LABDEX

Oil Test Centrifuge

LX1010TC

Index

1. Safety Measures

Attention to safety clarifies the requirements of safe operation in the instruction manual. Carefully read it before installation, operation, maintenance, and repair. Understanding the warning and correct operation can avoid personal injury and damage to the centrifuge.

1.1 Attention for installation and maintenance

- The rotor accessory and package may be placed in the centrifugal chamber. When installing, open the door lid to check.
- In the machine maintenance process, the parts that need to be covered may cause electrical shock or personal injury. Ensure that the power has been cut off, the power line has been removed from the socket, and qualified staff has manipulated it.
- The replaced part must be consistent with the requirements of this centrifuge.

1.2 Attention to the electric system

- To reduce the risk of electric shock, the centrifuge adopts the plug with three points which must connect with the socket with ground lead.
- Make sure the wall socket is connected to the ground wire. The power supply's voltage must match that of the centrifuge.
- Don’t use the power adapter from three holes to two holes.
- It is forbidden to use the expanding socket with two lines or an all-purpose power adaptor without ground wire.
- Don’t put the container with liquid on the centrifuge or around the centrifuge. If the container is knocked over, the liquid will infiltrate into a centrifuge and damage the electrical or mechanical parts.

1.3 Attention for fireproofing

- Use the overload fuse with the same model and specification.
- The centrifuge is not designed for the flammable and explosive matters. You cannot make centrifugation for the matter (chloroform, acetaldehyde), and cannot put the matter in the centrifuge or store them around the centrifuge within 30cm.

1.4 Attention to safe operation

- Use the rotor and accessories that are designed for this centrifuge
- Make sure the centrifugal chamber is cleaned before operation.
- Make sure the screw (nut) of the rotor in the centrifugal chamber has been screwed down tightly.
- Not exceed the max speed of the rotor during operation. Don’t decelerate the rotor speed or stop it by hand. Don’t hold or move the centrifuge when the rotor is rotating.

- If the glass test tube is cracked in the centrifuge chamber, carefully check and clean the gasket and centrifugal chamber because the glass fragment may have been inserted into their surface.
- Don't open the door lid of the centrifuge in the running status.
- The distance between the centrifuge and other objects must be kept 30cm during operation. Users should not stand around the centrifuge within 30cm unless adjusting it. Anything is not allowed to enter into the centrifuge during operation.

1.5 Symbol and its meaning

No.	Symbol	GB No.	Meaning
1	~	4706.1	Alternating current
2		5465.2	Power on(general supply)
3		5465.2	Power off (general supply)
4		4728.2	Protective earthing(ground)
5		4793	Warning! (see attachment paper)

 is an international conventional symbol, which is used here for reading and understanding before operation. You should pay attention when you see this symbol.

 is used here to focus on the important explanation. Users should read and understand the contexts before operation.

 **Warning: It shows the potential risks. If not pay attention to it, it will lead to personal injury.**

Warning about Safety

The warnings about safety in the instruction manual describe the requirements of safe operating centrifuge. Please read it carefully before installation, operation, maintenance, and repair. You should understand the warnings about safety and correct operation to avoid personal injury and damage.

2. Introduction

Oil Test Centrifuge LX101OTC is a microprocessor controlled heated tabletop centrifuge with a speed range of 4000 rpm with a LCD display for viewing parameters like speed, time, temperature and RCF and error codes. Features circular heater for rapid heating with temperature uniformity. Built-in self-diagnosis system automatically detects and displays over speed, over temperature and error codes improving safety performance.

3. Features

- Microprocessor controlled heating
- Circular heater for rapid heating with temperature uniformity
- Self-diagnostic system to detect and fix errors
- Provision for parameters revision during the run

4. Specifications

Model No.	LX101OTC
Maximum speed	4000 rpm
Maximum RCF	3150 × g
Maximum capacity	4 × 100 ml
Speed accuracy	± 10 rpm
Time setting range	1 ~ 99 min
Temperature setting range	Room temperature +10℃to 70℃
Noise level	≤ 65 dB
Power	1500 W
Power supply	AC 220 V ± 22 V 50 Hz 8 A
Dimensions (W x D x H)	520 × 550 × 400 mm
Weight	86 Kg
Packing dimensions	750 x 750 x 700 mm
Gross weight	150 kg

