Temperature transducer

Istructions

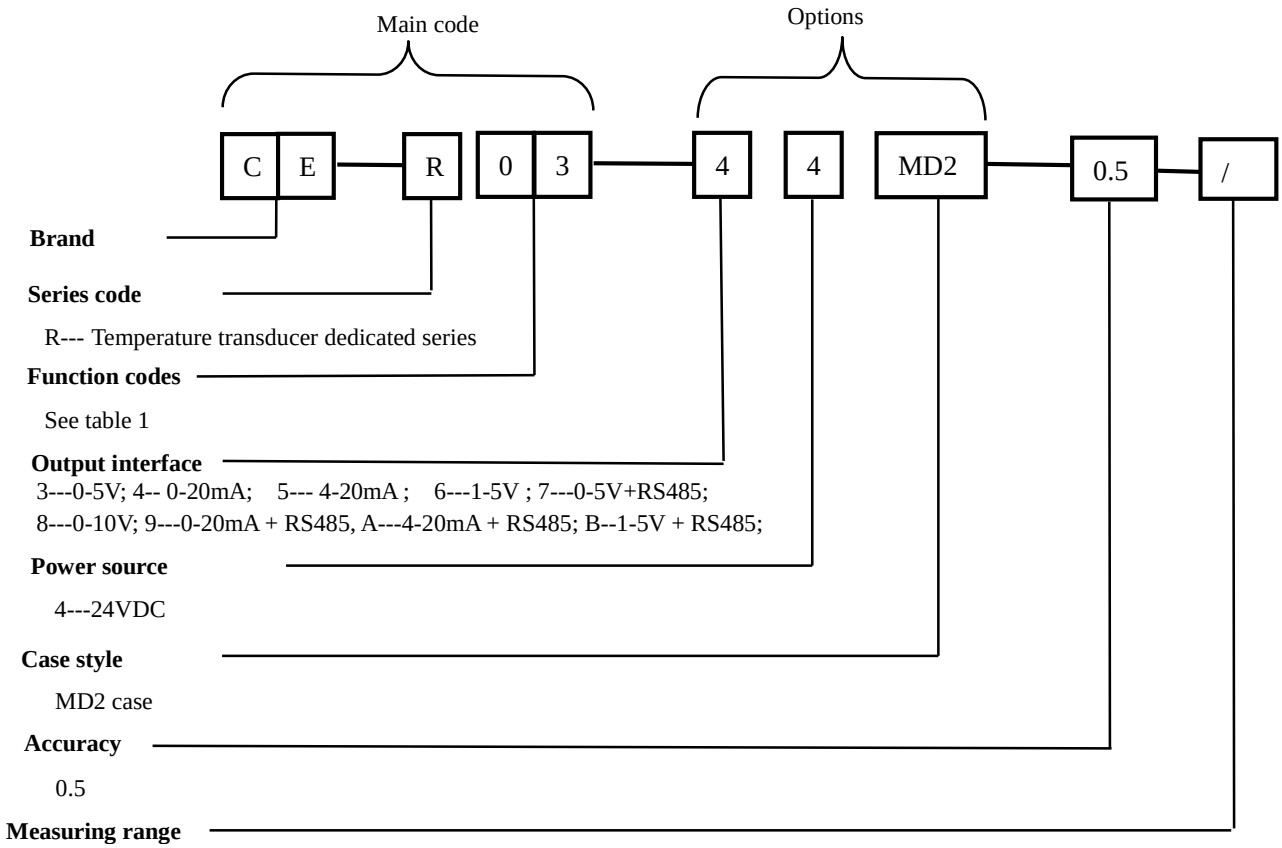
CE-R**-*4MD2-0.5(V1.2)

1 Overview

This series of products use professional MCU and 24-bit high-precision AD for data acquisition, non-linear processing algorithms and isolated measurement of the various models of thermal resistance and thermocouple signals, The transmission output is standard DC signal of 0 ~ 20mA , 0 ~ 5V, 4 ~ 20mA or 1 ~ 5V, it is with high precision, high isolation, low power consumption, low drift, wide temperature range, strong anti-interference ability and so on. The transducer uses a fully isolated design, that is, input, output and power are isolated from each other, eliminating the mutual interference between the signals. This product is widely used in electric power, communication, railway, mining, metallurgy, transportation, instrumentation and other industries because of its ultra-thin housing DIN rail card-mounted structure, plug-in terminal wiring, installation and maintenance convenience.

