RTD Temperature Sensors Modular Design for Industrial Applications

MTM100R

Introduction

MTM100R RTD Temperature Sensors (hereinafter referred to as RTD) incorporate a Pt100 or Pt1000 platinum resistance element, compliant with IEC 60751, housed in a mineral-insulated (MI) sheath. The product has a slim form factor, fast thermal response, and excellent resistance to mechanical stress as well as environmental adaptability.

Measurement Principle

RTD Temperature Sensor measures temperature based on the property of metallic conductors whose electrical resistance varies with temperature. As the temperature rises, the resistance increases; conversely, as the temperature decreases, the resistance decreases. The measured temperature can be determined precisely by accurately measuring the resistance.

Technical Standards

- Standards: GB/T30121-2013 IEC 60751-2022

Applications

- Chemical industry
- Energy and power generation
- Marine and shipbuilding
- HVAC systems

Features

- Measuring range: -200°C ～ +500°C
- Sensing element: Pt100 and Pt1000
- Compatible with transmitter modules to enhance measurement accuracy, reliability, and system integration
- Modular design allows for various specifications and compatibility with thermowells

RTD type	Temp range	Accuracy class	Tolerance (°C)	Effective temp range
PT100	-200°C～500°C	AA	± (0.1+0.0017|t|)	0°C～ 150°C
		A	± (0.15+0.002|t|)	-30°C～ 300°C
		B	± (0.3+0.005|t|)	-200°C～ 500°C
PT1000	-50°C～500°C	AA	± (0.1+0.0017|t|)	0°C～ 150°C
		A	± (0.15+0.002|t|)	-30°C～ 300°C
		B	± (0.3+0.005|t|)	-50°C～ 500°C

Thermal Response Time

Sheath diameter (mm)	Thermal response time τ0.632 (s)
ϕ6	5.17

- Test medium: water
- Test conditions: Flow velocity 1m/s
- Reference standard: JJF 1049-2024
- Temperature step: 10 K per change

Insulation Resistance

Under ambient air temperature of 15°C –35°C and relative humidity not exceeding 80%, the insulation resistance between the lead wires and the outer sheath shall be no less than 100 MΩ (test voltage: 10–100 V DC).

Vibration Resistanc

Vibration	10g

Test conditions
- Frequency range: 10Hz – 1000Hz
- Acceleration: 10g
- Amplitude: 0.15mm
- Test axes: X, Y, Z
- Duration: 30 min per axis
- Reference standard: GB/T 2423.10-2019

Shock Resistance

Shock	50g

Test conditions
- Waveform: Half-sine wave
- Acceleration: 50g
- Pulse duration: 6ms
- Test directions: ±X, ±Z
- Test cycles: 3 times per direction
- Reference standard: GB/T 2423.5-2019

Component Materials

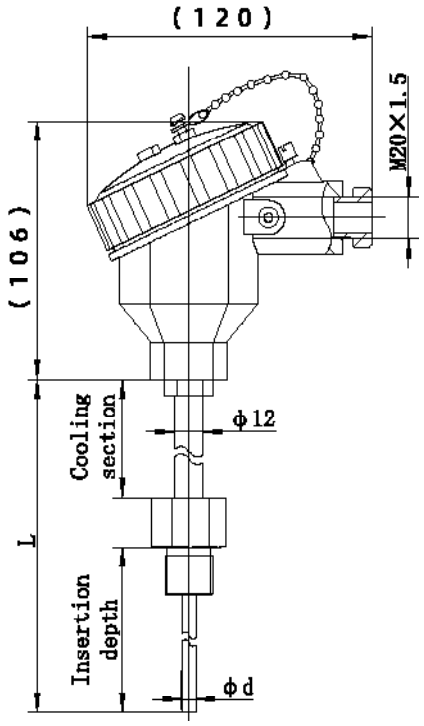
Type	Material (s)
RTD sheath	304、321、316L
Process connection	304、321、316L
junction box	Cast aluminum
Terminal block	Ceramic
Wires	PTFE shielded, silicone rubber, PVC

