Profesional Temperature Measuring Instrument

Instruction manual

V2.2

Contents

Document Description

This section provides important advise while using this instrument.

This document contains all the information that is required about how to use this instrument safely and effectively. Please read it carefully and be familiar with the operation of this product.

Button Introduction

Short Press: Press the button and then lift it, there will be a beep when pressed.

Long Press: Press and hold the button for about 2 seconds, then lift it up after hearing the prompt.

There will be a prompt sound when the corresponding function of the button is activated. If there is not any sound, which means that the current function is not available or the button sound is turned off.

Identification Introduction

Identification	Signification	Introduction
!!	Note	Provide important advise and information
✓	Condition	Conditions that must be met before performing an operation
➢, 1, 2...	Objective	Indicate what user wants to achieve. The sequence number is the steps required to achieve the objective, and these sequences must be followed all along
BUTTON	Button	Short press/long press the button
-	Supplement	Supplementary instructions for certain operations/items
●	Example	List some related details or examples
◆	Result	Obtained when performing some certain operations

1. Safety Introduction

This section describe the general rules that must be obeyed and followed in order to use this product safely.

Avoid Personal Injury/Equipment Damage

- Do not use this instrument to measure on alive parts or nearby. (Especially for high voltage)
- The probe cannot be used to measure corrosive solvents, unless it is a designated anti-corrosion probe.

Statement of Valid Safety/Warranty

- Can only operate the instrument within the measuring range specified in this technical sheet.
- Always use the instrument in the correct way and its intended purpose.
- Do not place the handle and cable in an environment above 80°C unless they are explicitly allowed to be used in high temperature environment. The temperature given on the probe is only related to the measuring range of the sensor.
- Only disassemble the instrument when it is clearly stated in the document for maintenance and repair purposes. Only perform the maintenance and repair work described in the documentation. Perform maintenance and repair work in accordance with the prescribed steps. For safety's sake, please use the original factory accessories.

Correct Disposal Statement

- Send the used batteries to the battery recycling point.
- Please return the product to the original factory when the service life of this product is running out. We promise to dispose of these recycled products in an environmentally friendly manner.

2. Intended Use

This chapter describes the intended using range of this product.

Use this product only for those applications which it is designed specifically. This product is a dual-channel high-precision measuring instrument with calibration for temperature measurement.

Accurate Measurement: Whether it is a low-temperature cold storage or a high-temperature boiler, PT100 and PT1000 sensors can ensure accurate measurement across the entire range.

Safe and Reliable: Provide you with a safe and reliable measurement experience during the measurement process.

High Scalability: Users can be compatible with more types of probes through the calibration function, such as PT100 (3916), PT100 (3926).

Outstanding Performance: Large backlight display; temperature over limit alarm; maximum/minimum/average value display, large dot matrix screen to display more information.

Practical Accessories: Protective soft cover, waterproof and oil-proof. When it is connected with temperature probe, it can reach IP52 protection level.

This product can be used for the following tasks/applications (including but not limited to):

- Temperature standard instrument
- Scientific experiment
- Medical
- Food
- Chemical industry
- HVAC industry

