



Automatic Freezing Point Tester **LMFZP-A100**

Operational Manual

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1. Safety Measures

	Warning	To ensure your safety, the instrument must be connected to a power supply with reliable grounding.
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1) **Power**

The main working power supply is AC (220+10%) V, 50Hz, single-phase grounding.

2) **Installation requirements**

- When the instrument is transported or moved, it must be kept at rest for 2 hours before it can be energized.
- The instrument is placed on a firm and flat ground. The distance between the air inlet of the condenser and the wall is not less than 200 mm.
- There shall be no objects or equipment near the instrument that interfere with the normal operation of the instrument, such as a strong magnetic field.

2. Introduction

Automatic Freezing Point Tester LMFZP-A100 offers freezing point measuring range of -54°C to 2°C with a temperature controlling accuracy of $\pm 0.1^\circ\text{C}$. This floor standing unit incorporates an imported refrigerator compressor system for reliable cooling performance. Utilizes advanced temperature control technology for efficient temperature regulation. It can be configured to test various freezing point indexes, such as jet fuel, engine coolant, and their concentrated solutions.

3. Features

- Automatic freezing point determination
- Equipped with double glass observing window
- Stainless steel work table-board and cold bath
- Adjustable mechanical stirring
- Durable full-spray plastic construction
- Offers rapid cooling
- Meets ASTM D1177 standards

4. Specifications

Model No.	LMFZP-A100
Freezing Point Range	-54°C to 2°C
Cold Bath Measurement Temperature	-70°C to 30°C
Temperature Controlling Accuracy	$\pm 0.1^\circ\text{C}$
Sample Stirring	60 to 80 r/min
Ambient Temperature	15 to 35 °C
Relative Humidity	$\leq 80\%$
Heating Rate	350 W
Maximum Power Consumption	2000 W
Power Supply	AC (220 $\pm$ 10) V, 50 Hz
Dimension	770mm $\times$ 480mm $\times$ 730mm
Net Weight	45kg

5. Applications

Automatic Freezing Point Tester is used to automatically determines the freezing point temperature of different substances. It is widely used in automotive, aviation, and chemical manufacturing industries.

6. Instrument Introduction

6.1 Instrument Structure

The instrument is composed of a refrigeration system, a controlling system, and other components.