2 Part Number

CE-R product selection is as follows, in order to make your selected products accurate application, please read carefully.



Product input range, such as -200 ℃ --- 800 ℃

Table 1, input types

Code	Signal type	Measurement range	Code	Signal type	Measurement range
01	Resistance value	0-10KΩ	10	S type thermocouple	0 -- 1600℃
02	PT1000	-200 -- 800℃	11	K type thermocouple	0 -- 1300℃
03	PT100	-200 -- 800℃	12	E type thermocouple	0 -- 1000℃
04	BA1	-200 -- 600℃	13	T type thermocouple	-200 -- 400℃
05	BA2	-200 -- 600℃	14	J type thermocouple	0 -- 1200℃
06	CU50	-50 -- 150℃	15	R type thermocouple	0 -- 1600℃

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07	CU53	-50 -- 150℃	16	N type thermocouple	0 -- 1300℃
08	Customize thermal resistance		17	Customized thermocouple types	
09	B type thermocouple	400 -- 1800℃	18	Voltage signal	0--2V

3 Product Features

- Ultra-thin shape design, plug terminal wiring, easy to use on-site;
- A variety of output, which can output the standard transmission signal and RS485, user-friendly;
- It can switch the analog signal output to 0-20mA (0-5V) or 4-20mA (1-5V) through the internal DIP switch.

4 Specifications

Test conditions: auxiliary power: +24 V, room temperature: 25 ℃.
Detection signal type: thermal resistance: PT100, PT1000, BA1, BA2, CU50, CU53,R;
thermocouple B, S, K, E, T, J, R, N, voltage signal;
Isolation: treble-isolated, input, output and power isolation between each other;
Isolation voltage: >2500V DC;
Response time: ≤500mS;
Accuracy: 0.5;
Temperature drift: ＜500ppm/℃;
Rated power consumption: <2W;
Power supply: 24V±20%;
Load capacity: current output ≤250Ω; voltage output ≥2kΩ;
Communication: RS485/MODBUS protocol;
Output ripple: ≤10mV;
Frequency response range: none;
Working temperature: -10~60℃;
Data format (factory default): Baud rate 9600, Address: 1, Data: 8 data bits, no parity, 1 stop bit;
Lightning surge: power input± 4KV; voltage output ± 2KV; current output ± 2KV; communication port ± 2KV;
Anti-group pulse: power input;± 2KV; voltage output ± 2KV; current output ± 2KV; communication port ± 2KV;
Weight: 121g;
Storage conditions: -40 ~ +70 ℃

5 Terminal definition and connection diagrams

5.1 Connection diagram

5.2 Wiring board wiring diagram

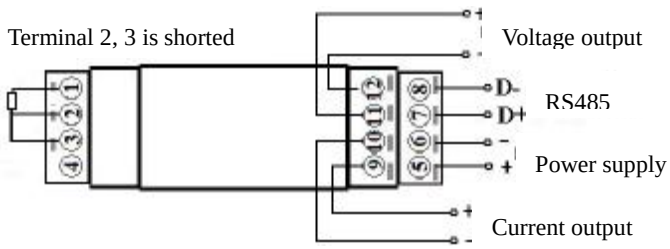

Figure 2, wiring diagram of thermal resistance input

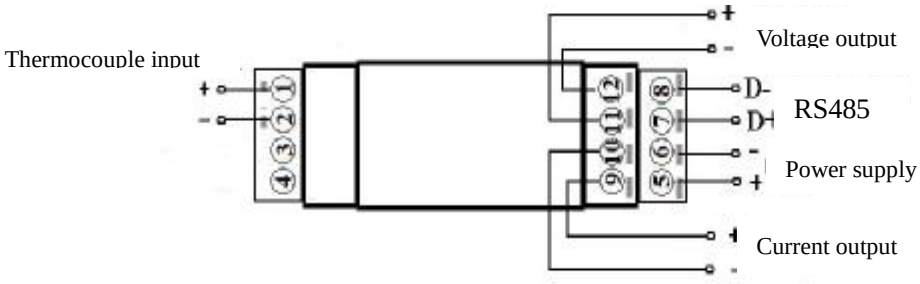

Figure 3, wiring diagram of thermocouple input

6 MODBUS Communication Protocol

6.1 Format of message

(1)Function code 03H--- to read the contents of registers from the slave equipment

