

UNI-T®



UT714 Multifunction Temperature Process Calibrator



P/N:110401109796X

Preface

Thank you for purchasing this brand new product. In order to use this product safely and correctly, please read this manual thoroughly, especially the safety notes.

After reading this manual, it is recommended to keep the manual at an easily accessible place, preferably close to the device, for future reference.

Limited Warranty and Liability

Uni-Trend guarantees that the product is free from any defect in material and workmanship within one year from the purchase date. This warranty does not apply to damages caused by accident, negligence, misuse, modification, contamination or improper handling. The dealer shall not be entitled to give any other warranty on behalf of Uni-Trend. If you need warranty service within the warranty period, please contact your seller directly.

Uni-Trend will not be responsible for any special, indirect, incidental or subsequent damage or loss caused by using this device.

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1. Overview

UT714 is a high-performance, high-accuracy, handheld, multifunctional temperature calibrator. It can output and measure direct current and voltage with a high accuracy of 0.02%, it can respectively measure and output 10 kinds of thermal resistance and 10 kinds of thermocouple signals. It has the functionalities of automatic stepping and automatic sloping output, these functionalities help you to rapidly detect the linearity, the storage functionality facilitates the system setup, the data transferring functionality help the customers to rapidly test the communication.

Chart 1 Functionality of Input and Output

Functionality	Measurement	Output
DC Voltage	0~30V	0~10V
Resistance	0~5000Ω	0~4000Ω
DC millivolt	0~500mV	0~1000mV
Thermal Resistance	Pt100, Pt200, Pt500, Pt1000, Cu10, Cu50, Cu100, PT100-392, PT100-JIS, Ni120	Pt100, Pt200, Pt500, Pt1000, Cu10, Cu50, Cu100, PT100-392, PT100-JIS, Ni120
Thermocouple	R, S, K, E, J, T, N, B, L, U	R, S, K, E, J, T, N, B, L, U
Others	Progress output, slope output, step output, custom range	

2. Features

- a) The output accuracy and measurement accuracy reach up to 0.02%.
- b) It can output "Percentage", users can easily get different percentage values by pressing a button.
- c) It has the functionality of automatic stepping and automatic sloping output, these functionalities help you to rapidly detect the linearity.
- d) It can measure and output 10 kinds of thermal resistance and 10 kinds of thermocouple signal.
- e) It can save frequently-used status.
- f) The data transferring functionality helps you to rapidly test the communication.
- g) Adjustable screen brightness.
- h) Rechargeable NiMH battery.

3. Original accessories

Open the carton and take out the calibrator to thoroughly check if below accessories are missed or damaged, if missed or damaged, please contact the supplier.

- 1. UT714 ----- 1 piece
- 2. Probes ----- 1 pair
- 3. Alligator clips ----- 1 pair
- 4. User manual ----- 1 piece
- 5. AA NIMH battery ----- 6 pieces
- 6. Adaptor ----- 1 piece
- 7. USB cable ----- 1 piece
- 8. Cloth bag ----- 1 piece

4. Operation

Please use the calibrator according to the user manual. “Warning” refers to potential hazard, “Attention” refers to the situation where would damage the calibrator or tested devices.

Warning

To avoid electric shock, damage, explosive gas ignition, please follow below:

- Please use the calibrator according to this manual.
- Check before use, please do not use a damaged calibrator.
- Check the connectivity and insulation of the test leads, replace any exposed test leads.
- When using the probes, users should only hold the protection end of the probe.
- Do not exert a voltage with more than 30.0V on any terminals and earth line.
- If a voltage with more than 30.0V is applied on any terminals, the factory certificate will be out of effect, moreover, the device will be damaged permanently.
- Correct terminals, modes, ranges must be used when it is on output status.
- To prevent the tested device from being damaged, choose a correct mode before connecting the testing lead.
- Connect the common test lead and then the live test lead when wiring. Remove the live test lead first when disconnecting.
- Do not open the calibrator case.
- Before using the calibrator, please ensure that the battery door is tightly closed. Please refer the “Maintenance and Repair”.
- When the battery power is insufficient , replace or charge the battery as soon as possible to avoid wrong reading value which may cause electric shock. Before opening the battery door, first remove the calibrator from “Dangerous Zone”. Please refer “Maintenance and Repair”.
- Disassemble the test leads of the calibrator before opening the battery door.