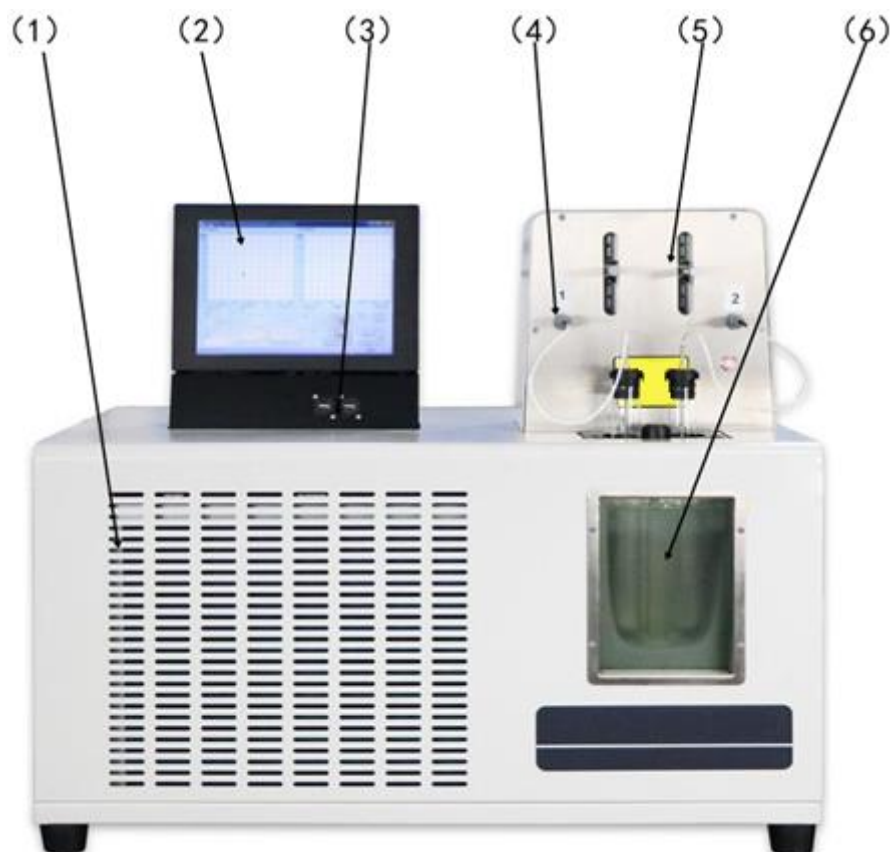


Figure-1

1	Refrigeration system
2	Touch screen
3	USB socket
4	Temperature sensor
5	Testing stir device
6	Cold trough device

Automatic Freezing Point Tester LMFZP-A100

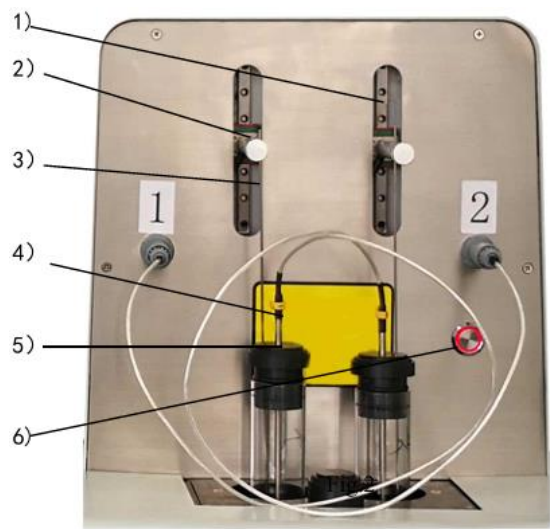


Figure-2

1	Stirring device
2	Screw grip
3	Stirring rod
4	Temperature sensor
5	Test tube stopper
6	Power switch

6.2 Sides of the instrument

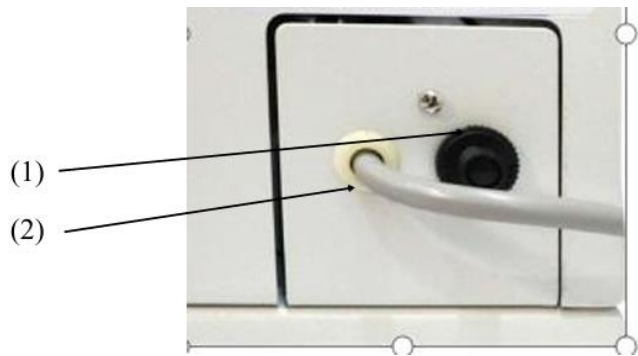


Figure-3

1	Recoverable overload protector
2	Power supply

7. Operations

7.1 Preparation before use

- 1) Please read the Operation Manual before use.
- 2) Please read the Standard of ASTM D1177 "**Test Methods for Freezing Point of Cooling Liquids**" to acquaint yourself with test methods, test procedures, and test requirements.
- 3) Prepare all test apparatus and materials as per the stipulation of the standard.
- 4) Check the working state of the instrument to ensure it is in accordance with the working environment and working conditions stipulated in the Operation Manual.
- 5) Check the outer shell of the instrument to ascertain that it is fine-grounded.

7.2 Operation methods

- 1) Add some alcohol into the cold trough, and ensure that the liquid level of industrial anhydrous ethanol is 10 mm higher than the isolation plate in the cold trough. When the industrial anhydrous ethanol is insufficient, it must be added and then tested.
- 2) Turn on the power switch, the industrial computer starts automatically, and the control software runs to the control home page automatically (as shown in **Figure 4**).