5. Applications

Used to determine the water and deposit in crude oil

6. Instrument Introduction

6.1 Structure

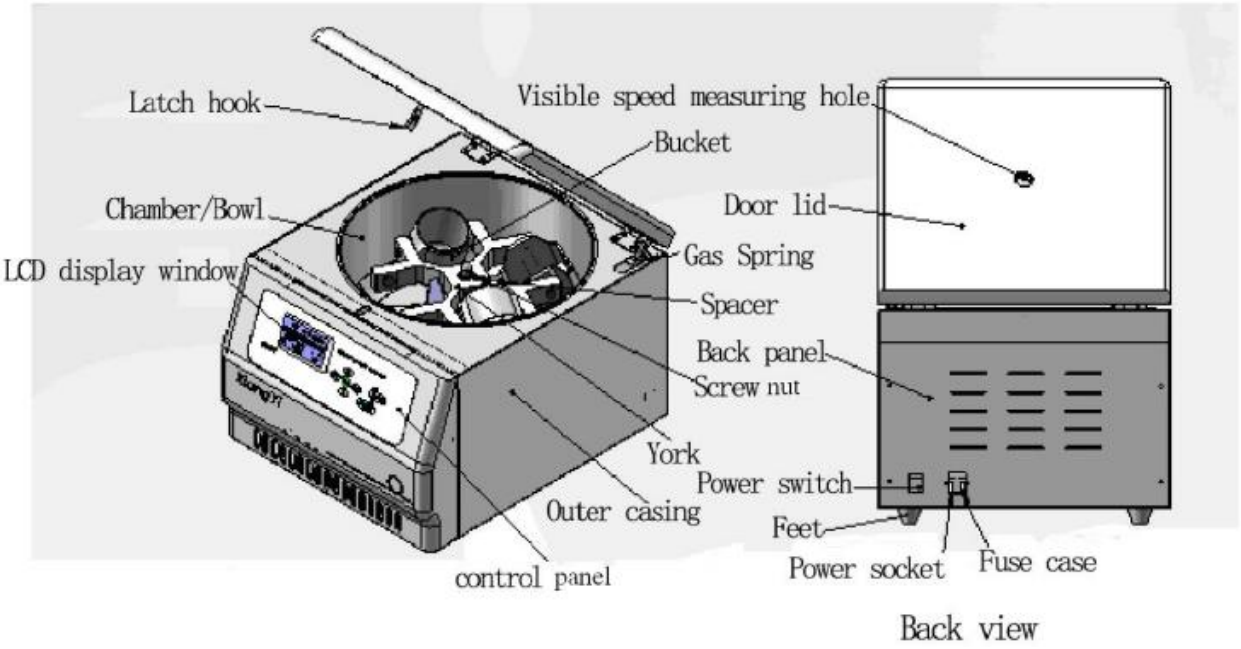


Figure-1

LX101OTC is composed of the main machine and accessories. The main machine is composed of an outer casing, centrifugal chamber, drive systems, drive system, control system, and part of manipulation display. The rotor and centrifugal tube (bottle) belong to the accessory (provided according to the contract).

6.2 Display and Operation Panel

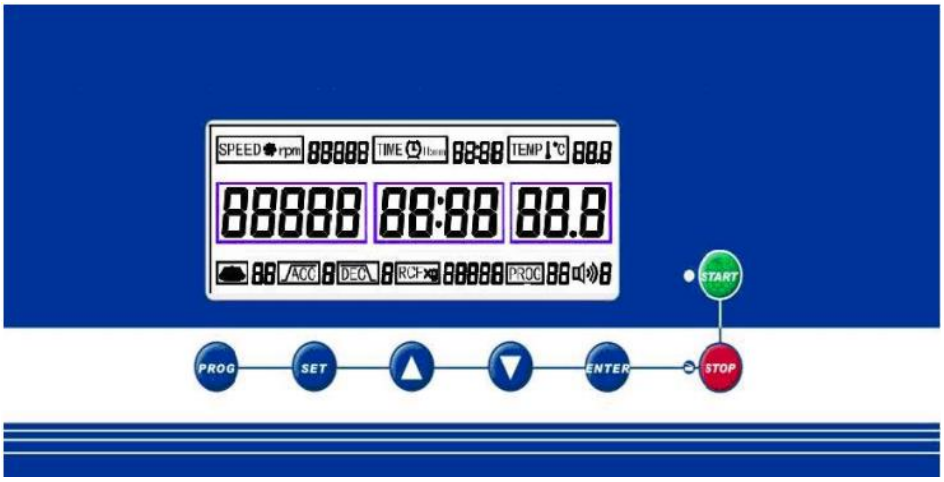


Figure-2

LCD display window:

Rotor: Display setup or current running rotor No

Speed: Speed display window, the upper figure is the setup speed, and the lower bigger figure is the actual running speed (unit: rpm).

TIME: Time display window， the upper small figure is the setup time and the lower bigger figure is the balancing time left/counted down. (unit: minute and second).

Temperature: Temp display window， the upper small figure is the setup temperature and the lower bigger figure is the actual reached temperature (unit: ℃)

RCF： RCF displays the window in real-time.

Program： Display setup or running program No.

Acceleration: Display setup acceleration profile.

D/M(Default/Error Code) display window. Display the default message while the trouble/default occurs during instrument operation.

Key function:

SET: Setting key. Set program No., rotor No., speed, time, acceleration, and deceleration profiles by pressing this key once or several times until the selected item flashes.

PROG: Program key. Select program preferences; revise and save program preferences.

▲: **Increase key**. When you set rotor number, speed, Acc/Dec, and time, press "▲" to increase the setting parameter value.

▼: **Decrease key**. When you set rotor number, speed, Acc/Dec, and time, press "▼" to decrease the setting parameter value.

ENTER: Press **[ENTER]** to confirm and store the setup values of rotor No., Acc/Dec. profiles, speed, and time.

START: Press **[START]** to begin centrifugation after setting and confirming the parameters or repeating the setup parameters last time, and the start indicator light on.

STOP: The key to stop centrifugation and open the door lid.

① Press this key to clear the error code.

② When the centrifuge is working (time isn't counted down to "0"), the user can stop it manually and the stop indicator light on.

③ When the centrifuge is in the state of standby, press it to open the door lid.

The function of indicator lights:

[START] indicator light: The **[START]** indicator light is on, which means that the centrifuge has started and is in the running status.

[STOP] indicator light: The [STOP] indicator light is on which means [STOP] is pressed or the work time is counted down to "0". The centrifuge is slowing down for stopping or has stopped (speed is less than 20rpm).

7. Installation

7.1 Instrument installation and its requirements:

7.1.1 Installation requirements:

Warning: Don't install a centrifuge in a place with flammable and explosive matters. The flammable and explosive gas comes into the running centrifuge, which may lead to fires.

- The centrifuge should be installed on a flat and solid platform.
- The large free space should be kept around the two sides and back of the centrifuge for heat dissipation for ventilation.
- It is prohibited to put lab equipment with large heating production and strong vibration around the centrifuge.
- The working environment temperature is 10°C to 35°C, and the relative humidity is no more than ≤85%. The requirement of power supply: 220V±10% 50/60.

7.1.2 Install centrifuge

- Open the outer package, carefully take out the centrifuge with the foam package, then put it on the even platform and take off the foam package. The four rubber feet of the centrifuge should touch the platform evenly.
- Pull the string for the door opening on the bottom of the centrifuge outward, then uplift the door lid until it is held by the gas spring.
- Clear the centrifugal chamber.
- Check the main machine, accessory, attached tools, and documents according to the packing list.
- You should confirm that the voltage of the power supply should be consistent with the voltage the centrifuge requires. (Check the marking beside the electric outlet on the centrifuge back, and the instrument's power requirement is AC 220V 50/60Hz with single phase and three wires).
- Connect the power cord (three wires and 16A) to the electric outlet on the centrifuge back first, then put the plug on the other end into the external electric supply socket. Press one side marked "I" on the switch to power on.
- If there are any electronic problems, they should be repaired by professional technicians.

7.2 Centrifuge adjustment

Warning: It is forbidden to start before the centrifuge chamber is cleaned. Otherwise, the centrifuge may be damaged. According to the operation steps; first run with low speed, and gradually accelerate to the max. speed. If no abnormal phenomenon happens, you have succeeded in adjustment.

