

# **Operation Instruction for Thermocouple Calibrator**

# **WARRANTY**

Our company warrants to the original purchaser that each product it manufactures will be free from defects in material and workmanship under normal use and service for a period of one year from date of purchase. Our company's warranty does not apply to fuses, test leads or any product which, in our company's opinion, has been misused, altered, or damaged by accident or abnormal conditions of operation or handling.

To obtain warranty service, contact your nearest Service Center (or send the product, with a description of the difficulty, and postage prepaid, to the nearest Service Center). Our company assumes no risk for the damage in transit. Our company will, at its option, repair or replace the defective product free of charge or refund your purchase price. However, if our company determines that the failure was caused by misuse, alterations, accident or abnormal condition of operation or handling, you will be billed for the repair and the repaired product will be returned to you transportation prepaid.

## **SHIPPING TO MANUFACTURER FOR REPAIR OR ADJUSTMENT**

All shipment of our company's instruments should be made via United Parcel Service or "Best Way" prepaid. The instrument should be shipped in the original carton; or if it is not available, use any suitable container that is rigid and of adequate size. If a substitute container is used, the instrument should be wrapped in paper and surrounded with at least

four inches of excelsior or similar shock-absorbing material.

## **CLAIM FOR DAMAGE IN SHIPMENT TO ORIGINAL PURCHASER**

The instrument should be thoroughly inspected immediately upon original delivery to purchaser. All material in the container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately.




If the instrument is damaged in any way, a claim should be filed with the carrier immediately. (To obtain a quotation to repair shipment damage, contact the nearest Service Center.) Final claim and negotiations with the carrier must be completed by the customer.

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## **Section One Safe Use**

To ensure safe use, the meter and manual employ the following symbols:

-  **Warning** identifies conditions and actions that may pose hazard(s) to the user and avoid methods.
-  **Caution** identifies conditions and actions that may damage the meter or the equipment under test and avoid methods.
-  **Note** reminds Users of knowledge of symbols for the operation and explanations of the features.

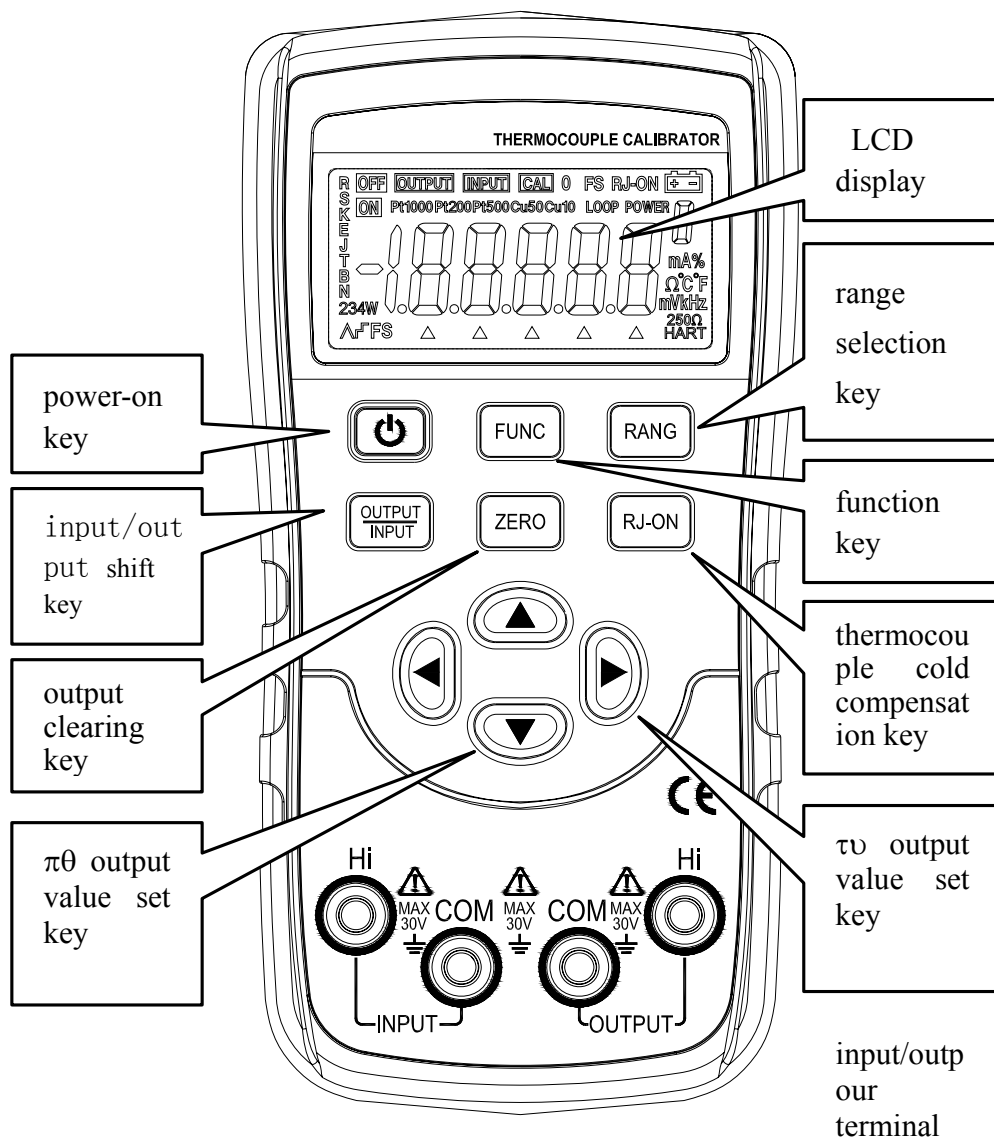
To avoid possible electric shock or any other dangers, please do follow the under-mentioned rules:

