Armored RTD

Supmea

Headquarters

5th floor, Building 4, Singapore Hangzhou Science Technology Park, No. 6 street, Hangzhou Economic Development Area, Hangzhou 310018, China

Singapore

2 Venture Drive #11-30 Vision Exchange Singapore

info@ supmea. com

www.supmea.com

Supmea Automation Co.,Ltd.

Contents

1 Introduction

1.1. Introduction

Screw-in temperature probes for standard applications are preferentially used for measuring temperatures in liquids and gases. A decisive selection criterion is the reliable sealing feature of this installation type with vacuum and with over-pressure. The application areas are, among others, in the air conditioning technology and refrigeration engineering as well as the HVAC and apparatus engineering sector.

Protection tubes made of various materials protect the measuring insert against chemical influences and mechanical damage. The appropriate protection tube material is selected according to the conditions on site.

1.2. Working Principles

TC principle

A thermocouple is a closed loop circuit that consists of two dissimilar metal wires welded together at both ends. When a temperature difference exists between the two junctions, thermal electromotive force (EMF) is generated and an electric current flows in the closed circuit. The direction and magnitude of the EMF generated depend upon the temperature of the two junctions and upon the materials making up the themocouple and are not affected by the size or length of the thermocouple wire. Temperature can be measured by knowing beforehand the change of EMF per degree change of temperature for a certain thermocouple.

RTD principle

Generally, electrical resistance of metal varies, depending on the temperature. Platinum in particular is more linear and has a larger temperature coefficient than most other metals. It is therefore, most suitable for temperature measurements. Platinum has excellent properties chemically and physically. Industrial high purity elements are readily obtained for long term use as a resistance elements for temperature measurements. The characteristics are specified in JIS and other foreign standards; thus, it permits a highly accurate temperature measurement.

1.3. Features

- Temperature range from -50 to +250 ° C
- With built-in measuring insert
- As TC or RTD temperature probes
- Available with transmitte

2 Technical Parameters

2.1. Technical Specifications

Table 1 Technical parameters

Input		
Input signal	Pt100	Resistance temperature detector(RTD), thermocouple (TC)
	Pt1000	Resistance temperature detector(RTD),
Cold-junction compensation temperature scope	-20～60℃	
Compensation precision	±1℃	
Output		
Output signal	4-20mA	
Load resistance	RL≤(Ue-12)/0.021	
Output current of upper and lower limit overflow alarm	IH=21mA、IL=3.8mA	
Power supply		
Supply voltage	DC12-40V	
Other parameters		
Temperature drift	0.02%FS/℃ （Standard）	
	0.0075%FS/℃ （Isolated）	
Response time	Reach to 90% of the final value for 1s	
Used environmental temperature	-40～80℃	
Storage temperature	-40～100℃	
Aseismicity	4g/2～150Hz	
Installation angle	Unlimited	
Installation area	B-type top cassette installation	
Electromagnetic compatibility	Conform to GB/T18268 industrial equipment application requirements (IEC 61326-1)	
Isolated type		
Insulation strength (between input and output)	1500Vrms (1 min, without spark)	
Insulation resistance (between input and output)	≥100MΩ(under the 500 VDC)	

2.2. Operating Temperature Range

(1) RTD

Symbol	Division	Operating temp range ℃
L	For low temperature	-200-+100
M	For medium temperature	0-350
H	For high temperature	0-500

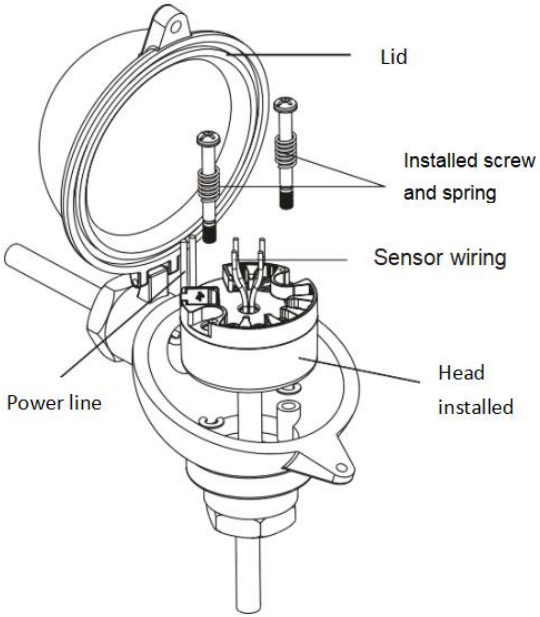
(2) TC

Components material of TC		
Symbol	Positive polarity	Negative polarity
N	Alloy consisting mainly of nickel, chromium and silicone	Alloy consisting mainly of nickel, and silicone
K	Alloy consisting mainly of nickel and chromium	Alloy consisting mainly of nickel and aluminum
E	Alloy consisting mainly of nickel and chromium	Alloy consisting mainly of nickel and copper
J	Iron	Alloy consisting mainly of nickel and copper
T	Copper	Alloy consisting mainly of nickel and copper