8. Operations

8.1 Check the rotor and tube

Users should carefully check the rotor, tube, or test bottle before operation. It is forbidden to use the cracked and damaged rotor, tube, or test bottle. Otherwise, all damages should be borne by the user.

8.2 Install Rotor

Place the rotor on the drive shaft and make the taper hole on the bottom of the rotor central hole to connect with the conical surface on the top of the drive shaft properly. Then put on a spacer and make the lock screw nut into a tapped hole on the motor drive shaft, tighten it with a spanner. (The rotor has been installed before delivery, and check whether the lock screw nut is tightened.)

8.3 Adding liquid and placing the centrifugal tube

Put centrifugal tubes by adding liquid into the centrifugal tube of the rotor and tubes should be placed symmetrically in even numbers. Otherwise, there will be vibration and noise because of imbalance.

Before running the centrifuge, install the rotor yoke and hang it on the buckets. Set the temperature to the desired temp, and close the door lid to preheat for 30 minutes (because of the variance of room temperature, adjust the preheating time based on the actual situation). Then run the centrifuge for the test. If using the No.2 swing rotor, add 75ml water into each bucket before hanging on the yoke and have the water preheated with buckets together to maintain the temperature and weight of the sample consistent.

Before running the centrifuge, must weigh the total weight(bucket, water, and tube with sample) of each bucket for balance and make sure that the tolerance of 4pc buckets is less than 2g. Users can add and pour out some water in the bucket for balance (an ordinary medical syringe can be used for water adding or pouring out). While weighing the buckets, use the special bracket to place the buckets on the scale steadily, the bracket figure is shown below:

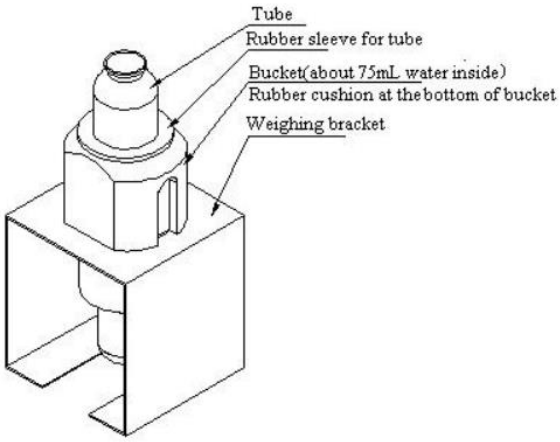


Figure-3

If using a No.1 swing rotor, add water in each tube cavity by 1/3 hole height. Since the buckets can be placed on the scale steadily, there is no special bracket. Just place the buckets on the scale, and other operations are the same with the No. 2 swing rotor.

8.4 Close the door lid

Press down the door lid until you hear a "**clicking**" sound which means the door lid pin enter into the hook. Then lift the door lid by hand to check whether it is closed properly. If the door lid cannot be opened, it means it is closed properly. If press the [START] key and the centrifuge cannot run, the buzzer will tweet and the LCD display window shows the [5] error code which means the door lid is not closed properly. Press the [STOP] key to clear the error code shown on the LCD, and then close the door lid properly again.

8.5 Set program, rotor number, speed, time, Acc and Dec profiles

After powering the machine, the system displays the setup value in the last operation which was stored before it stopped. Then press [START] to run. If require modifying the setup value, operate according to the following steps:

1) Select, store, and modify the preset program

- **Program using:** In the stopping status, press "PROG" once, and the "(PROG and digit)" flashes simultaneously, then press [▲]/[▼] to select the stored program(preset programs are 1 to 25, a total of 25 programs). At last, must press "**ENTER**" to confirm the program selection. Otherwise, it will automatically cancel the setup after 3 seconds.
- **Program storing:** In the stopping status, press "PROG" twice, and only the program number 

will flash (the digit flashes, but the character 

will not flash), then press [▲]/[▼] to select the preset program(preset programs are 1 to 25, total 25 programs). At last must press "ENTER" to confirm the current settings. Otherwise, it will automatically cancel the setup after 3 seconds.
- **Program modifying:** Operate according to the following 2 to 7 steps: press "**ENTER**" to confirm and the current program will automatically be stored as 0 (temporary program). If press "PROG" twice in the status of parameters being modified, only the program number will flash (the digit flashes, but the character 

will not flash), then press [▲]/[▼] to select the preset program and press "**ENTER**" to confirm. The current program will automatically be stored to "**PROG XX**" (preset programs are 1 to 25, no more than 25 programs).