This product can not be used for the following tasks/applications (including but not limited to):
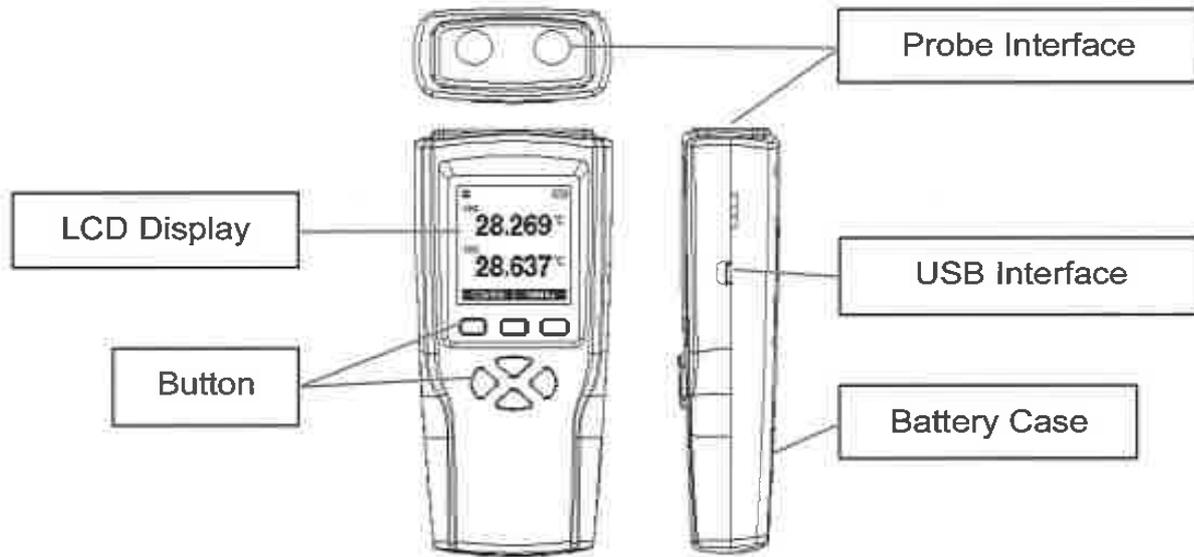
- Use in explosive hazardous areas
- Use in high-voltage areas
- Smelting industry

3. Product Description

This section describes an overview of the product components and their functions.

3.1 Display and Control Elements
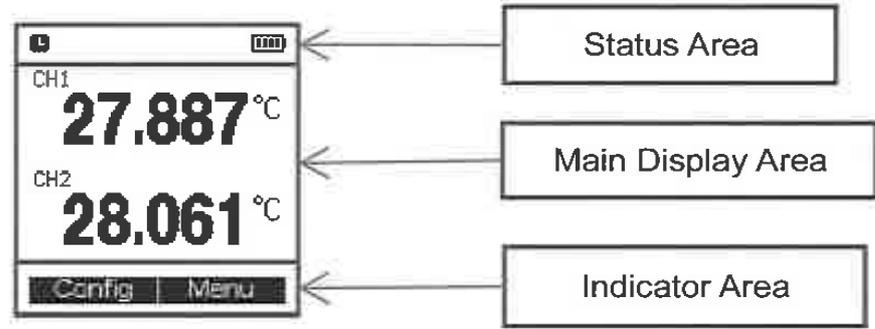
Instrument Overview

Probe Interface

LCD Display

28.269°C
28.637°C

USB Interface

Button

Battery Case

Button

Button	Function
F1	Multi-functional button 1, its function will be displayed at the bottom left of the screen
⏻	Turn on the instrument, turn off the instrument(long press)
☀	Turn on/off the backlight
F2	Multi-functional button 2, its function will be displayed at the bottom right of the screen
PROBE	Switch the type of probe
HOLD	Keep the current reading
MAX/MIN/AVG	Display the maximum/minimum/average value
℃/℉	Switch the unit of reading

Important Display

Display	Signification
❗	Alarm enable: displayed when the alarm function is turned on, and combined with the next icon to indicate the enabled channel
1, 2, 12	Only channel 1 enables alarms, only channel 2 enables alarms, and both channels enable alarms
⬆, ⬇	High and low limit alarm: display when the temperature is higher than the high limit or lower than the low limit
L	Auto power off: Display when the auto power off function is turned on
🔋	Battery capacity: display when the instrument is powered by battery
💻, ⚡	Displayed when the instrument is connected to the computer, and displayed when the instrument is connected to USB power

Regional Division


```
┌──────────────────────┐
│ 🕐            🔋      │  ◄──── Status Area
│ CH1                  │
│   27.887 °C          │  ◄──── Main Display Area
│ CH2                  │
│   28.061 °C          │
│ ▐ Config │ Menu ▌    │  ◄──── Indicator Area
└──────────────────────┘
```

Dividing area is to facilitate you quickly to locate the position of the icon or reading you want to view.

