SM100-T-B-4 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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Jiaxing Songmao Electronics Co., Ltd. Address : Room 1-201, Science and Technology Entrepreneurship Service Center, No. 79 Jinsui Road, Nanhu District, Jiaxing City, Zhejiang Province China
http://www.smmeter.com Tel:86-573-82623038 Email:sales@smdznet.com

Disclaimer:

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 However, content may become outdated or invalid due to product/software upgrades.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 for advice and answers.

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1. Introduction of SM100-T-B-4 Converter

1.1 Product Introduction

SM100-T-B-4 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-4 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

- It has a RS485 interface, supports standard MODBUS _ RTU communication protocol, and can also configure parameters.
- With special configuration software, it can communicate with HART protocol intelligent instrument.
- With 4 current outputs, it can transmit current to HART variables.
- 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: 134 mm L × 71 mm W × 43 mm H.
- Working temperature: -20 ℃ ~ + 80 ℃.
- Storage temperature: -25 ℃ ~ + 80 ℃.
- Power input voltage: DC 12 ~ 24V.
- HART protocol sampling resistor: 250Ω.

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2. Physical Drawing of SM100-T-B-4 Converter and Indicator Light Function

2.1 Physical Drawings

2.2 Wiring Diagram

2.2.1 Wiring Diagram of Two-Wire Instrument

2.2.2 Four-Wire Instrument Wiring Diagram

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2.3 Port Introduction

Port name	PROM	LOOP+	LOOP-	W1	W2	RS485+	RS485-	POW	GND
Function/access device	Program download	HART instrument				RS485 communication		Power source	

Port name	RESET	AO1	GND	AO2	GND	AO3	GND	AO4	GND
Function/access device	Parameter initialization	Current 1		Current 2		Current 3		Current 4	

● PROM: Program download button. Press and hold the button before powering on, and the converter enters the next program state.

● LOOP +, LOOP-, W1, W2: connect HART instrument and read HART instrument data.

● RS485 +, RS485-: RS485 communication interface, read HART instrument real-time data, current output value, range and other parameters.

● POW, GND: DC power supply, the positive and negative poles (+,-) of the power line are connected to the corresponding (POW, GND) terminals respectively.

● RESET: Parameter initialization button. Press and hold the button before powering on, and the converter initializes the parameters.

● AO1, GND ~ AO4, GND: 4 channels of 4 ~ 20 mA current output, with sampling resistance of 250 Ω.

2.4 Description of Indicator Light

● 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.

