Instruction Manual for
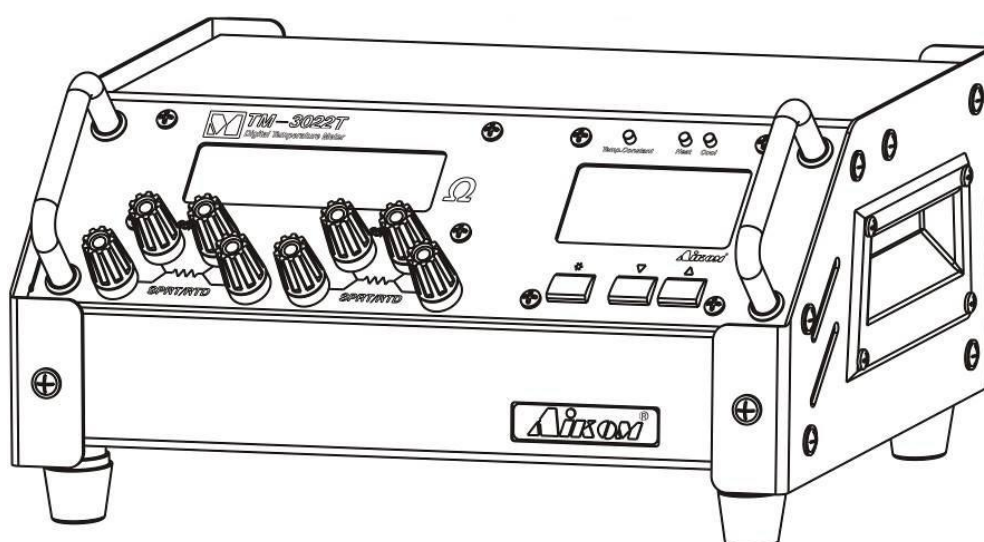# TM-3022T Bench Precise Dual-channel Standard Platinum Resistance Thermometer

(V1.3 140201)

Contents

Instruction on Editing and Printing:

- This manual is edited and printed by AIKOM instruments. The instruction and specifications of the latest products are covered in this manual.

- Contents and specifications are subject to change without notice.

- AIKOM reserves the rights of modifying the specifications and information covered in this manual without prior notice. In no event shall AIKOM be liable for damages or consequences incurred by information covered in this manual, including but not limit to the typing error or other error.

Safety Cautions:

The following safety signs are used in this manual:

⚠Indicates any imminently hazardous situation, warning you to avoid risk of personal injury or even death;

⚠Electric shock sign, warning you to avoid possible risk of electric shock;

⚠ High temperature surface sign, warning you not to touch high temperature parts;

📝Note: indicates a suggestion or hint to handle some possible situations or provide information about how the current operation works together other functions.

The steps you must observe or avoid so as not to cause possible damage to this device or other objects are described as below.

Important Safety Information:

- Products of AIKOM are designed for application in verification or measurement. Putting them to other uses may incur unpredictable risks;

- Measurement products of AIKOM should be used by personnel who are trained professionally.

Risk of Fire and Burning:

- Do not use this product near a place there is leakage of gas or natural gas.

Risk of Electric Shock:

- Avoid using this product during a thunderstorm; Otherwise electric shock may be caused by lightning.

- For normal operation of this product, 220V AC 50Hz (some specific model can use 110V AC 60Hz) shall be used. Any improper voltage input may cause damage to the instrument, electric shock or fire disaster.

Use this device safely

Please save this manual properly for future reference and maintenance.

1   Product Introduction

1.1 Product Features

The TM-3022T bench precise dual-channel standard platinum resistance thermometer (hereinafter referred to as TM-3022T) produced by AIKOM, which is excellent in design, compact and portable size, and easy in operation, is perfectly suitable for direct-reading measurement and temperature value display of second-class standard platinum resistance thermometer and industrial platinum resistance thermometer as well as the precise/fast measurement of thermal filed (temperature difference). This makes it an indispensable secondary electric measuring meter for temperature laboratory and temperature measuring room.

Using TM-3022T thermometer can input the characteristic error parameters of standard or industrial platinum resistance thermometers after indexing into memory through the keyboard of this instrument, so the indexing temperature value can be displayed accurately without the trouble of checking meter or calculating it using a computer. It is more accurate, faster, simpler and more convenient.

TM-3022T of AIKOM has the following features:

● **High display resolution**

Resistance display digits: 0.00001Ω;

Temperature valid display digits: 0.001℃.

● **Celsius ℃/ Fahrenheit ℉ Display**

Displaying in Celsius ℃/ Fahrenheit ℉ can be selected through the menu function.

● **Single channel, temperature difference, or dual channel display**

Single channel, dual channel or temperature difference display can be selected through the menu function.

● **Dual screen display of high bright VFD nixie tube and OLED 128×64 lattice LCD**

Display resistance of thermometer with a 7-digit high bright VFD nixie tube, and display temperature, temperature difference, thermometer No., and measuring range information with a OLED LCD screen;

● **Display resistance/temperature/dual-channel parameter simultaneously**

Display resistance /temperature value and dual-channel parameters of the thermometer of the measured channel simultaneously, convenient for users checking and comparing the indexing data of thermometer, and temperature and temperature difference of two measured points.

● **Storing measured temperature data for 10 hours**

When temperature fluctuation for a relatively long time is required to be detected, you can set storing measured data through Menu Items, and then download the memory data through data interface, and the required measuring result is obtained after format conversion.

● **Applicable to standard platinum resistance thermometer/Industrial platinum resistance thermometer**

Independent measurement and calculation of four channels, measurement channel and displayed data can be selected through keyboard and menu, applicable to 25Ω standard platinum resistance thermometer and 100Ω industrial platinum resistance thermometer or standard platinum resistance thermometer.

● **Low noise/high stability**

Effectively resolve mK-class precise temperature value, noise fluctuation ≤±1mK.

● **Characteristic error parameter can be input, convenient for obtaining temperature value displayed**

For 25Ω standard platinum resistance thermometer, input Rtp, a8, b8 (or a7, b7, c7);
For 100Ω industrial platinum resistance thermometer, input R0, A, B, and C;
Characteristic error parameters of 5 thermometers can be loaded to each measuring range channel.

● **Built-in thermostat**

With built-in thermostat, the thermometer is not subject to the impact of changes in ambient temperature. Consequently, the measurement accuracy and long-term stability of the thermometer is ensured.

● **Constant current source DC commutator**

With the constant current source DC commutator, the impact of contact thermoelectric potential is effectively eliminated, so measurement accuracy is improved.

● **Input/display thermometer No.**

The No. of the thermometer corresponding to characteristic error function can be input and displayed, prompting users to check if the correct thermometer is used.

● **Equipped with computer interface (optional)**

Automatic data acquisition, calculation and processing as well as report printing can be implemented via the USB/RS-232 interface and special software supplied by AIKOM.

● **Precise measuring value transfer calibration**

Using 10Ω, 100Ω, and 400Ω standard resistors for calibration and comparison.

● **Suitable for measurement of oil tank temperature filed**

If you choose to use 2 standard platinum resistance thermometers, temperature field test of high grade precise thermostatic Bath can be implemented. If you choose to use special high-temperature precise platinum resistance thermometer, accuracy test and temperature test of high-temperature dry thermostatic bath. (Refer to: Dedicated high-temperature precise platinum resistance thermometer of AIKOM, Model No. is 03251)

1.2 Specifications

Model		TM-3022T
Accuracy	Range: SPRTs	Resistance Range:5~100Ω ±3ppm reading; ±5ppm FS(typically) Resistance Resolution:0.00001Ω(0.1mK) Current Source:±1mA
	Range: PT100	Resistance Range:5~400Ω ±2ppm reading; ±5ppm FS (typically) Resistance Resolution:0.0001Ω(0.1mK) Current Source:±1mA
	Range: PT1000	Resistance Range:50~4000Ω ±10ppm reading; ±7ppm FS(typically) Resistance Resolution:0.001Ω(1mK) Current Source:±2.5mA
Measurement Period		2seconds
Stability		±5ppm/year
Display		VFD and OLED Dual screen display
Operating relative humidity		<80%non-condensing
Communications		RS-232
Operating temperature range		10°C~32°C
Supply voltage		220V~240V 50HZ
Weight		About 4. 5Kg

1.3 Environmental Condition

TM-3022T is designed for using in environment of temperature laboratory, temperature measuring room and general industrial site. It is not waterproof. Do not use it in at place where would be subject to high humidity or the risk of explosion or combustion.

1.3.1 Operating Conditions

- Environment temperature: 5℃~40℃;

- Environment humidity: 15%~85%;

- Vibration: avoid violent impact;

- AC supply voltage/frequency: 220VAC±10%/50±1Hz;

- These situations should be avoided: grease/oil or water entering the control panel or chassis of the TM-3022T, drop, or impact.
  AC voltage exceeding rated value;
  A maximum impact acceleration of (100±10) m/s2 in package

1.3.2 Storage Conditions

- Environment temperature: －5℃~65℃

- Environment humidity: 15%~65% (no condensation)

❗**Please use and store your instrument in an environment meeting the above requirements. Otherwise damage may be incurred.**

1.4 Quality Warranty

- Quality warranty period refers to the period from the date you receive (purchase) the instrument and accept as qualified to the expiration date you appoint with your supplier.

- Damage or consequence resulting from misuse, improper operation, accident or force majeure is not covered in the warranty.

- After-sales service, including repairing, technical support, and spare parts supplying without charge, is offered by supplier.

- If you find that the quality or performance of this instrument does not meet the conditions or standard covered in Specifications, AIKOM agrees to replace parts or repair and adjust the instrument till the specifications are met.

❶ This instruction manual is used for making users understand how to operate this instrument, not for other purposes.