- For CAT I, the standard definition of measurement is applicable to the circuit that does not directly connect to a power source.
- Specific replacement parts must be used when repairing the calibrators.
- The inside of the calibrator must be free from water.
- Before using the calibrator, input a voltage value to check if the operation is normal.
- Do not use the calibrator near explosive powder.
- For battery, please refer to “Maintenance and Repair”.
- Remove the test leads before switching to other outputs.

Warning

To prevent the calibrator or the test device from being damaged :

- The correct terminals, modes, ranges must be used when it is on output status.
- When measuring and outputting current, correct earplug, functionality and ranges must be used.

5. Symbol

	Double insulated
	Warning

6. Specification

1. The maximum voltage between the terminal and earth line, or any two terminals is 60V.
2. Range: manually
3. Operating Temp.: -10°C ~ 55°C
4. Storage Temp.: -20°C ~ 70°C
5. Relative Humidity: ≤90%(0°C ~ 30°C), ≤75%(30°C ~ 40°C), ≤50%(40°C ~ 50°C)
6. Altitude: 0 ~ 2000m
7. Battery: AA NIMH battery×6 pieces
8. Drop test: 1 meter
9. Dimension: 224×104×63mm
- 10.Weight: About 650g (Including batteries)

7. Structure

1. Input terminal and output terminal

Figure 1 UT714 Input terminal and output terminal. Chart 2 Description

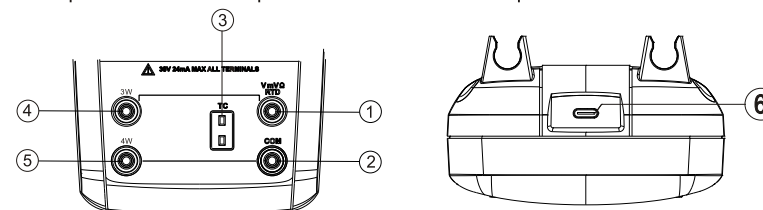


Figure 1 Input terminal and output terminal

Chart 2 Description

No.	Name	Description
① ②	Measure V, mV, Ω. Continuity test.	Terminal for outputting or measure voltage, millivolt, and resistance.
③	TC Socket	Thermocouple terminal.
④ ⑤	Three-wire or Four-wire measurement	For resistance measurement.
⑥	Charge/Data Transfer Port	Connect to 12V-1A adaptor for recharging, or computer for data transmission

2. Button

Figure 2 UT714 Calibrator buttons. Chart 3 Description.

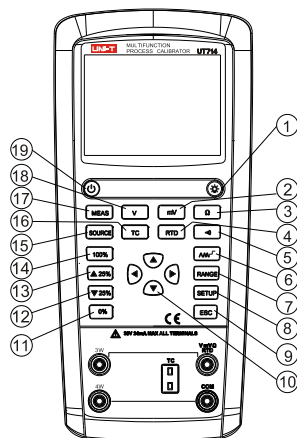


Chart 3 Button description

No.	Button	Description
1		Backlight adjustment.
2	mV	Millivolt measurement/output.
3	Ω	Resistance measurement/output.