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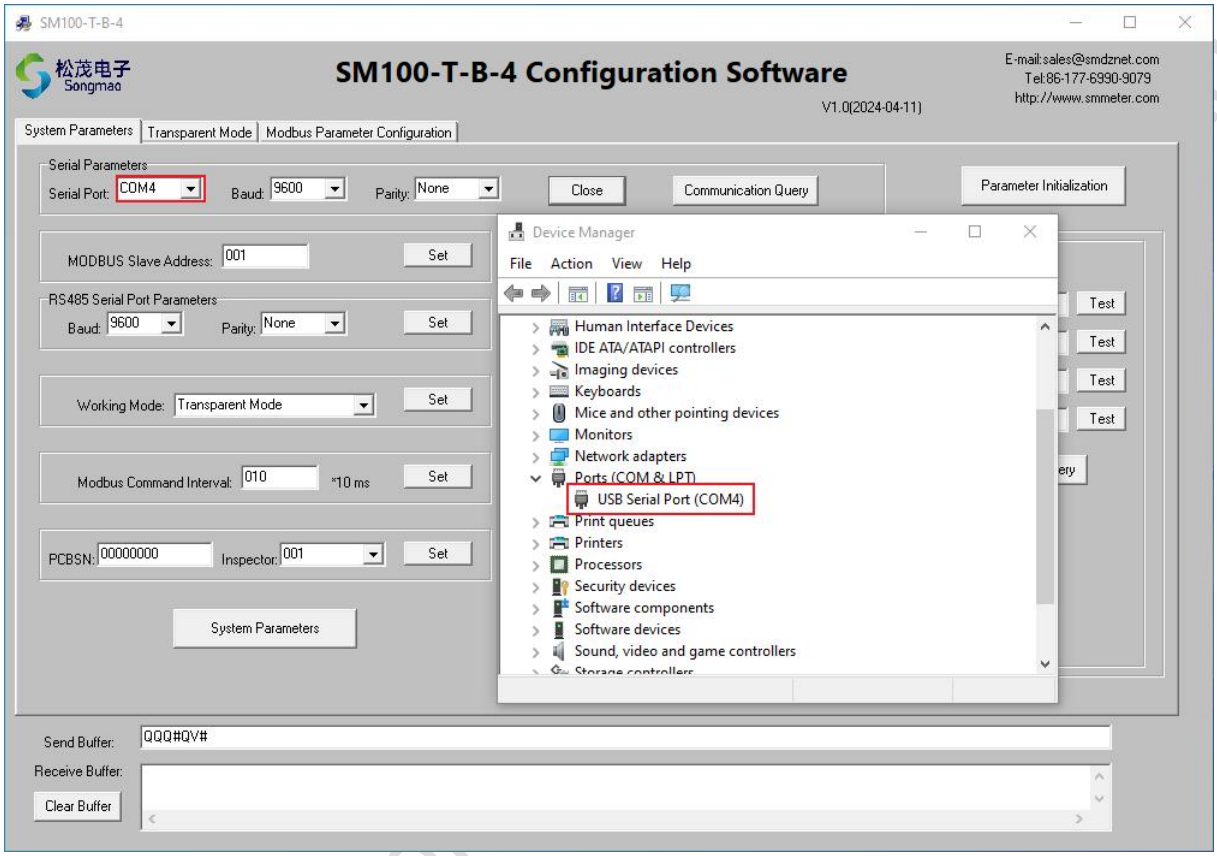
3. Function Introduction and Operation Steps of Configuration Software

3.1 Communication Connection

1) Connect the power supply and the RS485 communication 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 "Receiving 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 parameters, module working mode, MODBUS adjacent instruction interval, MODBUS slave address, etc.

1) Communication query: You can query the version number of the converter.

2) Parameter initialization: The parameters of the converter can be restored to the initialized state.

3) MODBUS slave address: Enter the 3-digit slave address and click "Set".

4) RS485 communication parameter setting: the user selects the baud rate and check bit (default baud rate: 9600, check bit: None) for RS485 interface communication according to the connected upper computer system, and then clicks "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.

5) Working 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 Operation 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 Test current output mode: When this mode is set, the current output of each DA channel can be tested by inputting the test value.

6) MODBUS command 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.

7) Analog output configuration: The variables corresponding to 4 AO current output channels and the upper and lower limits of their ranges can be configured respectively. According to the actual situation of each variable, configure its own range. The current output from the output terminal AO will vary depending on the range of the variable setting.

8) For test: when the working mode of the module is set as "Test DA Output Mode", input the current output value in the input box, click "Test", and the converter will output the cor9) System parameters: read communication parameters, working mode, MODBUS command interval, MODBUS slave address and other parameter information.

esponding current signal according to the set current value.