2   Initial Install

For initial start and use of TM-3022T, please perform the following steps to put it into operation:

2.1 Check the packing and disassembly

Before unpacking, please check if the outer packing is in good condition. If it is damaged and you think it is necessary to notify your supplier, please take a picture of it and determine whether the damage is taken place during the transportation. After unpacking, please confirm the items or parts (including part name and quantity) are complete against the packing list:

An example of packing list (subject to the packing list supplied with your instrument):

No.	Name	Model/Spec.	Unit	Q'ty
1	TM-3022T precise dual-channel digital indicator	TM-3022T, fluctuation ±0.002℃, resolution 0.001℃ Instrument No.: 0001	EA	1
Standard accessories				
2	Fuse tube	2A/250V	EA	1
3	Power cord	10A/250V, 1m	EA	1
4	Instruction Manual		EA	1
5	Instrument container		EA	1

2.2 Installation

The instrument should be placed on a horizontal level at a place with good ventilation.

2.3 Inspection

The instrument needs 220V/50HZ AC power supply. Be sure not to connect undesirable power source to this instrument.

2.4 Power On

After all the inspections and preparations are completed, insert the power plug into the socket (on rear panel). Turn on the power switch "Power", see Figure 1. The instrument starts self-check (Dynamic AIKOM trademark pattern appears) till the lower limit value of resistance for calibration is displayed on the screen, now the instrument is started.
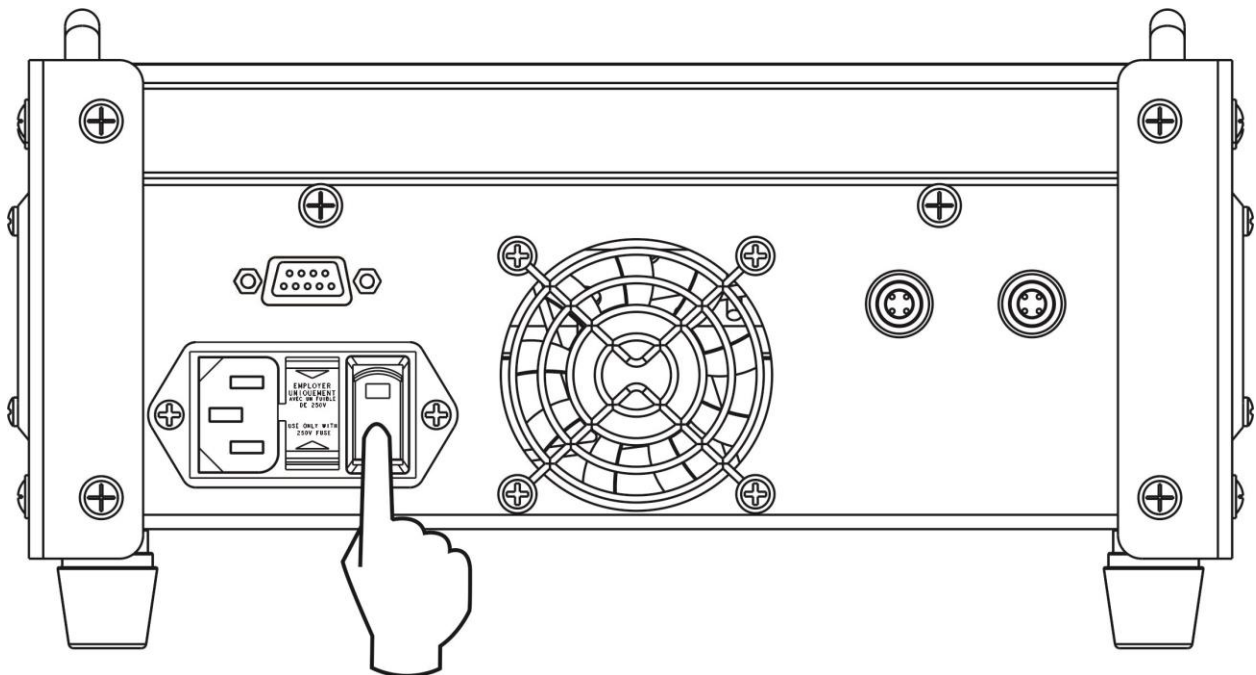

Figure 1

3 Operation

3.1 Functional component descriptions
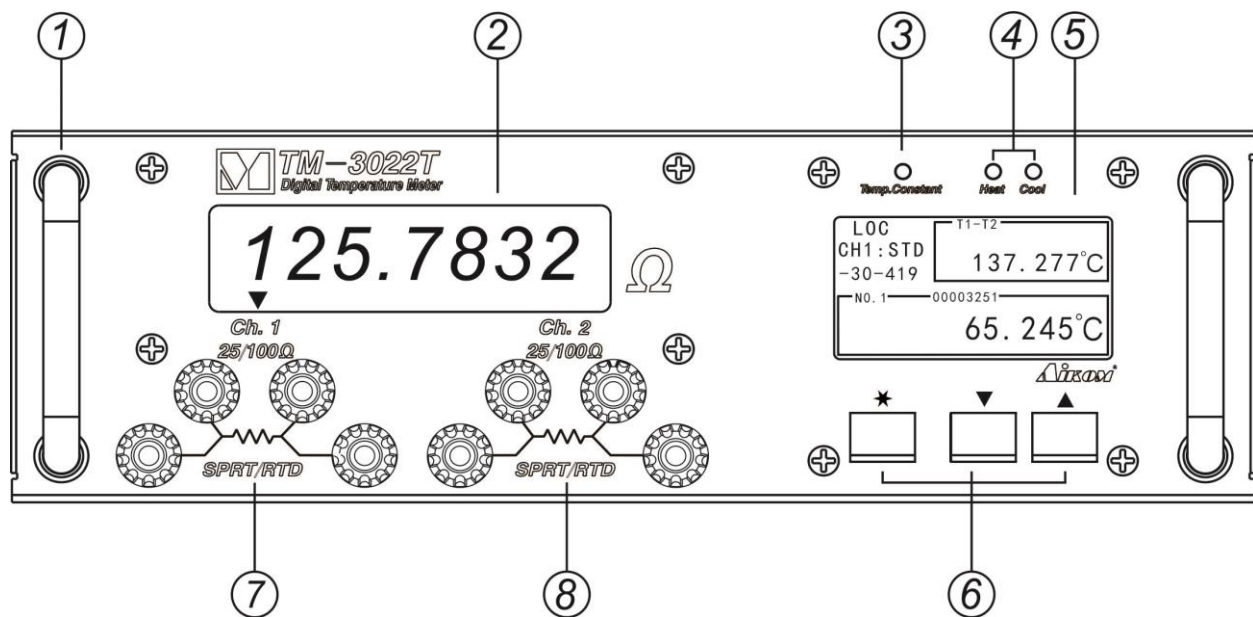
Figure 2

⑴ Control panel handle: used for pulling out the control panel when checking control circuit. Be sure not to move the instrument with this handle.

⑵ VFD screen: displays the measured resistance value.

⑶ Controller blue LED: Solid On means thermostatic box is constant temperature effective.

⑷ Controller orange /green LED: indicates the temperature control state of thermostatic box.

⑸ Main display window: displays the temperature value and other information in the condition of the current resistance value.

⑹ Controller key: Combined operation of these three keys can implement the all controller function operations and parameter input.

⑺ Channel 1 connector posts: Standard platinum resistance thermometer or PT-100 platinum resistance thermometer can be connected.

⑻ Channel 2 connector posts: Standard platinum resistance thermometer or PT-100 platinum resistance thermometer can be connected.
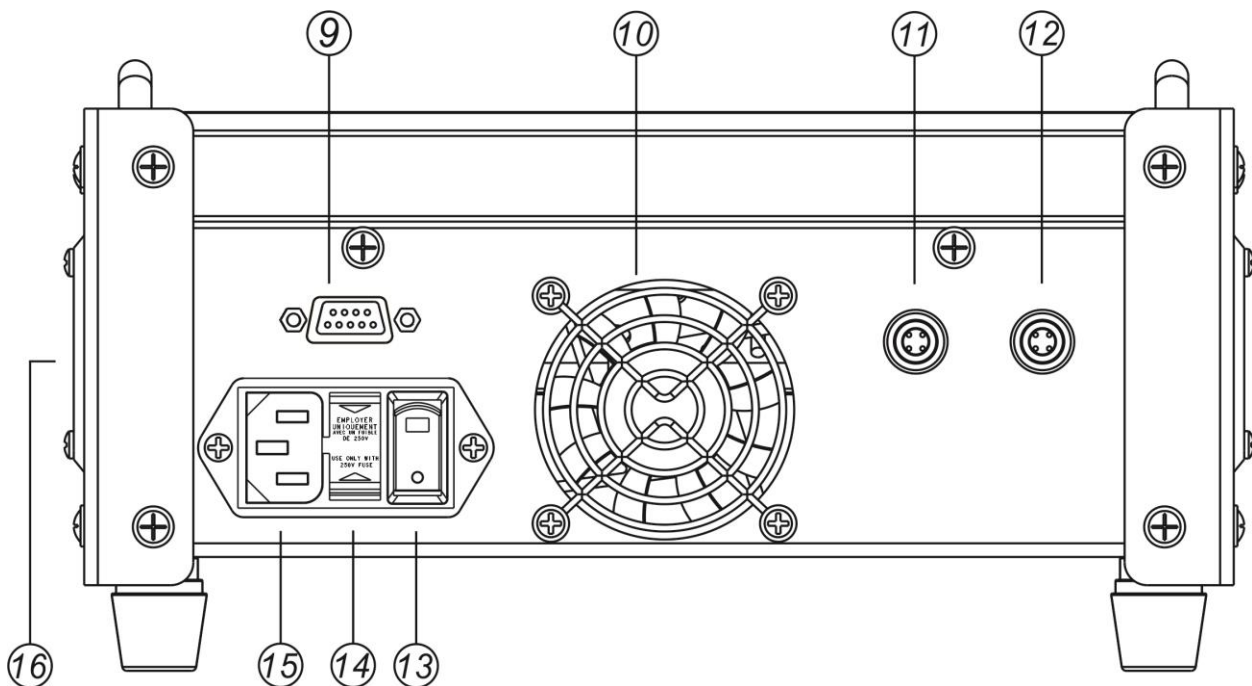
Figure 3