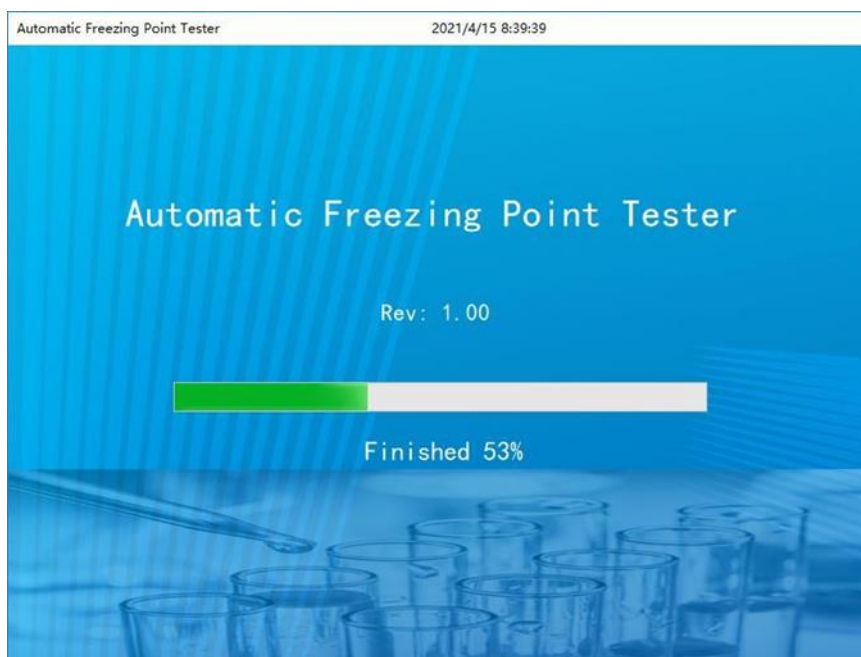


Figure-4

Automatic Freezing Point Tester LMFZP-A100

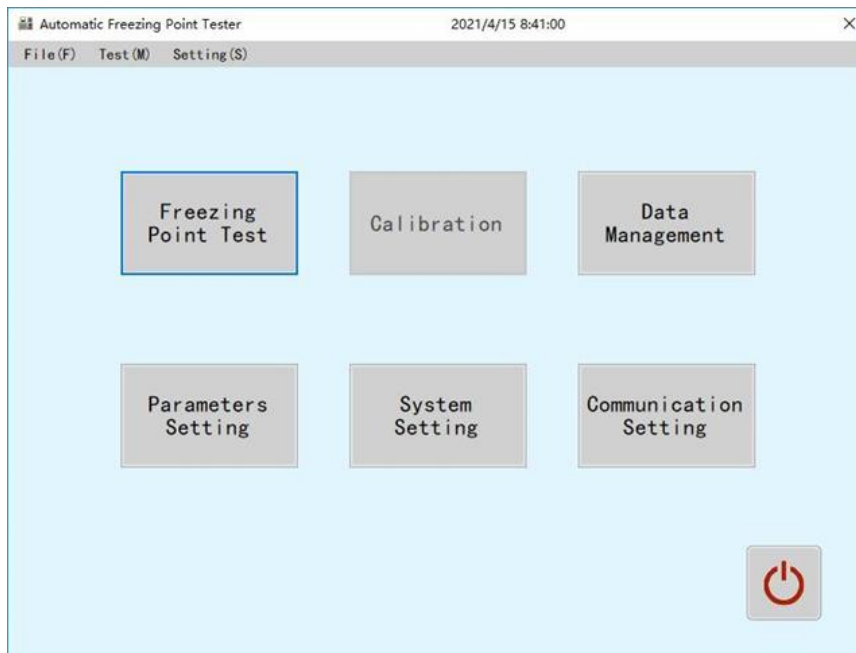


Figure-2

- 3) Click the “**Settings**” button, which opens the interface of the communication settings (**Figure 5**). The serial port number of the communication port can be set according to the serial port of the industrial computer connected by the serial port line. Click “**OK**” to save the new setting value and exit this interface. Other communication settings have been set before the instrument leaves the factory; please do not change them at will. Click “**Default**” to restore the initial settings. Click “**Exit**” to exit the form interface without modifying the settings.