The message from the master equipment:

Address of the slave equipment	(01H-FFH	1byte)
Function code	(03H	1byte)
Address of the first register		(2bytes)
Quantity of registers		(2bytes)
CRC code		(2bytes)

The correct responded message from the slave equipment

Address of the slave equipment	(01H-FFH	1byte)
Function code	(03H	1byte)
Byte count	(2xN*	1byte)
Data section		(N*x 2 bytes)
Address of the slave equipment	(01H-FFH	1byte)

(2) Function code 06H --- Set the number of single register from the slave device

The message from the master equipment:

Address of the slave equipment	(01H-FFH	1byte)
Function code	(06H	1byte)
Address of the first register		(2bytes)
The data written to the register		(2xbytes)
CRC code		(2bytes)

The correct responded message from the slave equipment

Address of the slave equipment	(01H-FFH	1byte)
Function code	(06H	1byte)
Address of the first register		(2bytes)
The data written to the register		(2xbytes)
CRC code		(2bytes)

(3) Function code10H---to set data of registers of the slave equipment

The message from the master equipment

Address of the slave equipment	(01H-FFH	1byte)
Function code	(10H	1byte)
Address of the first register		(2bytes)
Quantity of registers		(2bytes)
Byte count	(2xN*	1byte)

The data written to the register	(2x N*)
CRC code	(2bytes)

The correct responded message from the slave equipment

Address of the slave equipment	(01H-FFH	1byte)
Function code	(10H	1byte)
Address of the first register		(2bytes)
Quantity of registers		(2bytes)
CRC code		(2bytes)
CRC code		(2bytes)

Note: 1 For all address of registers, quantity of registers and contents of registers (data), the high order byte is before their low order byte. But the low order byte of CRC code is before its high order byte.

2 the length of the register is 16bits (2 bytes).

6.2Format of read and write the registers

With the Modbus function code 03H can read the contents of all the following register address;

Address of register (Hex)	Contents of registers	Quantity of registers	Attribute if registers	Range of data
0010H	Temperature	1	Read only	With one decimal
0011H	Resistance or voltage value	1	Read only	High byte
0012H	Resistance or voltage value	1	Read only	Low byte (two decimal for resistance value, three decimal for voltage value)
0013H	Communication check	1	Read/ write	0: stands for 1 stop bit, no parity check; 1: stands for 2 stop bits, no parity; 2: stands for 1 stop bit, even parity; 3: stands for 1 stop bit, odd parity;
0014H	Input signal	1	Read/ write	1 ~ 18 (see Table 1), the user can not modify, need to factory calibration
0015H	Cold junction temperature	1	Read only	Only for the thermocouple type
0016H	Zero calibration	1	Read/ write	-100~400(With one decimal)
0017H	Rated value calibration	1	Read/ write	-100~400(With one decimal)
0018H	Zero masking	1	Read/ write	-100~400(With one decimal)
0019H	Password	1	Write	55AAH (note 1)
0020H	Address and baud rate	1	Read/ write	High byte: Address 1-255 Low byte: Baud rate 3-7
0021H	Transducer's name	2	Read only	AT12(ASCII)

Note 1: The input signal, cold junction temperature, zero correction and zero mask register can be written to the data when 55AAH is written to 0019H register, when a read command issued, the password will be invalid, if you need to re-modify the value must re-write 55AAH value.

6.3 Example of the commands

1 Example of the commands "to read temperature value"

Send command:

Address of the slave equipment	Function code	Address of the first register	Quantity of registers	CRC-L	CRC-H

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01H	03H	00H	10H	00H	01H	C5H	CBH

Return data:

Address of the slave equipment	Function code	Data bytes count	Contents of register		CRC-L	CRC-H
01H	03H	02H	03H	E8H	B8H	44H

Note: The temperature value is 03E8H (1000D), that is, the temperature value is 100.0 ℃ (with 1 decimal place).