⑼ Computer communication interface: RS-232 communication protocol;

⑽ Fan: cooling fan inside the device;

⑾ Jack for parallel connecting dedicated probe for channel 2: used for connecting external probe into the controller;

⑿ Jack for parallel connecting dedicated probe for channel 1: used for connecting external probe into the controller;

⒀ Power switch: the instrument starts work when it is switched on;

⒁ Fuse holder: used for replacing fuse, see Figure 4 for fuse replacement.
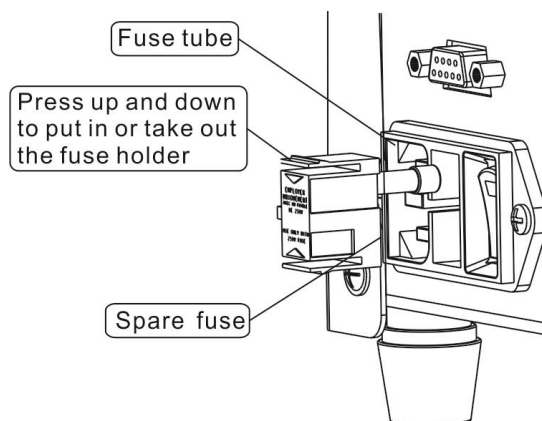
Figure 4

⒂ AC inlet socket: connect 220V AC power supply;

⒃ Chassis handle: used for moving the device.

4   Key and Wiring

4.1 Combined operation of three keys to implement the following operations
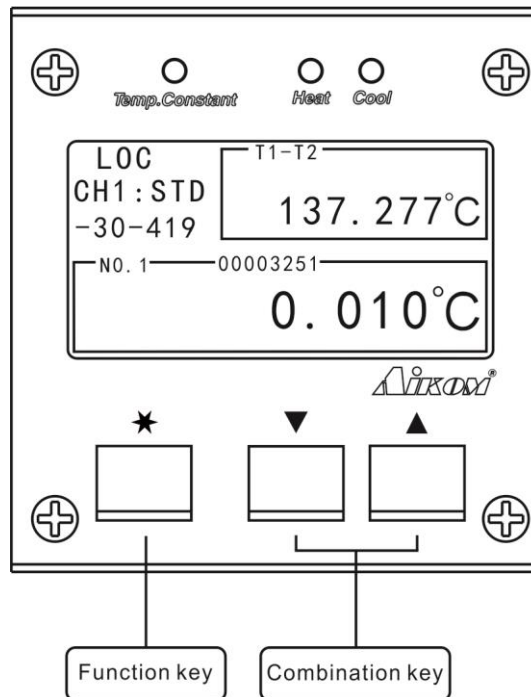
Figure 5

（1）Press the function key ＊ (blue) to

- Switch channel on main screen

- Confirm the selected option in menu mode

- Confirm the selected function in menu mode

（2）Press function key＊(blue) + ▼ or ▲ to

- Increase or decrease numerical value

（3）Press ▼ or ▲ to

- Move cursor down or up in menu mode

- Move cursor left or right at numerical value editing position

（4）Press ▼ + ▲ to

- Enter the main menu screen 2 seconds later;

- Confirm the adjusted or input numerical value

4.2 Wiring of Standard Platinum Resistance Thermometer

4.2.1   Method of connecting standard platinum resistance thermometer: Loosen the connector post along the direction indicated by arrow, get the wire tab stuck with the connector post, and then tighten it up.

Figure 6

5 Proper Operation

As a thermometer direct-reading secondary meter with features of small in size, light in weight, high accuracy, and easy to operate, TM-3022T solves the problem of directly reading delivered temperature of 25Ω standard platinum resistance thermometer/PT-100 industrial platinum resistance thermometer, make readi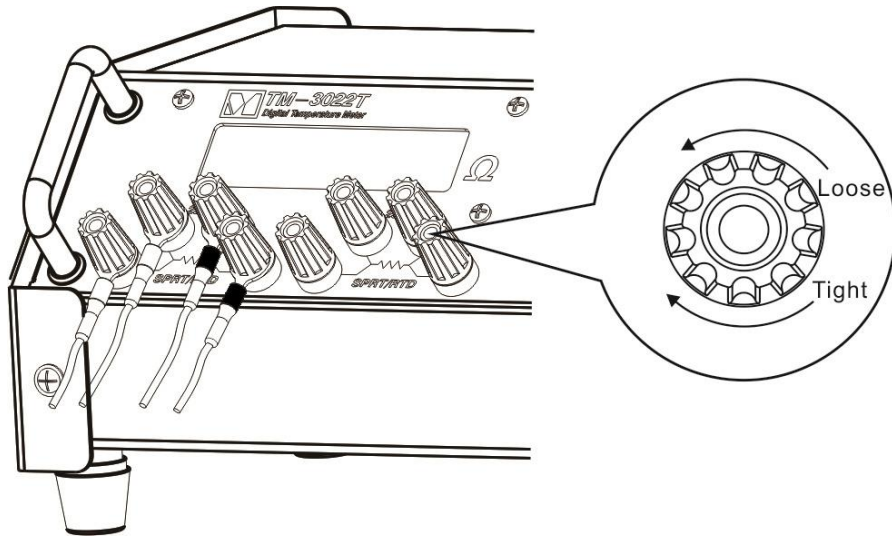ng delivered temperature value of standard thermometer more convenient. In this chapter, the operation of the most commonly used functions is introduced, and other auxiliary functions are covered in Chapter 8 *Quick Start Guide*.

5.1 Inputting Platinum Resistance Characteristic Error Parameters

The delivered temperature value can be expressed accurately by simply inputting the characteristics parameters Rtp, a8, b8 (or a7, b7, c7) of error function in the calibration report of standard platinum resistance thermometer. Since PT-100 industrial platinum resistance thermometer has been preset with parameters R0, A, B, and C preset, if users performed indexing calibration to a certain thermometer, accurate delivered temperature value can be obtained by replacing the preset parameters R0, A, B, and C with the obtained parameters in calibration.

1. Turn on power till the following screen appears, press ▼ and ▲ simultaneously to enter the System Settings menu.
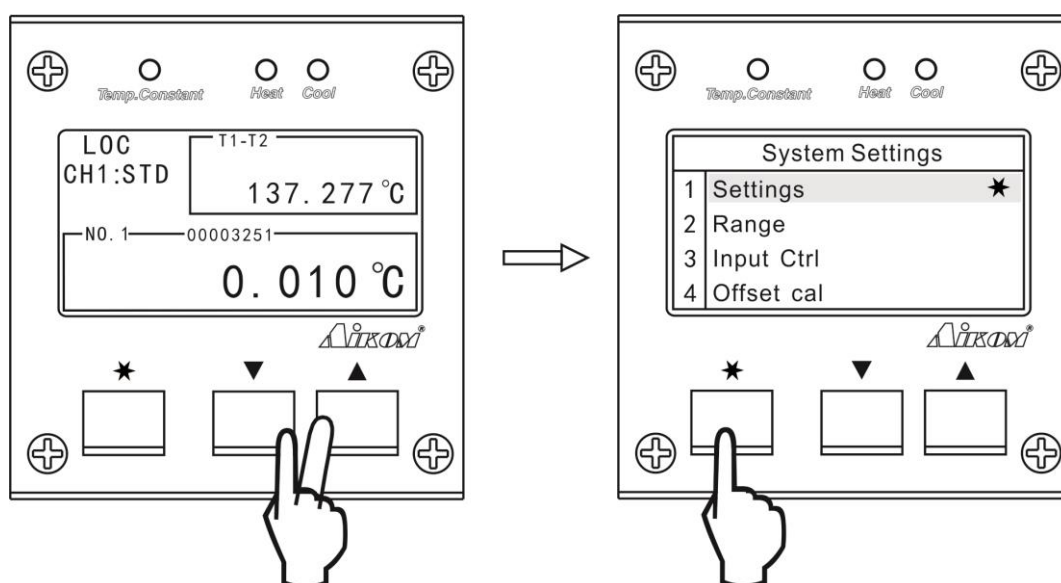
Figure 7

2. On the System Settings menu, press ▼ to move the cursor to "Input Ctrl", then press ＊(blue) to enter the "Input Ctrl" submenu screen.
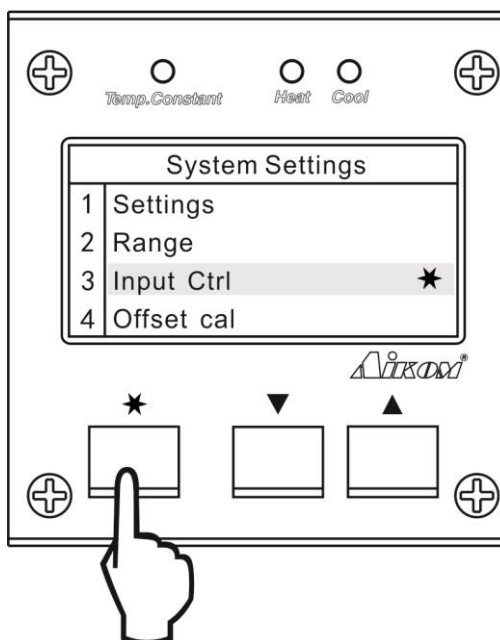
Figure 8

