

WERTH

MEASUREMENT INSTRUMENTS



THERMOSTATIC COOLING BATH

Dear users,

Thank you for purchasing East Tester's equipment!

In order to use the thermostat correctly, please read the full text of this manual carefully before using the equipment, especially the part about "safety precautions". If you have read this instruction manual, it is recommended that you keep it properly for future use.

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1. Summary

KET -40 refrigeration constant temperature tank is a common liquid as the working medium, can quickly provide stable temperature field (normal temperature $-40^{\circ}\text{C}\sim 95^{\circ}\text{C}$), suitable for reliable temperature calibration, widely used in machinery, chemical, food, medicine and other industries of industrial constant temperature equipment.

This product uses high-precision sensor temperature measurement and reliable temperature control circuit to ensure that the accuracy is higher than

the level of other domestic manufacturers, and the technology reaches international standards. The advanced touch operation is simple and quick to use. The high-precision temperature sensor is used in the constant temperature bath, which can make the resolution of the system reach 0.001°C .

2. Features

Fast Temperature Control, strong anti-interface ability

This equipment adopts the optimized PID control algorithm, which shortens the stabilization time, and the temperature difference of 30°C can be stabilized in

less than 35 minutes. Similarly, when the temperature receives external interference, it can quickly stabilize again.

Resolution 0.001°C, fluctuation $\pm 0.02^\circ\text{C}$

The portable oil tank adopts a self-developed precision temperature control module, with appropriate heating components and stirring devices, so that the working environment temperature in the oil tank can be stabilized within 0.01°C . The

high-precision temperature sensor is used in the constant temperature

oil tank, which can make the resolution of the system reach 0.001°C

- **With Multiple temperature calibration points, temperature control is more accurate**

A number of calibration points are set in the system, and a standard thermometer can be used to calibrate the temperature of the device. After calibration, the temperature accuracy of the device can be greatly improved.

- **Increase the control parameter self-tuning function, which can adapt to more use environments**

The automatic parameter setting function is added to the system. When the temperature control effect of the device is poor or the ambient temperature

changes greatly, users can use the automatic parameter setting function to adjust parameters.

➤ **functional diversity Meet all kinds of usage scenarios**

The device has a variety of functional options, including: high and low temperature alarm, high temperature warning, language switching, unit switching, brightness adjustment, automatic setting of temperature control parameters, control mode selection, serial communication (optional), file saving, sensor fault alarm, temperature stability warning and other functions.

➤ **Multiple sensors can be inserted at the same time for testing and calibration**

The machine has a number of slot inserts in common sizes, which can meet most of the sensor calibration use. Users can also contact the sales staff to customize the required size.

➤ **Level temperature field, the vertical temperature field**

The heating medium is liquid, and the uniformity of temperature field is excellent.

➤ **Touch Screen display**

Equipped with 7.0 inch screen, 16 bit true color RGB display, the temperature display in the working area eye-catching, convenient timely viewing. Full touch operation, easy to use.

➤ **Sentenced to stability conditions can be set up, smart reminder after stability**

The device has the temperature stability condition. You can modify the condition as required. When the device reaches the stable condition, it will remind the user to save the waiting time

➤ **Comprehensive protection function, using at ease**

With load short circuit, load break, sensor protection and other functions, when the equipment failure, the system will timely alarm and execute the corresponding action, to protect the equipment and personal safety.

3. Product parameter table

KET Thermostatic Cooling Bath

Product	Thermostatic Cooling Bath				
Model	KET -40	KET -30	KET -20	KET -10	KET -0A
temperature range	-40℃～95℃	-30℃～95℃	-20℃～95℃	-10℃ ～95℃	0℃～95℃
Fluctuation	0.01℃/10min	0.01℃/10min	0.01℃/10min	0.01℃/10min	0.01℃/10min
Uniformity	0.01℃	0.01℃	0.01℃	0.01℃	0.01℃
Working area(mm)	φ80*195mm	φ80*195mm	φ80*195mm	φ80*195mm	φ80*195mm
Cooling method	Single stage system	Single stage system	Single stage system	Single stage system	Single stage system

Working environment	Soft water/anhydrous ethanol	Soft water/anhydrous ethanol	Soft water/anhydrous ethanol	Soft water/anhydrous ethanol	Soft water/anhydrous ethanol
Environment temp	Lower than30°C	Lower than35°C	Lower than35°C	Lower than35°C	Lower than35°C
Power	1.3KW	1.3KW	1.3KW	1.3KW	1.3KW
Dimension(mm)	510mm*250mm*600mm	510mm*250mm*600mm	510mm*250mm*600mm	510mm*250mm*600mm	510mm*250mm*600mm

4. Safety Precautions

Please use the instrument in accordance with this manual. Otherwise the protective function of the instrument may be affected. See the security information in the warning and attention sections below.

