Labotronics

High Speed Refrigerated Centrifuge

LB-10HRC

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Index

1. Safety Measures

1.1 Safety & Warning Symbols

Note: The above symbols apply to all centrifuges; not all symbols apply to this centrifuge.

Symbol	Meanings
~	Alternating current
|	Connect with (power)
O	Cut off (power)
	Ground fault protection (earth)
	Warning!

Symbols	Meanings
	Notice! Indicates a potential hazard that may cause harm
	warn! Indicates a potential hazard that may cause greater harm
	Danger! Indicates a critical situation that may result in serious injury
	Beware of fire! Indicates that a fire or other fire hazard may occur, resulting in damage to persons or property.
	Beware of electric shock! Indicates that voltage may cause direct harm to human life and health
	Beware of biohazards! Indicates potential biohazards.

1.2 Safety Precautions

 : Before starting the centrifuge, make sure the centrifuge chamber is clean and free of debris. Before starting the centrifuge, make sure the rotor in the centrifuge chamber is installed in place.

 : When the centrifuge is working, do not allow it to rotate faster than the maximum speed limit of the rotor. Do not lift or move the centrifuge until the centrifuge rotor has stopped spinning. A distance of at least 30cm from other objects must be maintained when the centrifuge is running. Do not stay in this range when the centrifuge is working, except when debugging the centrifuge.

 : It is prohibited to open the door cover while the centrifuge is running. Do not put any objects into the centrifuge while the centrifuge is running. Do not force the centrifuge rotor to slow down or stop with your hands.

Electrical Precautions

1) To reduce the risk of electric shock, this centrifuge uses a three-core power cord that must be connected to a power source with a grounded wire.
2) Make sure the wall outlet is properly connected to the ground wire. Make sure the power supply voltage is consistent with the voltage used by this centrifuge.
3) It is prohibited to use an extension power adapter that converts three holes into two holes.
4) It is prohibited to use a two-wire extension socket or a multi-purpose power adapter without a ground wire.
5) Do not place containers containing liquids on or near the machine. If the container is accidentally knocked over, liquid may seep inside and damage electrical or mechanical parts.

Fire Precautions

1) Use overload fuses of the same model and specification. The model and specification of the fuse used in this machine are 10A L250V φ5×20.
2) It is strictly prohibited to use this centrifuge-to-centrifuge flammable and explosive substances.
3) It is strictly prohibited to place containers containing flammable and explosive substances inside the machine or store such substances within 30cm of the machine.

Chemical and Biological Safety Precautions

1) Routine operations may include a variety of solutions and test samples, which may be pathogenic, toxic or radioactive substances. Such substances cannot be handled with this centrifuge unless necessary protective measures have been taken.
2) Note the biochemical properties of the original solution before proceeding. Care must be taken when handling these solutions as they may be contagious.
3) Operations must be carried out in strict accordance with the operating procedures and methods specified by the laboratory.
4) All waste solutions must be destroyed in compliance with environmental safety and protection requirements.

2. Introduction

High Speed Refrigerated Centrifuge LB-10HRC reaches a maximum speed of 14,000 rpm and generates an RCF of 18,845 × g, ensuring precise sample separation. It supports multi-stage centrifugation for complex separation protocols. It uses a motorized electronic self-priming lid lock for secure and effortless operation. Our centrifuge features an LCD touchscreen, enabling intuitive parameter setting and monitoring.

3. Features

- Microprocessor control
- Variable acceleration rates
- Temperature sensor
- Imbalance detection
- CFC-free refrigeration
- Fast temperature function

4. Specifications

Model No.	LB-10HRC
Maximum Speed	14000 rpm
Maximum RCF	18845 × g
Maximum Capacity	12 × 5 mL
Speed Accuracy	± 10 rpm
Temperature Range	-10℃ to +40℃
Temperature Accuracy	±1℃
Timer Range	1s to 99h 59m
Noise Level	≤ 56dB(A)
Power Consumption	400W
Dimension	510 × 300 × 200 mm
Weight	29 kg

5. Applications

High Speed Refrigerated Centrifuge LB-10HRC is ideal for the precise and rapid separation of biological, chemical, and clinical samples. It is widely used in research laboratories, hospitals, pharmaceutical labs, and biotechnology facilities.