3.2 Interface

● **Probe Interface**
  — The pluggable probe can be connected to the instrument through the probe interface.
● **USB Interface**
  — The instrument can be connected to a computer or other 5V output USB power supply equipment through a Micro USB cable.

3.3 Power Supply

Under normal circumstances, the instrument uses 3 1.5V AAA batteries or 1.2V rechargeable batteries for power supply. 5V voltage can be provided through the USB interface. However, unstable USB power supply may cause inaccurate measurement. So we recommend that user use a genuine 5V adapter as power supply.

4. Operation

This section describes operations frequently performed when using this product.

4.1 Preparation

- Tear the protective film off on the display.
- Put in the battery/rechargeable battery and pay attention to the polarity of the battery.
- Connect the plug of the probe to the probe interface of the instrument.

4.2 Turn On/Off

➢ **Turn on the instrument/Check the version number and serial number**
  1. Short press⟨ ⏻ ⟩to turn on the instrument. When the instrument is on, press the button⟨℃/℉⟩ continuously to check the version number and serial number.

➢ **Turn off**
  1. Long press⟨ ⏻ ⟩until you see "shut down" on the screen, then raise the button⟨ ⏻ ⟩.

4.3 Backlight

➢ **Turn on/off the backlight**
  ✓ Turn on the instrument.
  1. Short press⟨ ☀ ⟩, when it shows ☀ which means the backlight is on.

4.4 Multi-Funcitonal Button

● There are two multi-functional buttons for this instrument:⬜F1⬜ and⬜F2⬜. Their specific functions will be displayed in the indicator area.
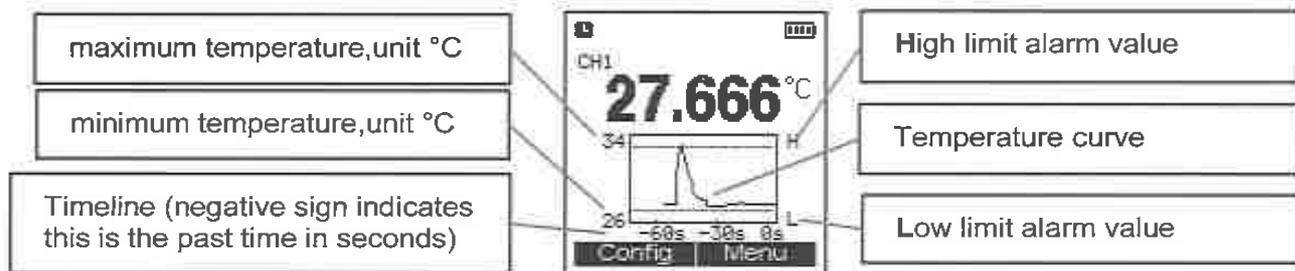
Common Function for F1		Common Function for F2	
Config	Enter the configuration interface	Menu	Enter the menu interface
Enter	Enter the next option interface	Exit	Exit the configuration interface or menu interface
Set	Change the setting of the current option		
Ok	Confirm the change of an option or value	Back	Return to the previous interface or exit the editing interface
Yes	Perform an action		
Edit	Edit a value	No	Cancel an action

4.5 Channel Mode

● This instrument has two platinum resistance measurement channels and four channel modes, which can be used flexibly to meet various measurement needs. As shown in the following table:

Channel Mode	Dual channel merge mode	Single channel mode one	Single channel mode two	Dual channel difference mode
Example	CH1 **28.292** °C CH2 **28.248** °C	CH1 **28.229** °C	CH2 **28.204** °C	CH1-CH2 **-0.323** °C CH1: 27.702 °C CH2: 28.025 °C
Feature	Dual-channel to be measured and displayed simultaneously	Can view the temperature change curve of channel one in the past 70 seconds.	Can view the temperature change curve of channel two in the past 70 seconds.	Suitable for measuring items related to temperature difference.