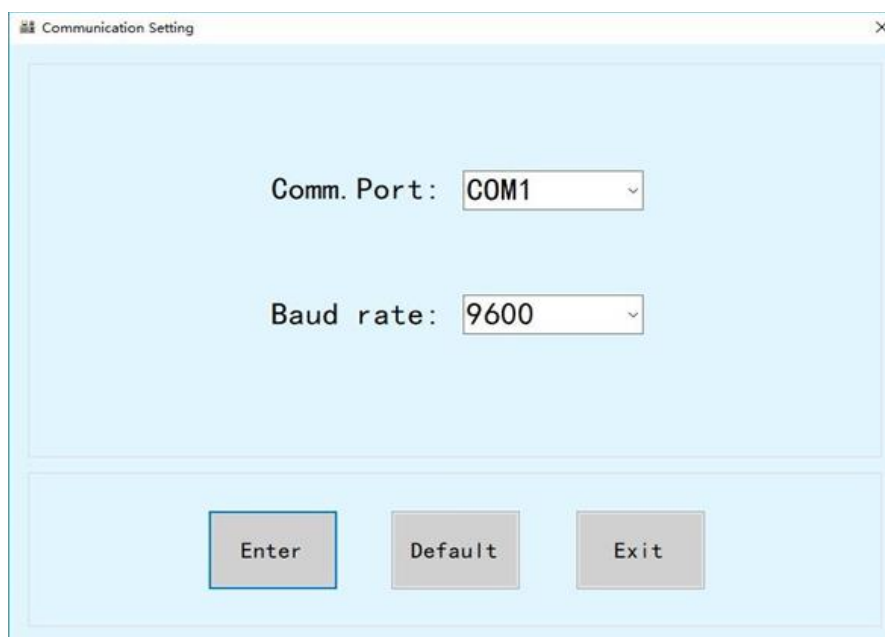
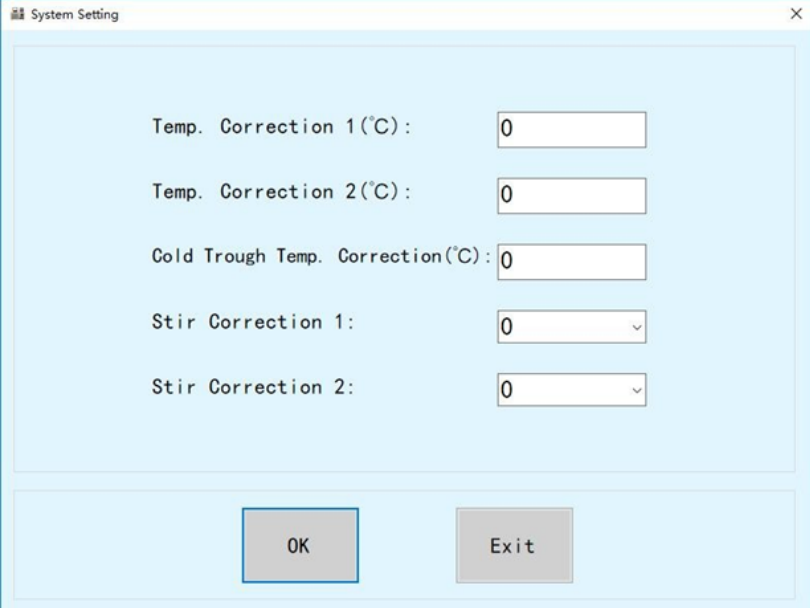


Figure-5

4) Parameter Setting (Figure 6)

Input sample No., Sample name and preset the freezing point temperature and sample type in the text box, click “OK” to restore the data and exit the interface.