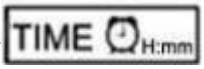
2) Rotor number

Press the "**SET**" key until the last number of  the display window flashes, and then you can set the rotor number; press "▲" or "▼" to select the installed rotor number. Press "**ENTER**" to keep the current setting at last, otherwise it will automatically cancel the setup after 3 seconds. It is prohibited to modify the rotor number during a run.

Warning: **The rotor type should be set according as the installed one.**
Wrong setting will make the rotor overspeed and lead to accident.

3) **Speed:** Press the "**SET**" key until the figures of " 

" display window flash, then users can set the speed value, and then press "▲" or "▼" to set the speed for this centrifugation. Press "**ENTER**" to keep the current setting at last, otherwise, it will automatically cancel the setup after 3 seconds.

4) **Time:** Press the "**SET**" key until the figures of " 

" display window flashing, then you can set time(Time setting range: 1min00s ~ 99min59s); and then press "▲" or "▼" to set time for this centrifugation(set minutes while two figures for "min" flashes; set seconds while "s" flashes). Press "ENTER" to keep the current setting at last, otherwise, it will automatically cancel the setup after 3 seconds.

5) **Temperature:** Press the "SET" key until the figures of " 

" display window flashing, then you can set the temp value(Temp setting range: +15℃ ~ 65℃); and then press "▲" or "▼" to set the desired temperature for this centrifugation. Press "ENTER" to keep the current setting at last, otherwise, it will automatically cancel the setup after 3 seconds.

6) **Acc profiles:** Press the "SET" key until the figure of " 

" display window flashes, then you can set Acc profiles; and then press "▲" or "▼" to set Acc profiles for this centrifugation. There are 1~9 Acc profiles, and the acc time would be shorter while the setting figure is bigger. We choose 5 usually. Press "ENTER" to keep the current setting at last, otherwise, it will automatically cancel the setup after 3 seconds.

7) **Dec profiles:** Press the "SET" key until the figure of " 

" display window flashes, then you can set Dec profiles; and then press "▲" or "▼" to set Dec profiles for this centrifugation. There are 1 to 9 Dec profiles, and the stopping time would be shorter while the setting figure is bigger. We usually choose 5. Press "ENTER" to keep the current setting at last, otherwise it will automatically cancel the setup after 3 seconds.

8) The above steps can be set continuously, and press **[ENTER]** to confirm at last. After confirming the setting value of the rotor number, speed time, etc., press [**START**] to run the centrifuge. If [8] error code shows which means maloperation, you should reset rotor No. or speed parameters.

8.6 Start and stop

1) **Start:** Press [START] to start the centrifuge and the [START] indicator light is on.
2) **Automatic stop:** When time is counted down to "0", the centrifuge automatically slows down and stops running. When the speed is 0 r/min, the buzzer will tweet and the [STOP] indicator light is on.
3) **Stop by manual:** In the running status (the working time isn't counted down to "0"), press [STOP] to slow down and stop running. The buzzer will not tweet, and the [STOP] indicator light is on.

8.7 Take out the centrifugal tube

When the rotor stops rotating, press the [STOP] key to open the door lid. Then press the switch with the mark "O" to cut off the power. Open the door lid and take out the centrifugal tubes.

8.8 Uninstall the rotor

When replacing the rotor, you should uninstall the used rotor (unscrewing the bolt with a screwdriver and taking out the rotor after removing the spacer).

 Don't hold up or move the centrifuge during operation.

 Don't open the door lid when the rotor is rotating.

8.9 Power off

Turn off power and unplug the power cable after finishing work.

9. Maintenance

- Make sure to wipe up the rotor with a neutral cleaning mixture after taking it out to avoid corrosion and then stock it in a dry and ventilated place.
- The central hole in the rotor should be smeared with some lubricating oil for protection.
- All action on the rotor should be soft, and the rotor should be taken out vertically to protect the shaft.
- Wipe up the water in the centrifuge chamber if it is left unused for a long time. Some lubricating oil should be smeared on the drive shaft for protection.