The following definitions apply to the terms "warning" and "attention."

"Warning" indicates conditions and actions that may endanger users.

"Caution" indicates conditions and actions that may damage the instrument used.

warning

Please do not Use this instrument for other applications other than calibration. The instrument is designed for temperature calibration. Any other use can cause unpredictable harm to users.

Please do not Place the instrument under a cabinet or other object. Space needs to be left at the top so that probes can be inserted and taken

In the case of **alcohol medium**, special attention should be paid to open flame and static electricity when using this instrument. It is not recommended to run without monitoring, which may cause safety problems.

It is forbidden to operate the instrument in any direction other than vertical. Tilting the instrument or turning it over to the side may cause a fire incident.

Be aware of the risk of burns and frostbite



Do not touch the upper surface and motor parts of the equipment with your hands while working to prevent burns or frostbite.

Never use instruments near combustible materials.

Pay attention to prevent static electricity and open flame when the medium is alcohol.

5. Quick Use

5.1prepare the items

- 1、Stable laboratory temperature.
- 2、Thermostatic bath
- 3、Heating medium (above 0°C working medium is generally soft water, below 0°C working medium is generally alcohol, are about 4L).
- 4、220V AC power supply, 10A socket or wall plug

- 5、High temperature resistant container (for receiving liquid from overflow pipe)
- 6、Fire extinguisher to prevent alcohol from burning.

5.2Operation

- 1、Put instrument in the right position,then keep it horizontal and stable. Place the container connected with the overflow pipe liquid.

- 2、Pulling heating medium(methyl silicone oil) into the instrument slowly until it reaches the upper surface of the working area, as shown in 5.2.1

3、Cover the thermometer fixing plate, insert the thermometer under test, connect the power supply, and turn on the equipment switch.

4、After turn on the instrument, it shows the current temperature and working status. The stirring motor, compressor and heating rod is not working. The screen shows main display Interface, as shown in 5.2.2.

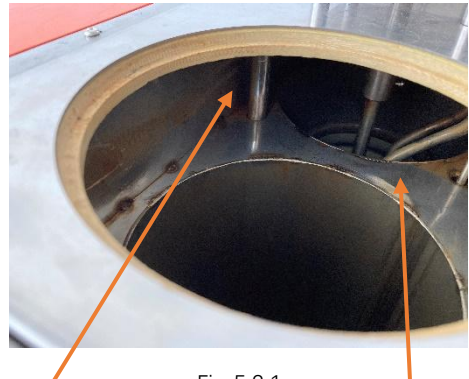


Fig 5.2.1

Overflow pipe

Working area surface



Fig5.2.2 Main interface

① Resistance value of PT100: shows the resistance value corresponding to the temperature;

② Temperature measurement text display: when the temperature meets the requirements of stable judgment, the text color turns green

③ Curve display: enter into curve display

④ Main output indicator: indicates whether the heating module is working, gray is not working, red is working.

⑤ Time display: Displays the current time

⑥ Start button

⑦ Stop button

⑧ Menu button: enter into menu interface

⑨ Setting temperature point

⑩ Temperature fluctuation: indicate the temperature fluctuation in the last 10 minutes

⑪ Temperature control time: the total time from start to the present

⑫ Current temperature

5、 Set the temperature, click the start button, and the device starts to heat. **Note that medium may flow out of the overflow pipe during heating.** When the color of the text "Measure temperature" changes to green, it indicates that the temperature of the medium meets the stability judgment condition. (After clicking the start button, the system will judge whether the compressor starts or not according to the current temperature, without human intervention)

6、 Click the start button again after changing the temperature (**Note: it is not necessary to press the stop button before changing the temperature, because frequent start and stop action of the compressor is easy to be damaged**)