● Single Channel Trend Chart

maximum temperature,unit °C

minimum temperature,unit °C

Timeline (negative sign indicates this is the past time in seconds)

High limit alarm value

Temperature curve

Low limit alarm value

‼ The trend graph maximum temperature is set to 105% of the maximum measured temperature over the past 70 seconds. Therefore, the display shows that the temperature may be outside the measurement range, but this does not mean that the instrument can measure temperatures outside this range. The same is true for the lowest temperature of the trend graph.

4.6 Instrument Settings

➤ **To enter configuration interface**
  ✓ The instrument is turned on and the function description area displays: Config | Menu
  1. Press F1 (Config).Enter the configuration interface.
     ‼ The configuration interface is as shown on the right. You can press the ▲ / ▼ button to move the cursor.
     ‼ The settings related to instrument properties are located in the configuration interface.
     ‼ You can exit the configuration mode at any time by pressing the F2 (Exit). The settings will be saved when you exit the configuration interface.

➤ **To set channel mode**

- ✓   Configuration mode is opened ,move the cursor to "Channel Mode" and press `F1` (Enter).
- 1.   Press `▲`/`▼` to select mode. Press `F1` (Ok)to confirm or press `F2` (Back)to exit.

➢ **To set the sound when pressing button**
- ✓   Enter the configuration interface and move the cursor to "Sound".
- 1.   Press `F1` (Set)to switch settings.

➢ **To set the automatic shut-down**
- ✓   Enter the configuration interface and move the cursor to "Auto off".
  - ‼   After the automatic shut-down function is enabled, if no is pressed within 10 minutes, the instrument will automatically shut down.
- 1.   Press `F1` (Set)to switch settings.

➢ **To reset**
- ✓   Enter the configuration interface and move the cursor to "Recovery", press `F1` (Enter)and wait for 5 seconds.
- 1.   Press `F1` (Yes)to restore factory configuration. Press `F2` (No)to return to the configuration interface.

4.7 Data Settings

➢ **To enter menu interface**
- ✓   The instrument is turned on and the function description area displays: `Config | Menu` .
- 1.   Press `F2` (Menu)to enter menu interface.
  - ‼   The menu interface will change according to the channel mode, as shown in the following table.

Channel mode	Dual channel merge mode		Single channel 1 mode	Single channel 2 mode	Dual channel difference mode
Option 1	High Limit-CH1	High Limit-CH2	High Limit-CH1	High Limit-CH2	Difference Limit
Option 2	Low Limit-CH1	Low Limit-CH2	Low Limit-CH1	Low Limit-CH2	Diff-Alarm
Option 3	Alarm-CH1	Alarm-CH2	Alarm-CH1	Alarm-CH2	Calibration
Option 4	Calibration		Calibration	Calibration	

!!   Press[▲]/[▼]to switch menu options. If there is a triangle icon at the right end of the cursor, it means that there are sub-options, press[◄]/[►]to switch.

!!   The options related to measurement data are in the menu interface.

!!   You can exit the menu interface at any time, just short press[F2](Exit). The changed settings will be saved when exiting the menu mode.

➢ **To set the high limit of temperature alarm**
  ✓   The instrument is turned on and enters the menu interface.
1.   Move the cursor to "High Limit-CH1" or "High Limit-CH2", press[F1](Edit)to set the temperature high limit alarm value of the channel. (In the dual-channel combination mode, the options of channel two are folded in the sub-options. Please press[►]first).

➢ **To set the low limit of temperature alarm**
  ✓   The instrument is turned on and enters the menu interface.
1.   Move the cursor to "Low Limit-CH1" or "Low Limit-CH2", press[F1](Edit)to set the temperature low limit alarm value of the channel. (In the dual-channel combination mode, the options of channel two are folded in the sub-options. Please press[►]first).

➢ **To set temperature alarm enable**
  ✓   The instrument is turned on and enters the menu interface.
    !!   The status of the alarm enable will be directly displayed on the option. Beep means that the way of the alarm is the buzzer sound alarm.
1.   Move the cursor to "Alarm-CH1" or "Alarm-CH2", press[F1](Set)to turn on or off the temperature alarm of the channel. (In dual-channel merge mode, the options of channel 2 are collapsed in sub-options.Please press[►]first).