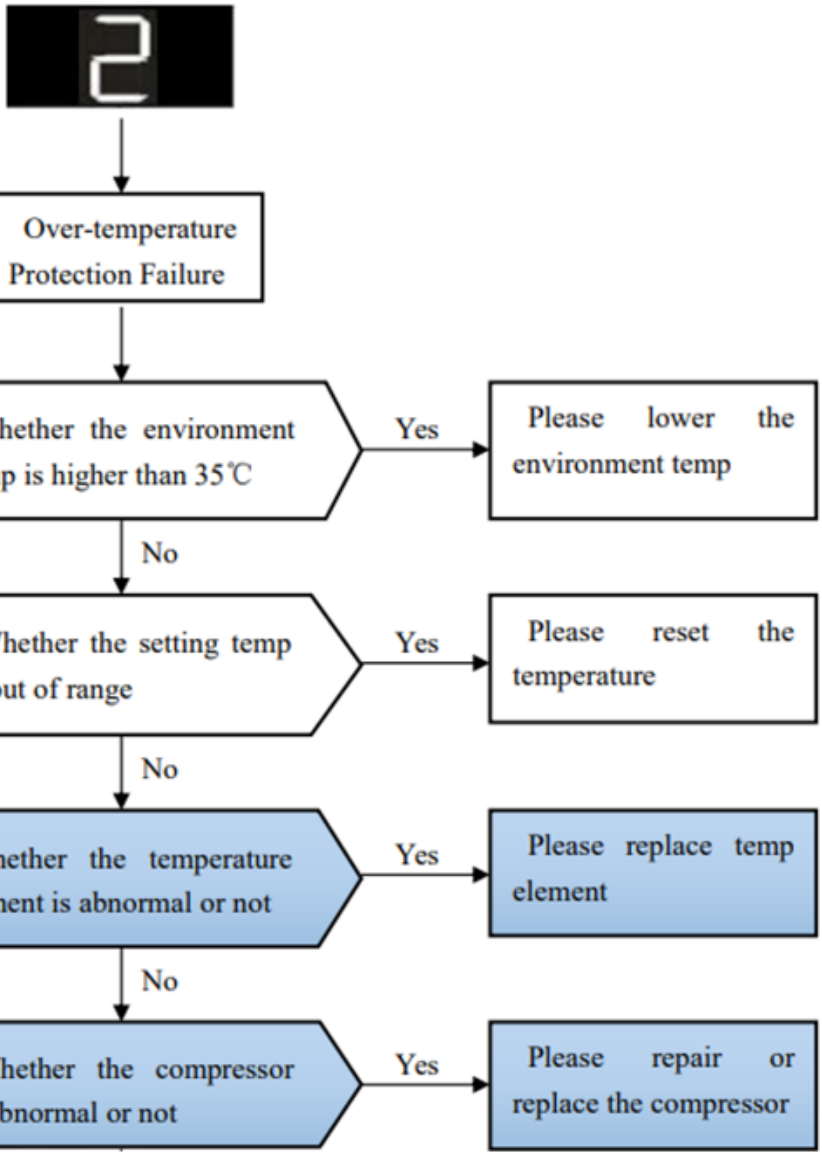
10. Troubleshooting

10.1 Common error code

Error code	Description	Reasons	Solutions
	Temp sensor damaged.	The temp sensor is damaged or the sensor connecting is loose.	Replace or reconnect.
	Door lid protection.	The door lid isn't closed when pressing **[START].**	Close the door lid properly.
		The installed sensitive switch of the door lid is not in place or damaged.	Check and replace.
	The door opened during the run.	The sensitive switch of the door lid detecting triggers the protection function during centrifugation.	Close the door lid properly.
	Overspeed.	Check and reset speed, rotor number, Acc, and Dec value.	Reset parameters.
		Inverter parameters are not set properly.	Reset parameters.
	The motor does not run or run without speed.	The motor runs without speed; The speed-detecting signal is unreliable or the speed sensor is damaged.	Check and replace.
		The motor does not run, and the shaft is blocked.	Replace motor.
		Inverter parameters are not set wrong.	Check and replace.
	Wrong setup and mal-operation.	Set or operate wrongly.	Reset.
	Inverter trouble.	The inverter is over current, over-voltage, and overheated in the process of Acc. And Dec.	Reset.