6. Instrument Introduction

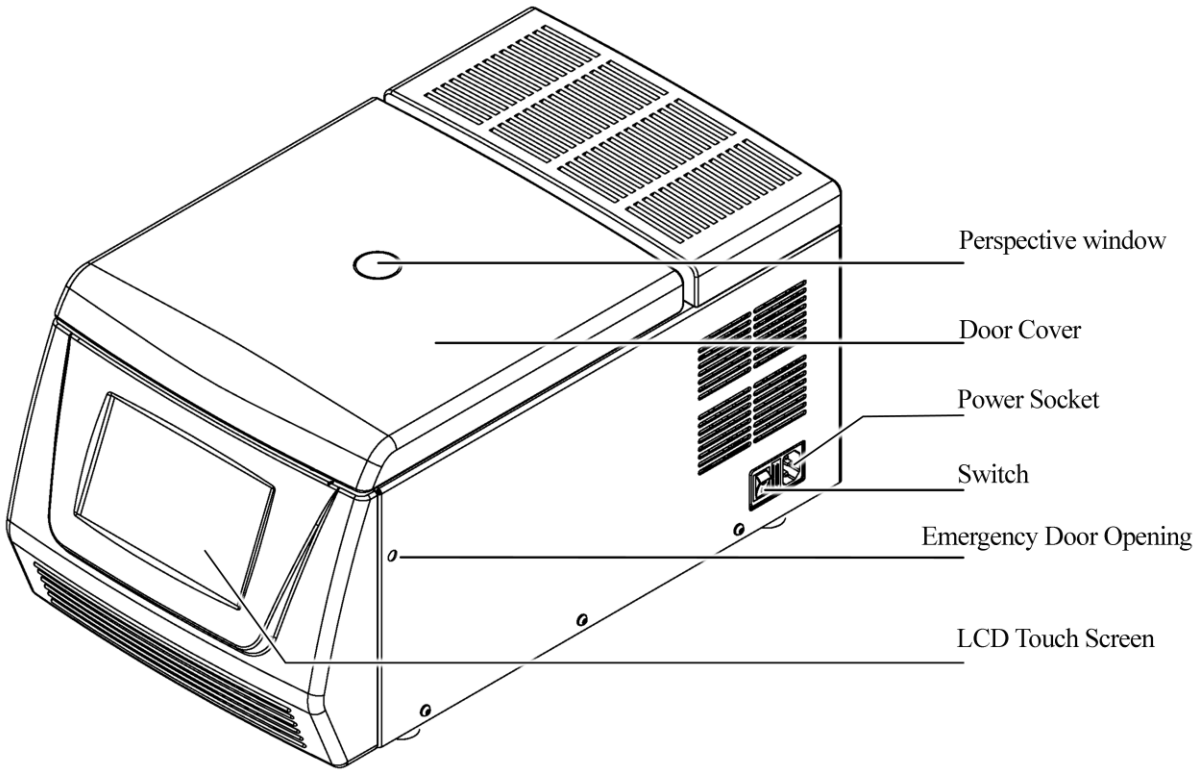


Figure-1 (Main view of centrifuge)

7. Installation

7.1 Main Machine Installation

7.1.1 Installation requirements

Installation environment requirements: The installation location is indoors, the ground should be flat and rigid, the air should be free of conductive dust, corrosive or insulation-damaging gases, and there should be no other strong vibration sources nearby.

Installation space requirements

1) There must be a 30cm safe space around it after installation. No other materials may be placed in this space while the machine is in use.

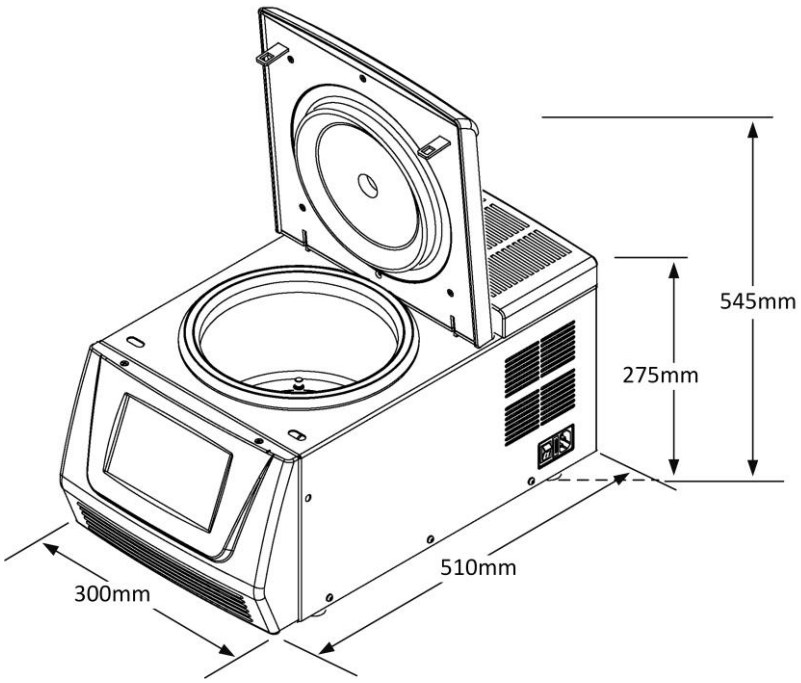


Figure-2 (Centrifuge Dimensions)

2) Use scissors or a knife to remove the packing tape and open the packaging carton.

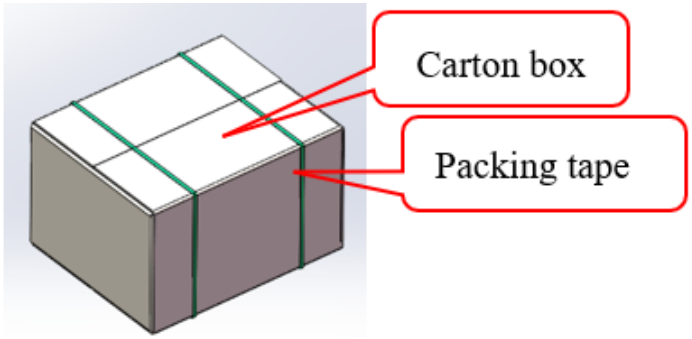


Figure-3

3) Remove the upper foam.

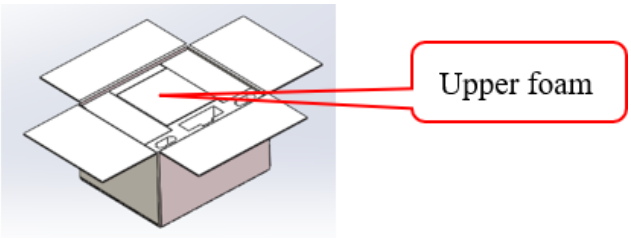


Figure-4

4) Take out the foam on the right side, and take out the rotor, installation tools, power cord, and other accessories placed in the foam groove and set them aside.

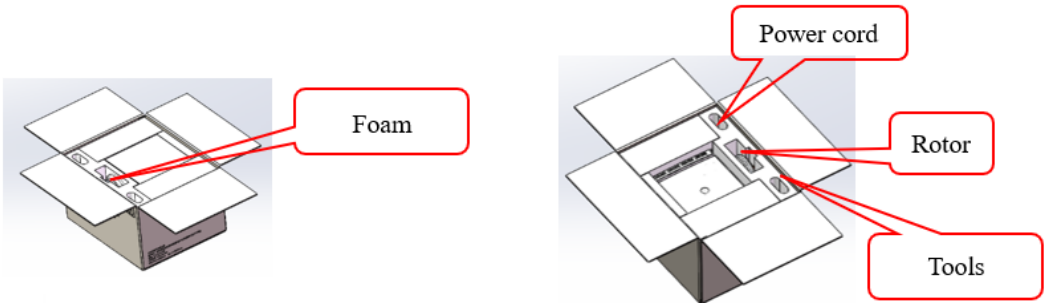


Figure-5

5) Remove the foam on the left side.