➢ **Set the temperature difference alarm value**
  ✓   In dual channel difference mode, enter the menu interface
1.   Move the cursor to "Difference Limit", press[F1](Edit)set the temperature difference alarm value.

➢ **Set the temperature difference alarm switch**

✓ In dual channel difference mode, enter the menu interface.
!! The basis of the temperature difference alarm is that the absolute value of the temperature difference of the dual channels is greater than the temperature difference alarm value.
1. Move the cursor to "Diff-Alarm", press⌐F1⌐ (Set)to turn on or off the temperature difference alarm.

4.8 Calibration

➢ **To enter the calibration mode**
✓ The instrument opens and enters the menu interface.
!! This product supports two types of probes, PT100/PT1000, so they can be calibrated separately, and the calibration operation of the PT100 probe is the same as the PT1000 probe.Each type of probe has 5 calibration points. **Calibration will directly affect the measurement data, please ensure that the calibration value is the result of the correct measurement by the high-precision instrument.**
1. Move the cursor to "Calibration", press⌐F1⌐ (Enter).
➢ **Start calibration/view the total number of calibration points**
✓ Enable the calibration mode and enter "select probe type" interface.
!! The number of calibration points is displayed after the probe type. If PT100 has 2 calibration points, it will display "PT100: 2 Point".
!! The operation of the PT1000 probe is the same as the PT100 probe, so the following operation takes the calibration of the PT100 probe as an example.
1. Move the cursor to "PT100", press⌐F1⌐ (Enter) to calibrate the PT100 probe.
➢ **Delete all calibration points of PT100/PT1000**
✓ Enable the calibration mode and enter the "Select probe type" interface
!! The operation of the PT1000 probe is the same as the PT100 probe, so the following operation takes the calibration of the PT100 probe as an example.
1. Move the cursor to" PT100" , press⌐▶⌐ , The option changed to "Delete all points", and press⌐F1⌐ (Yes)to delete all PT100 calibration points(the PT1000 calibration points will not be deleted)
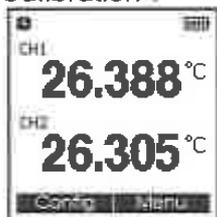
Add a calibration point

✓   Enable the calibration mode and select the probe type to be calibrated in the "Select probe type" interface.

‼   Each calibration point displays the temperature value before calibration, such as "Point 1: -100.00°C", which means the temperature value of the first calibration point before calibration is -100.00°C. Each time a calibration point is added, it will be automatically sorted according to the temperature value before calibration from small to large.

1.   Press⬛F1⬛(Add)to enter calibration point edit mode. The interface for editing calibration points is shown in the figure below: "Calibration point editing interface".

2.   Press⬛◄⬛/⬛►⬛to move the cursor, press⬛▲⬛/⬛▼⬛to increase or decrease the number under the cursor. Enter the temperature value before calibration in the Before column, and enter the temperature value after calibration in the After column.

3.   Press⬛F1⬛(Save)to save the calibration point data, press⬛F2⬛(Back)to return to the previous interface.

When the calibration point is in effect, the affected channel number is displayed in reverse color. As shown in the figure below, "Before Calibration" and "After Calibration".
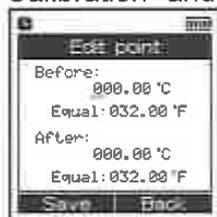
Editing calibration point interface   Before calibration   After calibration

Remove a calibration point

✓   Enable the calibration mode and select the probe type to be calibrated in the "Select probe type" interface.

1.   If a certain calibration point is entered incorrectly, for example, the second calibration point is wrong, you can move the cursor to the second calibration point, and press⬛►⬛, so that the option

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becomes "Remove point 2", and press[F1](Yes) to remove the calibration point data.

4.9 Data Logging (Model with Recording Function)

➤ **Enable the recording mode**
   ✓   Turn on the instrument and enter the menu interface to ensure sufficient power.
   ‼   This product supports 20000 data points.
   1.   Move the cursor to "Logging", press[F1] (Enter).