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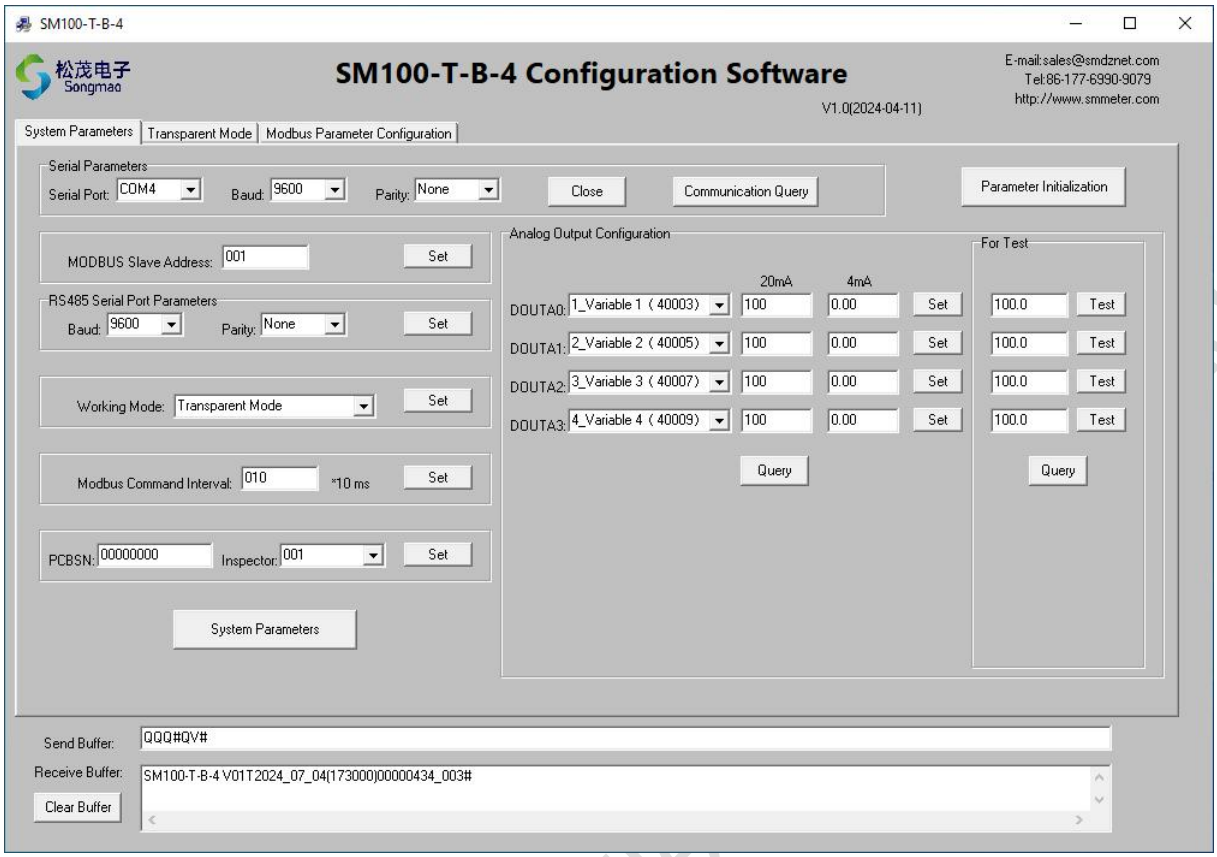

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3.3 Transparent Mode

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.