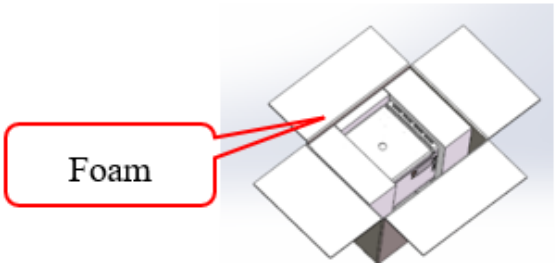


Figure-6

6) The centrifuge can be moved slowly, and then the centrifuge and the front and rear foams can be taken out together.

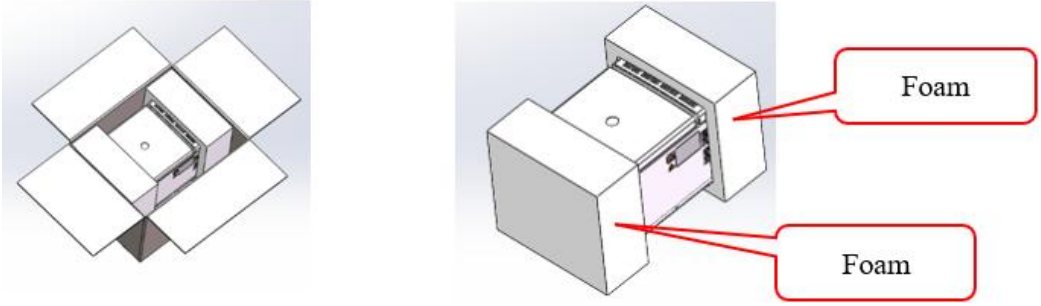


Figure-7

7) Remove the front and back foam coverings and take the centrifuge out of the plastic bag, taking care to avoid bumps.

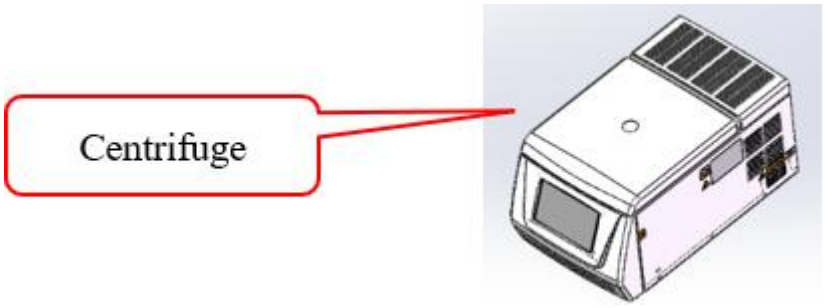


Figure-8

Installation power requirements: The power supply used is single-phase AC power, AC 220V,15A.

Warning: The power supply must have an independent ground wire, and it is strictly forbidden to use a neutral wire instead of a ground wire!

7.1.2 Unpacking the Box

1) Users should check the appearance of the packaging box when receiving the goods. There should be no accidents such as violent impact, lying horizontally, or upside-down during transportation. The appearance of the packaging box should be intact.
2) Remove the upper cover of the packaging box. First, take out the rotor, adapter and other accessories in the packaging box, and then remove the packaging box. You can use a lifting device or multiple people to move the host out of the packaging box.
3) After the installation is completed, the packaging box and packaging fillers should be properly disposed of to avoid environmental pollution.

Notice: The net weight of this machine is 29 kg.

7.1.3 Installation Steps

1) After the machine is taken out of the packaging box, place the machine on the reserved horizontal workbench or the ground.
2) After placement, the four rubber feet of the machine base should be evenly stressed, otherwise, pads should be added (solved by the user) and readjusted to the requirements.
3) Use the emergency door opening device (Emergency door opening) to open the door cover and take out all accessories or packaging (if any) in the centrifuge chamber.

Notice: Install an emergency switch at an indoor doorway or outdoors away from the machine to cut off the power supply when the centrifuge fails and goes out of control. After the centrifuge is transported, let it stand for more than 2 hours before connecting it to the power supply!

7.2 Rotor Installation

1) In the stopped state, click the "Door Cover" icon to open the door cover and select the rotor you want to use.
2) Rotor installation: Align the center hole of the rotor with the motor shaft, install it vertically on the motor shaft, and tighten the compression nut clockwise with the 5mm hexagonal wrench provided with the box.
3) **Rotor removal:** Use the Allen wrench to loosen the screw counterclockwise and lift the rotor to complete the disassembly.

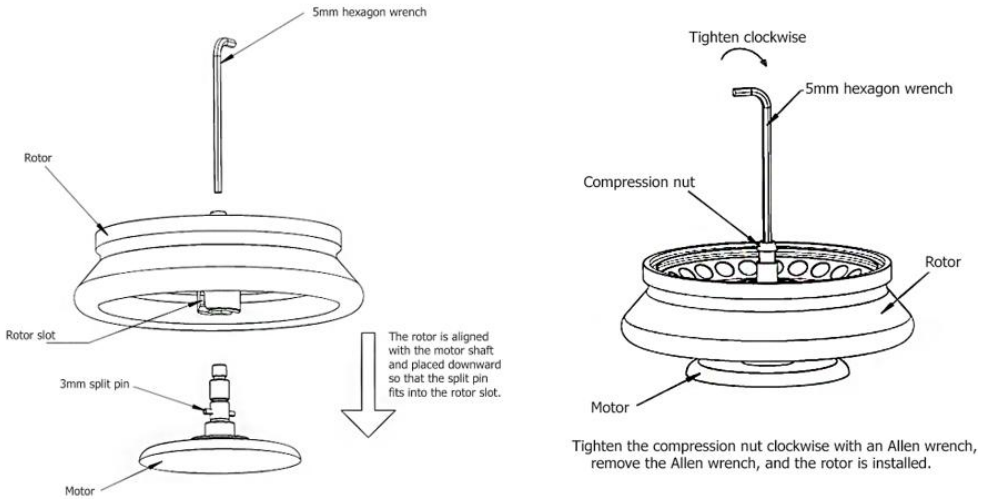


Figure-9 (Schematic diagram of angle rotor installation)

7.3 Packaging and Storage Conditions

1) During long-distance, wooden or paper packaging boxes must be used, the centrifuge should be put into the box with a dust cover, and foam plastic shock-absorbing materials should be filled up, down, and around the box.
2) Short-distance indoor transportation can be carried out directly, but large vibrations, collisions, and inversions should also be avoided.