3. On the "Input Ctrl" submenu screen, press ＊(blue) to confirm to edit group No.1 parameters (up to 5 groups of parameters can be saved).
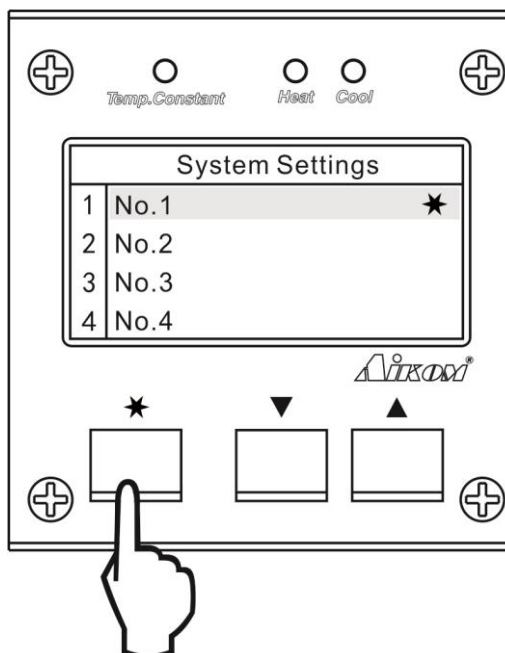
Figure 9

🛈**Index error function characteristics parameters are different depending on the type of thermometers. They are not general purpose. After inputting parameters, please input the thermometer No. to facilitate users identifying it.**

4. On the submenu screen of No.1, press ✳(blue) to select "STD Para." to enter the submenu Items.
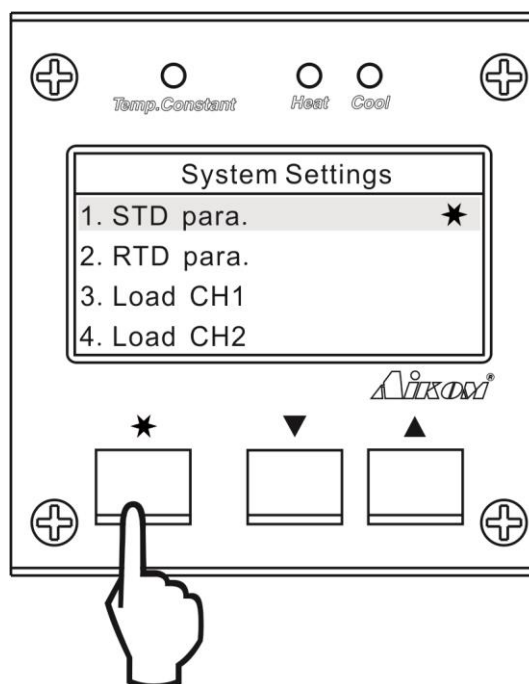
Figure 10

🛈**Standard platinum resistance thermometer is PT25, and industrial platinum resistance thermometer is PT100.**

5. Select "Rtp= ?" and press ＊(blue) to confirm.
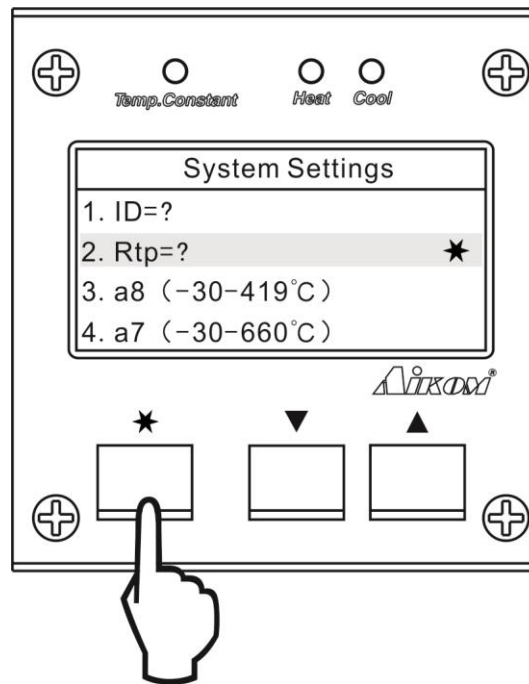
Figure 11

❶**Parameter input (Input Ctrl): Parameters of up to 5 standard platinum resistance thermometers/ industrial platinum resistance thermometers can be saved, including thermometer No., Rtp=?, a8=?, and b8=?, etc.**

6. Press ▼ or ▲ to move the cursor left or right, and press ✳(blue) and ▼ or ▲ simultaneously to change the data.
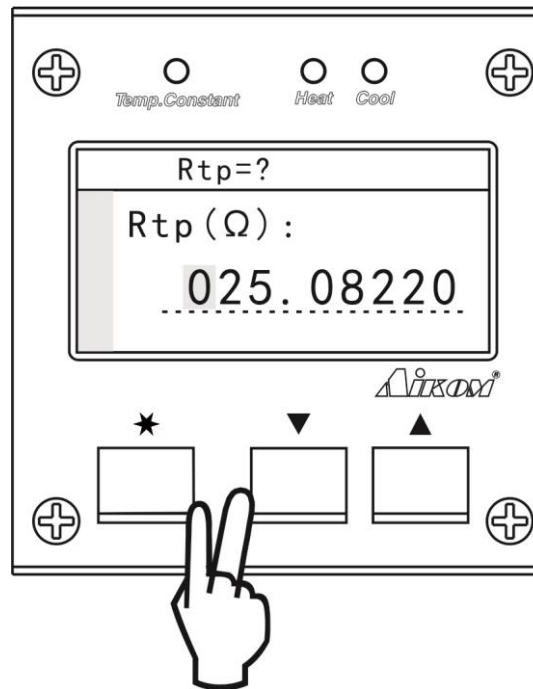
Figure 12

7. Press ▼ and ▲ simultaneously to confirm the data and exit.
8. Repeat the above steps to input parameters for area 8 (a8), area 7 (a7), or area 4 (a4), and after all parameters are input, select **Return** to back.

9. Finally, select "Load CH1" or "Load CH2" and press ✳(blue) to confirm. Now the parameters of standard platinum resistance thermometer have been loaded.
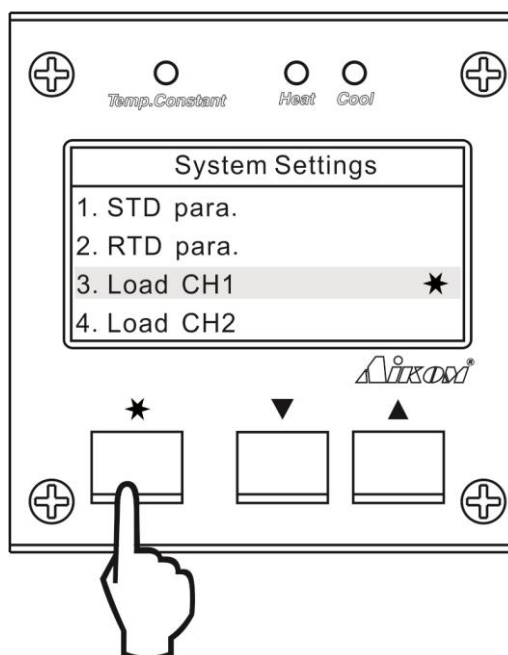
Figure 13

❗**When a standard thermometer is required to be used, the parameters need to be loaded into the channel (CH1/CH2) that the thermometer is connected with. If the No. of this thermometer is displayed on the main screen when back to the main screen after parameter loading, it indicates that the parameters are loaded correctly. Besides, correct measuring range is also required, or error still may occur (see table below for measuring range):**

Platinum Resistance Type	Scope of Application (Range)
Standard platinum resistance thermometer Area 8 Zinc point	T:-30-419℃
Standard platinum resistance thermometer Area 7 Aluminum point	T:-30-660℃
Standard platinum resistance thermometer Area 4 and 8 Zinc point	T:-189-419℃
Standard platinum resistance thermometer Area 4 and 7 Aluminum point	T:-189-660℃
Industrial platinum resistance thermometer R0=100Ω	PT-100
Industrial platinum resistance thermometer R0=1000Ω	PT-1000

5.2 Switching Display Mode

1. Turn on power till the following screen appears, press ▼ and ▲ simultaneously to enter the System Settings menu.
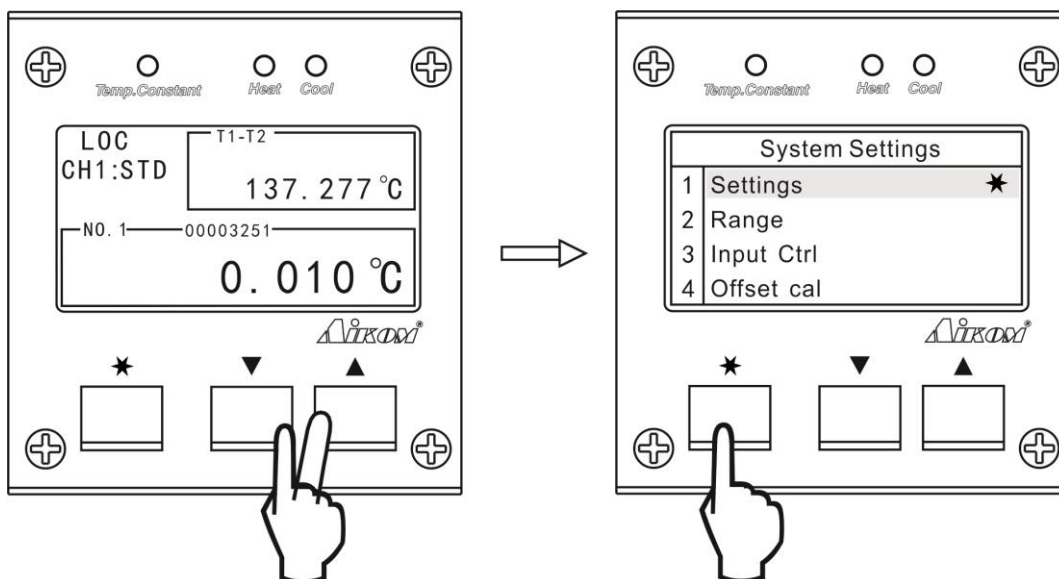
Figure 14

