Order: 010-59822688
Toll-free: 800-990-6057 /400-810-6057
TIANGEN BIOTECH (BEIJING) Co., LTD.

Version No.: OS180918

TGrade Bath Shaker User Manual



Catalog Number	Product Name
OSE-DB-03-AM	TGrade Bath Shaker

For Research Use Only. Not for use in diagnostic procedures.

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Important Instructions

1. Important safe operation information



Users should read the operating manual carefully before operating TGrade Bath Shaker. No one is permitted to operate TGrade Bath Shaker before reading the operating manual. Failure to follow the instructions in the operation manual may result in damage to the equipment or failure to operate properly and may result in serious personal injury. Please read the following safety tips and instructions carefully and take all precautions.

2. Safety requirements

The following basic safety measures must be observed during all stages of operation, maintenance and repair of TGrade Bath Shaker. Failure to observe these measures, or the warnings noted elsewhere in this manual, may result in a weakening of the protection provided by the instrument. It may also cause damage to the instrument and shorten its expected service life.

TIANGEN shall not be liable for any consequences of the user's failure to comply with the following requirements.



TGrade Bath Shaker is for indoor use.

Operators should not attempt to disassemble or repair TGrade Bath Shaker as this will void your warranty. Replacing components or making in-unit adjustments must be done by a licensed maintenance professional.



Before connecting TGrade Bath Shaker power supply, make sure that the voltage of the power supply is the same as the voltage required by the instrument (±10% deviation is allowed), and make sure that the rated load of the power outlet is not less than the requirement of the instrument.



To avoid electric shock accidents, the input power cord of the instrument must be reliably grounded. This instrument uses a three-pronged grounding plug, which has a 3rd (grounding) prong and can only be used with a grounding type power outlet, which is a safety device. If the plug cannot be inserted into the outlet, have an electrician install the correct outlet and do not render the grounding plug unsafe.



TGrade Bath Shaker should normally be used with the supplied power cord. If the power cord is broken, it must be replaced and not repaired. When replacing it, the power cord must be replaced with one of the same type and size. Do not press anything against the power cord while the instrument is in use. Do not place the power cord in a place where people

are walking around. Always hold the plug in your hand when plugging or unplugging the power cord. Make sure the plug is fully inserted into the socket when plugging in, and do not pull the power cord hard when pulling out the plug.



TGrade Bath Shaker should be placed in a place with low humidity, less dust and away from water sources (e.g., near pools, water pipes, etc.), and the room should be well ventilated and free of corrosive gases or strong magnetic field interference. Do not place the instrument in a damp or dusty place.



The openings in the TGrade Bath Shaker are designed for ventilation. To avoid overheating, be sure not to block or cover the ventilation holes. When using a single instrument, the ventilation holes at the front and back of the instrument should be no less than 25 cm from the nearest object, and the instrument should not be used on a flimsy support table as this may block the ventilation holes at the bottom of the instrument.



Excessive temperature will affect the use of the instrument and even cause fault. Do not use the instrument in direct sunlight and keep it away from heaters, stoves and all other heat sources.

When the instrument is not used for a long time, unplug the power supply and cover the instrument with a soft cloth or plastic paper to prevent dust from entering.



In the following cases, immediately unplug TGrade Bath Shaker from the electrical outlet and contact TIANGEN for disposal:

- Liquid spilled into the instrument;
- Instruments exposed to rain or water;
- The instrument is not working properly, especially if there is an unusual sound or odor present;
- The instrument is dropped or the housing is damaged;
- There is a significant change in instrument function.

3. Warning sign



TGrade Bath Shaker has a HOT SURFACE (i.e., beware of high temperatures) sign affixed in one place next to the oscillating plate. It is strictly prohibited to touch the metal part (module) near this sign with any part of the body during or just after high temperature operation of the instrument to avoid burns!

