

NCS-TT106M User Manual



Application

- 1: Temperature measurement of various industrial sites
- 2: Sensor output voltage and current measurement, etc
- 3: Application of weak signal detection
- 4: Process measurement of high-speed temperature rise
- 5: Process measurement of high-speed temperature rise
- 6: High-level voltage and current measurement

Hardware

- 1: One channel of RS485 interface
- 2: One way of thermal resistance / thermocouple / voltage / current input

Communication

- 1: One RS485 communication (MODBUS-RTU protocol) is available, and custom protocols can be customized

Features

- 1: Connect computer, PLC, MCCM, etc., a bus can monitor the number of 254 devices at the same time
- 2: The RS485 and sensor input interface are equipped with TVS diode protection
- 3: Digital isolation
- 4: Wide range voltage power supply (10~30VDC)
- 5: Support thermocouple K/J/R/S/T/E/B/N
- 6: Support PT100, PT1000, PT10, PT500, PT800, CU10, CU50, BA1, BA2, C53
- 7: 50/60HZ Anti-interference (20HZ)
- 8: RS485 photoelectric isolation output

9: Built-in watchdog to prevent crash

10: The acquisition speed is 20-1000HZ, available be set can be set

11: mV, V, mA measurement (for current measurement, a 50R resistor needs to be connected in parallel externally, and high-precision resistors should be used as much as possible). Through an external shunt and voltage divider, any current and voltage values can be measured

12: Dual constant current drive, supports long-line sensors, PT100 can support line resistance up to 1200 ohms

13: 0.01degree resolution

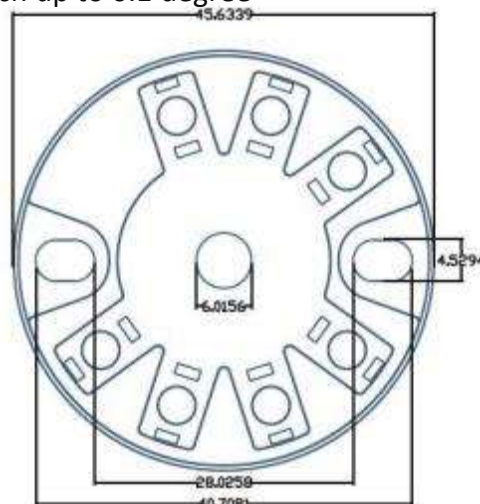
14: The measurement accuracy of the thermal resistor input can reach up to 0.1 degree

15: Extremely low temperature drift (5PPM)

16: IP68 waterproof, with internal glue injection treatment

Dimension

Outer diameter:45mm height :21mm



Input Sensor Types (PT100 as default)

Input	Measurement range (32位)	Measurement Resolution	16Pins	Type Number	Note
PT100	-200.00-850.00	0.013	-200.0-850.0	0	
PT1000	-200.00-850.00	0.01	-200.0-850.0	1	
PT10	-200.00-850.00	0.016	-200.0-850.0	2	
PT500	-200.00-850.00	0.01	-200.0-850.0	3	
PT800	-200.00-850.00	0.013	-200.0-850.0	4	
Cu10	-50.00-150.00	0.01	-50.0-150.0	5	
CU50	-50.00-150.00	0.01	-50.0-150.0	6	
Cu100	-50.00-150.00	0.01	-50.0-150.0	7	
BA1	-200.00-650.00	0.012	-200.0-650.0	8	
BA2	-200.00-650.00	0.011	-200.0-650.0	9	
G53	-50.00-150.00	0.017	-50.0-150.0	10	
K	-270.00-1370.00	0.028	-270.0-1370.0	16	
J	-200.00-1200.00	0.017	-200.0-1200.0	17	
R	-50.00-1700.00	0.072	-50.0-1700.0	18	
S	-50.00-1700.00	0.085	-50.0-1700.0	19	
T	-270.00-400.00	0.015	-270.0-400.0	20	
E	-270.00-1000.00	0.013	-270.0-1000.0	21	
B	250.00-1800.00	0.085	250.0-1800.0	22	
N	-200.00-1300.00	0.028	-200.0-1300.0	23	
0~15mV	-150000~+150000	0.1uV	-15000~+15000	32	
±15mV	-150000~+150000	0.1uV	-15000~+15000	33	
0~100mV	-100000~+100000	1uV	-10000~+10000	34	
±100mV	-100000~+100000	1uV	-10000~+10000	35	
0~1	-100000~+100000	10uV	-10000~+10000	38	
±1	-100000~+100000	10uV	-10000~+10000	39	
0~2V	-200000~+200000	10uV	-20000~+20000	40	
±2V	-200000~+200000	10uV	-20000~+20000	41	
0~+20mA	-200000~+200000	0.1uA	-20000~+20000	64	External 50R precision