4	RTD	RTD (Thermal resistance), select the graduation of thermal resistance.
5	••)	Continuity test.
6	MMF	Cycle selection: $\wedge$ Constantly output 0%-100%-0% at low slope (slow), repeat automatically. M Constantly output 0%-100%-0% at high slope (fast), repeat automatically. F At 25% of the step, step output 0%-100%-0%, repeat automatically.
7	RANGE	Switch range.
8	SETUP	Long press to enter menu. To measure TC, short press to switch to manual mode.
9	ESC	ESC.
10	◀ ▶ ▲ ▼	Direction buttons, adjust the cursor and parameter.
11	0%	Short press to output 0% value of the currently-set range, long press to reset the 0% value.
12	▼ 25%	Short press to decrease 25% of the range.
13	▲ 25%	Short press to increase 25% of the range.
14	100%	Short press to output the 100% value of the currently-set range, long press to reset the 100% values.
15	SOURCE	Mode selection.
16	TC	Select TC (Thermocouple), select the graduation of thermocouple.
17	MEAS	Measurement mode.
18	V	Voltage measurement/output.
19	⏻	Power on/off.

8. LCD Display

Symbol	Description	Symbol	Description
SOURCE	Source output mode		Battery power
MEASURE	Measurement mode	LOAD	Overload
	Data adjustment prompt		Progress output, slope output, step output
SIM	Transmitter output simulation	PC	Remote control
LOOP	Loop measurement	AP0	Auto power off

9. Operation

This part introduces how to operate the UT714 calibrator.

- Press (ON) for more than 3s to power on, LCD will display the model number.
- Long press [SETUP] to enter system setup menu. Press the arrow key to set parameter, short press [ESC] to exit the setup menu.



Figure 3 system setup

1) Auto power off:

Press ▼▲ to AUTO POWER OFF, press ◀▶ to set up auto power off time. The AUTO POWER OFF time will start when no button is pressed, the counting will restart if any button is pressed. The max. AUTO POWER OFF time is 30 minutes, "0" means auto power off is disabled.

2) Brightness:

Press ▼▲ to select the BRIGHTNESS, press ◀▶ to adjust the screen brightness. Press  on setup menu to rapidly adjust the brightness.

3) Remote Control

Press ▼▲ to select REMOTE CONTROL, press ◀▶ to set up for remote PC control.

4) Button beep control

Press ▼▲ to select BEEP CONTROL, press ◀▶ to set up button sound. "Beep" once enables button sound, "Beep" twice disables button sound.

10. Measurement Mode

If the calibrator is on 'Output' status, press **MEAS** to switch to "Measurement Mode".

1. Millivolt

Press **mV** to measure millivolt. Measurement page shown in figure 5. Connection shown in Figure 6.



Figure 5 millivolt measurement

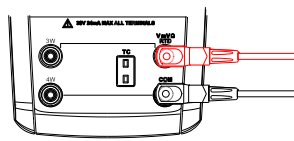


Figure 6 Connection

2. Voltage

Press **V** to measure the voltage. Measurement page shown in figure 7. Connection shown in Figure 8.



Figure 7 voltage measurement

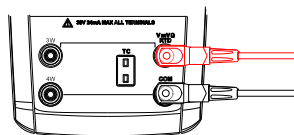


Figure 8 Connection

3. Continuity

Press **(diode symbol)** to measure the continuity. Measurement page shown in figure 9. Connection shown in figure 10.



Figure 9 Continuity measurement

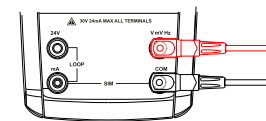


Figure 10 Connection

Note: The buzzer beeps once the resistance is less than 250Ω.

4. Resistance

Measurement ways include two-wire, three-wire and four-wire measurement.

Ut714 resistance measurement: Press **MEAS** to enter (MEASURE) mode, press **Ω** to select resistance functionality (The display unit is Ω). 2W2W, 3W3W and 4W4W measurement ways are displayed on the top left corner of the screen. Measurement page shown in figure 11. Connection shown in figure 12.