Material Properties

Material	Features
304	• General austenitic stainless steel • Excellent corrosion resistance, formability, and low-temperature toughness • Widely used in food processing, chemical & pharmaceutical industries, building decoration, and energy equipment
321	• Titanium-stabilized austenitic stainless steel • Excellent intergranular corrosion resistance even after welding • Good weldability, suitable for all standard welding methods • Widely used in chemical industry, petrochemical applications, and pressure vessels
316L	• Low-carbon, molybdenum-containing austenitic stainless steel • Strong general corrosion resistance • Enhanced resistance to chloride, acidic, and non-oxidizing environments due to molybdenum addition (e.g., dilute phosphoric, sulfuric, acetic, and tartaric acids) • Resistant to intergranular corrosion and pitting

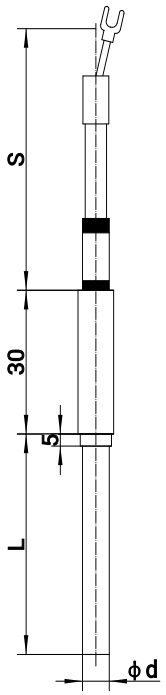
Outline Construction

Unit：mm



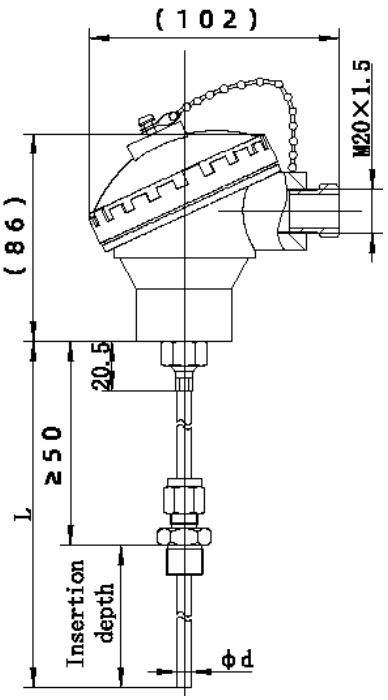
Fixed Insertion RTD (Ex-proof Junction Box)

- Code: A
- Housing material: Cast aluminum
- Ex-proof mark: Ex db IIC T6 Gb
- Insertion depth: Probe length + thread length
- IP rating: IP67



Direct Lead RTD

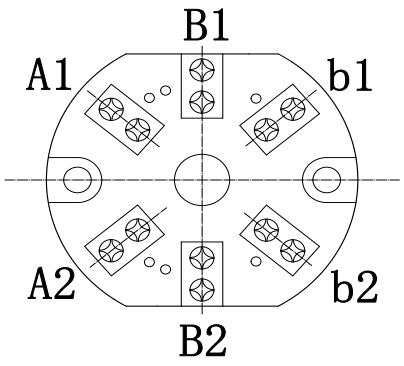
- Code: D
- IP rating: IP67
- Lead wire material: PTFE shielded or others



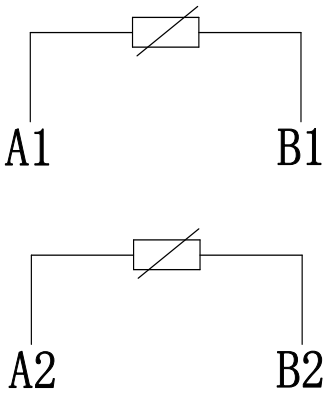
Plain Stem RTD (Waterproof Junction Box)

- Code: B
- Housing material: Cast aluminum
- Insertion depth: Probe length + thread length
- IP rating: IP65