-  **Warning**
  - Do not operate the meter around explosive gas, vapor, or dust, which is extreme dangerous.
  - Never apply voltage exceeding 30V between any two terminals and earth ground terminals.
-  **Caution**
  - Do not open the meter's case except for the professional technicians.
  - Use a damp cloth with neutral detergent for cleaning the meter periodically. Do not use abrasives or solvents.

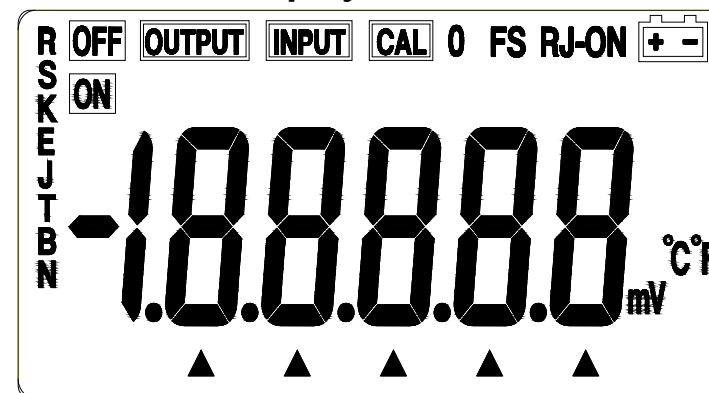
## **Note**


- To ensure accuracy, preheat for 5 minutes after power-on.
- Please contact the manufacture or dealers if the Users have higher accuracy requirement.


## **Section Two Components and Functions of Meter's Panel**



**Illustration for LCD display area**



- OUTPUT** : indicates the meter is in output state.
- INPUT** : indicates the meter is in input state.
- CAL** : indicates the meter is in calibration state.
- 0 FS** : indicates the present calibrated zero point or full point etc. when the meter is in calibration state.
- RJ-ON** : indicates the meter has undergone cold junction compensation work (See detailed section).
-  : indicates the batteries are exhausting and needs replacement (See detailed section).
- ▲** : indicates present set output value.
- mV, °C, °F** : indicates the unit for present output value.

- i)  : indicates connection of output signals.
- j) R, S, K, E, J, T, B, N: indicates graduated no. of thermocouple(TC).

### **Section Three Maintenance**

This section provides some basic maintenance procedures. Repair, calibration, and servicing not covered in this manual must be performed by qualified personnel. For maintenance procedures not described in this manual, contact a Service Center.

#### **(1) General maintenance**

- Periodically wipe the case with a damp cloth and detergent; do not use abrasives or solvents.
- Take out the batteries if the meter won't be used for a long time.
- Dirt or moisture in the terminals can affect readings.

Clean the terminals as follows:

- (1) Turn the meter off and remove all test leads.
- (2) Shake out any dirt that may be in terminals.
- (3) Soak a new swab with alcohol. Clean each terminal with the swab.

#### **(2) Replacing the batteries**

The meter is powered by two LR6 alkaline batteries (AA).

 **Warning**

To avoid electrical shock or personal injury:

- Remove test leads from the meter before opening the battery door.
- Close and latch the battery door before using the meter.