   Warning: During transportation, collision, inversion, rolling, and exposure to rain and snow are strictly prohibited.

3) If the centrifuge is not used for a long time, the door cover should be opened and stored in a ventilated, dry, and clean room. The storage area should be free of corrosive substances, flammable, and explosive substances.

7.4 Working Environment

1) **Ambient Temperature:** 5℃～35℃
2) **Relative Humidity:** ≤80%
3) **Atmospheric pressure:** 860hPa~1060 hPa；
4) **Power supply:** AC 220V±22V，50Hz±1Hz
5) The ventilation is good, and no dust, floc, metal shavings, or other debris will invade the body. Resistant to corrosive gases and strong electromagnetic interference.
6) When in use, place it on a stable horizontal working platform, and all machine feet will be firmly secured.

8. Working Principle

During centrifugation, centrifuge containers (such as centrifuge bottles, centrifuge test tubes, etc.) containing equal amounts of test solutions are placed symmetrically in the centrifuge holes around the rotor. The centrifugal force generated by the high-speed rotation of the rotor driven by the motor causes the test solution to have different densities. material separation.

The size of its relative centrifugal force (RCF) depends on the rotation radius r and rotation speed n of the sample during centrifugation. Its calculation formula is as follows:

RCF=1.118×10^ (-5) ×n^2×r (×g)

In the formula:

n- Indicates speed (r/min)

r- Radius of rotation (cm)

g- Unit of acceleration due to gravity (9.8 N/Kg)

It can be seen from the formula that the larger the radius of the rotor and the higher the speed, the greater the relative centrifugal force experienced by the material.

The time T (minutes) required for the separation and precipitation of particles in the mixed liquid is calculated by the following formula:

$$T = \frac{27.4 \times (\ln R_{max} - \ln R_{min})\mu}{n^2 \times r^2(\sigma - \rho)} \qquad (min)$$

In the formula:

ρ- Mixed liquid density (g/cm^3)

μ- Mixture viscosity (P)

n- Rotating speed (r/min)

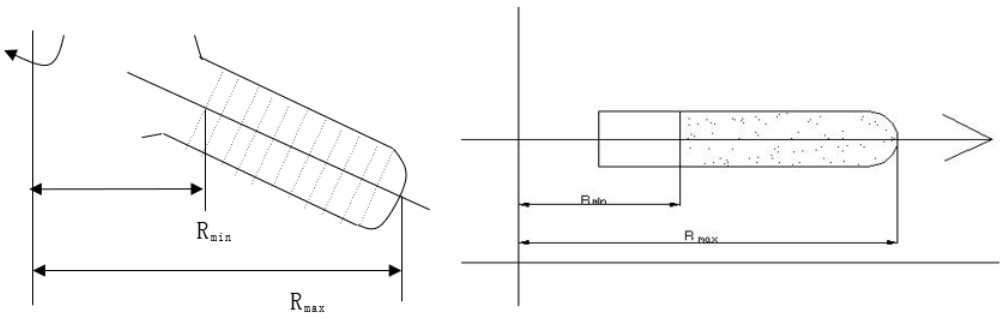
r- Rotor radius (cm)

σ- Particle density (g/cm^3)

Rmax- The horizontal distance from the bottom surface of the centrifugal test solution to the centre of the axis (cm)

Rmin- The horizontal distance from the liquid level of the centrifugal test solution to the center of the axis (cm)

For the two commonly used rotors, due to the different conditions of the test tubes in the rotor during centrifugation, even if they have the same solution, centrifugal force, and other conditions, the centrifugation time will still be different. The test tube status of the angle rotor and horizontal rotor during centrifugation.



Angle rotor **Swing out rotor**

Figure-10 (Schematic diagram of test tube centrifugation state)

9. Operations

9.1 Basic Operation and Debugging

Warning

1) Do not start the centrifuge without cleaning the centrifuge chamber, otherwise the machine may be damaged!
2) It is strictly prohibited to use the rotor at excessive speed. If any loss is caused by excessive speed use, the user shall be solely responsible for the loss!
3) Do not lift or move the centrifuge while it is running.
4) Do not open the door cover while the rotor is rotating.
5) After turning off the power, there should be more than 5 mins before turning on the power to avoid compressor rotor blockage and affect the life of the compressor.
6) After use, use a soft rag to dry the moisture in the centrifuge chamber, then open the door cover to dry the remaining moisture.
7) Components such as the rotor and bucket must be kept clean to prevent corrosion or accelerated aging.

9.1.1 Steps

Before operating a centrifuge, the required speed/centrifugal force, operating time, and operating temperature. For detailed parameter settings. The basic operating process of the centrifuge is as follows:

1) Turn on the power, pull the power switch upward, and the display will light up

Turn on **Turn off**

Figure-11

2) Click the "Door" icon to open the door cover and flip the door cover. Select the applicable rotor, follow the steps in the installation, and close the door cover.
3) Set operating parameters: Select the rotor model to be used (models with identification function do not require manual setting), and set the speed/centrifugal force, temperature, and operating time.
4) Click the "Start" icon to start running. Wait for the time to end, or click the "Stop" icon to end the operation.
5) When the rotor stops completely and you hear the beep, click the door icon to open the door cover. After hearing the door opening sound, open the door cover, take out the sample, and clean the chamber.
6) After use, turn off the power to the centrifuge.

9.1.2 Debugging

Follow the above steps: First, select low speed operation, and gradually increase to the highest speed operation. If there are no exceptions, the debugging is successful.

9.2 Instrument Control System

The main interface is the first operation page displayed after the system is started. The two rows of buttons are setting and operation buttons; the middle column displays the real-time value in the centrifugal chamber; the bottom sidebar contains the menu, status display bar, and system time. The specific introduction is as follows:

Figure-12

Program Group Button: Displays the called program group number and name. By default, the temporary program group "000" is displayed. Click to enter the program group interface to view, modify, and call the program group.