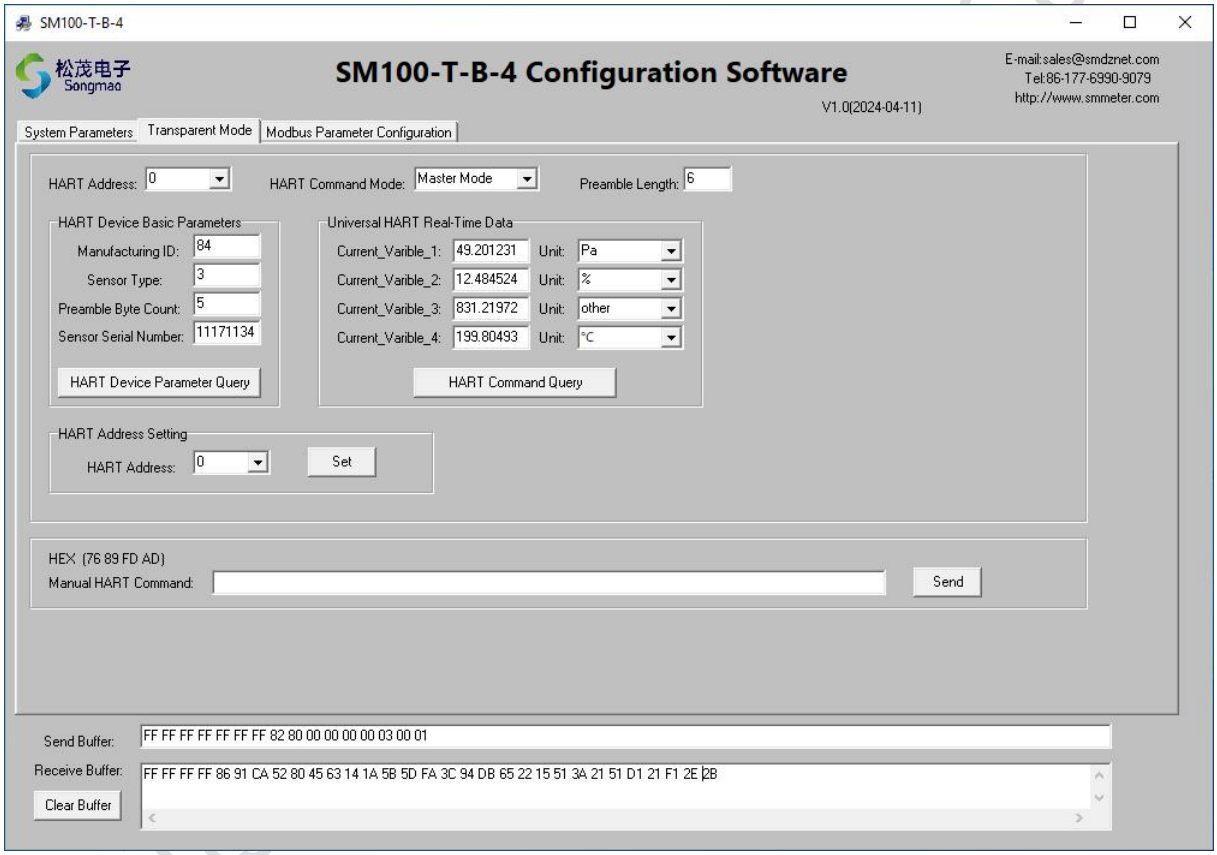
③ Preamble length: the 'FF' quantity of the leader of the HART instruction, which is generally 6 bytes.

3) HART device basic parameter : 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 setting: HART address of HART instrument can be set.

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



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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 Operation Mode", and then click "Parameter query" and "query" to read the parameter information in this interface.

2) Custom HART commands and parsing methods

① Meter ID: select "Device 0".

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

③ HART 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.

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).

⑦ Read meter command 1/2: when the instrument type is "custom instrument", the user can turn on the command enable and read HART instrument data by inputting the command code.

⑧ Parameter query: parameter information such as instrument enable, instrument type and user-defined command of the interface can be read.

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

① MODBUS format: refers to the format of the exported MODBSU data. The user shall configure the corresponding analytic format according to the format of the 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 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 Length: byte length of the data to be parsed.

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.

⑤ Address bit: 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.

4) 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.

5) 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.