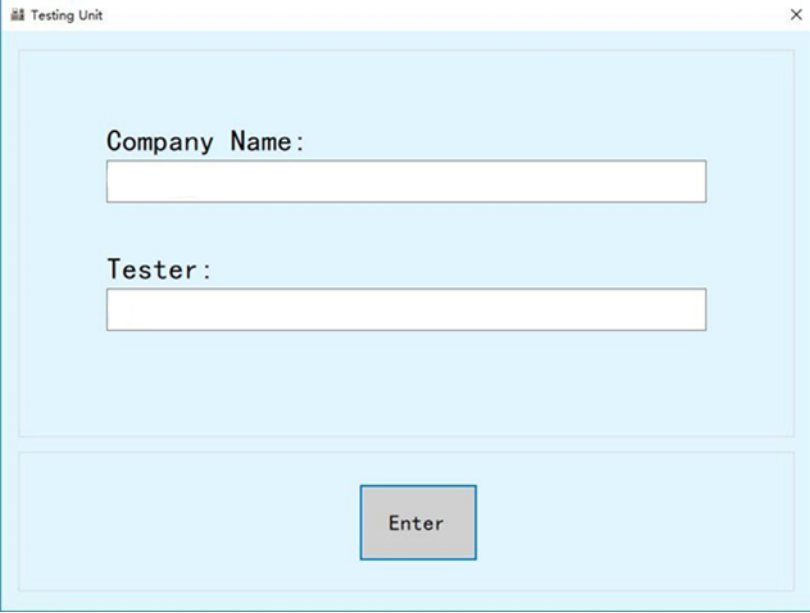
The 'System Setting' dialog box contains five input fields for temperature corrections and stirrer settings. Each field is labeled and has a corresponding input box with the value '0'. The first three are temperature corrections in degrees Celsius, and the last two are stirrer corrections. At the bottom, there are two buttons: 'OK' and 'Exit'.

Parameter	Value
Temp. Correction 1(°C):	0
Temp. Correction 2(°C):	0
Cold Trough Temp. Correction(°C):	0
Stir Correction 1:	0
Stir Correction 2:	0

Buttons: OK, Exit

Figure-6

Input detection unit and operator in the “**Detection Unit**”, click “OK” to restore the data and exit the interface. (Refer to **Figure 7**)



The 'Testing Unit' dialog box contains two text input fields for 'Company Name' and 'Tester'. Below these fields is a single button labeled 'Enter'.

Company Name:

Tester:

Enter

Figure-7

5) System setting (Figure 8)

This menu can be used for temperature correction and sample mixing times correction. The factory default value is 0. Operators can use distilled water to test the freezing point value and then correct the temperature.

Figure-8

6) Freezing point test (Figure 9)

After setting the above parameters, enter the "freezing point test" menu and click "cold bath start" to cool the test bath. Operators can also input "preset freezing point" directly in the test interface and click the "OK" button.

Figure-9

- 7) When the cold bath temperature reaches the test temperature, take (80 ± 5) ml of the sample with the measuring cylinder and put it into the test tube.
- 8) Install the test-tube, test-tube plug, stirring rod, temperature sensor, etc., according to the test procedures, put the test tube assembly into the cold bath, and insert the sample detection temperature sensor. **(Figure 10)**