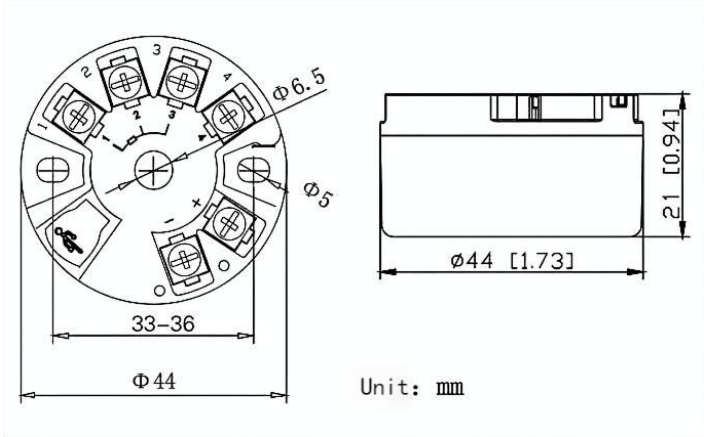
Operating temperature range (in air)							
Sheath OD(mm)	N	K			E	J	T
0.25	-	500*1			-	-	-
0.5		600*1			-	-	-
1.0	900*3	650		900*3	650	450	300
2.0	1200*3	650		1200*3	650	450	300
3.0	1260*3	750		1260*3	750	650	350
5.0	1260*3	800		1260*3	800	750	350
6.0	1260*3	1000*1	900*2	1260*3	800	750	350
8.0	-	1050*1	1000*2	-	800	750	350

3 Structure and Dimensions

3.1. Structure



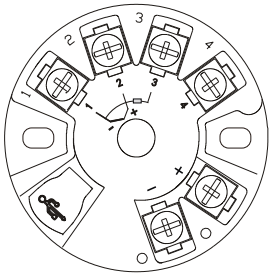
3.2. Dimensions

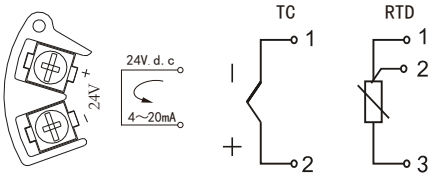


4 Electrical Connection and Wiring

4.1. Wiring

(1) Pt100





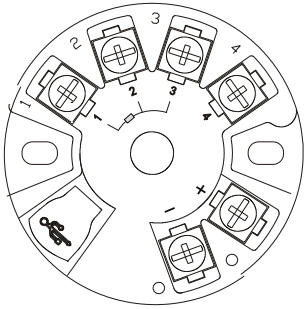
Note:

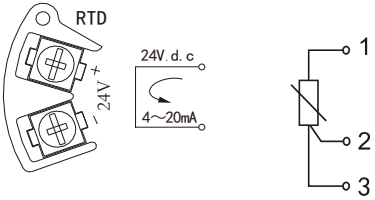
① When wiring a 2-wire RTD input, terminals 1and 2 must be shorted.

② When wiring a 3-wire RTD input, the resistance of the three leads should be as equal as possible, and the resistance of each lead must not exceed 10Ω.

③ When wiring a thermocouple input, the compensation cables should be connected directlyto the instrument's input terminals. No wires of other materials should be connected in between, otherwise measurement errors will occur.

(2) Pt1000



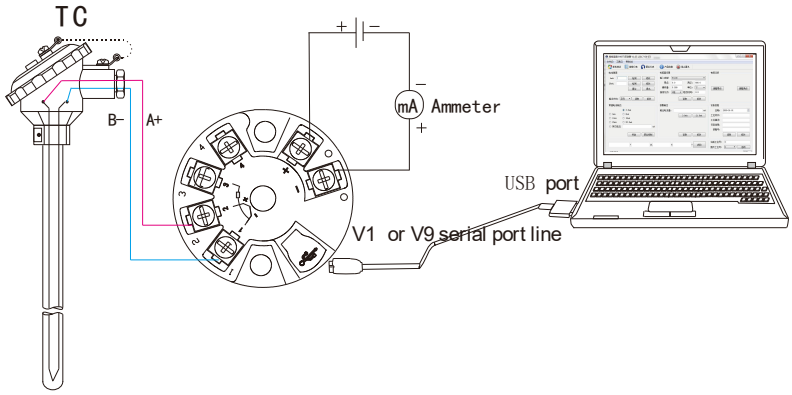


Note:

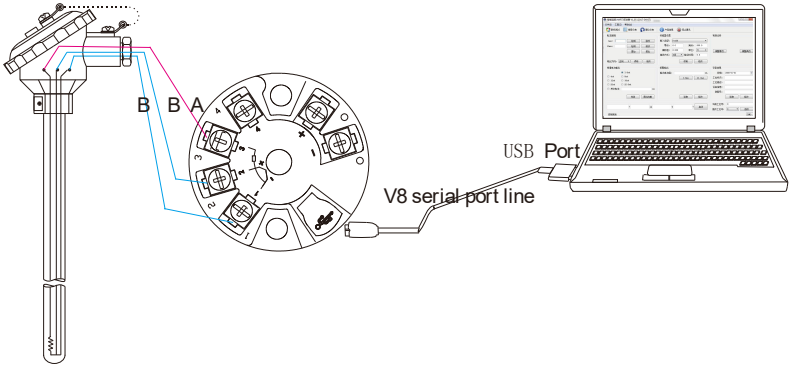
When using a three-wire RTD input, the resistance of the three leads should be as equal as possible, and the resistance of each lead must not exceed 10Ω.

4.2. Connection Schematic

(1) Pt100

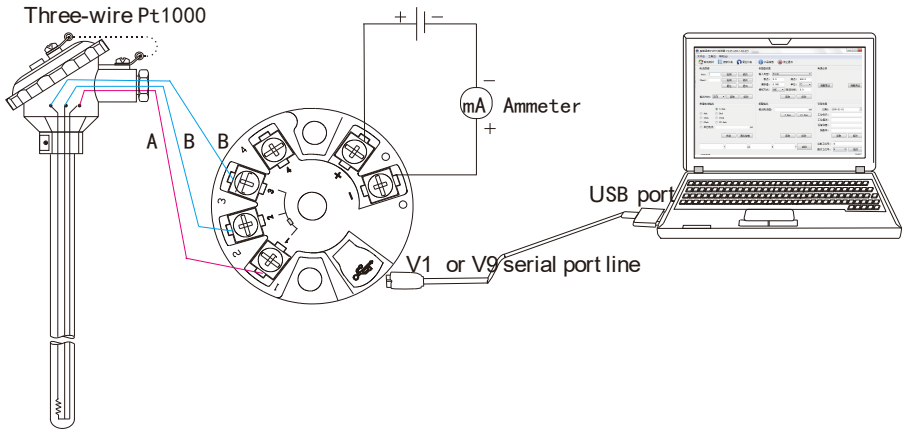


Three-wire Pt100

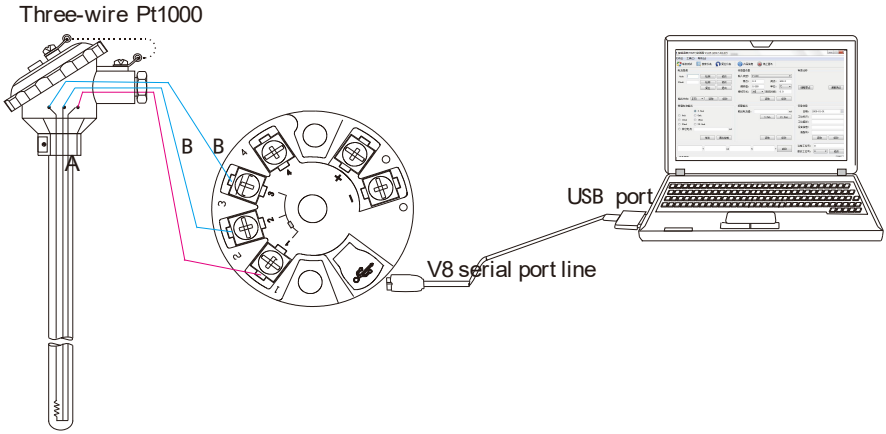


Note: no 24V power supply is required when using the V8 serial port line

(2) Pt1000



V8 Connection way:



note: no 24V power supply is required when using the V8 line

5 Input Type and Transmission Accuracy

5.1. Pt100

Model	Type	Measuring scope	Minimum measuring scope	Conversion accuracy
Resistance temperature detector (RTD)	Pt100	-200.0～850.0℃	20℃	±0.20%
				±0.4℃
	Cu50	-50.0～150.0℃	20℃	±0.10%
				±1℃
Thermocouple (TC)	B	400～1800℃	500℃	±0.10%
				±1.5℃
	E	-100～1000℃	50℃	±0.10%
				±0.5℃
	J	-100～1200℃	50℃	±0.10%
				±0.5℃
	K	-180～1372℃	50℃	±0.10%
				±0.5℃
	N	-180～1300℃	50℃	±0.10%
				±0.5℃
	R	-50～1768℃	500℃	±0.10%
				±1.5℃
	S	-50～1768℃	500℃	±0.10%
				±1.5℃
	T	-200～400℃	50℃	±0.10%
				±0.5℃
	Wre3-25	0～2315℃	500℃	±0.10%
				±1.5℃
	Wre5-26	0～2310℃	500℃	±0.10%
				±1.5℃