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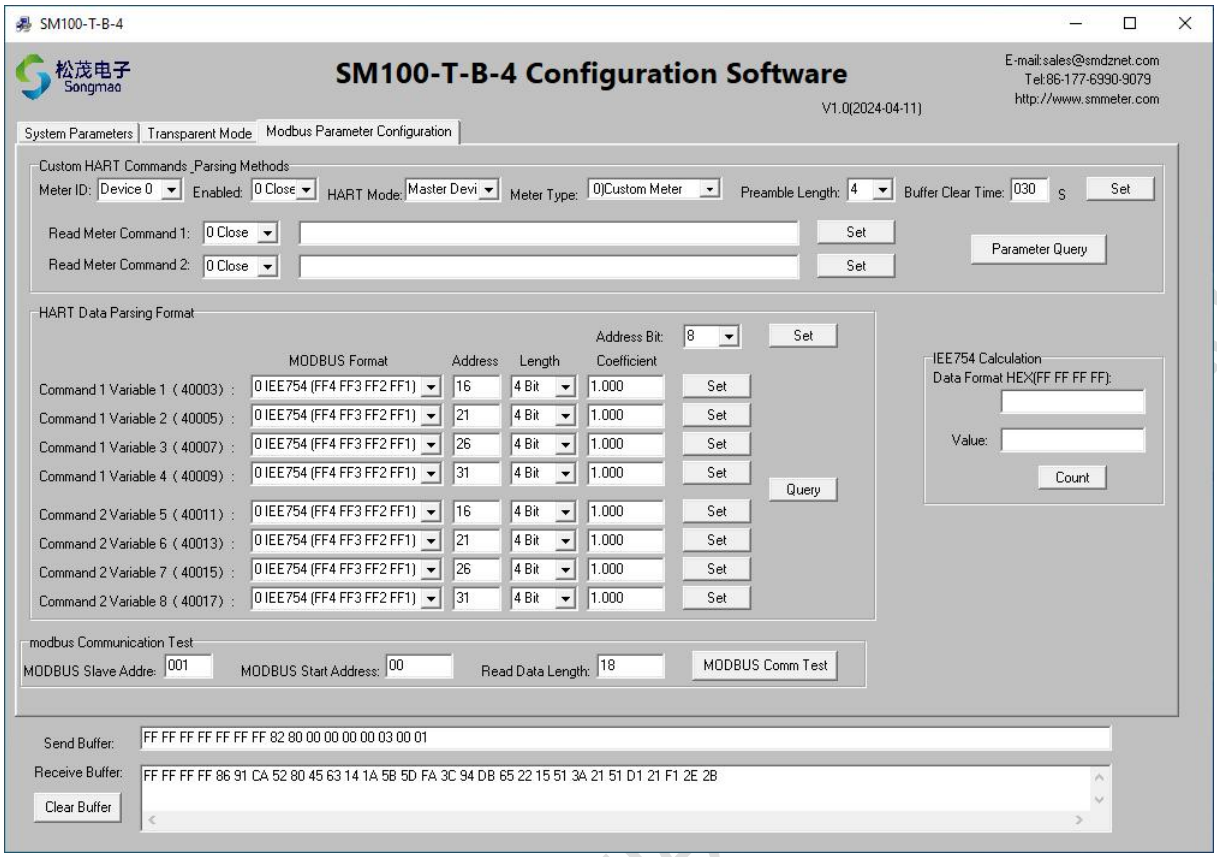

4. MODBUS Communication Test

When the RS485 interface is used for communication, the communication protocol is a standard MODBUS _ RTU protocol.

4.1 Data Register Address Table

Serial number	Data name	Data address	Data type	Data format	Mode of operation	Function Code
1	Current value	40001 40002	IEE754	4321	Read	03
2	Variable 1	40003 40004	IEE754	4321	Read	03
3	Variable 2	40005 40006	IEE754	4321	Read	03
4	Variable 3	40007 40008	IEE754	4321	Read	03
5	Variable 4	40009 40010	IEE754	4321	Read	03
6	Variable 5	40011 40012	IEE754	4321	Read	03
7	Variable 6	40013 40014	IEE754	4321	Read	03
8	Variable 7	40015 40016	IEE754	4321	Read	03
9	Variables 8	40017 40018	IEE754	4321	Read	03
10	Module operating mode	40120	Uint16		Read	04
11	AO1 upper range limit	30121 30122	IEE754	4321	Read	04
12	AO1 lower range limit	30123 30124	IEE754	4321	Read	04
13	AO2 upper range limit	30125 30126	IEE754	4321	Read	04
14	AO2 lower range limit	30127 30128	IEE754	4321	Read	04
15	AO3 upper range limit	30129 30130	IEE754	4321	Read	04
16	AO3 lower range limit	30131 30132	IEE754	4321	Read	04
17	AO4 upper range limit	30133 30134	IEE754	4321	Read	04
18	AO4 lower range limit	30135 30136	IEE754	4321	Read	04