4. Module installation and instrument maintenance

TGrade Bath Shaker Module is not screw-fixed. When installing the module, the left bottom bevel of the module is tangent to the left bevel of the oscillating plate of the instrument, and the right side is pressed down, and the sound of the buckle is heard, which means that the installation is successful; when disassembling the module, the left hand holds the module, and the right hand presses the button on the right side of the module, which separates the module from the host machine.

TGrade Bath Shaker should be cleaned regularly with a cotton swab moistened with water to clean the holes in the module to ensure that the test tubes are in full contact with the walls of the holes and that they conduct heat well. Any stains on the surface of this instrument can be cleaned with a soft cloth soaked in water and wrung dry.



Caution:

- The power supply must be disconnected while the instrument is engaged in cleaning the surface;
- Cut off the power supply when replacing the module;
- Never start oscillating operation without the module installed;
- The instrument surface is strictly prohibited to be cleaned with corrosive cleaning agents.

5. After-sales service

TGrade Bath Shaker warranty period is 12 months, such as by the user to use the operation is not appropriate, does not meet the requirements of the conditions of use and unauthorized maintenance or modification caused by the instrument damage is not covered by the warranty.

For out-of-warranty repairs, TIANGEN will charge an appropriate repair fee.

Caution:

This instrument should be inspected and accepted in the packing box immediately after unpacking according to the list on the packing list. If you find any damaged or missing items, please contact TIANGEN immediately.

After the instrument is unpacked, please keep the packing box and packing materials properly for use in maintenance. TIANGEN will not be responsible for any damage to the instrument that occurs during transportation to the maintenance department due to poor packaging.

Product Introduction

TGrade Bath Shaker is an advanced microcomputer-controlled metal bath with a variety of specifications of the heating module can be selected for a variety of test tubes, can be widely used in the incubation of samples, enzyme reactions, electrophoresis pre-denaturation, serum coagulation, etc., temperature control or oscillating needs of a variety of molecular biology experiments.

This product has the following characteristics:

- ◆ LCD true color high brightness touch screen;
- ◆ Display the set temperature and instant temperature at the same time;
- ◆ Display setting time and running time at the same time;
- ◆ Various sizes of heating modules are available for a wide range of test tubes;
- ◆ The heating module is non-screwed for easy replacement;
- ◆ The heating module is a metal module for easy cleaning and sterilization;
- ◆ The heating module automatically recognizes the speed limit;
- ◆ Built-in over-temperature protection device, more reliable use;
- ◆ Run the end reminder function.

Technical Parameters

1. **Normal working conditions**
   Ambient temperature: 10°C to 30°C
   Relative humidity: ≤ 70%
   Power supply: AC220V±22V 1.5A 50Hz ±1Hz
   Placement table: horizontal and stable

2. **Transportation and storage conditions**
   Ambient temperature : -20°C ~+55°C
   Relative humidity: ≤80%