Speed/RCF Setting Button: The displayed value is the currently set speed/RCF. Click it to enter the speed/RCF setting page. Automatic conversion between speed and RCF.

Time Setting Button: The displayed value is the current running time. Click to enter the time setting interface. h:m means the current value is in hours: minutes; m: s means the current value is in minutes: seconds.

Temperature Setting Button: The displayed value is the currently set temperature. Click it to enter the temperature setting page.

ACC/DEC Setting Button: Displays the currently ACC/DEC value. Click to enter the settings page. There are 40 rates; 0 is the fastest, and 40 is free parking. The value on the icon left indicates the acc rate, and the value on the right indicates the dec rate.

Fast pre-cooling: Click this button, and the system will run at 5000 rpm and cool at maximum power. When the centrifugal chamber reaches the set temperature, the system will automatically stop and prompt. (Make sure the rotor is installed properly before starting this function!)

Run Button: Select to start/stop running, long press for a short spin. Click the "Run" icon to start running, the icon will change to "Stop" while running. Click the "Stop" icon while running to terminate the process.

Door Button: Click to open the door, and the icon will toggle when closing the door. The icon indicates that the door is open, and the icon indicates that the door is closed.

Rotor Display Bar: Displays the information of the currently installed rotor.

4000 rpm **Speed/RCF Display Bar:** Displays the current rotor speed or RCF. Click the display area to switch.

06:56 **Time Display:** Display the machine running time. Click to switch the time display mode between count up, countdown, or continuous centrifugation. The display mode can be switched during operation, but it cannot be switched to continuous centrifugation. Continuous centrifugation can be switched off when the machine is stopped. ⬆ Indicates count up, showing the running time.
⬇ Indicates countdown, showing the remaining running time.
∞ Indicates continuous centrifugation, the device will continue to run until the upper limit of the time (99 h 59 m 59s), and the timing mode is count up.

15.0 ℃ **Temperature Display:** Displays the real-time temperature inside the centrifuge chamber.

Administrator **Menu:** Click to enter the menu page to view product information, set up the system, edit user account permissions, and passwords, etc. After the user logs in, the current logged-in user's name will be displayed below

Running **System Status Display Bar:** The machine operating status, system warnings, fault information, etc., are all displayed here.

2024/09/26 10:29 **System Time:** Display system time. Click to enter the system time calibration page, enter the time manually, and click "OK" to save. The data time of system event logs, operation records, etc., is consistent with the system time.

Notice After returning to the main interface from other pages, you need to wait for 5 seconds before clicking the system time to calibrate. If the system time is reset when the machine is powered off and then on after multiple time calibrations.

9.3 Parameter Settings

9.3.1 Speed /RCF Settings

Click the 4000 rpm 1300 xg on the main interface, and the page will automatically jump to the speed/centrifugal force input interface.
Depending on the currently installed rotor, the set speed or RCF will be converted to the other and displayed.

Notice: The set speed or RCF cannot exceed the upper limit of the currently installed rotor, otherwise, it cannot be saved!

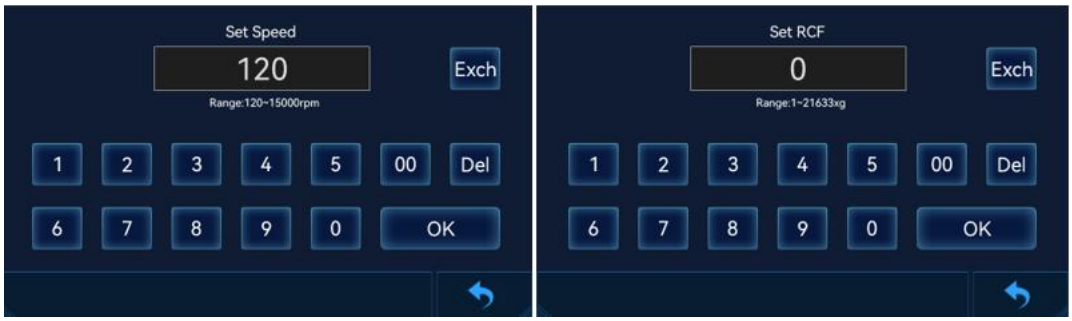


Figure-13 (Speed/RCF setting interface)

Click Exch to convert the current setting to speed/RCF. Use the numeric keypad to enter the required value, and use it to delete the entered content. Click OK to confirm the setting, or select cancel and return to the previous page.

9.3.2 Temperature Settings

Click the icon  on the main interface to jump to the temperature setting interface. The temperature setting range is -20℃ to 40℃. Settings outside the range will automatically default to the maximum or minimum value.
Depending on the use environment and parameters, the speed of cooling will vary. The machine will automatically pre-cool when the power is turned on. The factory debugging is that the ambient temperature is 25℃±2℃, and it will reach below 4℃ within 20 minutes at the highest speed of the equipped rotor.

Figure-14 (Temperature setting interface)

Use the numeric keypad to enter the required value. The default is a zero-up value. Click  to switch the value to a zero-down value. After setting, click  to confirm the setting and exit; or select Cancel setting and return to the previous page.

9.3.3 Time Setting

Click the icon  on the main interface to jump to the time setting interface. If the set time is more than or equal to 1 hour, the time unit on the main interface automatically displays hours: minutes (h: m); if it is less than 1 hour, the time unit on the main interface automatically displays minutes: seconds (m: s).

Figure-15 (Time setting interface)

Use the numeric keypad to enter numbers, click  to move the cursor position, switch to set the value unit, click  to confirm setting and return to the previous page; or click  to cancel the setting and return to the previous page. Enter the interface and set the minutes by default.

9.3.4 Acceleration/Deceleration Rate Setting

Click the icon  on the main interface, the page jumps to the acc/dec rate setting interface. The range is 1-40, with 1 being the fastest and 40 being a free stop (without applying external force, relying only on the original resistance). The acc/dec time varies according to the specifications of the rotor. The larger the capacity, the longer the time required for the rotor, and the smaller the capacity, the faster the lifting speed.

Use the numeric keypad to enter numbers, click Exch to switch to set the acc/dec level, and click OK to confirm the setting and exit after the setting is completed; or select to cancel the setting and return to the previous page.