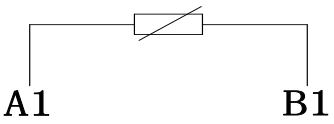
Ceramic Terminal Block Wiring



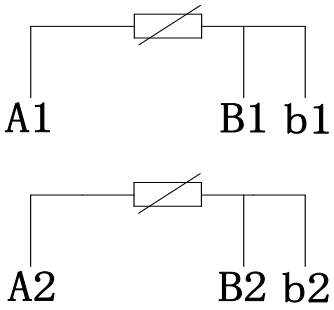
Ceramic Terminal Block



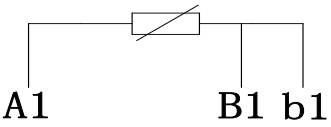
2-Wire - Duplex RTD Wiring



2-Wire RTD Wiring

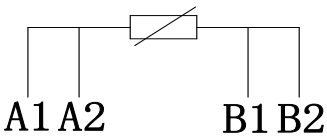


3-Wire - Duplex RTD Wiring

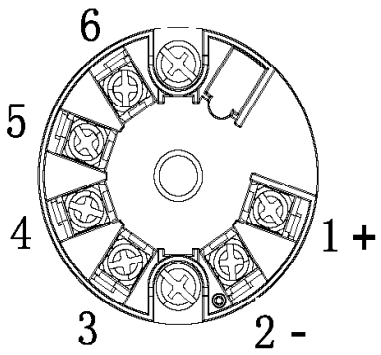


3-Wire RTD Wiring

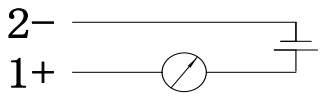
Transmitter Module Wiring



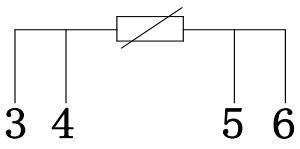
4-Wire RTD Wiring



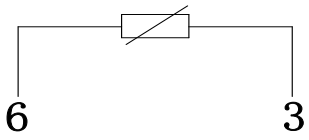
Transmitter Module Wiring



Transmitter Module Power Wiring

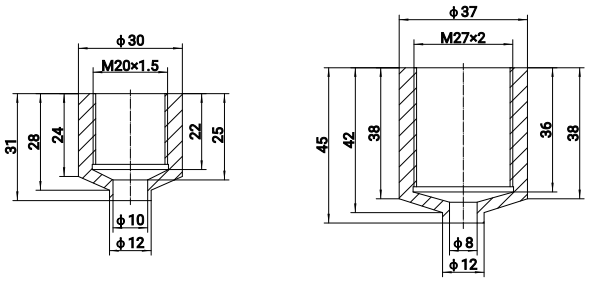


4-Wire - Transmitter Module Wiring

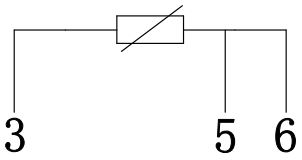


2-Wire - Transmitter Module Wiring

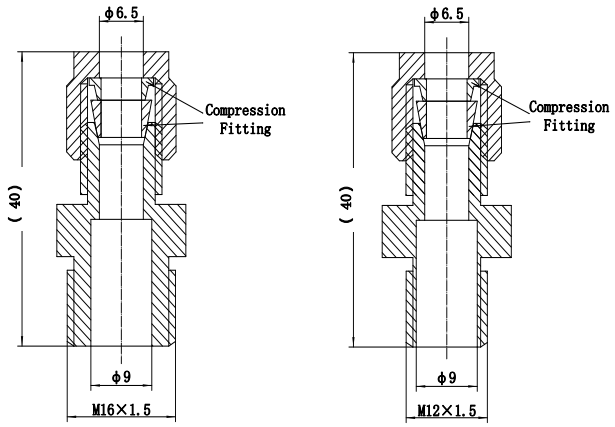
Mounting Accessories



Standard Welding Base



3-Wire - Transmitter Module Wiring



Compression Fitting Bolt

Order Guide

MTM100R-A	Industrial RTD (Insertion type, with cooling section, mounted via fixed threaded connection)

Code	RTD type
PA	RTD (Pt100)
PB	RTD (Pt1000)

Code	Number of sensors
1	Simplex
2	Duplex (for sheath ϕ5mm and above)

Code	RTD wiring
2	2-wire
3	3-wire
4	4-wire

Range	Measuring range
[X°C～ Y°C]	X and Y represent the lower and upper temperature limits, respectively (°C)

Code	Tolerance class	
AA	AA ： ± (0.1+0.0017|t|)	PT100/PT1000：0°C～ 150°C
A	A： ± (0.15+0.002|t|)	PT100/PT1000：-30°C～ 300°C
B	B： ± (0.3+0.005|t|)	PT100：-200°C～ 500°C
		PT1000：-50°C～ 500°C
Y	Other tolerance classes (specify)	