➤ **Start recording/Abandon recording**
   ✓   Enable the logging mode and enter the Logging interface.
   ‼   The internal storage will be cleared at the beginning of recording, so the last recorded data will be cleared, but the last recorded file will not be deleted. At the same time, the automatic shutdown function is disabled.
   ‼   During recording, the number of recorded data points will be displayed in real time in the middle of the screen and 🔋 are shown.
   2.   Move the cursor to "Start Logging", press[F1] (Enter)and jump to the main interface. At this moment, press[F1] (Start)to start recording, press[F2] (Exit)to abandon recording.

➤ **Stop recording/Save results**
   ✓   Enable the recording mode and started recording.
   ‼   When stopping recording , the current result generation file will be automatically saved to the internal storage. Files can be viewed by connecting to a computer via USB.
   ‼   In addition to manual stop, being connected to a computer, low battery power, loose battery, turning off the device, and the number of recorded points is full to 20,000 also causes to stop recording.
   1.   Press[F1] (Stop)to stop recording.

➤ **View recorded data**
   ✓   Enable the logging mode and enter the Logging interface. Before viewing, there should be data is recorded.
   1.   Move the cursor "View", press[F1] (View)to enter the view data interface. Press[▲]/[▼] switch display content.

➤ **View storage capacity**
 ✓ Enable the logging mode and enter the Logging interface.
 1. Move the cursor to "Flash", press⬜F1⬜ (View)to enter the storage capacity interface.

➤ **Regenerate files**
 ‼ When the file is damaged, it can be used to restore the file. If you want to generate files in other formats, please set the file format before generating again. Please do not delete a single file on the computer, if you no longer need to record the file, please format it directly.
 1. Move the cursor to "Regenerate File", press⬜F1⬜ (Ok)to generate the file again.

➤ **Enter the setting interface**
 ✓ Enable the logging mode and enter the Logging interface.
 1. Move the cursor to "Settings", press⬜F1⬜ (Set)to enter the setting interface.

➤ **Time settings**
 ‼ Enable the record mode and enter the Log Setting interface.
 1. Move the cursor to "Set Time", press⬜F1⬜ (Set)enter the time setting interface.
 2. Press⬜▲⬜/⬜▼⬜ to select option, press⬜◄⬜/⬜►⬜ to modify the value of this option. Press ⬜F1⬜ (Ok)to save time settings.

➤ **Sample rate settings**
 ✓ Enable the record mode and enter the Log Setting interface.
 ‼ The sampling rate setting range is 1 second to 86399 seconds, that is, 23:59:59. When the total recording time exceeds 3 days, please use USB power supply.
 1. Move the cursor to "Set Sample Rate", press⬜F1⬜ (Set)Enter the setting sample rate interface.
 2. Press⬜▲⬜/⬜▼⬜ to select option, press⬜◄⬜/⬜►⬜ to modify the value of this option. Press ⬜F1⬜ (Ok) to save sample rate settings.

➤ **Connect to computer**
 ✓ Make sure that the machine is in the main interface, use a USB cable to connect to the computer.
 1. If pressing⬜F1⬜ (Link), the device will connect to the computer, please do not operate the

instrument at this time.

2. If pressing ⬚F2⬚ (Exit), the instrument will only be powered by the computer but not connected to the computer.

➢ **File format settings**
   ✓ Enable the record mode and enter the Log Setting interface.
   1. Move the cursor to "Set File Format", press ⬚F1⬚ (Set)to enter the text format interface.
   2. Press ⬚▲⬚/⬚▼⬚ to choose the desired file format. Press ⬚F1⬚ (Ok)to save file format.

5. Measuring

This section describes the steps required to perform measurements with this product.