					resistor
-20~+20mA	-200000~+200000	0.1uA	-20000~+20000	65	External 50R precision resistor

4~20mA	40000~200000	0.1uA	4000~20000	66	External 50R precision resistor
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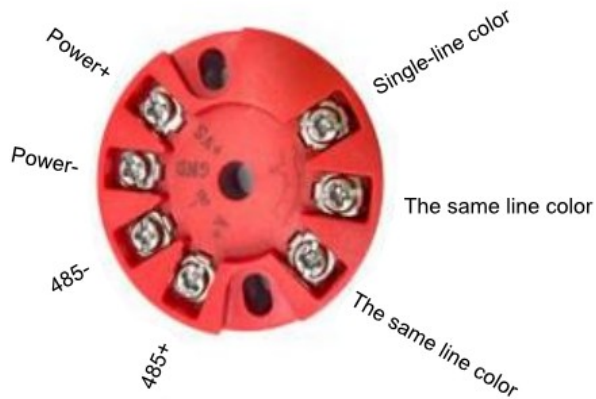
Note: The type number is 10 decimal, and the value is SULIN K protocol

For voltage / current / thermocouple measurement with IN-short connection to the COM foot, otherwise the measurement result will be incorrect.

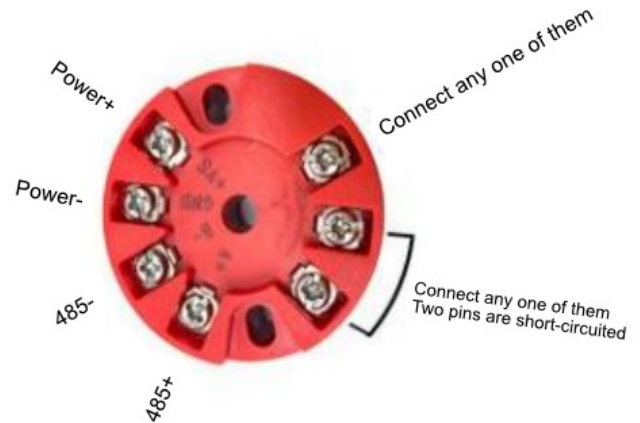
Wiring

Connection method of three-wire/four-wire thermal resistance sensor

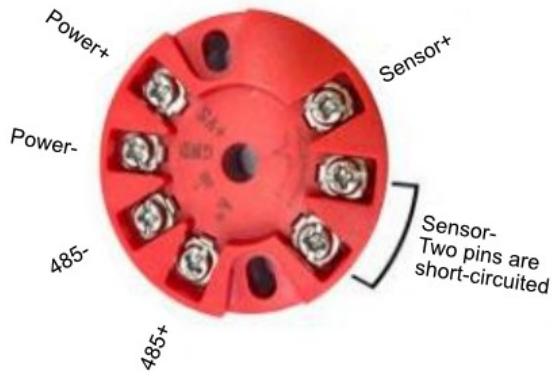
For the four-wire sensor, remove one of the wires and leave it unconnected, then connect them in the three-wire method



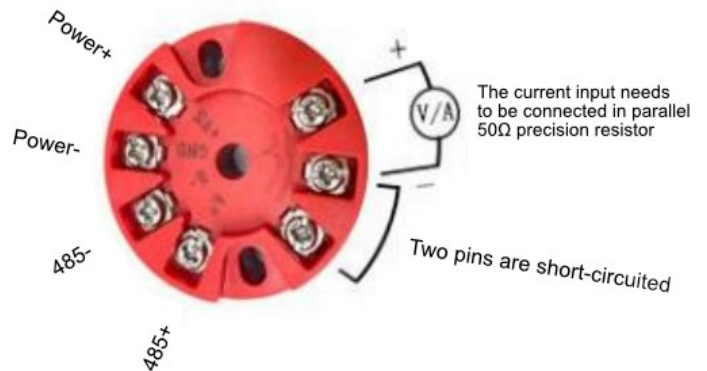
Connection method of two-wire thermal resistance sensor