#### **Note**

- The new and old batteries can not be mixed.
- Make sure the battery's poles are in accordance with the marks illustrated in battery pool when replacing them.
- Take out the batteries if the meter won't be used for a long time.
- Dispose the old batteries in accordance with the local law.

Replace the batteries as follows (See Figure 3-1):

1. Turn the rotary switch to OFF and remove the test leads from the terminals;
2. Take off the support of the meter, remove the battery door by a standard-blade screwdriver, and then take off the battery case;
3. Replace with two new batteries;
4. Reinstall the battery case, spin the screws and tighten screws.

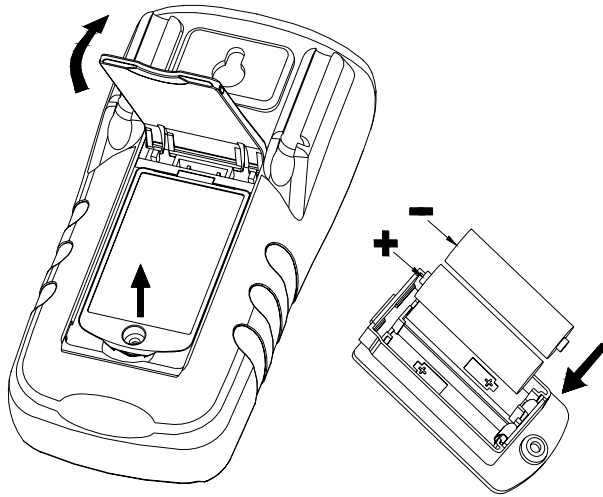


Figure 3-1 replacing batteries

#### **Section Four Power on/Power off the Meter**

##### **(1) Turn on/off the meter**

Press [power] key to electrify the meter, and repress [power] key for more than 1 second to cut off the power.

When turning on the power, the meter starts to make inner diagnose and display in full screen, and then undertakes corresponding operation.

##### **⚠ Note**

To ensure correct electrifying operation, please wait for 5 seconds to turn on the meter again after cutting off the power.

##### **(2) Automatically turn off the power**

The default factory value is set as: the meter will automatically turn off if no operation has been made within 15 minutes.

The Users can set by themselves to choose whether using this function or not (See the detailed section).

#### **Section Five Output of the Meter**

The meter generates DC current or thermocouple simulate temperature by the Users from the corresponding output terminals (OUTPUT) .

##### **⚠ Caution**

Do not apply any voltage to output terminal; otherwise damage to interior circuit may occur if the voltage is not proper.

##### **(1) DC voltage output**

1. Insert the testing probe into the jack of the meter's output terminal (OUTPUT), and connect the other end with input terminal of the Users' meter, see Figure 5-1:
2. Press [FUN] key , select V/mV function, and display 'V' or 'mV' unit;
3. Press [RANG] key, select 100.00mV or 1.0000V range;
4. Press [τ] / [υ] key, select output set bit;



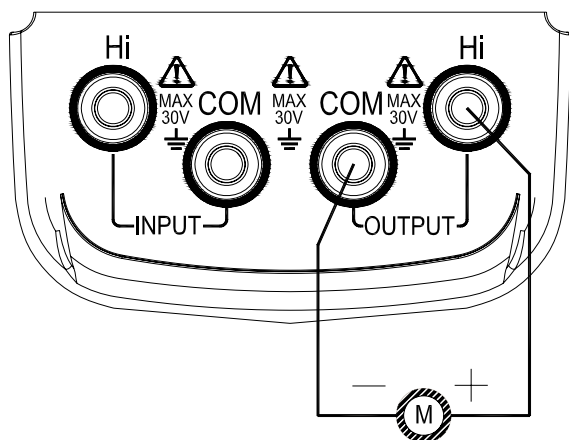


Figure 5-1

5. Press  $\{\pi\} / \{\theta\}$  key , change the value of set bit, and the value can carry or abdicate automatically, and hold the key, the value will change constantly after one second;
6. Press  $\{\text{ZERO}\}$  key, the output will be set as 000.00mV or 0.0000V.