3. Performance parameters

<table>
<tr><td>Temperature setting range</td><td colspan="4">1～100°C</td></tr>
<tr><td>Temperature control range</td><td colspan="4">Room temperature -15°C ~ 100°C</td></tr>
<tr><td>Time setting</td><td colspan="4">1 min～99 h 59 min 59 sec or ∞</td></tr>
<tr><td>Temperature fluctuation range</td><td colspan="4">20°C~45°C≤±0.5°C; <20°C or >45℃≤±0.8°C</td></tr>
<tr><td>Temperature control precision</td><td colspan="4">≤ ±0.5°C</td></tr>
<tr><td>Module temperature uniformity</td><td colspan="4">20°C~45°C≤±0.5°C; <20°C or >45°C≤±0.8°C</td></tr>
<tr><td rowspan="9">Heating/cooling time
(ambient temperature 20-25°C,
humidity ≤ 70%)</td><td>Module</td><td>25°C up to 95°C</td><td>Room temperature drops by 10°C</td><td>95°C down to 25°C</td></tr>
<tr><td>96 × 0.2 ml</td><td>≤12 min</td><td>≤12 min</td><td>≤12 min</td></tr>
<tr><td>54 × 0.5 ml</td><td>≤12 min</td><td>≤12 min</td><td>≤12 min</td></tr>
<tr><td>35 × 1.5 ml</td><td>≤12 min</td><td>≤12 min</td><td>≤14 min</td></tr>
<tr><td>35 × 2.0 ml</td><td>≤12 min</td><td>≤12 min</td><td>≤14 min</td></tr>
<tr><td>20 × 1.5 ml+
32 × 0.2 ml</td><td>≤12 min</td><td>≤12 min</td><td>≤14 min</td></tr>
<tr><td>8 × 5.0 ml</td><td>≤18 min</td><td>≤18 min</td><td>≤18 min</td></tr>
<tr><td>8 × 15 ml</td><td>≤21 min</td><td>≤18 min</td><td>≤21 min</td></tr>
<tr><td>4 × 50 ml</td><td>≤21 min</td><td>≤18 min</td><td>≤21 min</td></tr>
<tr><td>Oscillating frequency</td><td colspan="4">300～3000 rpm</td></tr>
<tr><td>Oscillating amplitude</td><td colspan="4">3 mm</td></tr>
<tr><td>Outline dimension</td><td colspan="4">311 mm × 210 mm × 145 mm</td></tr>
<tr><td>Net weight</td><td colspan="4">5.9 kg</td></tr>
<tr><td>Power supply</td><td colspan="4">AC110V-240V, 50-60Hz, 180W</td></tr>
</table>

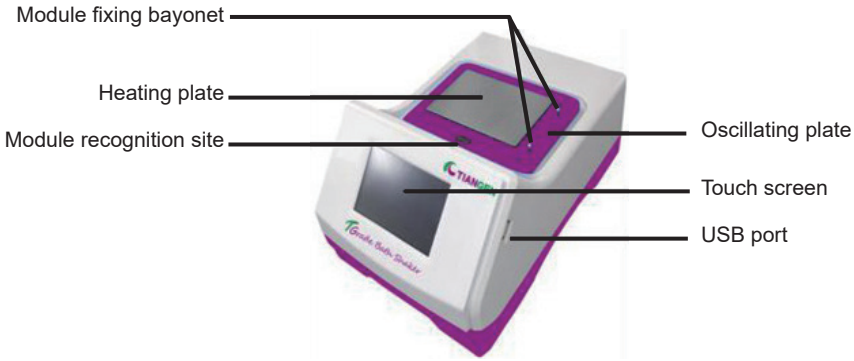
Package Composition

Name	Quantity
Host machine (excluding heating module)	1 set
Power cord	1 pcs
User Manual	1 copy
Performance Test Report	1 copy
Warranty Card	1 copy
Packing list	1 copy
Spherical bottom angle	4 Nos

Accessories Guide

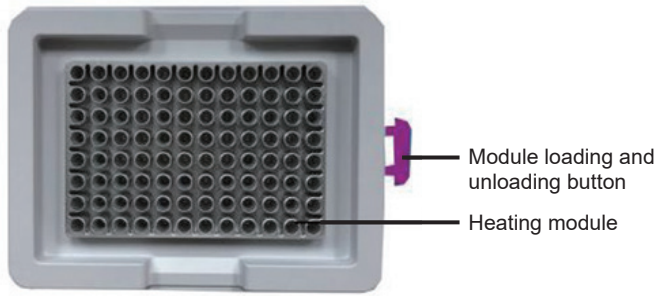
Product Name	Cat. No.	Speed Limit Range (rpm)
384-well Block	OSE-DB-A01	300-3000
96 × 0.2 ml Block	OSE-DB-A02	300-2500
35 × 1.5 ml Block	OSE-DB-A03	300-2000
35 × 2.0 ml Block	OSE-DB-A04	300-2000
12 × 5.0 ml Block	OSE-DB-A05	300-1000
12 × 15 ml Block	OSE-DB-A06	300-1000
4 × 50 ml Block	OSE-DB-A07	300-1000
32 × 0.2 ml + 20 × 1.5 ml Block	OSE-DB-A08	300-2000