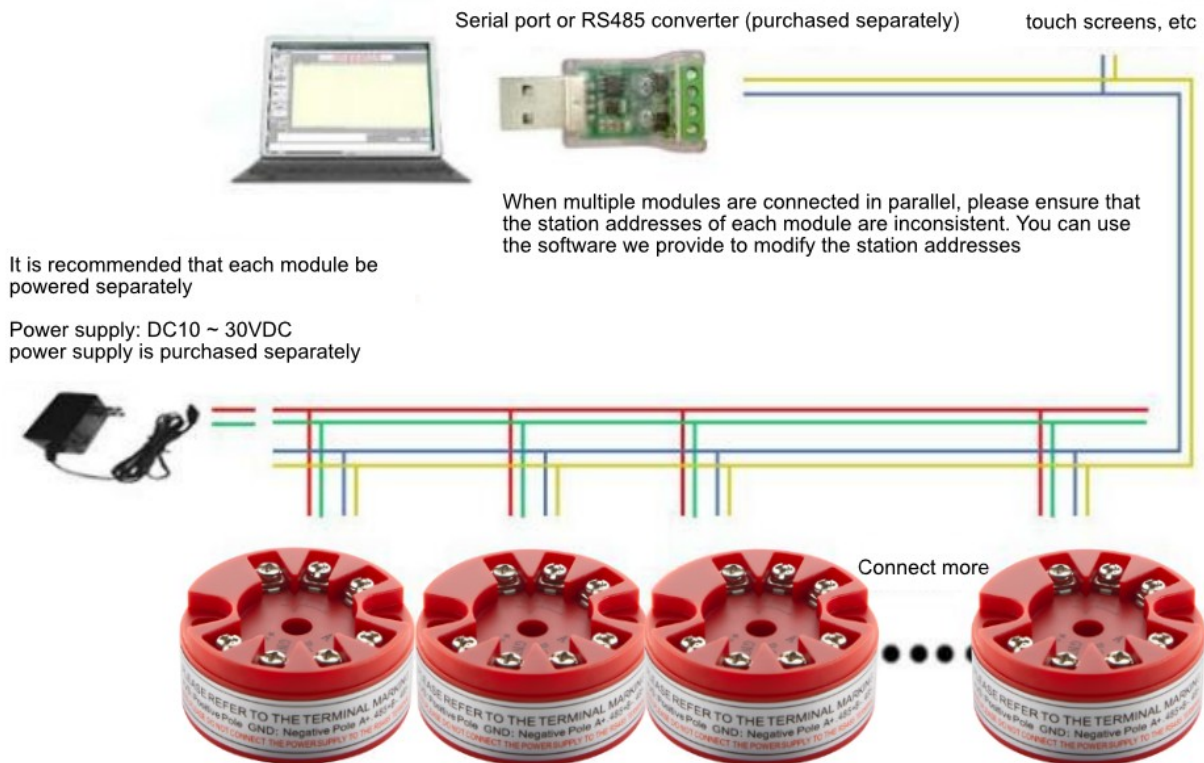
Connection method of thermocouple sensor