## (2) **Thermocouple (TC )simulate output**

1. Insert the testing probe into the jack of the meter's output terminal (OUTPUT) and connect the other end with input terminal of the Users' meter, see Figure 5-1;
2. Press  $\{\text{INPUT/OUTPUT}\}$  key, select output function
3. Press  $\{\text{FUN}\}$  key , select thermocouple(TC) function, and display '°C' unit and 'R' graduation no.;
4. Press  $\{\text{RANG}\}$  key, select corresponding graduation no.;

5. Press  $\{\tau\} / \{\upsilon\}$  key, select output set bit;
6. Press  $\{\pi\} / \{\theta\}$  key , change the value of set bit, and the value can carry or abdicate automatically, and hold the key, the value will change constantly after one second.

## 7. Automatic compensation of cold junctions

When calibrating meter with temperature cold junction compensation directly, press  $\{\text{RJ-ON}\}$  key to start the automatic compensation function of cold junctions of this meter, and it will output the necessary temperature thermoelectric force, and display 'RJ-ON'. (See detailed section for the accuracy of cold junction compensation), and :

Output thermoelectric force = the corresponding thermoelectric force of set temperature – the corresponding thermoelectric force of room temperature

- \* The Users need to wait for 2 seconds when starting the interior cold junction compensation of the meter and the meter will make automatic compensation every 10 seconds
- \* When the operation ambient temperature change, the Users need to wait until the interior compensation sensor stabilizes (about 10 minutes) and then use
- \* if the Users do not use the automatic compensation function of this meter, press the  $\{\text{RJ-ON}\}$  key and the symbol 'RJ-ON' will not display any more

8. Press  $\{\text{ZERO}\}$  key, the output will be set as 0000°C

(R、S graduation)、400°C(B graduation)、0000.0°C  
(other graduation) .

9. Press [°C/°F] key , select Centigrade or Fahrenheit unit.

## Section Six Measurement

### ⚠ Warning

**Usage:** the maximum voltage allowed between the terminals and within the terminals and the ground is 30V, any exceeding over this voltage may cause damage to the meter and even make injury to persons.

### ⚠ Caution

**Usage:** do not apply any voltage exceeding the maximum allowed to the input terminals, which may cause damage to the meter.

**Usage:** when connected to the measured meter, please first cut off the electricity supply. A connection to the measured meter with power may cause damage of this meter.

**Usage:** pay particular attention to not to connect the current signal to the input terminal, incorrect connection may cause damage to this meter and the meter under measured.

### (1) Measuring DC voltage

1. Insert the testing probe into the jack of the meter's input terminal (INPUT), and connect the other end with output terminal of the Users' meter, see Figure

6-1:

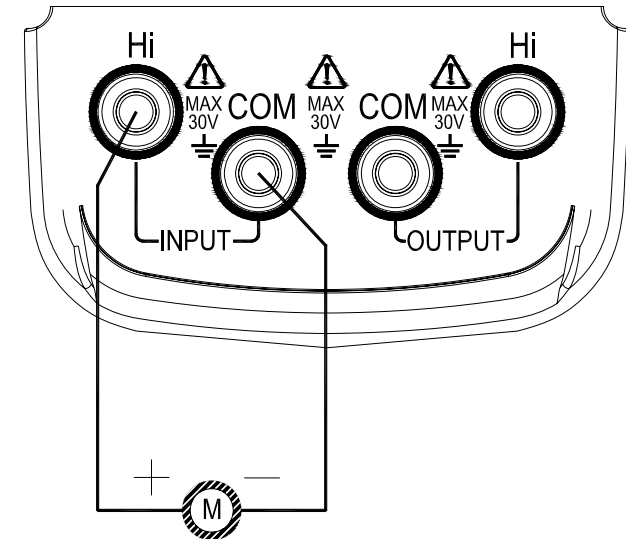


Figure 6-1

2. Press [INPUT/OUTPUT] key , and the LCD displays 'INPUT', 'ON', 'mV', indicating the meter is in input state;
3. The meter starts to measure, and the LCD displays '000.00' which indicates waiting and then displays measurement result.
4. The refreshing rate of measurement is about twice every second, and if the measured value exceeds the measurement range, the LCD displays 'OL'.

### (2) Measuring thermocouple(TC)

1. Insert the testing probe into the jack of the meter's input terminal (INPUT), and connect the other end with output terminal of the Users' meter, see Figure 6-1:

2. Press (INPUT/OUTPUT) key , and the LCD displays 'INPUT', indicating the meter is in input state;
3. Press 【FUN】 key , select thermocouple(TC) function, and display '°C' unit and 'R' graduation no.;
4. Press (RANG) key, select corresponding graduation no.;
5. The LCD displays '0000' , indicating waiting and then displays measurement result. And the refreshing rate is approximately once a second, and if the measured value exceeds the measurement range, the LCD displays 'OL' .
6. Automatic compensation of cold junctions

When calibrating meter with temperature cold junction compensation directly, press (RJ-ON) key to start the automatic compensation function of cold junctions of this meter, and :

Displayed temperature = the corresponding temperature of input thermoelectric force + room temperature

### **Section Eight Performance Index**

Accuracy is specified for a period of one year after calibration, at 23±5°C, with relative humidity to 75%.