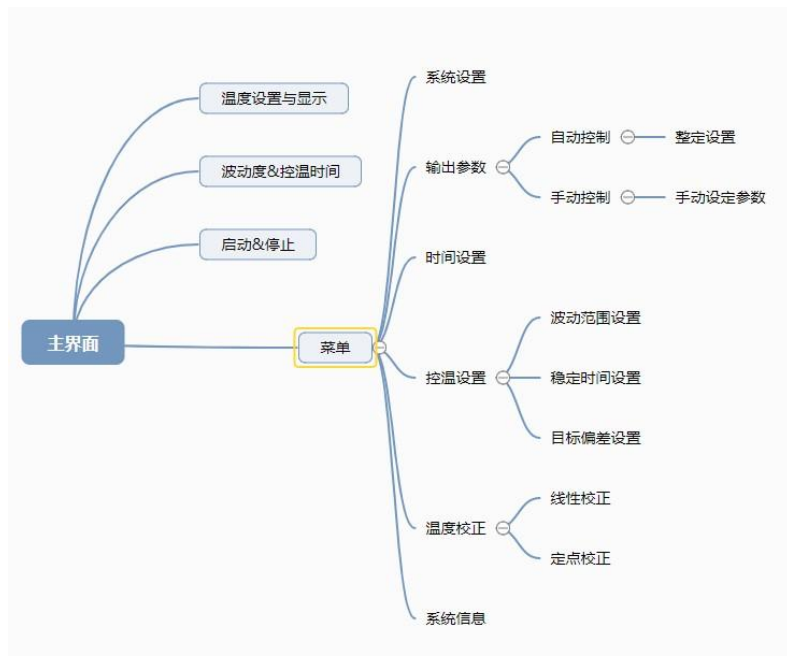
7、 Click the Stop button after finishing the work, and then turn off the power.

8、When the working medium needs to be replaced or discharged, it can be sucked out with suction tubing. When discharging alcohol, the medium should be heated to near 0°C, and attention should be paid to frostbite at low temperature.

6. Detail Operation

6.1 System Menu Structure

The specific structure of the system menu is shown in Figure 6.1.1. You can quickly understand the specific functions of the device according to this figure.



6.2 System Menu

As shown in Figure 6.2.1, it is the general entrance of system operation, including stability judgment setting, output parameter setting, system setting and system information, etc. Click the corresponding text to enter the corresponding interface.



Fig6.2.1 Menu Interface

6.3 Temperature stability judgment setting

This setting mainly includes fluctuation, target deviation and stability time.

Fluctuation Indicates the value of stable up-and-down fluctuations;

Target Deviation The deviation from the

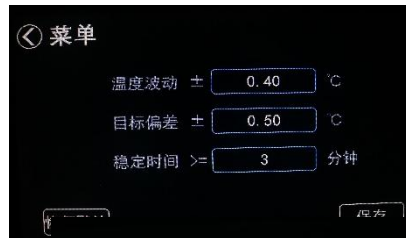


Fig6.3.1



set value in which the deviation range is stable can be judged to be stable.

Stable Time The time when the temperature fluctuation does not exceed the fluctuation degree

For example: The preset target temperature is 100°C, the

stability judgment parameter is set to the fluctuation of 0.01, the [6.4.1 Control mode selection screen

target deviation is 0.1, and the stability time is 3 minutes. Then

the judgment condition is that between 99.9°C and 100.01°C, the temperature fluctuation of less than

0.01°C is greater than or equal to 3 minutes

6.4 Output parameter setting

After you click parameter setting, you will enter the control mode selection interface. The system has two control modes: automatic control and manual control.



Click the button below to enter the corresponding setting interface. The control mode selection interface is shown in Figure 6.4.1.

6.5 Automatic Control

Automatic control Mode The system controls the temperature based on default values or self-tuning parameters. The parameters cannot be changed. This mode is recommended for control. The system will choose automatic control mode by default every time it starts up. Figure 6.5.1.

6.6 Automatic Setting

Automatic setting function is an auxiliary function under automatic control mode. When the temperature control effect of the device is not good, the user can choose to self-adjust the



6.6.1 Set the temperature range interface

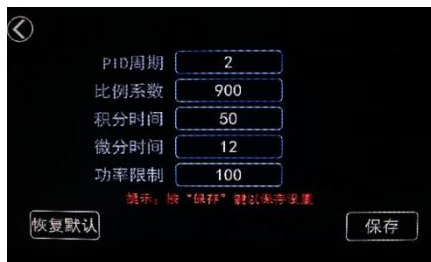
control parameters. Click "Setting Settings" to set the temperature range, as shown in FIG. 6.6.1, and then click "Confirm". The system will jump back to the main page with "Setting" prompt on the interface. Until the system prompts that the setting process is complete. In the setting process, you can also click the Stop button to end the process, but this self-setting will fail.

Because water and alcohol have good fluidity, in order to save the setting time, so the constant temperature tank setting a temperature point can achieve good control effect. It is recommended to set this temperature point at the lowest temperature $+10^{\circ}\text{C}$ (for example, ET3875-40 is set at -30°C). The setting interface is shown in Figure 6.6.1.