Figure-10

- 9) Manually adjust the position of the stirring device to the lowest or highest position, and adjust the moving position of the stirrer to make it not higher than the liquid level, yet not touch the bottom of the tube. Then tighten the clamping button.
- 10) Click "**Stir 1**" or "**Stir 2**" to start the freezing point test. The controlling software records test temperature, and the values are displayed in the test value area. The Figure of temperature change is shown in the area shown with sample 1 or sample 2.
- 11) When the freezing point appears, the instrument can automatically display the freezing point temperature value and stop stirring, the average freezing point of the parallel sample is calculated automatically, and the test value area of the main interface is displayed, the graph area of the main page shows the change of the test temperature graph, and the temperature characteristics of the freezing point are clearly recorded in the graph.
The operator can also capture the freezing point value manually; double-click the inflection point of the temperature curve to pop up the freezing point temperature value of the sample at this time.
- 12) Take out the sample temperature sensor plug, release the stirrer clamping knob, take out the test tube, and clean these for the next test.
- 13) The test data record appears again. Click "**Data management**" on the home page to enter the test data query and print interface **(Figure 11)**.
Note: After clicking a file in the restored data files, the operator can only click other data files after the measurement curve is drawn.

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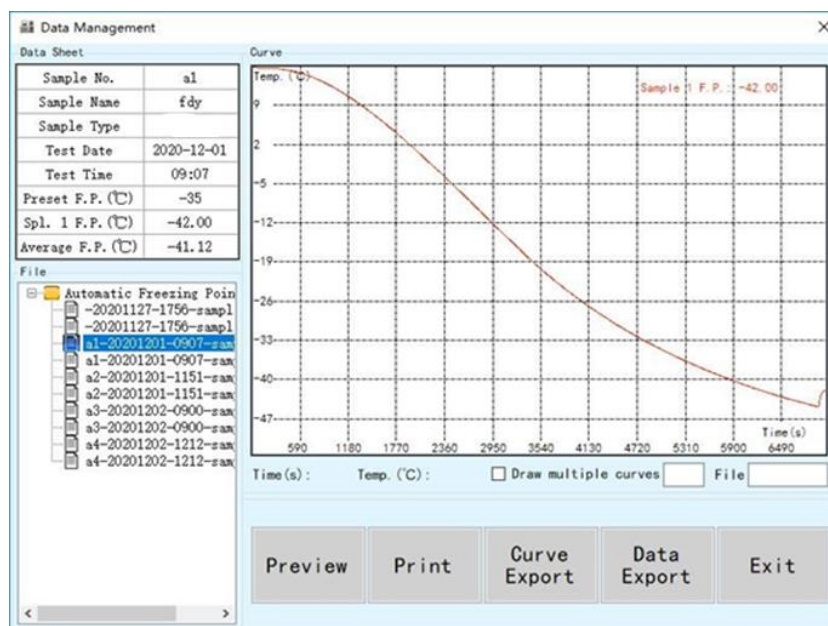


Figure-11

- 14) Click "Export" in **Figure 11** to enter the data deriving interface (as shown in **Figure 12**). First, select the test results to be derived from the data file on the left, then select the folder path to be imported from the target folder on the right, and then click "Export" to complete the data file export. To delete data, select the data file to be deleted and click "Delete".

Note: Delete data with caution.