Figure-16 (Acceleration/Deceleration setting interface)

9.3.5 Preset Program Groups

This machine can store 1000 preset program groups and one temporary program group. The temporary program group is numbered 000. After modifying the called program group in the main interface, the modified parameters are automatically saved to the temporary program group No. 000, and the parameters of the original program group will not be changed. If you want to modify, you must enter the program group setting interface.

Click the program group icon on the main interface, and the page will jump to the program group setting interface.

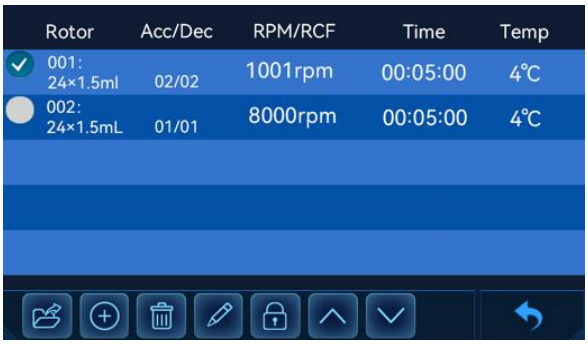


Figure-17 (Program Group Interface)

Instructions

1) **Call a program group:** After selecting a program group, click the button  to call this program group. If you need to return to the temporary program group after calling, you can do so by modifying the parameters in the main interface.

2) **Add a new program group:** Click the button to add a new program group and set the program group parameters in the pop-up window. The program name can be 1-15 characters long, including uppercase and lowercase letters, numbers, and regular symbols.
3) **Delete a program group:** After selecting a program group, click the button to delete the program.
4) **Modify a program group:** After selecting a program group, click the button to modify the program group notes and parameters.
5) **Lock/unlock a program group:** After selecting a program group, click / to lock/unlock the program group. To lock a program group, you need to set a lock password for unlocking. A locked program group cannot be modified or deleted.

9.4 Menu Function

Click the icon on the main interface, and the page will automatically jump to the function menu interface. In this interface, you can modify the user password, modify system settings, view device information history, etc.

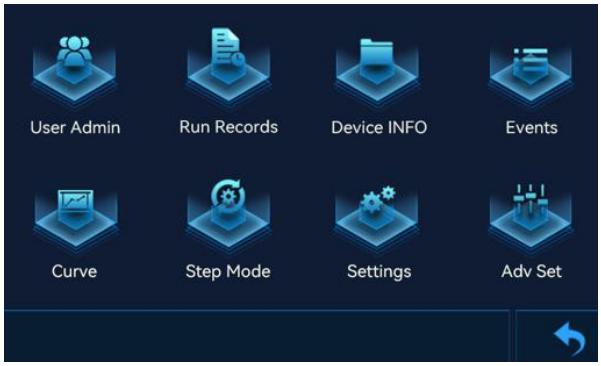


Figure-18 (Menu Interface)

9.4.1 User Management

Click the "User Admin" icon to enter the user management interface, where you can set user account passwords, operation permissions, etc.

The system default administrator account 001: User name - Administrator, password - 1111. The user can modify the user's name and password of this account at their own will.

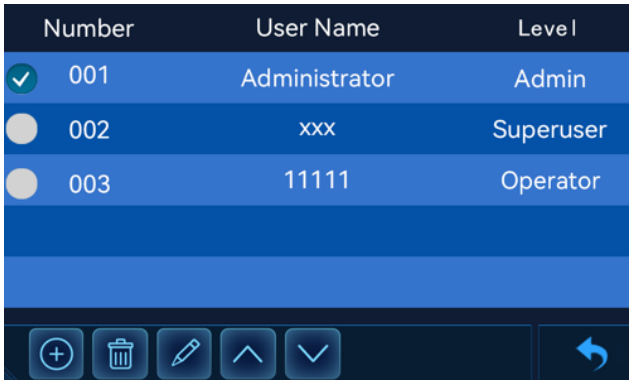


Figure-19 (User Management Interface)

Instructions:

1) **Add a new user:** Click the icon to add a new user. The username is 1-15 characters long and the password is 4-9 characters long. Usernames cannot be repeated.
2) **Delete a user:** Select an account and click the icon to delete the user.
3) **Modify a user:** Select a user and click the icon to modify the username, password, or permissions.

9.4.2 Run History

Click the "Run Records" icon to enter the page. You can view the historical usage records. The system only records the complete operation data, including the rotor information used, speed, centrifugal force, temperature, centrifugal time, and system time during operation.

9.4.3 Device Info

Click the "Device Info" icon to enter the page. The user can check the device information, the currently loaded rotor information, and all compatible rotors with model, parameters, production date, rotor radius, and remaining number of uses, etc.

9.4.4 Events

Click the "Events" icon to enter the page. View the centrifuge's operation records include recording time, operation user, event ID, and event details.

9.4.5 Curve Display

Click the "Curve" icon to enter the page. Real-time view of the speed, centrifugal force, temperature, vibration and time curves of the current equipment operation. This function records data from the start of the host and draws a graph.

9.4.6 Centrifugal Mode

Click the "Step Mode" icon to enter the page. The user can switch the centrifugation mode to general mode or multi-step mode, and edit the multi-step centrifugation parameters.

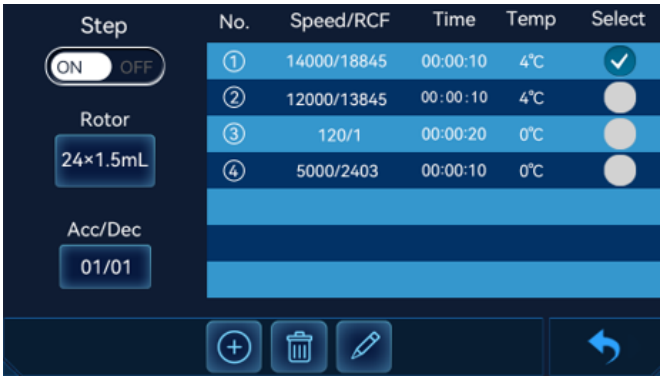


Figure-20 (Centrifugal Mode Interface)

Instructions:

1) **General Centrifugal Mode:** Set the centrifugation parameters normally, and stop the centrifugation after the set time is reached. The parameters will not change during the process. Switch the button ON OFF indicate that the current centrifugation is normal.
2) **Multi-step Centrifugal Mode:** The running time set for each centrifugal step, the system will automatically adjust the speed and temperature according to the parameters after the time is reached. It will not stop in the middle and does not require human operation. ON OFF

This system can set up to 7 centrifugal steps. The parameter setting method is as follows:

Add step: Click the icon ⊕ to add a new step and set the corresponding parameters.