5.2. Pt1000

Model	Type	Measuring scope	Minimum measuring scope	Conversion accuracy
Resistance temperature detector (RTD)	Pt1000	-200.0～850.0℃	20℃	±0.20%
				±0.4℃

Notes:

1. The above accuracy data was obtained by testing at an ambient temperature of 20℃ ± 2℃

2. The output precision “%” is relative to the set range.

3. The cold end compensation error needs to be added to the thermocouple measurement, and the internal cold end compensation error is ≤±1°C.

6 Tolerance and Standards

6.1. Thermal resistor (RTD)

Table 2 Tolerance of RTD to temperature and applicable standard table

	IEC 751		JIS C 1604	
	Class	Tolerance ℃	Class	Tolerance ℃
Pt100 (R(100℃)/R(0℃)=1.3851	A	±(0.15+0.002 | t |)	A	±(0.15+0.002 | t |)
	B	±(0.3+0.005 | t |)	B	±(0.3+0.005 | t |)
Pt1000 （R(100℃)/R(0℃)=1.3851）	A	±(0.15+0.002 | t |)	A	±(0.15+0.002 | t |)
	B	±(0.3+0.005 | t |)	B	±(0.3+0.005 | t |)

6.2. Thermocouple (TC)

Table 3 TC tolerance and applicable standard

	JIS C1605				IEC 584-2			ASTM E230		
	Temp Range	Class	Tolerances ℃		Temp Range	Class	Tolerances℃	Temp Range	Class	Tolerance ℃
SNSK	-40℃-+375℃	1	±1.5	NK	-40℃-+375℃	1	±1.5	+0℃-+1260℃	STD	±2.2℃-±0.75%
	+375℃-+100℃		±0.004 | t |		+375℃-+100℃		±0.004 | t |			
	-40℃-+333℃	2	±2.5		-40℃-+333℃	2	±2.5		SP	±1.1℃-±0.4%
	+333℃-+1200℃		±0.0075 | t |		+333℃-+1200℃		±0.0075 | t |			

	-167℃-+40℃	3	±2.5		-167℃-+40℃	3	±2.5	-200℃-0℃	STD	±1.1℃-±2%
	-200℃--167℃		±0.015 | t |		-200℃--167℃		±0.015 | t |			

SE	-40℃-+375℃	1	±1.5	E	-40℃-+375℃	1	±1.5	+0℃-+870℃	STD	±1.7℃-±0.5%
	+375℃-+800℃		±0.004 | t |		+375℃-+800℃		±0.004 | t |			
	-40℃-+333℃	2	±2.5		-40℃-+333℃	2	±2.5		SP	±1℃-±0.4%
	+333℃-+900℃		±0.0075 | t |		+333℃-+900℃		±0.0075 | t |			
	-167℃-+40℃	3	±2.5		-167℃-+40℃	3	±2.5	-200℃-0℃	STD	±1.7℃-±1%
	-200℃--167℃		±0.015 | t |		-200℃--167℃		±0.015 | t |			
SJ	-40℃-+375℃	1	±1.5	J	-40℃-+375℃	1	±1.5	+0℃-+760℃	STD	±2.2℃-±0.75%

	+375℃-+750℃		±0.004 | t |		+375℃-+750℃		±0.004 | t |			
	-40℃-+333℃	2	±2.5		-40℃-+333℃	2	±2.5		SP	±1.1℃-±0.4%
	+333℃-+750℃		±0.0075 | t |		+333℃-+750℃		±0.0075 | t |			
ST	-40℃-+125℃	1	±0.5	T	-40℃-+125℃	1	±0.5	+0℃-+370℃	STD	±1℃-0.75%
	+125℃-+350℃		±0.004 | t |		+125℃-+350℃		±0.004 | t |			
	-40℃-+133℃	2	±1.0		-40℃-+133℃	2	±1.0		SP	±5℃-0.4%
	+133℃-+350℃		±0.0075 | t |		+133℃-+350℃		±0.0075 | t |			
	-67℃-+40℃	3	±1.0		-67℃-+40℃	3	±1.0	-200℃-0℃	STD	±1℃-±1.5%
	-200℃--67℃		±0.015 | t |		-200℃--67℃		±0.015 | t |			