Accuracy specifications are given as: ± ([% of reading] + [number of least significant digits]) ("Counts" refers to the number of increments or decrements of the least significant digit).

### **Output function and technical index**

Output	Range	Output range	Resolution	Accuracy	Illustration
DCV	100mV	-10.00~110.00mV	0.01mV	0.05%+30uV	Max. output current ±2mA

7. Press (°C/°F) key , select Centigrade or Fahrenheit unit.

### **Section Seven Function Setting**

The following operation can change the automatic power off function of the meter:

1. When the meter is in power-off state, press (power) key and the LCD displays fully , loose (power) key and press (RANG) key, the meter enters into maintenance state and the LCD displays 'AP-XX'
2. Press (θ) key and the LCD displays symbol 'AP-OF', the meter stops automatically power-off function ; The LCD displays symbol 'AP-ON', the meter restores automatically power-off function, and the meter exit from maintenance state if cutting off the power again.

	1V	-0.1000~1.1000V	0.1mV	0.05%+0.3mV	
TC	R	-40~1760℃	1℃	0.05%+3（less than or equals to 100℃）	Employs ITS-90 temperature standard The accuracy does not include the error of interior temperature compensation sensor The accuracy does not include the impact of interior thermoelectric force
	S	-20~1760℃	1℃	0.05%+2（more than 100℃）	
RTD	B	400~1800℃	1℃	0.05%+3（less than or equals to 600℃） 0.05%+2（more than 600℃）	
	E	-200.0~1000.0℃	0.1℃	0.05%+20（less than or equals to -100℃） 0.05%+10（more than -100℃）	
	K	-200.0~1370℃	0.1℃		
	J	-200.0~1200.0℃	0.1℃		
	T	-200.0~400.0℃	0.1℃		
	N	-200.0~1300.0℃	0.1℃		

### ***Input function and technical index***

Input	Range	Output range	Resolution	Accuracy	Illustration
DC voltage DCmV	100mV	-10.00~110.00mV	0.01mV	0.05%+3	Input resistance: 1MΩ
thermocouple TC	R	-40℃~1760℃	1℃	0.05%+3 (less than or equals to 100℃)	Input resistance : 1MΩ Employs ITS-90 temperature standard

	S	-200℃～1760℃		0.05%+2（more than 100℃）	The accuracy does not include the error of interior temperature compensation sensor The accuracy does not include the impact of interior thermoelectric force
	B	400℃～1800℃		0.05%+3(less than or equals to 600℃) 0.05%+2（more than 600℃）	
	K	-200.0℃～1370.0℃	0.1℃	0.05%+20（less than or equals to -100℃） 0.05%+10（more than -100℃）	
	E	-200.0℃～1000.0℃			
	J	-200.0℃～1200.0℃			
	T	-200.0℃～400.0℃			
	N	-200.0℃～1300.0℃			

### General feature

- power : two 1.5V alkaline batteries(LR6)
- power consumption : about 50m/3V
- maximum allowed voltage : 30V (within terminals or between terminal and earth ground)
- operation temperature range : 0°C~50°C
- operation humidity range : ≤ 80%RH
- storage temperature range : ≤ -10°C~55°C
- storage humidity range : ≤ 90%RH
- temperature coefficient :  $0.1 \times$  (dedicated accuracy) %/°C (5°C~18°C、28°C~40°C)
- measurement : 180 (L) × 90 (W) × 47 (D) mm (with protector)

- weight : about 500g
- accessory : User's Manual, industrial testing lead CF-36 (clips for probe)
- safety : complies with IEC1010 (safety standard issued by International Electrician Committee)

***Section Nine Note for the Manual***

- The present operation instruction is subject to change without notice;
- The content of the operation instruction is regarded as correct. Whenever any user finds its mistakes, omission, etc., he or she is requested to contact the manufacturer;
- The present manufacturer is not liable for any accident and hazard arising from the customer misuse or inadvertent operation;
- The functions described in this operation instruction should not be used as grounds to apply this product to a particular purpose.