Instrument Schematic Diagram

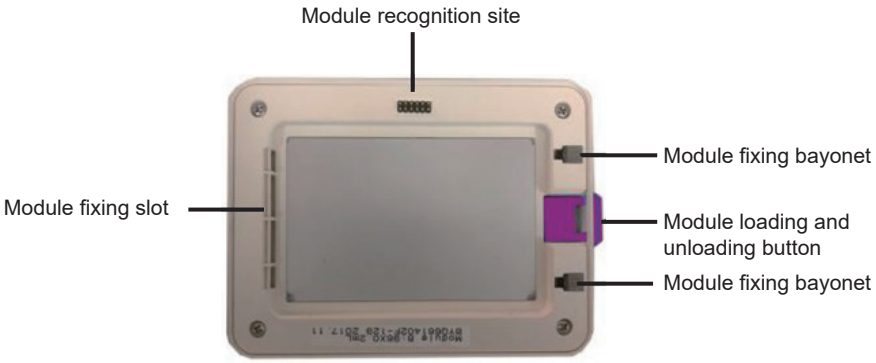


Schematic Diagram of Heating Module

Take the 96 × 0.2 ml Block for example:



Heating module front



Heating module back

Instrument Installation

Carefully unpack TGrade Bath Shaker Constant Temperature Oscillating Metal Bath as described below:

1. Firstly, remove the filling material at the top;
2. Remove the instrument from the foam housing and place it on a horizontal sturdy lab bench;
3. Remove the protective material of the external packaging of the instrument;
4. Place the instrument in a suitable operating area, plug in the power cord, make sure the power is off, and select the desired module;
5. Cut the left bottom bevel of the module to the left bevel of the instrument transition plate, press the right side down, and hear the sound of the clasp that the installation is successful.

Check before Power On

Before powering up the instrument after connecting the power cord, confirm the following:

1. The table on which the instrument is placed is horizontal and firm;
2. The power supply is consistent with the voltage required by the instrument;
3. Verify that the power cord plug is inserted into the electrical outlet;
4. The power cord is grounded reliably;
5. The module is firmly fixed with the host.

Note: If the instrument displays abnormally (e.g., flashing, white or black screen) after startup, please turn off the power immediately and contact TIANGEN!

Operation Guide

1. Main screen

When the instrument is powered on, turn on the power switch and the display will enter the main screen. The main screen includes four option buttons: File, Single Point Setting, System, and Inch.

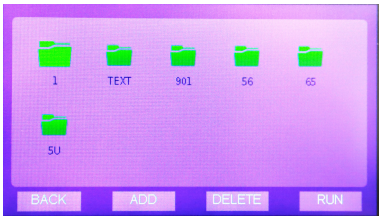
2. File editing

In the main screen, click on the "Program" option to enter the file list screen. The maximum number of files you can save is 10. Click "BACK" button to return to the main screen.

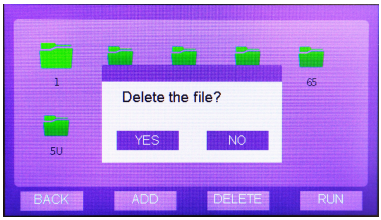
Click "DELETE" in the file list screen, a deletion confirmation box will pop up, click "YES" to confirm deleting the file, or click "NO" to cancel deleting the file, then return to the file list screen. Click "ADD" in the file list screen or select a file and click it to enter the file editing screen.

Operate the file program in the file editing screen, and the first line of the screen, 1-5 represents the number of sections, and you can set up to 5 sections for a file. Click "BACK" to return to the file list screen. When the number of sections of a file is greater than or equal to 2, click "DELETE" to delete the selected section. Click "RUN", a prompt box will pop up to run the file, select "YES" to run the program, select "NO" to return to the file editing screen.