✓ Turn on the instrument and enter the measurement interface. Insert the probe.
➢ **Perform measurement and read the current temperature reading on the screen**
   – When the alarm function is turned on, once the temperature is higher than the high limit or lower than the low limit, the instrument starts to alarm.
   – When the reading is lower than the high limit or higher than the low limit, the alarm stops.
   – In order to save power, the alarm will automatically stop 10 minutes after the start of the alarm.
➢ **Keep reading**
   1. Press ⬚HOLD⬚ to keep the reading on the main screen. At the same time, the probe reading will continue to be displayed in small letters above the frozen reading.
➢ **View/reset maximum, minimum and average values**
   1. Press ⬚MAX/MIN/AVG⬚ several times to switch to display various values. The value will be updated in real time in small letter.
      – Display the following values in turn: MAX(maximum), MIN(minimum), AVG(average), Current

reading.
2. When viewing the maximum, minimum and average values, press[F1](Reset) to clear statistics.

➢ **Switch unit**
1. Press[C/F]to switch Celsius and Fahrenheit.
➢ **Switch probe**
1. In two dual channel modes, press[PROBE]to enter the switch probe interface, PROBE will flash in the status area. Press[F1](CH1)/[F2](CH2)to switch the probe type of the corresponding channel. The current probe type will be displayed on the right side of the channel number. In single channel mode, press[PROBE]to switch probe type directly, and the current type will be displayed in the status area for 5 seconds.

6. Maintenance

This section describes steps to help maintain the function of this product and extend its life.

➢ **Clean the case:**
1. If the case get dirty, use a clean damp cloth to clean the case. Do not use aggressive detergent or solution.
➢ **Replace battery/rechargeable battery:**
✓ Turn off the instrument
1. Remove the battery cover in the direction of the arrow marked on the battery cover.
2. Take out the used battery/rechargeable battery and put the new battery/rechargeable battery in the battery compartment. Please pay attention to battery polarity.
3. Put back the battery cover, push and fasten it in the opposite direction of the arrow.

7. FAQ

Question	Reason	Solution
⊏▭⊐ is bright, even flashing	• Battery is too low	• Replace battery
Instrument shuts down automatically	• Enable the automatic shutdown function • Dead battery • Use temperature exceeds the specified value	• Disenable the automatic shutdown function • Replace battery • Move to a location that meets the requirements for measurement
"Probe Abnormal" is shown	• Wrong probe type	• Switch probe type
"Short Circuit" is shown	• Tip of probe short circuits	• Replace probe
"Open Circuit" is shown	• Tip of probe opens circuits	• Replace probe
"No Probe" is shown	• Plug out the probe	• Plug in the probe
The function is normal but the keys are silent	• The buzzer is damaged	• Please send it back to factory for repair
Inaccurate measurement data	• The probe does not meet the standard • Wrong calibration point setting • The internal circuit of the instrument is damaged	• Please use the designated probe • Clear all calibration points • Please send it back to factory for repair
" SD Card Error!" is shown	• SD card read error inside the instrument	• Please reinstall or replace the SD card
" FLASH Error!" is shown	• The internal FLASH of the instrument is damaged	• Please send it back to factory for repair
Failed to generate file, FLASH shows 0KB	• SD card read and write error	• Please restart the instrument and regenerate the file

8. Specification

Probe type	PT100	PT1000
Measuring parameters	Temperature(℃/℉)	
Measuring range	-200~+800℃	
Resolution	0.01℃(-200℃~+800℃)	0.001℃(-99.999℃~+99.999℃) 0.01℃(other)
Accuracy	±(0.05%|t|+0.10)℃	±(0.05%|t|+0.05)℃
Storage capacity	20000 readings (models with recording function)	
Measuring rate	1/s	
Recording interval	1~86399seconds adjustable(models with recording function)	
Operation temperature	-10~+50℃	
Storage temperature	-20~+60℃(without batteries)	
Power supply	3 pcs of 1.5V AAA batteries/1.2V rechargeable batteries	
Protection class	IP52	
Dimensions	174mmx73mmx40mm	
Weight	About 210g(not including batteries and probe)	
Standard/ Certificate	CE, EMC, ROHS	
Warranty	12 months	

The accuracy of the system is affected by the quality of the probe! The above list is the accuracy of the machine.
Standard basis: JJF1171-2007 national standard "Calibration Specification for Temperature Itinerant Detecting Instrument", JJG (Machinery) 94-1992 Metrological verification procedure "Digital Temperature Measuring Instrument".