Figure 11 Resistance measurement

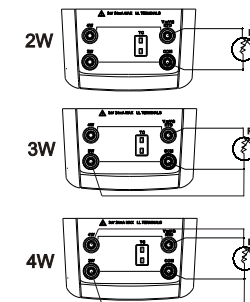


Figure 12 Connection

5. Thermal Resistance

UT714 can measure thermal resistances with different graduations, such as Pt100, Pt200, Pt500, Pt1000, Cu10, Cu50, Cu100, PT100-392, PT100-JIS, Ni120, etc. It can also measure 2W, 3W and 4W RTD. The 3W is the most common measurement way, the 4W is with the highest precision, while 2W is with the lowest precision. Press **[MEAS]** to enter (MEASURE) mode, the connecting way is same as UT714 resistance measurement, thermal resistance measurement shown in figure 13.



Figure 13 Thermal resistance measurement

6. Thermocouple

UT714 can measure 10 models of thermocouples, including R, S, K, E, J, T, N, B, L, U. Press **[TC]**, the thermocouple reading will display. Press **[TC]** one more time to select appropriate model of thermocouple. Press **[SETUP]** to set up the manual cold junction compensation. Short press **[ESC]** to switch to automatic compensation. Thermal resistance measurement shown in figure 14, connection shown in 15.



Figure 14 Thermal resistance measurement

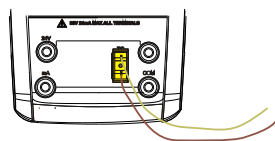


Figure 15 Connection

11. Source

If the calibrator is on "Measurement Mode", press **[SOURCE]** to switch to "Output Mode".

1. Millivolt

Press **[mV]** to select millivolt output. Millivolt output shown in figure 16, connection shown in figure 17. Press the arrow key (right & left) to choose output digit, press the arrow key (up & down) to set the value.



Figure 16 Millivolt output

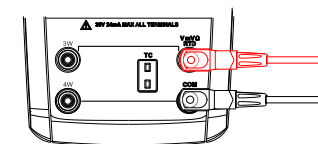


Figure 17 Connection

2. Voltage

Press **[V]** to select voltage output. Voltage output page shown in figure 18. Connection shown in figure 19. Press the arrow key (right & left) to choose output digit, press the arrow key (up & down) to set the value.



Figure 18 Voltage output

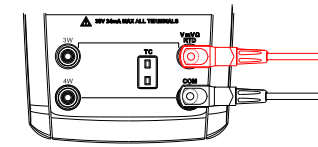


Figure 19 Connection

3. Thermocouple simulation

UT714 can measure 10 models of thermocouples, including R, S, K, E, J, T, N, B, L, U. Press **[TC]**, the thermocouple reading will display. Press **[TC]** one more time to select appropriate model of thermocouple. Press **[SETUP]** to set up the manual compensation value of cold junction temperature, press arrow key to adjust the manual compensation value, press **[SETUP]** again to finish the setup. Short press **[ESC]** to switch to automatic compensation. Thermal resistance measurement shown in figure 20, connection shown in figure 21.



Figure 20 Thermal resistance measurement

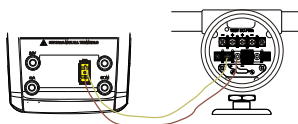


Figure 21 Connection

4. Thermal resistance simulation

UT714 can simulate thermocouples with different graduations, such as Pt100, Pt200, Pt500, Pt1000, Cu10, Cu50, Cu100, PT100-392, PT100-JIS, Ni120, etc. Press **[RTD]** to select RTD graduation. Press **[RTD]** again to select RTD type, press arrow key to adjust output value. Thermal resistance simulation shown in figure 22, connection shown in figure 23.



Figure 22 Thermal resistance simulation

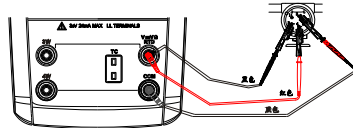


Figure 23 Connection

Note: "Exl HI"/"Exl LO" indicates the excitation current of to-be-tested device is out of the calibrator limitation.

5. Resistance output

Press **[Ω]** to select resistance functionality (the display unit is Ω), press RANGE to switch resistance range (400Ω and 4000Ω), press the arrow key to adjust the output value. Resistance output shown in figure 24, connection shown in figure 25.