Modify parameters: Select the centrifugal step to be modified, click and modify the corresponding parameters.

Delete step: Select the centrifugal step to be deleted, click

General parameter setting: Click the icon 24×1.5mL to select the rotor model to be used; click the icon 01/01 to set the acceleration and deceleration level; the rotor and acc /dec level apply to all centrifugal steps.

9.4.7 System Setting

Click the "Settings" icon to enter the system settings page means open means close.

Figure-21 (System Setting Interface)

Instructions:

1) **System sound:** Open or close the system sound.
2) **Touch sound:** Open or close the touch sound.
3) **User login:** Open or close the user login function. When open, you need to enter the user's name and password to enter the system.
4) **Logout:** Click + to open the automatic logout function and adjust the logout time in increments of 30 seconds. If there is no operation for n seconds, the system will automatically lock the screen.
5) **Time mode:** Click to switch between two-time modes "Speed timing" means that the system starts timing according to the set time after the actual operating speed in the centrifuge reaches the set value; "Run timing" means that the system starts timing immediately after the "Run" button is pressed.

6) **IMBA set:** Click to switch the imbalance level; there are 4 levels, D1 has the highest sensitivity. The higher the sensitivity, the lower the system's tolerance to imbalance.
7) **Language:** Click to switch to English.
8) **Cool system:** Open or close the refrigeration system. The following settings will be effective after opening:
9) **Temp mode:** Switch two cooling mode "ECO" means energy-saving mode, "PER" means keep running at optimal status.
10) **Stop Temp Ctrl Time:** The users can set the machine to automatically stop cooling after a certain period in the open door and standby states. The setting increment of "Door" is 1 min, and the setting increment of "Standby" is 10 min.

9.4.8 Advanced Setting

Click the "Advanced Settings" icon to enter the advanced settings page, which is used for device debugging before leaving the factory.

9.5 Other Functions

9.5.1 Short spin

Long-press the Run ▶ icon the centrifuge will run with the current setting parameters. Press and hold the icon, the machine will continue to run, and the main interface will display the running time; release the icon, the time will stop accumulating and the machine will slow down and stop immediately. The short spin centrifugation time does not exceed 2 minutes.

9.5.2 Modify Parameters During Runtime

During operation, you can change the speed, time and temperature parameters without stopping the operation. The parameter setting method is the same as before. After the new parameters are set successfully, the centrifuge will immediately run according to the new parameters, the previous centrifugation time will not be calculated, and the timing will start again. In multi-step centrifugation mode, parameters cannot be modified during operation.

9.6 Emergency Door Opening

When there is a power outage or the door lock fails, you can manually open the centrifuge cover as follows:

1) Turn off the power switch and unplug the power cord from the socket.
2) At the bottom of the front cover of the machine, there is a pull cord with a round bead behind the left foot.
3) Pull the pull cord to open the door cover.

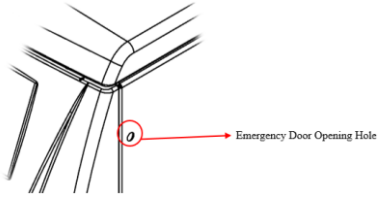


Figure-22 (Emergency door opening position diagram)

10. Maintenance

10.1 Main Machine

After reaching the expiration date, please dispose of it properly to avoid harming the environment. After a liquid spillage occurs, it should be cleaned up in time to prevent the surface of parts from rusting or contamination after drying. You can use a cloth to wipe all liquids in the centrifuge chamber (including water, all solvents, acid or alkaline solutions, etc.).

Notice: Before cleaning the centrifuge, unplug the power plug!

It is recommended to check and clean the condensate tray at the bottom of the main unit regularly. The condensate tank is located at the bottom of the rear of the main unit and can be removed by pulling it out horizontally. After cleaning, insert the tank inward to complete the installation.

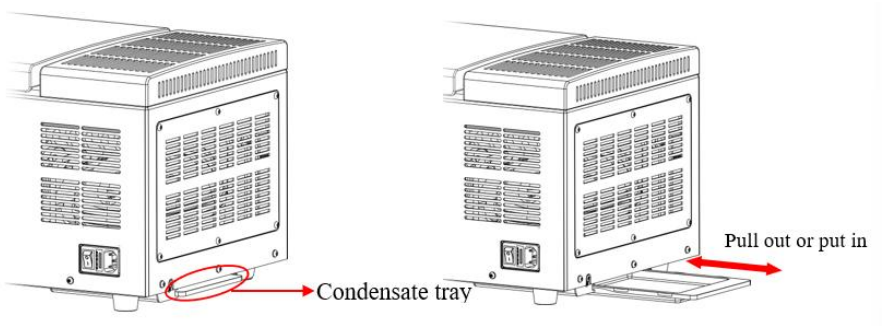


Figure-23

If the centrifuge is not used for a long time, the rotor needs to be taken out to clean the centrifuge chamber. After cleaning, apply a little grease on the drive shaft for protection.

10.2 Rotor

Warning

If any of the above is reached, the rotor life has expired! Do not use rotors that have exceeded. Do not use sharp and hard objects to collide with the rotor. Avoid bumps during transportation and disassembly, and prevent cracks in the rotor caused by scratches or trauma during use. And regularly check the rotor for corrosion spots, grooves, small cracks, etc.

Notice

If it is found that the centrifuged sample is spilled, soaked, or dripped on the rotor during use, it should be sucked up immediately and partially cleaned.
To prevent damage to the surface oxide layer when cleaning the rotor, please clean it with a sponge or cotton cloth moistened with detergent, then wash off the detergent with distilled water or scrub with 70% alcohol. After cleaning, you can turn it upside down to dry.