Code	Sheath outer diameter (mm)
03	ϕ3
05	ϕ5
06	ϕ6
08	ϕ8
Y	Other diameters (specify)

Code	Sheath material
A	304
G	321
L	316L
Y	Other materials (specify)

-Number-	Insertion length (mm) (incl. thread)

Code	Cooling section length (mm)
N	None (-50°C ~100°C)
S	50 (-50°C～ 100°C)
M	100 (-200°C～ 150°C)
L	150 (-200°C～ 500°C)

Code	Mounting type
1	Fixed thread
2	Fixed flange
3	Fixed clamp

MTM100R-A	PA	1	3	[0°C ~100°C]	AA	03	A	-Number-	L	1	The complete spec.

Code	Process connection material
A	304
L	316L
Y	Other materials (specify)

Code	Process connection
C24	Fixed thread, M10 x 1, length: 8mm
C23	Fixed thread, M12 x 1.5, length: 12mm
C40	Fixed thread, M14 x 1.5, length: 12mm
C30	Fixed thread, M16 x 1.5, length: 12mm
C1	Fixed thread, M20 x 1.5, length: 14mm
H1	Fixed thread, M27 x 2, length: 16mm
C3	Fixed thread, G1/2, length: 14mm
C30	Fixed thread, G1/4, length: 12mm
C16	Fixed thread, G3/8, length: 12mm
C6	Fixed thread, NPT1/4, length: 10mm
C10	Fixed thread, NPT1/2, length: 14mm
F1	DN10
F2	DN20
F3	DN25
F4	DN32
F5	DN40
F6	DN50
	Flanged connection: specify flange standard, PN (nominal pressure), and RF (sealing face)
G1	ϕ25.4(Fixed clamp)
G2	ϕ50.5(Fixed clamp)
Y	Other process connections (specify)

Code	Sealing gasket
T	Copper
S	PTFE
N	None

Code	Junction box
FB	Explosion-proof junction box
FS	Waterproof junction box

Code	Electrical connection of junction box (Female)
C1	M20×1.5
C10	NPT1/2
C3	G1/2

Code	Additional fittings
LT	Threaded thermowell
HT	Welded thermowell
FT	Flanged thermowell
HJ	Welded base
N	None

Code	Temperature transmitter module
B1	4~20mA
B2	4~20mA + Hart + isolated
N	None

Continued	A	C24	T	FB	C1	LT	B	The complete spec.

Order Guide

MTM100R-B	Industrial RTD (Plain stem type, adjustable insertion depth)									
	Code	RTD type								
	PA	RTD (Pt100)								
	PB	RTD (Pt1000)								
		Code	Number of sensors							
		1	Simplex							
		2	Duplex (for sheath ϕ5mm and above)							
			Code	RTD wiring						
			2	2-wire						
			3	3-wire						
			4	4-wire						
				Range	Measuring range					
				[X°C～ Y°C]	X and Y represent the lower and upper temperature limits, respectively (°C)					
					Code	Tolerance class				
					AA	AA ： ± (0.1+0.0017|t|)	PT100/PT1000：0°C～ 150°C			
					A	A： ± (0.15+0.002|t|)	PT100/PT1000：-30°C～ 300°C			
					B	B： ± (0.3+0.005|t|)	PT100：-200°C～ 500°C			
							PT1000：-50°C～ 500°C			
					Y	Other tolerance classes (specify)				
						Code	Sheath outer diameter (mm)			
						03	ϕ3			
						05	ϕ5			
						06	ϕ6			
						08	ϕ8			
						Y	Other diameter (specify)			
							Code	Sheath material (other materials available on		
							A	304		
							G	321		
							L	316L		
								-Number-	Overall length (mm)	
									Code	Mounting type
									1	Adjustable compression fitting thread
									2	Adjustable compression fitting flange
									N	None

MTM100R-B	PA	1	3	[0°C ~100°C]	AA	03	A	-Number-	1	The complete spec.