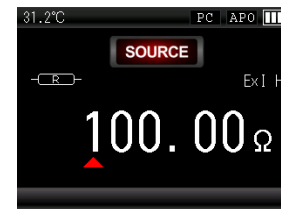


Figure 24 Resistance output

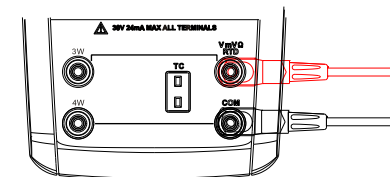


Figure 25 connection

12. Remote mode

Based on the instruction, turn on the PC control functionality, set the parameter of serial interface on PC and send the protocol command to control UT714.

Please access to UNI-T official website to download the communication protocol.

13. Advanced application

1. Percentage

When the calibrator is on output mode, short press [0%], [100%], [▲25%], [▼25%] to rapidly output percentage value accordingly, the [0%] or [100%] value of each output functionality is as below:

Output Functionality	0%value	100%value
Millivolt 100mV	0mV	100mV
Millivolt 1000mV	0mV	1000mV
Voltage	0V	10V
Current	4mA	20mA
Frequency 200Hz	0Hz	200Hz
Frequency 2000Hz	200Hz	2000Hz
Frequency 20kHz	2000Hz	20000kHz

The [0%] or [100%] value of each output can be reset by the following method:

- 1) Press the arrow key to adjust the value and long press [100%] until the buzzer beeps, a new [100%] value will be set as output value.
- 2) Long press [0%] until the buzzer beeps, a new [0%] value will be set as output value.

Note: The [100%] value must not be less than the [0%] value.

Short press [▲25%], the output value will add [25%] of the range between [100%] value and [0%] value.

Short press [▼25%], the output value will decrease [25%] range between [100%] value and [0%] value.

Note: If you short press [▲25%] or [▼25%] to adjust the value of output functionality, the output value shall not be greater than the [100%] value and not be less than [0%] value.

2. Slope

The automatic output functionality of the slope can constantly provide a dynamic signal to the transmitter. If pressing $\wedge$ or ∇ , the calibrator will produce a constant and repeated slope (0%-100%-0%). There are 3 kinds of slope:

- 1) $\wedge$ 0%-100%-0% 40 seconds, smooth slope.
- 2) ∇ 0%-100%-0% 15 seconds, smooth slope.
- 3) ∇ 0%-100%-0% 25% progress slope, each step keeps for 5 seconds.

If you want to exit the slope functionality, please press any key except for the slope key.

14. Indicator

Unless otherwise specified, the calibration period of all indicators is one year, the applicable temperature is +18°C to +28°C, the warm-up time is assumed as 30 minutes.

1. Output indicator

Indicator	Range	Resolution	Accuracy
DC Voltage	100mV	0.001mV	± (0.02%+10)
	1000mV	0.01mV	± (0.02%+10)
	10V	0.0001V	± (0.02%+2)
Resistance	400 Ω	0.01 Ω	± (0.02%+8)
	4000 Ω	0.1 Ω	± (0.05%+10)
Thermocouple R(TC)	0~100	1°C/1°F	±1.5°C
	100~1767	1°C/1°F	±1.2°C
Thermocouple S(TC)	0~100	1°C/1°F	±1.5°C
	100~1767	1°C/1°F	±1.2°C
Thermocouple K(TC)	-200~-100	0.1°C/0.1°F	±0.6°C
	-100~400	0.1°C/0.1°F	±0.5°C
	400~1200	0.1°C/0.1°F	±0.7°C
	1200~1372	0.1°C/0.1°F	±0.9°C