In the file editing screen, select a section and click on it to enter the section information editing screen or click on "ADD" to add a section after the selected section to enter the section information editing screen.



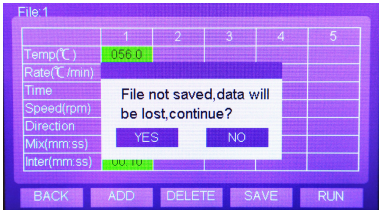
File list screen



Delete confirmation box



File editing screen



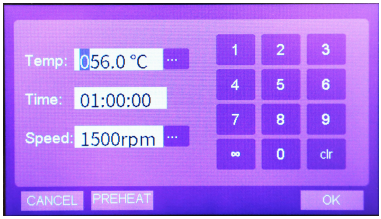
Run file prompt box

2.1 Section 1 Information editing

In the document editing screen, click and select the first section to enter the information editing screen of the first section, and modify the information of the first section according to your needs. Click "OK" to confirm that the modification is successful, and click "CANCEL" to abandon the modification and return to the document editing screen.

The number of digits in the display box that are not set cannot be empty, you need to enter "0", for example: the temperature is set to 1.5 ℃, you need to enter "0" "0" "1" "5".

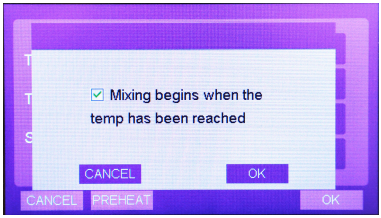
You can set the preheat in the first section of the file editing screen and the single point setting, click "PREHEAT" to enter the preheat setting screen.



The first section information editing interface

2.2 Preheating setting

According to the experimental requirements, select the constant temperature and then start oscillating, click "OK" to confirm the modification, click "CANCEL" to give up the modification, and return to the page of editing information in the first section. If you select "Mixing begins when the tamp has been reached", the instrument will start to oscillate and time after reaching the preset temperature.



Preheating setting screen

2.3 Section 2-5 Information Editing

There is no preheat setting for the second through fifth positions, only the first position has a preheat setting.

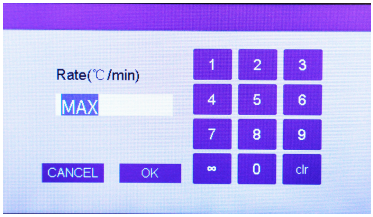
Section information includes temperature, time, and speed. Click the white edit box to select the corresponding information, and use the 12 buttons on the right to set the selected information. Click "OK" to add section successfully, click "CANCEL" to abort adding, and return to the file editing screen.



Section 2-5 Information Editing Interface

2.4 Temperature up/down speed setting

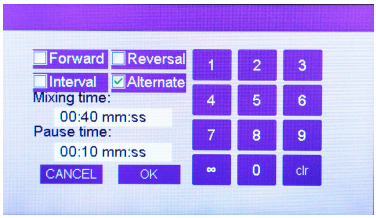
Click the option box behind the temperature in the section information editing screen to enter the screen for setting the temperature up/down speed. Use the 12 buttons on the right to set the temperature up/down speed. Click "OK" to set the speed successfully, click "CANCEL" to abort the setting and return to the section information editing screen.



Setting interface of heating and cooling speed

2.5 Oscillating setting

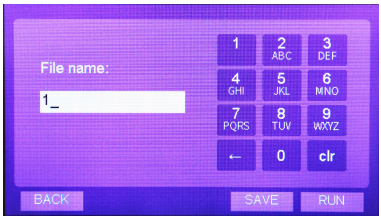
Click the option box behind Speed in the section information editing screen to enter the oscillating setting screen. Oscillating modes are Forward, Reversal, Interval and Alternate. When you select interval, you need to set the mixing time and pause time. Select the corresponding time and use the 12 buttons on the right to set the time. Click "OK" to set successfully, click "CANCEL" to abort the setting and return to the section information editing screen.



