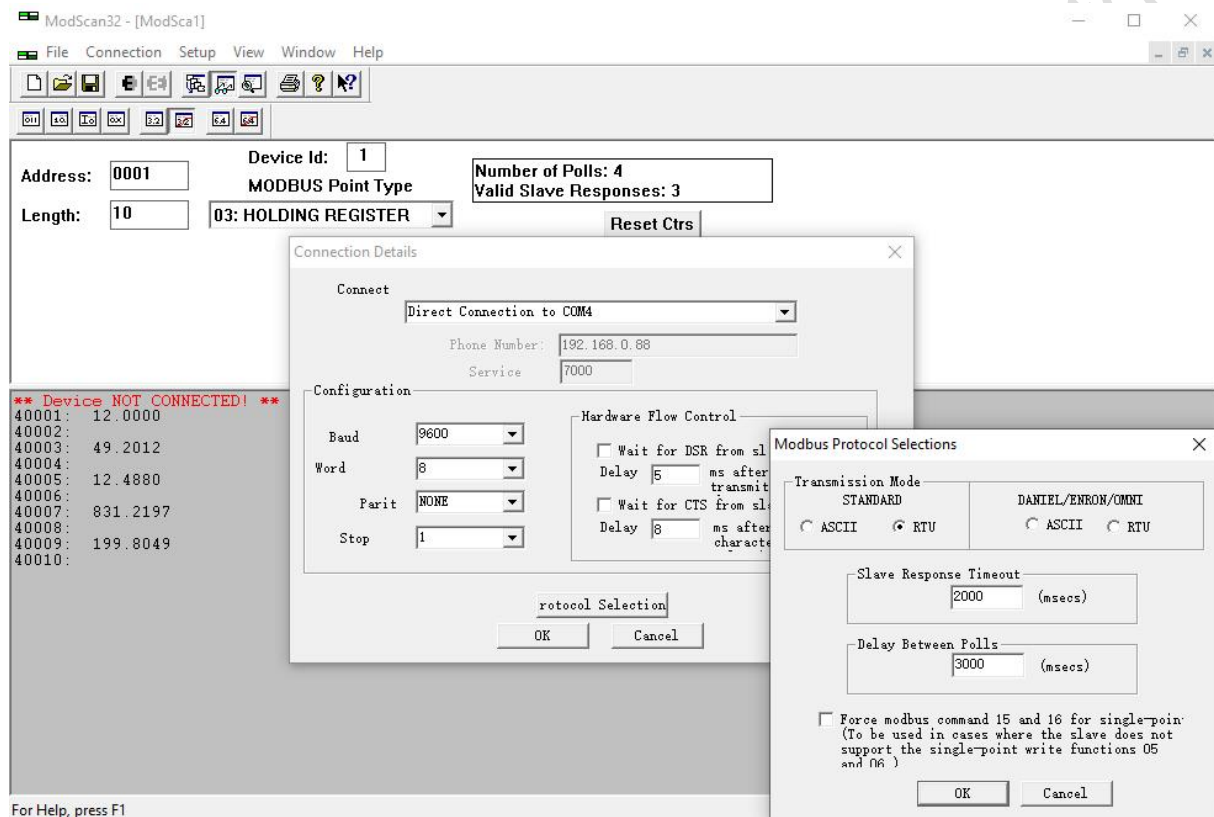
- 1) Close the serial port of the configuration software, open the Modscan32 software, click "Connection", configure the appropriate parameters in the pop-up dialog box according to the arrow in the figure below, and then click OK.
- 2) Select the appropriate data format in the main window of modscan32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

Data name	Data address	Data type	Data format (default)
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

5. Service and Warranty

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.

After-sales service hotline: 86-573-82623038

Email: service@smdznet.com