11. Troubleshooting

Fault	Reason	Solution
Communication failure	Specifically refers to the control panel losing contact with the main control board and reporting a fault	Check the screen wiring
Drive overheats	IPM temperature detected by ADC, inverter overheating, or motor driver overheating	Wait for cooling before use
Drive overcurrent	IPM fault foot output signal, inverter overcurrent, or motor driver overcurrent, and other hardware	Power off and restart!
Overvoltage	Recommends IPM, inverter, motor driver, and voltage overvoltage	Check the brake system, power off, and restart
Undervoltage	Recommends to IPM, inverter, motor driver, voltage, undervoltage	Check the power system, power off, and restart
Motor overcurrent	Sampling resistor detects current overcurrent, software overcurrent, or motor overload	Power off and restart
Abnormal speed	Speed sudden change between the previous moment and the next moment	Power off and restart
Speed is not returned to zero	Click to run when the speed is not zero	Wait for the speed to drop to zero
The door lock opened	Open the door cover when there is speed	Pay attention to safety
Overspeed warning	The speed exceeds the set speed by 500 rpm during operation	Check the speed control system
No speed	No speed measurement after 5 seconds of operation	Check whether the motor is blocked, power off, restart
The door cover is not locked	Running when the door cover is not locked	Relock the door cover
Rotor not detected	The rotor is not recognized by the rotor	Reinstall the rotor
Rotor mismatch	The rotor is inconsistent with the set rotor	Replace the rotor
Identification failure	Identification problem (the rotor is not recognized three consecutive times)	Power off and restart
Unbalanced communication	Unbalanced communication failure, or the unbalanced board, is not inserted	Check the unbalanced device, power off, restart
Rotor unbalanced	Unbalance detection exceeds the threshold	Balance the rotor
Speed exceeded	The set speed exceeds the identification rotor speed limit	Reduce the speed!
Rotor deadline approaching	Insufficient rotor life	Replace the new rotor as soon as possible
Rotor life expired	Expiration of rotor life	Replace the new rotor

Motor overheated	Motor overheating	Wait for cooling before use
Other faults	Other errors	Power off and restart
Communication blocked	Specifically refers to the control panel. When the sent data is full, the new command cannot be recorded and sent, so the fault is prompted.	Power off and restart
Secondary communication failure	Inverter, mounted secondary communication equipment, and additional secondary faults.	Power off and restart
Temperature acquisition abnormality	Temperature collection abnormality.	Temperature sensor failure, power off, and restart
The temperature exceeded limit	The temperature exceeds the upper limit of 40 degrees of machine by 2℃	Check the refrigeration system

12. Replacement

Replace the fuse

If the fuse of the centrifuge burns out during use, the machine has a set of new fuses for replacement. The specific replacement steps are as follows. The user can choose to replace it themselves or ask a professional maintenance person to do it.

Warning

Make sure that the power switch of the centrifuge is turned off and the power plug is unplugged! Live operation may cause personal injury!

1) Turn off the power. First, unplug the plug between the power cord and the external power connection end, and then unplug the plug between the power cord and the instrument connection end.
2) There is a fuse holder installed at the bottom of the power socket on the back of the instrument. There is a fuse symbol. Find the V-shaped groove of the fuse holder, insert a flat-blade screwdriver into this groove, and pull out the fuse holder.
3) Take out the damaged fuse in use and discard it, then take out the spare fuse from the holder and replace it. The fuse model specification used in this machine is LFT 10A L250V φ5×20.
4) Insert the fuse holder into the power socket of the instrument.

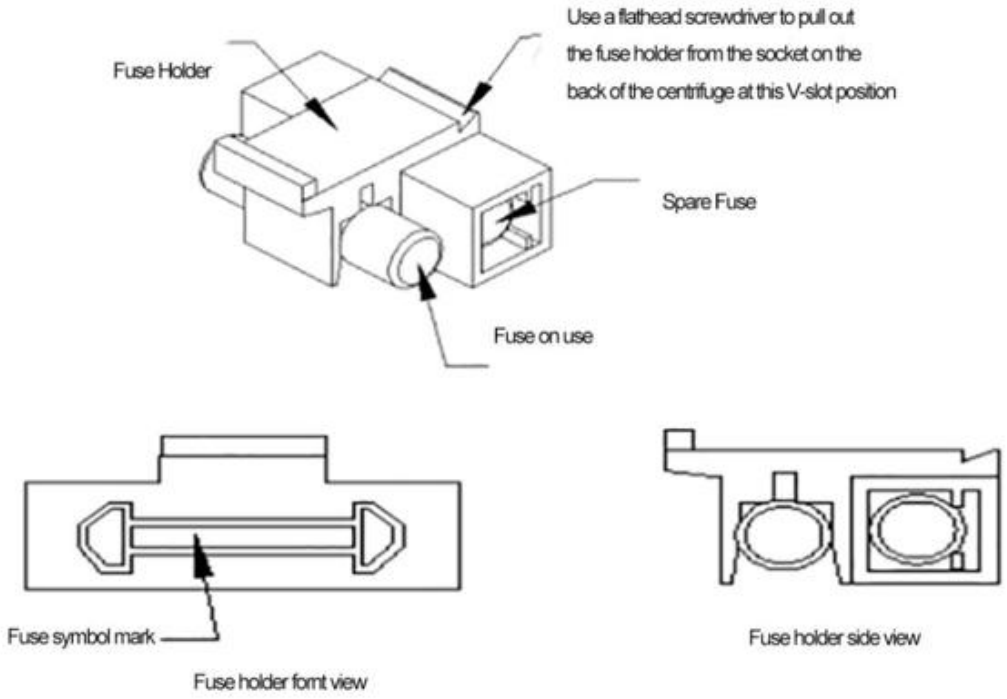


Figure-24 (Schematic diagram of fuse replacement)

13. Rotor Selections

Rotor Type	Capacity	Maximum Speed	Maximum RCF
Fixed Angle Rotor 1	24 × 1.5/2.2ml	14000rpm	18845 × g
Fixed Angle Rotor 2	4 × 0.2ml PCR strip	14000rpm	17091 × g
Fixed Angle Rotor 3	12 × 5ml	14000rpm	15930 × g