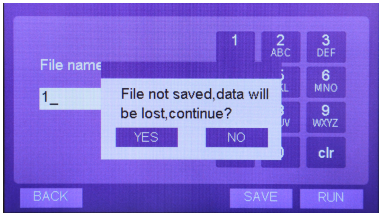
Oscillating setting screen

2.6 Save file

Click "SAVE" in the file editing screen to enter the file saving screen. Use the 12 buttons on the right to set the file name. The maximum length of the file name is 8 digits. Click "BACK" to return to the file editing screen. Click "RUN", a prompt box will pop up to run the file, select "YES" to run the program, select "NO" to return to the file saving screen.



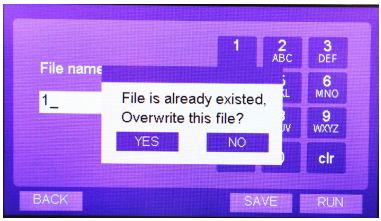
File saving screen



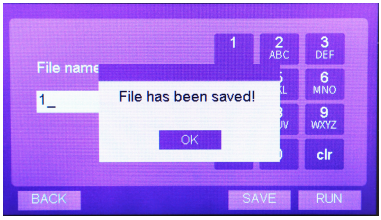
Run file prompt box

Click "SAVE" on the file saving screen, if the file name already exists, a prompt box will pop up to overwrite the file. Select "YES" to overwrite the existing file, select "NO" to go back to the file saving screen, modify the file name and then save it.

After the file is saved successfully, a file saving success prompt box will pop up.



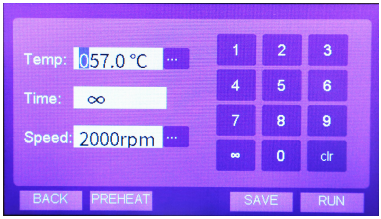
File overwrite prompt box



File saved successfully prompt box

3. Single point setting

The difference between a single point and a file is that there is only one node. In the main screen, click "Single point set" to enter the single point setting screen. The operation is similar to the editing information screen in the first section, and you can click "RUN" to run directly after editing the information in the section. Click "BACK" to return to the main screen.



Single point setting screen

4. Run

In the screen with "RUN" button, click "RUN" to enter the run screen.

There is only one section in the single point setup, so there is no "SKIP" button in the single point run screen. Other operations are the same as editing in the File Run screen.

The Run screen displays information about the running section, including which section it is currently running to, the current temperature, the time remaining in the section's thermostat, and the speed and mode of oscillating.



Single point operation screen



File running screen

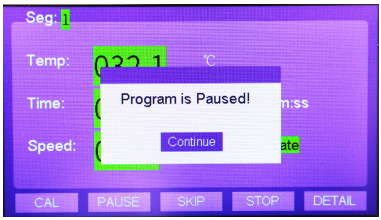
Clicking "Pause" on the single point/file run screen will pause the run time, and the run screen will pop up a pause prompt box. Click "Continue" to resume the current session.

Click "SKIP" on the screen to skip the current section and run to the next section. If the current section is the last section, the screen will pop up a prompt box to stop running. Click "Stop" to stop running, the screen will pop up a prompt box to stop running. Select "Yes" to stop running, or "No" to return to the current section to continue running.

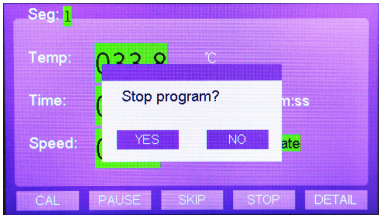
Click on "DETAIL" in the Single Point/Run screen to enter the Run Details screen. The details screen includes not only information about the current section of the run, but also information about the entire run file and the total run time. Click "BACK" to return to the run screen. All other operations except "BACK" are the same as in the Run screen.

Click "CAL" on the single point/file operation screen to calibrate the temperature, the current setting is in engineer mode, if you need to calibrate the temperature, please contact TIANGEN.