2 Example of the commands "to read the resistance or voltage value of transducer 1"

Send command:

Address of the slave equipment	Function code	Address of the first register		Quantity of registers		CRC-L	CRC-H
01H	03H	00H	11H	00H	02H	94H	0EH

Return data:

Address of the slave equipment	Function code	Data bytes count	Contents of register				CRC-L	CRC-H
01H	03H	04H	00H	03H	0DH	40H	0FH	53H

Description: The resistance value or voltage value is 00030D40H (200000D), namely the resistance value is 2000.00, the voltage value is 200.000.

3 Example for the broadcast command: "to modify the address" (address is change from 01 to 02, the baud rate is 9600bps):

Send command:

Address of the slave equipment	Function code	Address of the first register		Quantity of registers		Data bytes count	Data written to register		CRC-L	CRC-H
01H	10H	00H	20H	00H	01H	02H	02H	06H	20H	52H

Description: Baud rate code 03--- 1200bps; 04 ---2400bps; 05 --- 4800bps; 06 ---9600bps ; 07 --- 19200bps;

Return data:

Address of the slave equipment	Function code	Address of the first register		Quantity of registers		CRC-L	CRC-H
01H	10H	00H	20H	00H	01H	00H	03H

7 the analog output settings:

When configure the analog signal 0-20mA (0-5V) or 4-20mA (1-5V) output, it is needed to open the product shell. When analog output is 0-20mA (0-5V), the third bit of DIP switch SW1 is set to the OFF end, when 4-20Ma (1-5V) output, DIP switch is set to the ON end. Please note that the other bits of the DIP switch can not be toggle, with DIP switch setting table.

The first bit of DIP switch (SW1.1)	When the thermal resistance or resistance is input, set the DIP switch to the ON terminal and the other input to the OFF terminal
The second bit of DIP switch (SW1.2)	When thermocouple or voltage is input, DIP switch will be allocated to the ON side, the other input to the OFF end
The third bit of DIP switch (SW1.3)	Output 0-20mA (0-5V) to the OFF terminal, 4-20mA (1-5V) output to the ON terminal
The fourth bit of DIP switch (SW1.4)	None
The fifth bit of DIP switch (SW1.5)	None
The sixth bit of DIP switch (SW1.6)	When the thermocouple is input, set the DIP switch to the ON terminal and the other input to the OFF terminal

8 Application and notes:

8.1. The red indicator light of the transducer: When the product works normally, the red light is always on. The red light blinks

beyond the 1.2 times of range. Once the green light is successfully communicated, the green light does not shine when there is no communication.

8.2 When the RTD input is 2-wire, terminals 2 and 3 must be short-circuited.

8.3 When the RTD input is 3-wire, as far as possible to ensure that the resistance value of three wires is equal.

9 The correct use of isolators

9.1. Installations

Standard DIN35 rail card installation, the installation method is as follows:

9.1.1 The transducer fixed on the side of the card slot and hook on the mounting rail;

9.1.2 Rotate and press the underside of the transmitter bayonet against the rail, the transmitter is mounted on the rail;

9.1.3 Remove from the rail, pull down the pull-pin and the first proposed under the side, you can remove the transducer;

9.2. Products factory has been accurately set according to the "product standard". Apply power after determine the correct wiring. Product supply power requires the isolation voltage ≥ 2000VAC, AC ripple <10mV.

9.3. Connect the input and output signals in strict accordance with the isolator terminal definition diagram. Otherwise, the isolator may be damaged or the output value may be wrong.

9.4. The test shall be carried out under the following environmental conditions:

9.4.1 The accuracy of the signal source and measurement instrument is 0.05% above.

9.4.2 Power supply: nominal ± 5%, ripple ≤ 10mV; Ambient temperature: 25 °C ± 5°C; Relative humidity: RH (45 ~ 80)%;

9.4.3 Power preheat 5-20mins;

Note: please consult with our company for the verification method of other technical indicators.