Thermocouple E(TC)	-200~-100	0.1°C/0.1°F	±0.6°C
	-100~600	0.1°C/0.1°F	±0.5°C
	600~1000	0.1°C/0.1°F	±0.4°C
Thermocouple J(TC)	-200~-100	0.1°C/0.1°F	±0.6°C
	-100~800	0.1°C/0.1°F	±0.5°C
	800~1200	0.1°C/0.1°F	±0.7°C
Thermocouple T(TC)	-250~400	0.1°C/0.1°F	±0.6°C
Thermocouple N(TC)	-200~-100	0.1°C/0.1°F	±1.0°C
	-100~900	0.1°C/0.1°F	±0.7°C
	900~1300	0.1°C/0.1°F	±0.8°C
Thermocouple B(TC)	600~800	1°C/1°F	±1.5°C
	800~1820	1°C/1°F	±1.1°C
Thermocouple L(TC)	-200~0	0.1°C/0.1°F	±0.7°C
	0~900	0.1°C/0.1°F	±0.5°C
Thermocouple U(TC)	-200~0	0.1°C/0.1°F	±0.7°C
	0~600	0.1°C/0.1°F	±0.5°C
Thermal Resistance Pt100-385(RTD)	-200~850	0.1°C/0.1°F	±0.3°C
Thermal Resistance Pt100-392(RTD)	-200~630	0.1°C/0.1°F	±0.3°C

Thermal Resistance Pt100-JIS(RTD)	-200~630	0.1°C/0.1°F	±0.3°C
Thermal Resistance Pt200-385(RTD)	-200~250	0.1°C/0.1°F	±0.2°C
	250~630	0.1°C/0.1°F	±0.8°C
Thermal Resistance Pt500-385(RTD)	-200~500	0.1°C/0.1°F	±0.3°C
	500~630	0.1°C/0.1°F	±0.4°C
Thermal Resistance Pt1000(RTD)	-200~650	0.1°C/0.1°F	±0.15°C
Thermal Resistance Cu10(RTD)	-100~260	0.1°C/0.1°F	±1.8°C
Thermal Resistance Cu50(RTD)	-50~150	0.1°C/0.1°F	±0.5°C
Thermal Resistance Cu100(RTD)	-50~150	0.1°C/0.1°F	±0.25°C
Thermal Resistance Ni120(RTD)	-80~260	0.1°C/0.1°F	±0.2°C

NOTE:

- 1) For those temperatures that are not within +18°C~+28°C, the temperature coefficient of -10°C~18°C and +28°C~55°C is ±0.005%FS/°C.
- 2) The sensitivity of frequency measurement: Vp-p≥1V, waveform: rectangular wave, sine wave, triangular wave, etc.

2. Input indicator

Indicator	Range	Resolution	Accuracy
DC Voltage	50mV	0.001mV	±(0.02%+10)
	500mV	0.01mV	±(0.02%+5)
	30V	0.001V	±(0.02%+2)
Resistance	500Ω	0.01Ω	±(0.05%+10)
	5000Ω	0.1Ω	±(0.05%+10)
Thermocouple R(TC)	0~500	1°C/1°F	±1.8°C
	500~1767	1°C/1°F	±1.5°C
Thermocouple S(TC)	0~500	1°C/1°F	±1.8°C
	500~1767	1°C/1°F	±1.5°C
Thermocouple K(TC)	-100~0	0.1°C/0.1°F	±1.2°C
	0~1372	0.1°C/0.1°F	±0.8°C
Thermocouple E(TC)	-50~0	0.1°C/0.1°F	±0.9°C
	0~850	0.1°C/0.1°F	±1.5°C
Thermocouple J(TC)	-60~0	0.1°C/0.1°F	±1°C
	0~1120	0.1°C/0.1°F	±0.7°C