6.7 Manual Control

Manual Control Setting screen Set PID parameters, as shown in Figure 6.7.1. Click the Restore Default button to restore all Settings to preset values.

Note: After the setting is complete, the setting value will be saved only by pressing "Save". Otherwise, the modification will be regarded as abandoned.



5.7.1.1 Manual control parameter setting interface

PID Cycle Setting

The adjustment operation period of the instrument, in seconds; The value ranges from 0 to 100. The default value is 2. This parameter has great influence on the quality of

regulation, and the appropriate value can solve the overshoot and oscillation phenomenon perfectly, and obtain the best response speed. You are advised to change the value based on the preset value.

PID Proportional coefficient setting

The scale factor determines the size of the scale band. The smaller the ratio band, the stronger the adjustment effect (equivalent to increasing the amplification factor); On the contrary, the larger the ratio band, the weaker the regulation effect. You are advised to change the value based on the preset value.

PID Integration time setting

The integration time determines the integration intensity. If the integration time is short, the integration action is strong and the time to eliminate the static difference is short. However, if the integration action is too strong, it may lead to a large oscillation when the temperature is stable. On the contrary, if the integration time is long, the integration action

is weak, but the time to eliminate the static difference is longer. You are advised to change the value based on the preset value.

PID differential time setting

Differential time determines the strength of differential action. Differential time is long, differential effect is strong, reaction to temperature change Sensitive to reduce temperature overshoot. But too strong differential action may increase the temperature oscillation range and prolong the stability time.

Power limit setting

Limit the main output power. Percentage indicates that the value ranges from 0 to 100. The larger the value is, the larger the output power and the faster the heating is. However, it may not be conducive to the service life of the heating module. The default value is 100%.

6.8 System Setting



System Settings include language Settings, temperature scale Settings, alarm Settings, screen brightness Settings. The system setting interface is shown in Figure 6.8.1.

Fig 6.8.1 System Setting interface

System language setting

Supports Chinese and English system languages. Click to switch.

Set the system temperature scale

Support two system temperature scales, Celsius and Fahrenheit. Click the drop-down menu to set.

Alarm upper limit setting

Used to set upper limit alarm points. When the output is turned on, if the temperature in the furnace exceeds the alarm upper limit, the system will pop out the temperature alarm window, the buzzer will sound, and the output will be turned off. The value ranges from -45°C to 100°C.

If not, set it to the maximum value.

Upper and lower alarm Settings

Used to set upper and lower alarm points. When the output is turned on, if the temperature in the furnace is lower than the alarm lower limit or higher than the upper limit during the heating process, the system will give a prompt message and carry out the corresponding operation. The value ranges from -40°C to 95°C , and cannot be larger than the alarm upper limit.

If no, set it to -1.

Screen brightness setting

Percentage value Settings, from darkest to brightest, 0~100, press +/- to adjust the value.

6.9 Temperature Correction

The temperature correction function is to correct the display temperature and temperature control temperature of the device. The device display and temperature control can be closer to the actual value. Take KET-40 as an



example. On the system setting screen, press "Temperature Correction" to enter the temperature correction screen, as shown in Figure 6.8.2

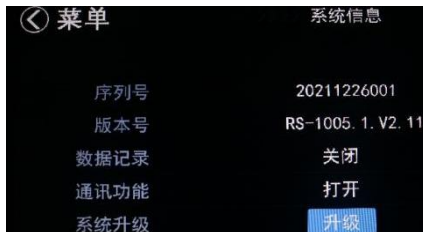
The system provides 14 temperature points. When there is an error between the temperature displayed by the instrument and the real temperature, the correction value is entered to correct the current display. (Correction = original correction value - (current heat source temperature value - standard thermometer value)) Click "Restore default" to restore all Settings to factory values.

Note: After the setting is complete, the setting value will be saved only by pressing "Save". Otherwise, the modification will be regarded as abandoned.

6.10 Time Setting

The time setting function allows you to set the device time. Figure 6.10.1

Fig7.1.System Interface



7. System Information

On the menu screen, tap System Info to switch to the system Info screen. You can view system info. The information includes serial number, version number, and communication status.

8. Accessory

Insert Plate(9 holes, can be customized) × 1

User Manual × 1

inner hexagon spanner × 1

Spare reeds and screws × 3

9. Maintenance

The chamber of the constant temperature tank is made of metal, and the liquid should be discharged after use to prevent rust in the chamber caused by long-term placement.