Connection method of current/voltage analog quantity sensor



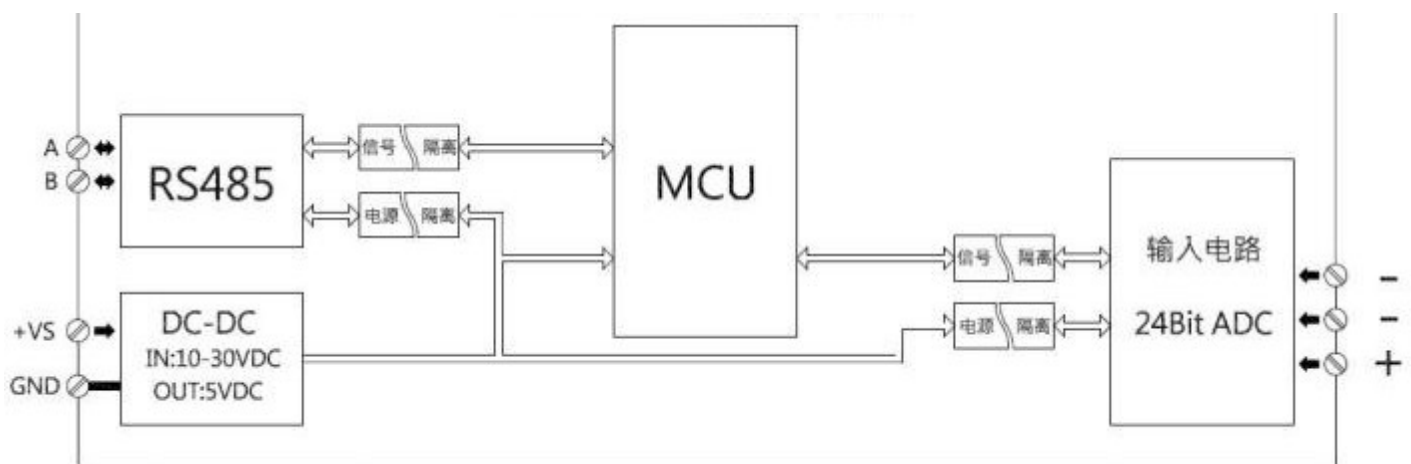
Parallel Application



Precautions for use:

The address of the module is set to No.1. When multiple modules are used in parallel, the number on the line (station address) is different. If there is the same, the module data between the same numbers will be dry, so that the communication cannot be normal. When multiple modules are used on one line, it is recommended to start from 1 and start in order. To change the address, please use our free software, and please connect the module to the computer through the converter.

Internal Diagram:



Software:

Address: Select the station address of the device to be configured, broadcast when 0, and all devices connected to the bus will respond.

Communication port: select the current use of the bus communication port, port rate factory default 9600

Station address setting: Enter the value in the data box and point "Set" to change the station address value of the module, and point "Read" to read the current equipment station address of the module(number)

ID: Hardware random code (0-65535) may be repeated.

Full range value shift value: modify the offset of the full range-128~ + 127.

Sensor type: Set the input type to requires external parallel 50R precision resistance.

Rate setting: Set the conversion speed.The higher the speed, the smaller the conversion stability it is.

Baud rate: select the wave rate back point "set" to change the Baud rate value, after the change will need to be repowered before taking effect.

Stop bit:It can be set to 1, 1.5,2 bits.

Check bit: can be set to no, odd and even.

Real-time AD value: The current channel AD value appears after clicking Read. Read the input type before reading the AD value, and if the input type is wrong, the read AD value is incorrect.

Real-time physical value: in the temperature register output, the 0 to the full range is determined by the upper and lower limit of the physical quantity, the value with a decimal point. **Physical quantity setting:** set the physical quantity value corresponding to 0 points and the

physical quantity value corresponding to the full range, which can be negative, with a decimal place, please see the function details

Reset communication parameters: reset communication parameters with 9600,8 / N / 1 and broadcast address command. After two seconds, if the communication parameters can be reset, **parameters reset:** port rate 9600,8 bits, no check, 1 stop bit, station number reset to 1. Other serial port parameters will not communicate correctly within two seconds of power-up.

Restart the module: send the specified command to the module, and will restart the module.

Physical Function

Voltage / current input sensor is generally a physical sensor, may be temperature sensor, humidity sensor, pressure sensor, etc., only the equipment range physical quantity limit, can directly output physical value, such as: 4-20MA sensor temperature, corresponding to 0-100

degrees, equipment output 12MA temperature is 50 degrees, the module will directly output integer variable 500, display function will also display 50.0, directly indicate the current sensor

temperature. Other devices, and so on. The upper and lower limits of physical quantities can be positive or negative numbers.

Physical value can only enter one decimal, if the physical value range is too small will need to expand the physical value multiplier, when the process is 0-1.0MPa, if the upper limit to 1.0, then the whole measurement value only 10 changes, too small resolution, you can change to 0-1000.0 or other multiplier, so the resolution reached 10000 values, read the value divided by 1000 can read the physical value such as 0.9999.