2. On the System Settings menu, press ▼ to move the cursor to "Display Settings", then press ✳ (blue) to enter the "Display Setting" submenu screen.
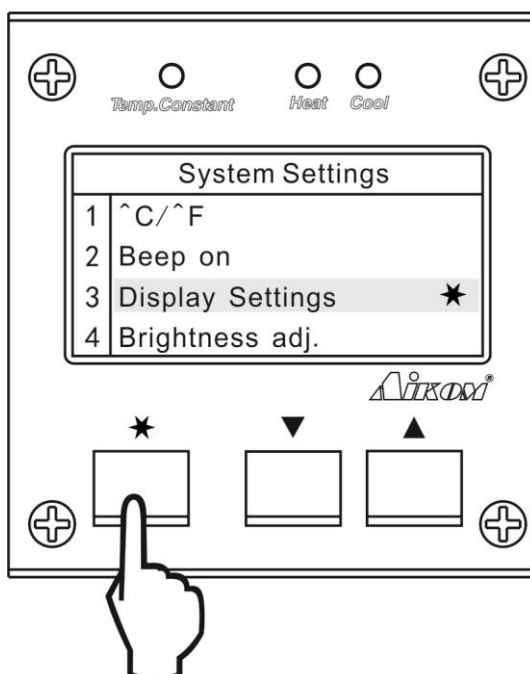
Figure 15

3. Select "Single Display" or "Dual Display" as needed and press ✳ (blue) to confirm.
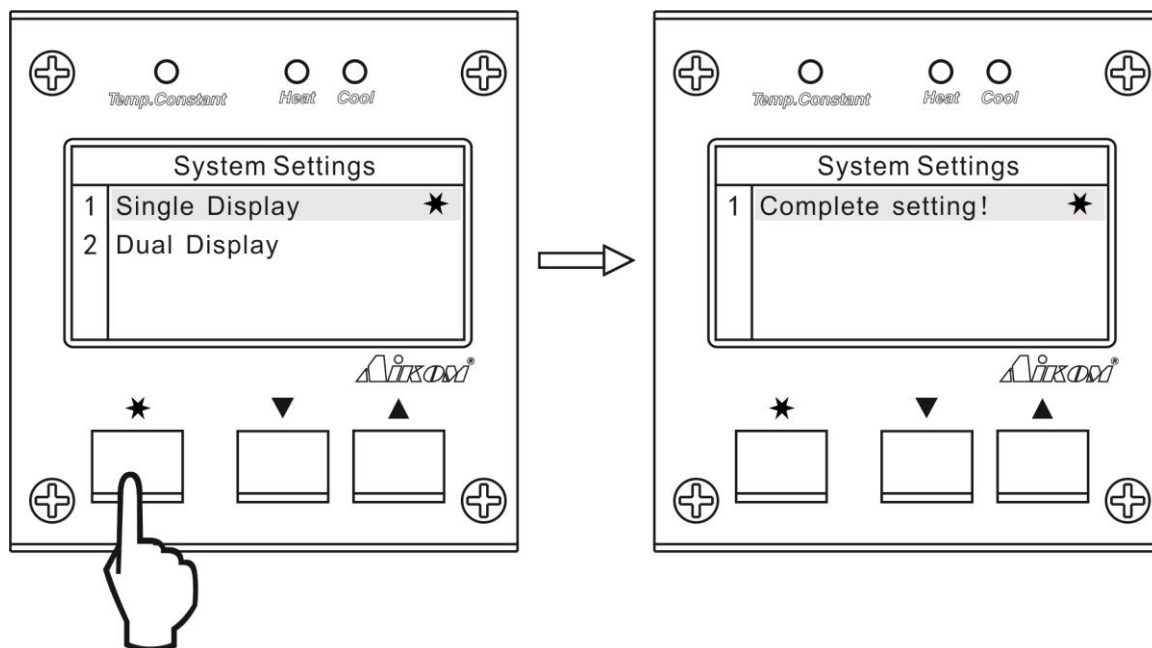
Figure 16

❶ **After "Single Display" or "Dual Display" is selected, "Complete Setting" screen will display for about 1 second before back to "Display Settings" screen, as shown in Figure 17.**
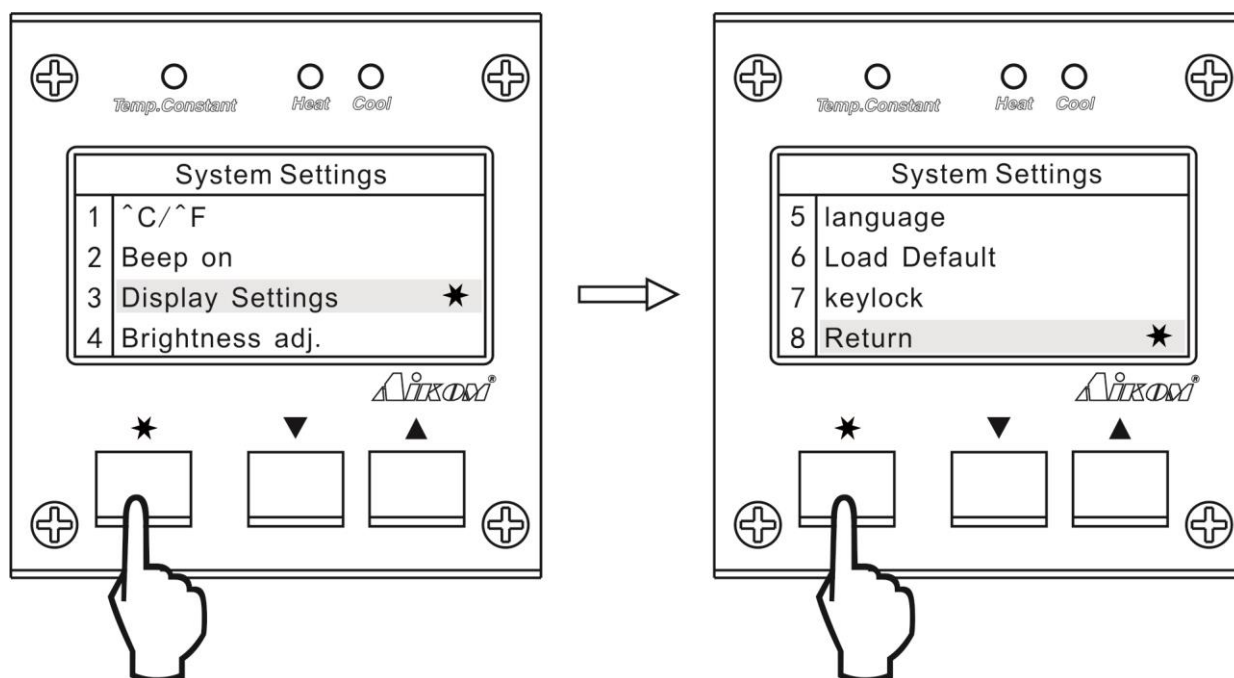
Figure 17

4. Press ▼ on the System Settings to move the cursor to "Return" and press ✳
    (blue) to return to previous level. Now the display mode is switched.
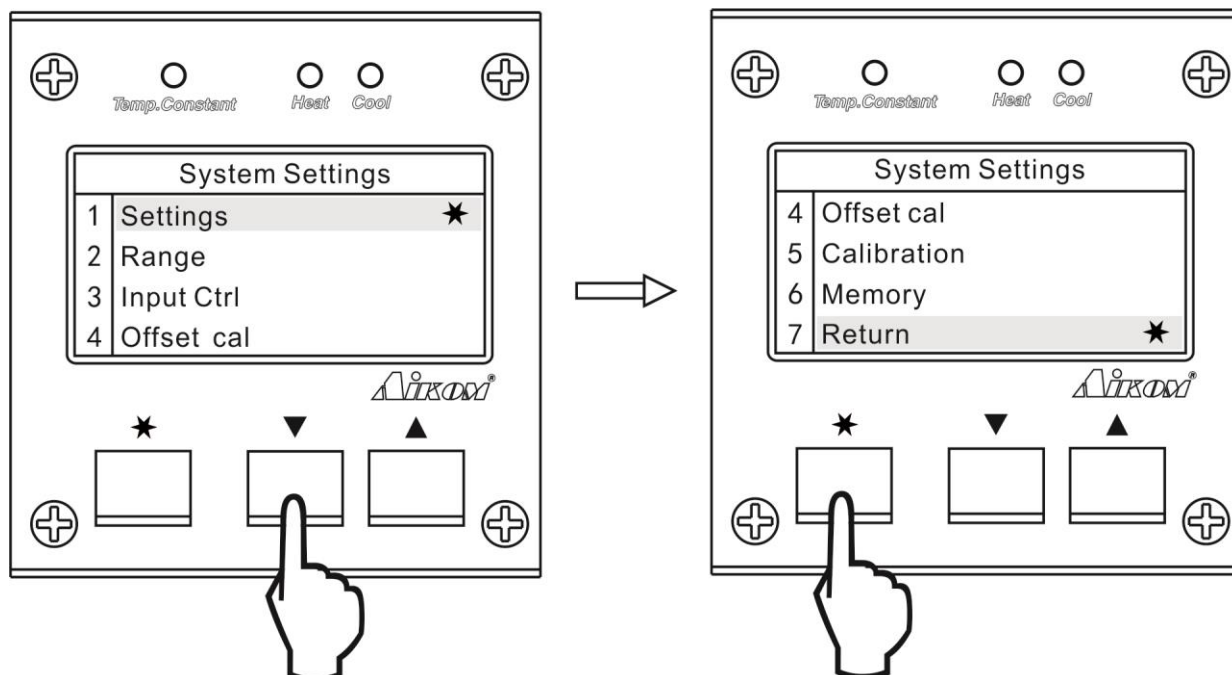
Figure 18

**After "Return" is selected, the system will inquire whether to exit, press "Yes"
to confirm.**

5.3 Channel Display Screen

5.3.1 Dual Display on Main Display Window (Figure 19)

Figure 19

- ①: Channel 1, the No. of the thermometer currently used by channel 1, and
  where the cursor locates indicates the resistance value of this channel
  displayed on the VFD screen.

- ②: The measuring range currently used by channel 1.

- ③: Channel 2, the No. of the thermometer currently used by channel 2.

- ④: The measuring range currently used by channel 2.