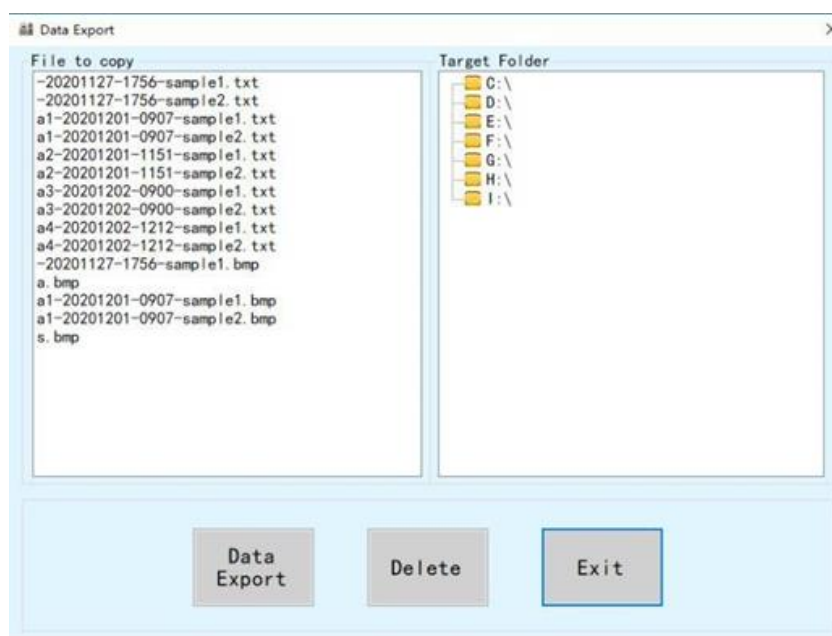


Figure-12

- 15) Turn off the control software and IPC, click "Turn off" in the home interface, the control software will exit, and turn off the operating system and IPC one minute later. After the IPC is turned off, the instrument power can be turned off.

8. Maintenance

- 1) The test must be carried out in strict accordance with the sample quantity of (80 ± 5) ml, because this is the test quantity verified by a large number of experiments, and the user cannot change it at will; otherwise, the test results will be affected.
- 2) The instrument shall be placed stably; otherwise, it will affect the normal operation of the instrument.
- 3) It is recommended to use industrial anhydrous ethanol as the cooling medium in the cold trough. Put industrial anhydrous ethanol into the cold bath to ensure that the liquid level of industrial anhydrous ethanol is 10 mm higher than the isolation plate in the cold trough. When the industrial anhydrous ethanol is insufficient, it must be added and then tested. Otherwise, do not start the machine.
- 4) The industrial anhydrous ethanol injected into the cold bath undergoes a process of thermal expansion and contraction at low temperature. It is necessary to control the amount of industrial anhydrous ethanol injected into the cold bath to ensure that the level of industrial anhydrous ethanol in normal operation is higher than the cooling coil in the cold bath.
- 5) Industrial anhydrous ethanol is often added to the cold bath to make up for the loss of volatilization. After the test, take out the test tube and the test tube seat in time, and cover the heat preservation bath cover.
- 6) When the industrial anhydrous ethanol in the bath becomes turbid, it should be replaced in time to ensure the clarity in the cold bath, so as not to affect the test observation.
- 7) If the test sample falls on the surface of the instrument, wipe it off with a warm cloth as soon as possible. Pay special attention to the electric control part, do not let water get wet.
- 8) It is forbidden to store or use the instrument in an environment of humid and corrosive gas; if it is not used for a long time, please wrap it for storage to avoid dust intrusion!

9. Troubleshooting

	Warning	If any trouble appears, please cut off the power supply immediately. Notify a professional personnel to check and repair it. You can use it again only after the problem has been solved to avoid any accidents.
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Problem	Reason	Solution
The instrument does not work after starting up	If the display does not show after the power switch is turned on, the compressor does not start after three minutes, it may be that the overload protector pops up	Press the overload protector again
	When the voltage is lower than 170V, it is difficult for the compressor to start and work normally	Continue to use after the voltage is normal
The instrument is noisy when working	The instrument is placed unevenly, and the tilting resonance will produce noise	Check whether the instrument's workbench is flat
	Check whether the fixing screws of the compressor and condenser are loose	Retighten the screws
Poor refrigeration effect	The working environment temperature exceeds the upper limit of the normal use temperature of the instrument by 35°C	Reduce indoor ambient temperature

10. Accessories

Standard Accessories

S. No	Accessory Name	Quantity
1	Main unit	1 set
2	Double wall cooling tube	2 pcs
3	Single wall test tube	1 pc
4	Test tube stopper	2 pcs
5	Temperature sensor	2 pcs
6	Stirrer	2 pcs
7	Constant temperature bath cover	3 pcs (2 large, 1 small)
8	Test tube holder	1 pc
9	O-shaped ring ($\Phi 28 \times 2.4$)	2 pcs
10	Disk (software backup)	1 pc