Note: When the input is 4-20MA or 2-10V, the physical value is -2048 (0XF 800) output when the input is below 3.5MA or 1.75V, indicating the current input channel error. Physical quantity

values are output with a temperature register.

Full-time Range Calibration:

RTD class input value is 100 times the temperature, if need to offset positive 2 degrees, then input 200, because the output temperature with two bit temperature value, if the input type is voltage

current, then the offset is full range AD offset, for example: 1V range output maximum 100000, offset is 100, then the actual output value of input 1V will be 100100

16The Bit ADC-value

The output value is a compression value of a 24-bit ADC

Input	Input Value	ADValue (Protocol1)	ADValue (Protocol2)	ADValue (SULINKProtocol)
Positive and negative input	-1V/-20mA	0	0X8000	Full multiple of the corresponding range value
	0V/0mA	0X7FFF	0	0
	0.2V/4mA	0X9FFF	0X1999	Full multiple of the corresponding range value
	1V/20mA	0XFFFF	0X7FFF	Full multiple of the corresponding range value
one-way input	0V/0mA	0X7FFF	0	0
	2V/4mA	0X9FFF	0X3333	Full multiple of the corresponding range value
	10V/20mA	0XFFFF	0XFFFF	Full multiple of the corresponding range value
4~20MA	0V/0mA	0XFFFF	0	0X7FF0(32-bit value*10)
	0.175V/3.5mA	0XFFFF	0	0
	0.2V/4mA	0	0	0
	1V/20mA	0XFFFF	0XFFFF	Full multiple of the corresponding range value
	>1v/20MA	0XFFFF	0XFFFF	More than the range value
Register Address		00~07 (03function code)	00~07 (04function code)	400~407 (03function code)

Note: SULINK protocol: when the input is 4-20MA or 2-10V, the AD output is 32752 (0X7FF0) when the input is below 3.5MA or 1.75V, indicating the current input channel sensor open circuit and 0 at

3.5-4MA or 1.75-2V to prevent misoperation from the sensor zero drift. When the AD value exceeds the range value, indicating that the current sensor input current is too large, the equipment should be checked as soon as possible.

Parameter

Item	Condition	Min Value	Standard Value	Max Value	Unit	Note
Power Supply	-20~70℃	10	12	30	V	DC
RS485-bus power	Disconnect with bus	4.0	4.5	5	V	
Accuracy	Voltage / current	±0.01%	±0.1%			25℃
	TC		1±0.1%			
	RTD		±0.1		℃	
Communication Baud Rate		1200	9600	115200	bps	
Number of RS485 buses supported			32		pcs	No amplifier
Working Temperature Range		-40	25	+80	℃	
Measure conversion speed		20		1000	HZ	
Bus response time	9600BPS		4	5	MS	
	115200		480		US	
Supply Current	DC12V				MA	Static
	DC24V				MA	
Correct the offset		-12.8		+12.7		
Address setting range		1		254		
Baud Rate Value		2	5	11		
Accuracy	PT100/PT1000/PT500/PT800/BA2		0.1		℃	Factory Calibration @25℃
	15MV/100MV/1V/2V		0.01		%	
	Other		0.2		℃	
Line loss error (PT100)	100Ωm/ (848℃)			±2.0	℃	Around 645 meters
	100Ωm/ (200℃)			±1.6	℃	
	100Ωm/ (0℃)			±1.5	℃	
	15.5Ωm/ (848℃)			±0.32	℃	Around 100 meters
	15.5Ωm/ (200℃)			±0.25	℃	
	15.5Ωm/ (0℃)			±0.23	℃	
	1.55Ωm/ (848℃)			±0.03	℃	Around 10 meters
	1.55Ωm/ (200℃)			±0.02	℃	
	1.55Ωm/ (0℃)			±0.02	℃	
Line loss error (PT1000)	100Ωm/ (848℃)			±0.34	℃	Around 645 meters
	100Ωm/ (200℃)			±0.16	℃	
	100Ωm/ (0℃)			±0.25	℃	
	15.5Ωm/ (848℃)			±0.05	℃	Around 100 meters
	15.5Ωm/ (200℃)			±0.04	℃	
	15.5Ωm/ (0℃)			±0.04	℃	
Stability	PT100/PT1000		±0.02		℃	20HZ
			±0.1		℃	1000HZ
	15MV		±0.004		mV	20HZ
			±0.01		mV	1000HZ