- ⑤: Current resistance value measured by channel 1.

- ⑥: Current temperature value measured by channel 1.

- ⑦: Current resistance value measured by channel 2.

- ⑧: Current temperature value measured by channel 2.

5.3.2 Single Display on Main Display Window (Figure 20)
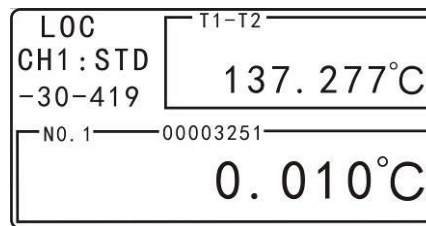
Figure 20

- "LOC": Lower computer control mode, the digital indicator is controlled by controller independently. Display "COM" in RS-232 communication.

- "CH1:STD": Current measurement mode is measuring standard platinum resistance thermometer with channel 1.

- "CH1:RTD": Current measurement mode is measuring industrial platinum resistance thermometer with channel 1.

- "CH2:STD": Current measurement mode is measuring standard platinum resistance thermometer with channel 2;

- "CH2:RTD": Current measurement mode is measuring industrial platinum resistance thermometer with channel 2;

- "-30-419": the currently used measuring range (standard platinum resistance thermometer area 8);

- "NO.x 00000000": "x" is any number from 1 to 5 (at most 5 groups can be saved), it is the No. of the currently used thermometer. (This thermometer No. will display after you loading the appropriate No. of thermometer into the corresponding input channel through the "Load" menu, as described above, and returning to the main screen).

- "T1-T2": Measuring the temperature difference between channels 1 and 2, here is the temperature difference displayed.

5.4 Selecting Measurement Channel

When users need to display the measured resistance value of channel 1 or channel 2 on the VFD display screen, press the ＊(blue) function key on the main screen for more than 2 seconds till the cursor on VFD screen moves to above the corresponding channel and flashes, then the resistance display is selected. See Figure 21.
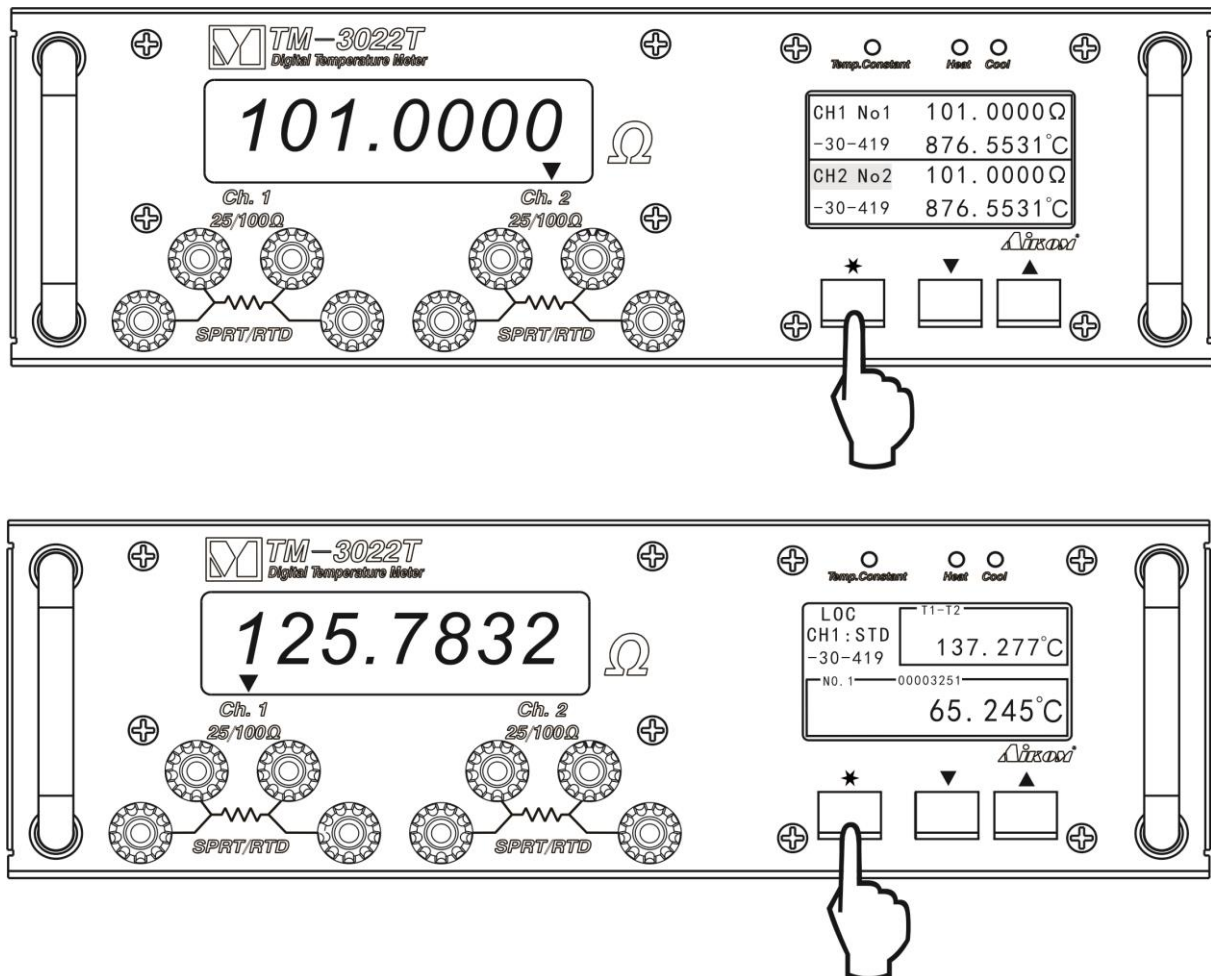
Figure 21

5.5 Save and Upload (Optional) Measured Data with Built-in Memory

Built-in memory of TM-3022T can record measured data in real time at an interval of about 2 seconds. The total recording duration is about 10 hours.

5.5.1 Upload Measured Data.
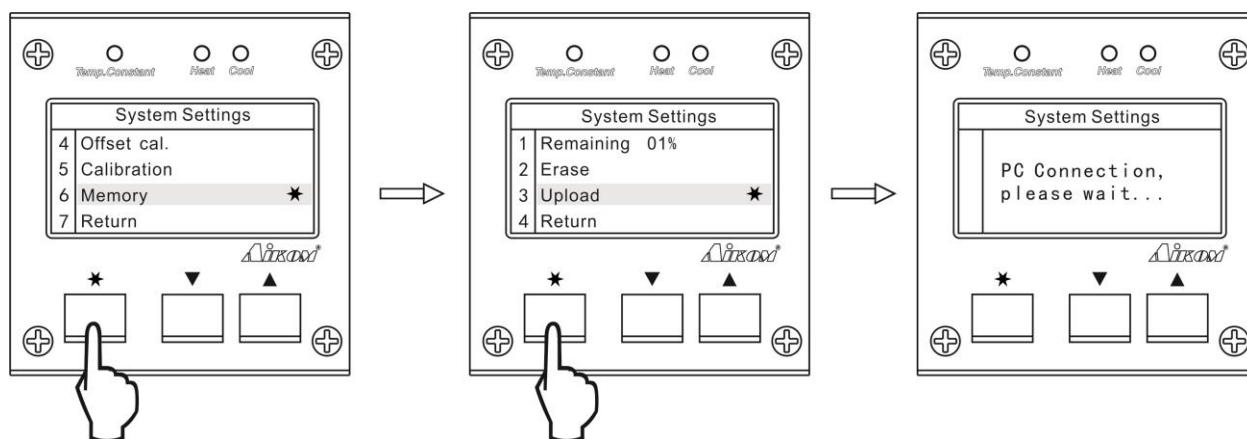
Figure 22

1. Connect your computer and TM-3022T with dedicated data line, press ▼ on the System Settings screen to move the cursor to "Memory", and then press ✳(blue) to enter the "Memory" submenu screen.

2. Move the cursor to "Upload" and press ✳(blue) to confirm to upload the data in the memory to computer via RS232.

5.5.2 Erasing Memory

This step is to erase the data saved in the memory.
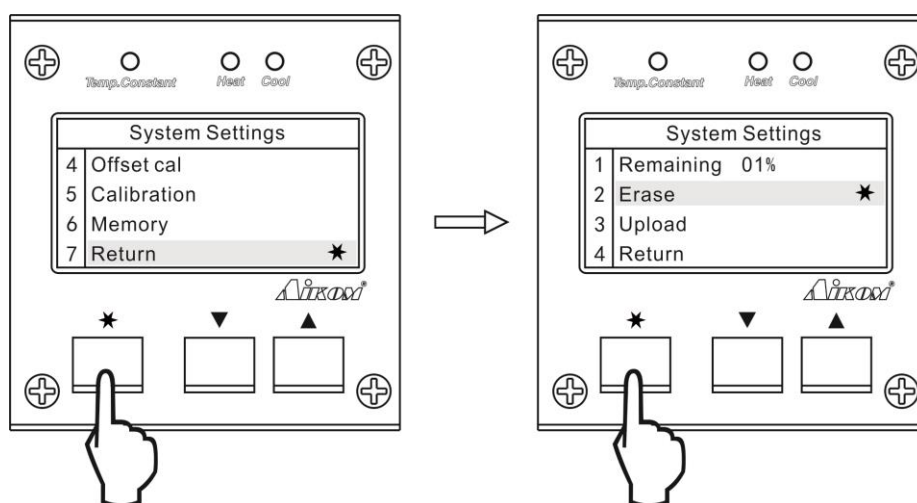
Figure 23

6   Higher Level Operation

6.1 Calibration

The purpose of calibration to this instrument is to perform traceability and calibration using standard resistor for obtaining a high accuracy of resistance value. The indicated temperature value and its error function are obtained through mathematical calculation. So, the measurement error of resistance value also indicates the error of indicated measured temperature value.