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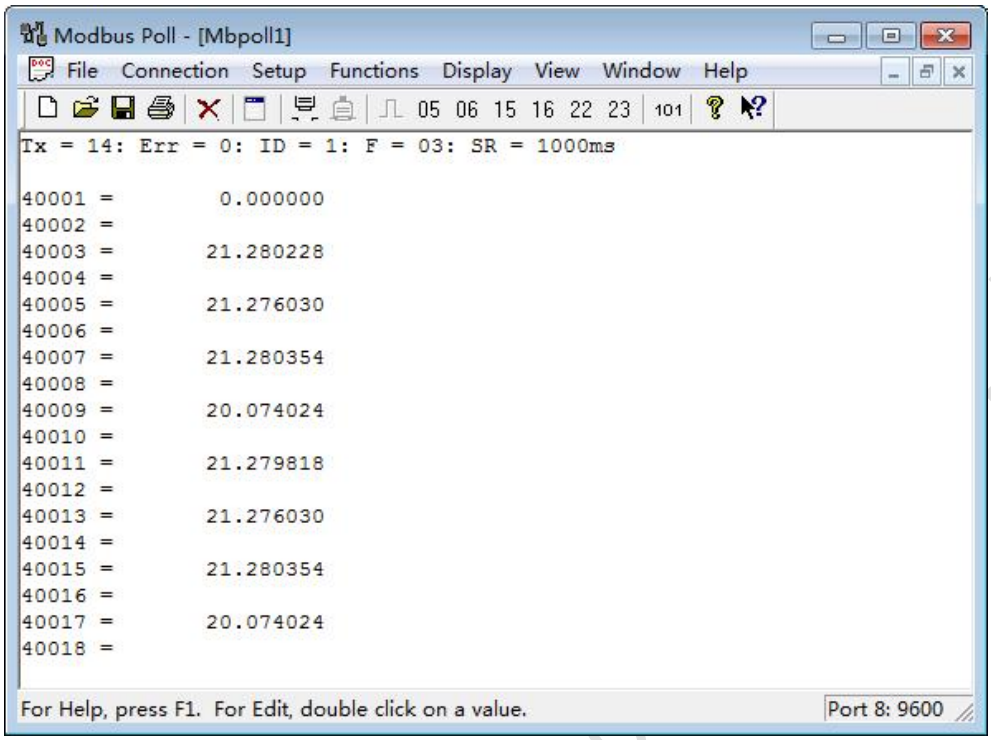
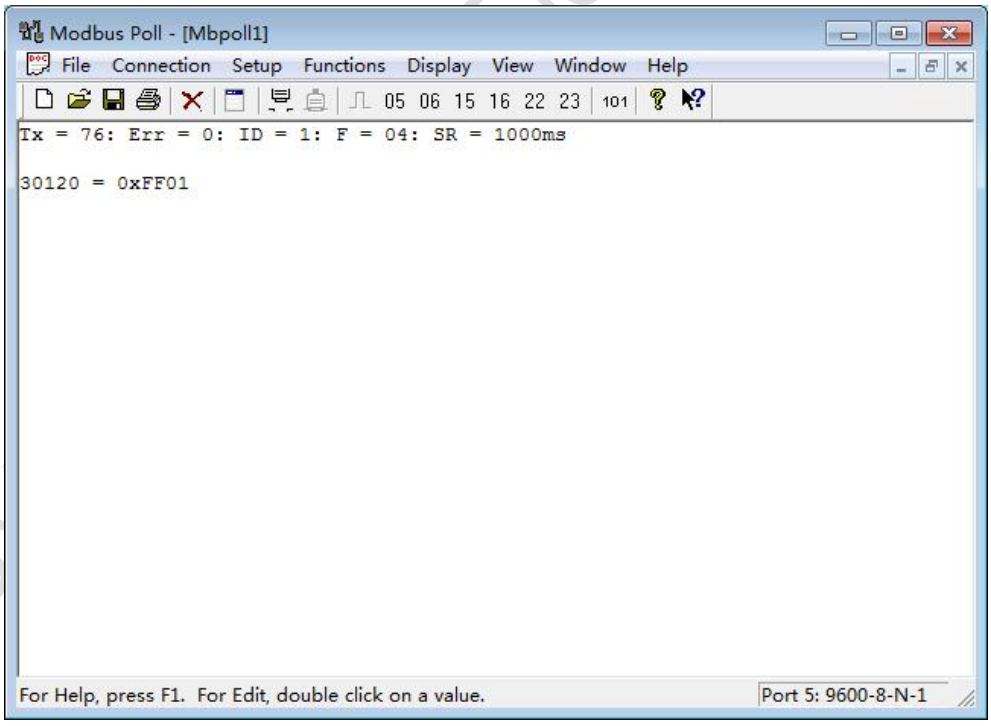
4.2 Example of Reading Real-Time Data and Converter Parameters