When the run is finished, the end-of-run prompt box pops up. If you set the end of run tone in the system settings, the instrument will emit a tone to indicate the end of the file run. Click "OK" in the end of run prompt box to return to the main screen.



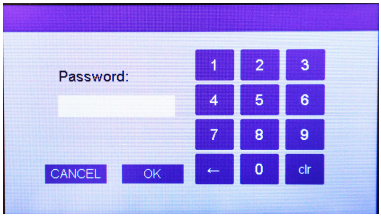
Pause operation prompt box



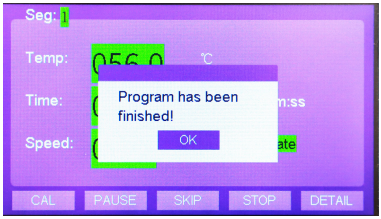
Stop running prompt box



Operation details screen



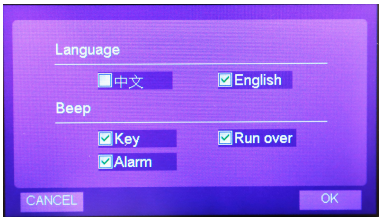
Calibration screen



Run end prompt box

5. System setting

Click "Sys" in the main screen to enter the system settings screen. System settings include language and sound settings. There are two languages: Chinese and English, and there are two tones: Key, Alarm, and Run over. After modifying the settings, click "Confirm" to save the settings, click "Cancel" to abort the modification and return to the main screen.



System setting screen

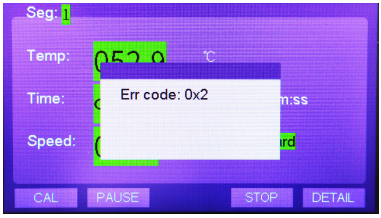
6. Inching

In the main screen, press and hold "Inch", the instrument will oscillate, the oscillating speed is the single-point setting speed, and the oscillating mode is positive by default. Release "Inch", the instrument stops oscillating.

7. Alarm

When the instrument is running, a sensor fault will pop up an alarm box. Error code 0×1 is sensor short circuit; 0×2 is sensor open circuit. If the alarm tone is set in the system settings, when a fault occurs, the instrument will emit a sound to indicate the occurrence of the fault.

When an alarm occurs on the instrument, refer to sections 9 and 10 of "Troubleshooting" for handling.



Alarm box

Troubleshooting

S/N	Fault description	Cause analysis	Solution
1	The display screen does not light up after turning on the power switch	The power is not turned on	Check the power supply and connect it
		Fuse burned out	Contact TIANGEN
		Switch damage	Contact TIANGEN
		Others	Contact TIANGEN
2	During oscillating operation, the instrument body vibrates greatly and there is an abnormal sound	Uneven or unstable placement table	Changing work locations and placing the instrument on a level, stable work surface
		The spherical foot is seriously worn or otherwise bad	Replace the foot
		Others	Contact TIANGEN
3	The module temperature uniformity is not good	The module is not installed correctly	Reinstall the module
		Poor refrigeration components	Contact TIANGEN
4	After replacing the module parts, the system crashed	Poor grounding of instrument	Check the power cord to make sure it is well grounded; and require that replacement of the module be done with the power off
5	The temperature display is seriously inconsistent with the actual temperature	Sensor damaged or poor contact	Contact TIANGEN
6	Module cools down signifi-cantly slower or fails to cool below room temperature	Damage of refrigeration sheet	Contact TIANGEN
		The fan is damaged or not running	
7	The module neither heats nor cools	Temperature sensor damaged.	Contact TIANGEN
		Damage of refrigeration sheet	
8	Vibration stop	Drive damage	Contact TIANGEN
		Motor damage	
		Fuse burned out	
9	Display alarm message prompt 0×1	Sensor short circuit	Contact TIANGEN
10	Display alarm message prompt 0×2	The sensor is open and the module is not installed correctly	Reinstall the module