TM-3022T needs to be calibrated for the ranges 4-101Ω and 4-401Ω. It requires to immerse standard   transition resistor or 10Ω/100Ω/400Ω standard resistor in 20℃ oil thermostatic bath for more than 30 minutes and the time of constant temperature effective (front panel blue indicator solid on) of TM-3022T is no less than 15 minutes before appropriate calibration operations can be carried out.

6.2 Zero Adjustment

⑴ Connect 10Ω standard resistor to connector post of Ch.1/Ch.2.

⑵ Enter "Range" menu, select range "-189℃—660℃".

⑶ Enter "Offset cal." menu, move to "4—101Ω" of Ch.1/Ch.2.

⑷ Go to "Zero Adj(Ohm)" under "4—101Ω", now the real-time ohm value is displayed.

⑸ Press and hold the function key ☆ (blue), and press ▼ or ▲ to increase/decrease the numeric value (there are "+" and "-" signs optional at the sign position) till the value is accordance with the standard value.

⑹ Press ▼ and ▲ simultaneously to confirm the modification you made.

6.3 Full Scale Correction

（1） Connect 100Ω standard resistor to connector post of Ch.1/Ch.2.

（2） Enter "Offset cal." menu, move to "4—101Ω" of Ch.1/Ch.2,"

（3） Enter "FS Adj(Ohm)" menu under "4—101Ω", now the real-time ohm value is displayed.

（4） Press and hold the function key ☆ (blue), and press ▼ or ▲ to increase/decrease the numeric value (there are "+" and "-" signs optional at the sign position) till the value is accordance with the standard value.

（5） Press ▼ and ▲ simultaneously to confirm the modification you made.

Repeating the above steps can calibrate the range 4—401Ω, but "PT—100" should be selected under the "Range" menu. It is recommended to correct full scale first, and then correct zero point, and at last correct full scale again till the requirement is met.

❗**The basic accuracy of instrument is guaranteed by calibrating resistance value (ohm). The measurement accuracy of instrument cannot be ensured unless the system calibration and error correction are done accurately.**

6.4 Measured Resistance Value of Platinum Resistance Thermometer under Triple Point of Water (TPW)

The Triple Point of Water (TPW) temperature defined in the international 90 thermometric scale (T90) is 0.010℃. TPW plays a very important role in the indexing calibration of thermometer. In the meantime, the measurement error of the temperature digital indicator in measuring resistance value (Rtp) of platinum resistance thermometer under TPW is also considerable. If just use the Rtp value in the thermometer calibration certificate, system error generated during the resistance value measurement of the measuring instrument will also be introduced. So measuring the resistance value of the platinum resistance thermometer under TPW is the correct method to obtain Rtp. To do so, perform the following the steps:

1） Freeze liquid nitrogen to make TPW, save it in crushed ice for at least 24 hours and return to TPW before using it.

2） Using TL-1010SA of AIKOM can make and save TPW directly (See TL-1010SA Instruction Manual for details);

3） Insert the thermometer into TPW and wait till it becomes stable, measure the resistance value (ohm) with electric measuring instrument in use and use this value as Rtp.

7 Troubleshooting

If any one of the following failures occurs, please check relevant operation and device status against the list below.

7.1 The device dead halt

Cause: Mis-operation, device fault, interference, etc;

Solution: Turn off power, and restart it again to observe if the device works normally. If not, contact your supplier for repairing.

7.2 Incorrect temperature value displayed

Cause: Input lead shorted with 6, poor contact, or incorrect connection;

Solution: Check connection and correct it, if problem is still there and you know what it is, contact your supplier for repairing.

7.3 Big error of temperature value displayed

Cause: Error calibration of the instrument, zero point/full scale adjustment error, or error function characteristics parameter input wrongly;

Solution: Calibrate by correct method, check and verify the correctness of the error function characteristics values and parameters.

7.4 Large offset of displayed temperature value

Cause: Constant temperature system fault;
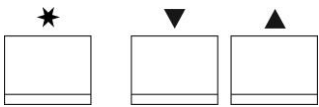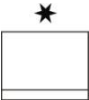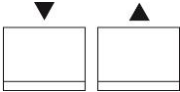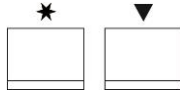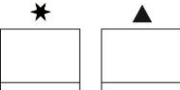
Solution: Check and correct it, if problem is still there and you know what it is, contact your supplier for repairing.

7.5 Other failure

If other problem occurs in use, if you checked and confirm that the instrument truly does not work normally, then contact supplier or contact manufacturer directly for repairing service.

8 Quick Start Guide

Browsing keys

✳ ▼ ▲	
✳	Access the next level menu; Accept an option; Switch channel on main screen; Confirm option
▼ ▲	Press them simultaneously for 3S to access the main menu; Confirm parameter changing; Scroll through options on the current menu
✳ ▼	Set parameter, adjust numeric value down
✳ ▲	Set parameter, adjust numeric value up

Press arrow key ▼or ▲ to scroll through options in menu;

When desired option appears on the screen, press * to select it;

The screen displays the next level of menu;

Press ▼ or ▲ to scroll through the options in the menu;

Press the ✳ key;

When an option is selected, press ✳ to confirm;

When parameter is modified, press ▼and ▲ to confirm.

You can press (▼▲) to enter the main menu mode;

After entering a menu, the menu items scroll display on the screen;

Press the ✳ key to enter submen
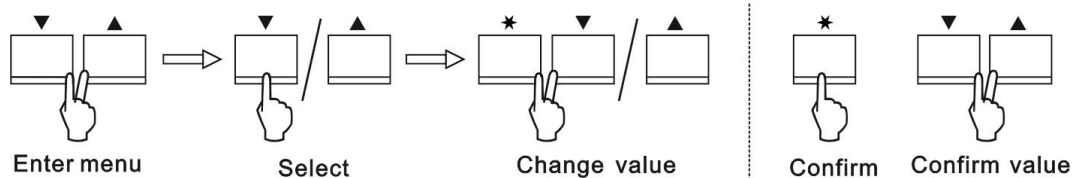
Main Menu	Submenu	Menu Items	Options	Parameter	Description
1、 Settings	1.^C/^F	**1.^C**			Displayed in Celsius.
		2.^F			Displayed in Fahrenheit.
	2.Beep on	**1.ON**			Enable the key tone.
		2.OFF			Disable the key tone
	3.Display Settings	**1.Single Display**			Only display data of channel 1 or 2
		2.Dual Display			Display data of both channels 1 and 2.
	4.Brightness adj.	1.Brightness adj			
	5.language	**1.Chinese**			Display menu in Chinese
		2.English			Display menu in English
	6.Load Default	1.Yes			Restore factory settings
		2.NO			
	7.keylock	1.Yes			Lock the backstage menu to avoid entering menu and changing parameter by mistake
		2.No			
	8.Return				Return to previous menu
2、 Range	1.Channel1	**1.T:-30-419℃**			Standard platinum resistance thermometer Area 8 Zinc point
		2.T:-30-660℃			Standard platinum resistance thermometer Area 7 Aluminum point
		3.T:-189-419℃			Standard platinum resistance thermometer Area 4 and 8 Zinc point
		4.T:-189-660℃			Standard platinum resistance thermometer Area 4 and 8 Aluminum point
		5.PT-100			Industrial platinum resistance, R0=100Ω
		6.PT-1000			Industrial platinum resistance, R_0=1000Ω
		7.Return			
	2.Channel2	**1.T:-30-419℃**			Standard platinum resistance thermometer Area 8 Zinc point
		2.T:-30-660℃			Standard platinum resistance thermometer Area 7 Aluminum point
		3.T:-189-419℃			Standard platinum resistance thermometer Area 4 and 8 Zinc point
		4.T:-189-660℃			Standard platinum resistance thermometer Area 4 and 8 Aluminum point
		5.PT-100			Industrial platinum resistance, R0=100Ω
		6.PT-1000			Industrial platinum resistance, R0=1000Ω
		7. Return			
	3.Return				

Note: the parameter displayed in bold is default setting.

| Enter menu | Select | Change value | Confirm function | Confirm value changes |

Main Menu	Submenu	Menu Items	Options	Parameter	Description
3、Input Ctrl	1.NO.1.	1.STD para.	1.TD=?		Input corresponding parameters in accordance with the calibration certificate of the standard platinum resistance thermometer.
			2.Rtp=?	**25.00000**	
			3.a8（-30-419℃）	1.a8=?	
				2.b8=?	
				3.Return	
			4.a7（-30-660℃）	1.a7=?	
				2.b7=?	
				3. Return	
			5.a4-189-0℃）	1.a4=?	
				2.b4=?	
				3. Return	
			6.Return		Return to previous menu
		2.RTD para	1.Input coefficient	1.ID=?	Input corresponding parameters in accordance with the calibration certificate of the industrial platinum resistance thermometer.
				2.RO=?	
				3.A=?	
				4.B=?	
				5.C=?	
				6.D=?	Factory settings
				7.Return	
			2.Restore Default		Restore PT100 parameters
			3.Mesure range	1.Low T	Set lower limit of measuring range
				2.Hing T	Set upper limit of measuring range
				3.Return	
			4.Return		
		3.Load CH1			Save and load the set parameters into CH1, parameters will be saved only when you selected loading the input parameters.
		4.Load CH2			Save and load the set parameters into CH2, parameters will be saved only when you selected loading the input parameters.
		5.Return			

Note: the parameter displayed in bold is default setting.