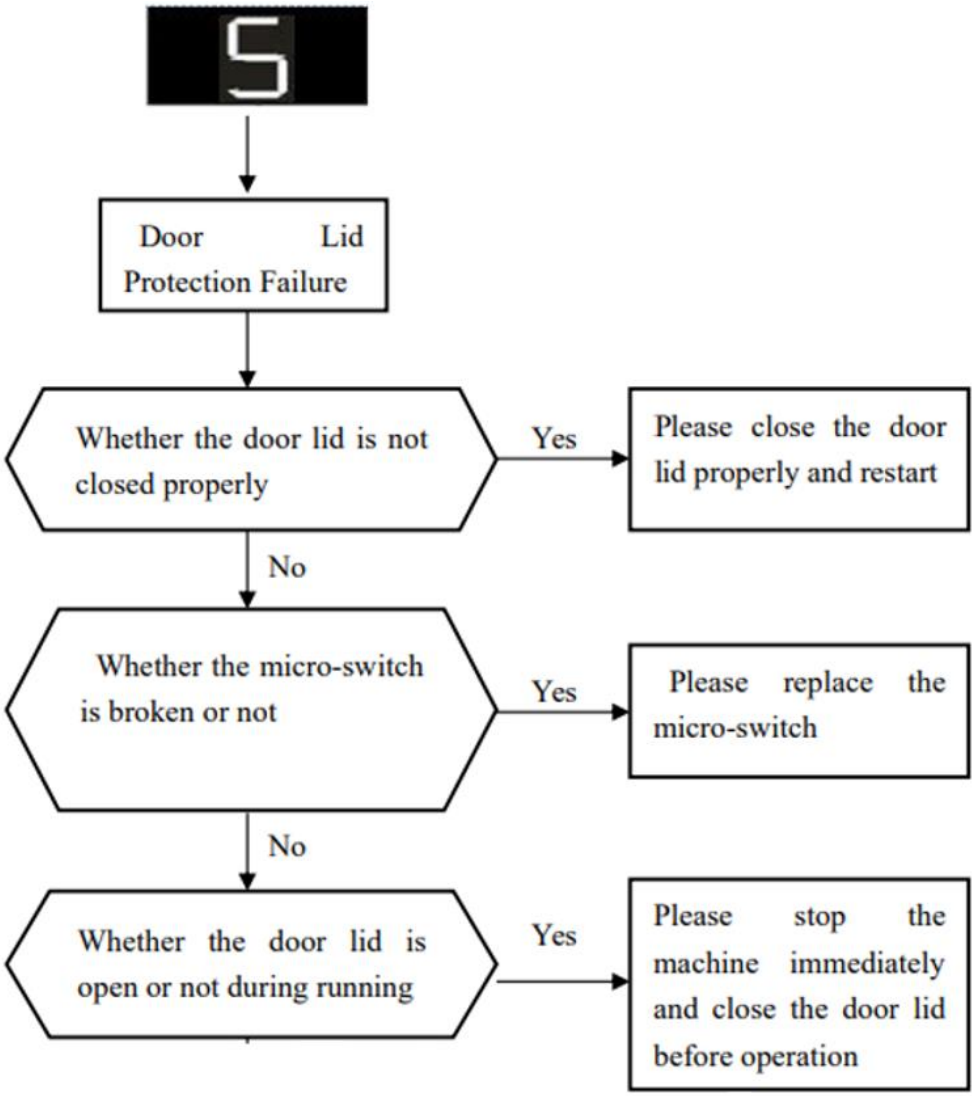
10.2 Over-temperature protection failure

Diagnostics: When the actual temperature exceeds the maximum allowable temperature of 50℃ or the temp sensor is broken, the system will automatically shut down and show the error code in the  display window.



10.3 Door Lid Protection Failure

Diagnostics: As the centrifuge belongs to high-speed running equipment, if the door lid is not closed, the system will not be able to start; if the user is forced to open the door during the process of operation, the system will automatically stop and at the same time in the display window it will show error code. 



11. Rotor Selection

Rotor name	Maximum speed (rpm)	Maximum capacity (ml)	Maximum RCF (×g)
Rotor R1	4000	10 ml Oil tube	2498 x g
Rotor R2	1700	100 ml Oil tube	691 x g