4.2.1 Read real-time data of HART instrument



4.2.2 Working mode of reading module



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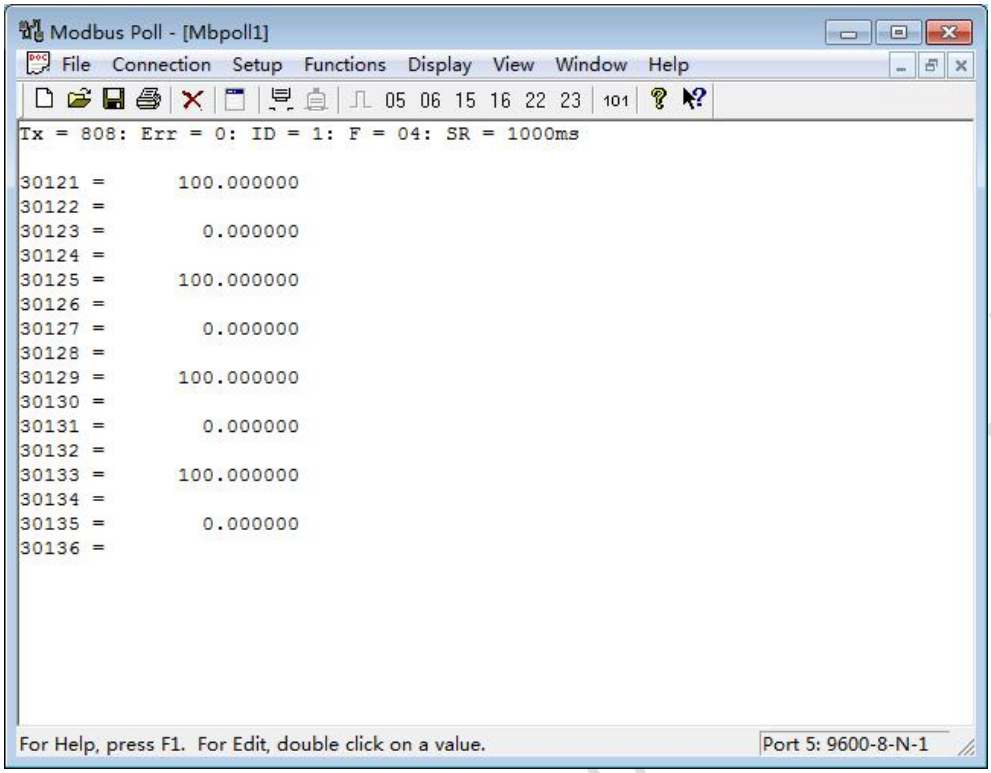
4.2.3 Read the upper and lower limits of the range



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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.

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