▼ ▲ Enter menu	▼ / ▲ Select	✶ ▼ / ▲ Change value	✶ Confirm function	▼ ▲ Confirm value changes	

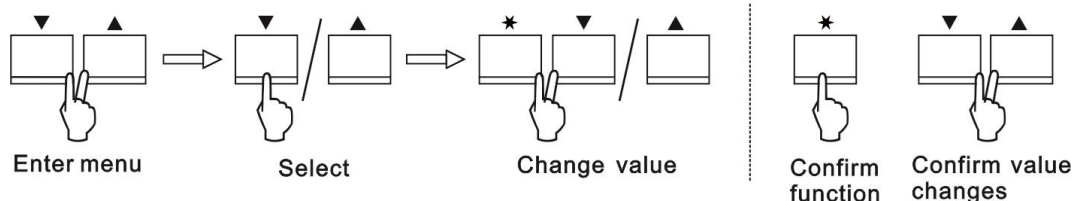| Main Menu	Submenu	Menu Items	Options	Parameter	Description
3、Input Ctrl	1.NO.2.	1.STD para.	1.TD=?		Input corresponding parameters in accordance with the calibration certificate of the standard platinum resistance thermometer.
			2.Rtp=?	**25.00000**	
			3.a8（-30-419℃） 1.a8=?		
			2.b8=?		
			3.Return		
			4.a7（-30-660℃） 1.a7=?		
			2.b7=?		
			3. Return		
			5.a4-189-0℃) 1.a4=?		
			2.b4=?		
			3. Return		
			6.Return		Return to previous menu
		2.RTD para	1.Input coefficient	1.ID=?	Input corresponding parameters in accordance with the calibration certificate of the industrial platinum resistance thermometer.
				2.RO=?	
				3.A=?	
				4.B=?	
				5.C=?	
				6.D=?	Factory settings
				7.Return	
			2.Restore Default		Restore PT100 parameters
			3.Mesure range	1.Low T	Set lower limit of measuring range
				2.Hing T	Set upper limit of measuring range
				3.Return	
			4.Return		
		3.Load CH1			Save and load the set parameters into CH1, parameters will be saved only when you selected loading the input parameters.
		4.Load CH2			Save and load the set parameters into CH2, parameters will be saved only when you selected loading the input parameters.
		5.Return			

✎ **Note: the parameter displayed in bold is default setting.**

▼ ▲ Enter menu	⟹	▼ / ▲ Select	⟹	✶ ▼ / ▲ Change value	✶ Confirm function	▼ ▲ Confirm value changes

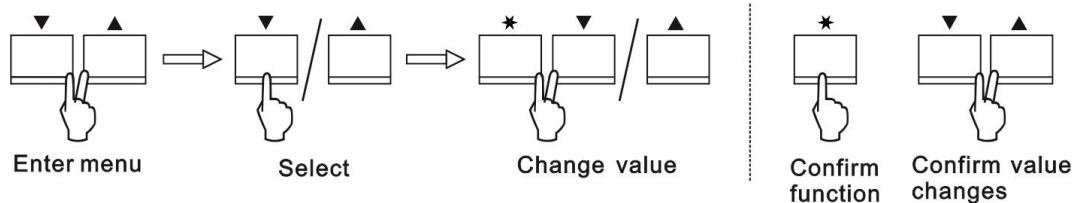| Main Menu	Submenu	Menu Items	Options	Parameter	Description
3、Input Ctrl	1.NO.3.	1.STD para.	1.TD=?		Input corresponding parameters in accordance with the calibration certificate of the standard platinum resistance thermometer.
			2.Rtp=?	**25.00000**	
			3.a8（-30-419℃）	1.a8=?	
				2.b8=?	
				3.Return	
			4.a7（-30-660℃）	1.a7=?	
				2.b7=?	
				3. Return	
			5.a4-189-0℃）	1.a4=?	
				2.b4=?	
				3. Return	
			6.Return		Return to previous menu
		2.RTD para	1.Input coefficient	1.ID=?	Input corresponding parameters in accordance with the calibration certificate of the industrial platinum resistance thermometer.
				2.RO=?	
				3.A=?	
				4.B=?	
				5.C=?	
				6.D=?	Factory settings
				7.Return	
			2.Restore Default		Restore PT100 parameters
			3.Mesure range	1.Low T	Set lower limit of measuring range
				2.Hing T	Set upper limit of measuring range
				3.Return	
			4.Return		
		3.Load CH1			Save and load the set parameters into CH1, parameters will be saved only when you selected loading the input parameters.
		4.Load CH2			Save and load the set parameters into CH2, parameters will be saved only when you selected loading the input parameters.
		5.Return			

🖉 **Note: the parameter displayed in bold is default setting.**

					Confirm function	Confirm value changes

Enter menu   Select   Change value

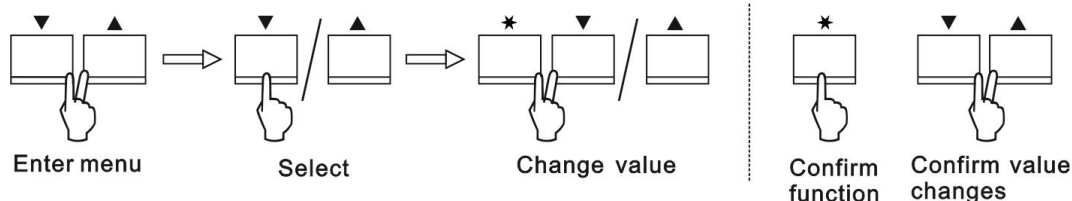| Main Menu	Submenu	Menu Items	Options	Parameter	Description
3、Input Ctrl	1.NO.4.	1.STD para.	1.TD=?		Input corresponding parameters in accordance with the calibration certificate of the standard platinum resistance thermometer.
			2.Rtp=?	**25.00000**	
			3.a8（-30-419℃）	1.a8=?	
				2.b8=?	
				3.Return	
			4.a7（-30-660℃）	1.a7=?	
				2.b7=?	
				3. Return	
			5.a4-189-0℃）	1.a4=?	
				2.b4=?	
				3. Return	
			6.Return		Return to previous menu
		2.RTD para	1.Input coefficient	1.ID=?	Input corresponding parameters in accordance with the calibration certificate of the industrial platinum resistance thermometer.
				2.RO=?	
				3.A=?	
				4.B=?	
				5.C=?	
				6.D=?	Factory settings
				7.Return	
			2.Restore Default		Restore PT100 parameters
			3.Mesure range	1.Low T	Set lower limit of measuring range
				2.Hing T	Set upper limit of measuring range
				3.Return	
			4.Return		
		3.Load CH1			Save and load the set parameters into CH1, parameters will be saved only when you selected loading the input parameters.
		4.Load CH2			Save and load the set parameters into CH2, parameters will be saved only when you selected loading the input parameters.
		5.Return			

📝 **Note: the parameter displayed in bold is default setting.**

| Enter menu | Select | Change value | Confirm function | Confirm value changes |

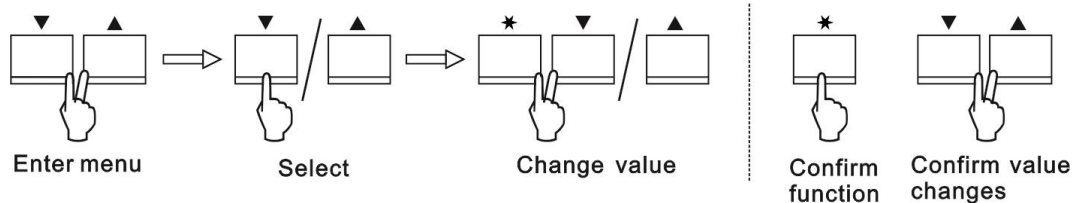| Main Menu	Submenu	Menu Items	Options	Parameter	Description
3、Input Ctrl	1.NO.5.	1.STD para.	1.TD=?		Input corresponding parameters in accordance with the calibration certificate of the standard platinum resistance thermometer.
			2.Rtp=?	**25.00000**	
			3.a8（-30-419℃）	1.a8=?	
				2.b8=?	
				3.Return	
			4.a7（-30-660℃）	1.a7=?	
				2.b7=?	
				3. Return	
			5.a4-189-0℃）	1.a4=?	
				2.b4=?	
				3. Return	
			6.Return		Return to previous menu
		2.RTD para	1.Input coefficient	1.ID=?	Input corresponding parameters in accordance with the calibration certificate of the industrial platinum resistance thermometer.
				2.RO=?	
				3.A=?	
				4.B=?	
				5.C=?	
				6.D=?	Factory settings
				7.Return	
			2.Restore Default		Restore PT100 parameters
			3.Mesure range	1.Low T	Set lower limit of measuring range
				2.Hing T	Set upper limit of measuring range
				3.Return	
			4.Return		
		3.Load CH1			Save and load the set parameters into CH1, parameters will be saved only when you selected loading the input parameters.
		4.Load CH2			Save and load the set parameters into CH2, parameters will be saved only when you selected loading the input parameters.
		5.Return			
	6. .Return				

📝 **Note: the parameter displayed in bold is default setting.**

Enter menu   Select   Change value   Confirm function   Confirm value changes

Main Menu	Submenu	Menu Items	Options	Parameter	Description
4.Offset cal.	1.Channel1	1.CH1:4-101ohm	1.Zero Adj(Ohm)		
			2.FS Adj(Ohm)		
			3.Return		
		2.CH1:4-401ohm	1.Zero Adj(Ohm)		
			2.FS Adj(Ohm)		
			3.Return		
		2.CH1:4-4001ohm	1.Zero Adj(Ohm)		
			2.FS Adj(Ohm)		
			3.Return		
	2.Channel2	1.CH1:4-101ohm	1.Zero Adj(Ohm)		
			2.FS Adj(Ohm)		
			3.Return		
		2.CH1:4-401 ohm	1.Zero Adj(Ohm)		
			2.FS Adj(Ohm)		
			3.Return		
		2.CH1:4-4001 ohm	1.Zero Adj(Ohm)		
			2.FS Adj(Ohm)		
			3.Return		
	3.Return				
5、Calibration	Factory settings				This menu is used by manufacturer only, is password protected.
6、Memorv	1.Remaining	01%			The memory save a data every 2 seconds, so the free space will decrease with the increasing of data over time.
	2.Erase	Yes			Empty data inside the memory
		No			
	3.Upload				Upload the data saved in memory to computer via RS232.
	4.Return				
7、Return					Return to main menu

 Note: the parameter displayed in bold is default setting.