Code	Process connection material
A	304
L	316L
Y	Other materials (specify)

Code	Process connection
C24	Adjustable thread, M10 × 1, length: 8mm
C23	Adjustable thread, M12 × 1.5, length: 12mm
C40	Adjustable thread, M14 × 1.5, length: 12mm
C30	Adjustable thread, M16 × 1.5, length: 12mm
C1	Adjustable thread, M20 × 1.5, length: 14mm
H1	Adjustable thread, M27 × 2, length: 16mm
C3	Adjustable thread, G1/2, length: 14mm
C30	Adjustable thread, G1/4, length: 12mm
C16	Adjustable thread, G3/8, length: 12mm
C6	Adjustable thread, NPT1/4, length: 10mm
C10	Adjustable thread, NPT1/2, length: 14mm
F1	DN10
F2	DN20
F3	DN25
F4	DN32
F5	DN40
F6	DN50
	Flanged connection: specify flange standard, PN (nominal pressure), and RF (sealing face)
Y	Other process connections (specify)

Code	Sealing gasket
T	Copper
S	PTFE
N	None

Code	Junction box
FB	Explosion-proof junction box
FS	Waterproof junction box

Code	Electrical connection of junction box (female)
C1	M20×1.5
C10	NPT1/2
C3	G1/2

Code	Additional fittings
HJ	Welded base
N	None

Code	Temperature transmitter module
B1	4~20mA
B2	4~20mA + Hart + isolated
N	None

Continued A C24 T FB C1 HJ B The complete spec.

Order Guide

MTM100R-D	RTD Temperature Sensor (Direct lead type)										
	Code	RTD type									
	PA	RTD (Pt100)									
	PB	RTD (Pt1000)									
		Code	Number of sensors								
		1	Simplex								
		2	Duplex (for sheath ϕ5mm and above)								
			Code	RTD wiring							
			2	2-wire							
			3	3-wire							
			4	4-wire							
				Range	Measuring range						
				[X°C～ Y°C]	X and Y represent the lower and upper temperature limits, respectively (°C)						
					Code	Tolerance class					
					AA	AA ： ± (0.1+0.0017|t|)	PT100/PT1000：0°C～ 150°C				
					A	A： ± (0.15+0.002|t|)	PT100/PT1000：-30°C～ 300°C				
					B	B： ± (0.3+0.005|t|)	PT100：-200°C～ 500°C				
							PT1000：-50°C～ 500°C				
					Y	Other tolerance classes (specify)					
						Code	Sheath outer diameter (mm)				
						03	ϕ3				
						05	ϕ5				
						06	ϕ6				
						08	ϕ8				
						Y	Other diameters (specify)				
							Code	Sheath material (other materials available on request)			
							A	304			
							G	321			
							L	316L			
								-Number-	Length (mm) (excluding cold junction and thread length)		
									Code	Process connection	
									C1	Fixed thread, M20 x 1.5, length: 14mm	
									H1	Fixed thread, M27 x 2, length: 16mm	
									C30	Fixed thread, G1/4, length: 12mm	
									C16	Fixed thread, G3/8, length: 12mm	
									C6	Fixed thread, NPT1/4, length: 10mm	
									C10	Fixed thread, NPT1/2, length: 14mm	
									N	None	
									Y	Other process connections (specify)	

MTM100R-D	PA	1	3	[0°C ~100°C]	AA	03	G	-Number-	C1	The complete spec.

Code	Process connection material
A	304
L	316L
Y	Other materials (specify)

Code	Sealing gasket
T	Copper
S	PTFE
N	None

Code	Lead wire material
S	PTFE shielded (-60°C ~+250°C , shielded, corrosion resistant, flame retardant)
G	Silicone rubber (-40°C ~+200°C , high temperature resistance, not wear resistant, not waterproof)
P	PVC (-15°C ~+70°C , corrosion resistant, flame retardant)
Y	Other materials (specify)

- Number -	Cable length (mm)

Code	Cable protection
TH	Spring
BW	Bellows
Y	Other protection types (specify)

Continued	A	T	S	100	TH	The complete spec.

Notes

1、 The insertion depth of the thermowell shall be selected based on the pipe diameter and installation configuration. For optimal accuracy, the probe tip should be positioned near the center of the medium.
2、 Minimum insertion depth verifiable by third-party metrology institute is ⩾ 15d (d = probe diameter).
3、 If installation conditions on site do not allow the required insertion depth, thermal insulation shall be applied to the pipe surface to improve measurement accuracy.