	1V/2V		±0.01		mV	20HZ
			±0.1		mV	1000HZ

Line resistance:

The 0.2 square pure copper line is about 100 meters and about 12 euros, the 0.12 square line resistance is about 15.5 euros, and the theoretical longest distance can reach 10,000 meters. If the line is too long, pay attention to the capacity value between the line core, but also pay attention to the use of shielding line, otherwise because the line is too long will

cause antenna effect, the electromagnetic interference in the air into the sensor, resulting in temperature jumping is serious, at the same time to pay attention to lightning protection, shielding line

grounding, wiring as far away from strong electricity. Because the problem of drive current accuracy cannot completely filter out the influence of the wire on the precision, the above accuracy data passes through theoretical calculation, but the test in production must be within this range. The line resistance PT 100 in the production test is 1200 euro, PT 1000 2K, PT 100 calibration resistance 330R (error within $\pm 24^{\circ}\text{C}$) and PT 1000 mode calibration resistance 3300R (error within $\pm 8^{\circ}\text{C}$)

Communicaiton Protocol

Factory value : Porter rate 9600 (adjustable), 8-bit data, 1 stop bit, no check

The functions of the register address are as follows (operations on registers outside the list are prohibited.) For some devices or PLCs with decimal representation, configurations, etc., register table 00 corresponds to 40001, register table 01 to 40002, register table 02 to 40003, and so on. It's actually 40001 plus the number in the register table.

Register Address	Function	Data Type	Data Range	(R/W)Read/Write
0 (03function code)	16Bit ADValue (Protocol 1)	Double byte type	0-65535	R
0 (04function code)	16Bit AD Value (Protocol 2)	Double byte type	0-65535	R
01	Equipment address (factory default 1)	Single byte type	1-254	R/W
03	Baud rate (factory default 9600)	Single byte type	0-11	R/W
10~11	Channel 1 Temperature Value (0.1)	Two-byte symbolic integer type	-3276.8~+3276.7	R
30	Device address	Single byte type	1-254	R/W
31	Baud rate	Single byte type	0-11	R/W
33	Hardware random number	Double byte type	0-65535	R
34	Stop bit	Single byte type	0-2	R/W
35	Verification	Single byte type	0-2	R/W
37	Write to the 0X 55AA restart module			W
40~41	Temperature value (0.1)	Two-byte symbolic integer type	-3276.8~+3276.7	R
60~67	Channel 1~8 physical quantity maximum value	Two-byte signed integer (0.1)	-3276.8~+3276.7	R/W
80~87	Channel 1~8 physical quantity minimum value	Two-byte signed integer (0.1)	-3276.8~+3276.7	R/W
220	Sensor input type	Single byte type	0~16	R/W
400	16Bit A D value (03 function code) SULINK protocol	Two-byte symbolic integer type	-32768~+32767	R
600	Enter the acquisition update speed	Single byte type	0~6	R/W
680~681	Temperature value (0.01)	Four-byte signed integer	See the Sensor Type Table for the range	R
760	Temperature correction value, (0.01)	Two-byte symbolic integer type	-1000~+1000	R/W
820~821	32Bit AD value (03 function code) SULINK protocol	Four-byte signed integer	See the Sensor Type Table for the range	R

Note: When the input is voltage current, correction value is correction value of full range AD value, integer, range-1000~ + 1000.

Porter rate value corresponds to the actual wave rate: starting from 0, for example: when the number is 5, wave rate is 9600 300,600,1200,2400,4800,9600,38400,43000,56000,57600,115200
Note:

Porter rate modification, other value default is 9600. Equipment address: 1~254. 0 Is a broadcast address, which is available with only one device, ignore the current device address, modify the

communication address or other operations.

The RS485bus and pt00 interface are not connected to the power supply, otherwise it may cause permanent damage to the equipment.

After getting the product, read the instructions, then connect the power supply, disconnect the bus with the multimeter RS 485 bus, the voltage value between A, B, normal in about 5V, if the voltage difference is too much, the interface is damaged.

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