Thermocouple T(TC)	-100~0	0.1°C/0.1°F	±1.0°C
	0~400	0.1°C/0.1°F	±0.7°C
Thermocouple N(TC)	-200~0	0.1°C/0.1°F	±1.5°C
	0~1300	0.1°C/0.1°F	±0.9°C
Thermocouple B(TC)	600~800	1°C/1°F	±2.2°C
	800~1000	1°C/1°F	±1.8°C
	1000~1820	1°C/1°F	±1.4°C
Thermocouple L(TC)	-60~0	0.1°C/0.1°F	±0.7°C
	0~900	0.1°C/0.1°F	±0.5°C
Thermocouple U(TC)	-100~0	0.1°C/0.1°F	±0.7°C
	0~600	0.1°C/0.1°F	±0.5°C
Thermal Resistance Pt100(RTD)	-200~850 (2W 3W)	0.1°C/0.1°F	±0.4°C
	-200~850 (4W)	0.1°C/0.1°F	±0.3°C
Thermal Resistance Pt200(RTD)	-200~100	0.1°C/0.1°F	±0.8°C
	100~300	0.1°C/0.1°F	±0.9°C
	300~630	0.1°C/0.1°F	±1.0°C
Thermal Resistance Pt500(RTD)	-200~500 (2W 3W)	0.1°C/0.1°F	±0.6°C
	-200~500 (4W)	0.1°C/0.1°F	±0.3°C
	500~630 (2W 3W)	0.1°C/0.1°F	±0.9°C
	500~630 (4W)	0.1°C/0.1°F	±0.4°C

Thermal Resistance Pt1000(RTD)	-200~100 (2W 3W)	0.1°C/0.1°F	±0.4°C
	-200~100 (4W)	0.1°C/0.1°F	±0.2°C
	100~630 (2W3W)	0.1°C/0.1°F	±0.5°C
	100~630 (4W)	0.1°C/0.1°F	±0.2°C
Thermal Resistance Cu10(RTD)	-100~260	0.1°C/0.1°F	±1.8°C
Thermal Resistance Cu50(RTD)	-50~150	0.1°C/0.1°F	±0.7°C
Thermal Resistance Cu100(RTD)	-50~150 (2W 3W)	0.1°C/0.1°F	±0.4°C
	-50~150 (4W)	0.1°C/0.1°F	±0.25°C
Thermal Resistance Pt100-392(RTD)	-200~800 (2W 3W)	0.1°C/0.1°F	±0.5°C
	-200~800 (4W)	0.1°C/0.1°F	±0.3°C
Thermal Resistance Pt100-JIS(RTD)	-200~630 (2W 3W)	0.1°C/0.1°F	±0.5°C
	-200~630 (4W)	0.1°C/0.1°F	±0.3°C
Thermal Resistance Ni120(RTD)	-80~260 (2W 3W)	0.1°C/0.1°F	±0.3°C
	-80~260 (4W)	0.1°C/0.1°F	±0.2°C
Continuity detected	500Ω	0.01Ω	≤50ΩIt beeps

NOTE:

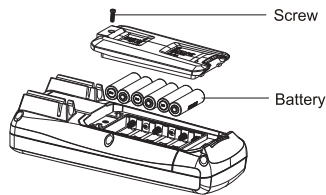
- 1) For those temperatures that are not within +18°C~+28°C, the temperature of -10°C~18°C and +28°C~55°C is 0.005%FS/°C.
- 2) The max load of DC voltage output is 1mA or 10kΩ, the smaller load shall prevail.
- 3) The max resistance of DC output: 1000Ω@20mA.

15. Maintenance and Repair

⚠ Warning: Make sure that the power is off before opening the rear cover of the calibrator or battery cover, and that the probe is away from input terminal and tested circuit.

1. General maintenance and repair

- Clean the case with damp cloth and mild detergent, do not use abrasives or solvents.
- If there is any malfunction, stop using the device and send it for maintenance.
- Please ensure that the calibrator is repaired by professionals or designated repair center.
- Calibrate the meter once a year to ensure its performance.
- If the meter is not in use, turn off the power. If the meter is not in use for a long time, please take out the batteries.
- Ensure that the instrumentation is free from moisture, high temperature and strong electromagnetic fields.



2. Install or replace the battery

NOTE: “” indicates battery power is less than 20%, please replace the battery to make sure that the calibrator can work normally, otherwise the measurement accuracy might be affected. Please replace the old battery by 1.5V alkaline battery or 1.2V NI-MH battery.

Instructions are subject to change without prior notice.