RWD

RWD Life Science Co.,Ltd

Microcentrifuge

User Manual **D**

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Contents

1-Introduction

1.1 Overview

First of all, thank you for choosing the Microcentrifuge manufactured by RWD.

Before the installation and application of this product for the first time, please read all attached materials to help you use this product in a better way.

RWD Life Science Co., Ltd. is committed to continually improving product features and service quality, and reserves the right to make changes to the User Manual and any product mentioned herein without prior notice.

For the latest product information, please call or write us or visit our website (http://www.rwdstco.com/). Please contact RWD in the case of any inconsistency between actual conditions of product and the User Manual, or any question or suggestion, during your application of equipment.

This User Manual is applicable to the Microcentrifuge produced by RWD:

- Microcentrifuge M1324R

1.2 Safety

When operating the system, please read the **"2-System Safety"** section carefully to avoid hurts to operators and damages to the equipment.

If you have any question or suggestion regarding safety, please contact RWD for after-sales support.

This equipment should be operated and managed by trained professionals!

1.3 Comprehensive description

The Centrifuge is a machine used to separate components in a mixture of liquid and solid particles or liquids via a centrifugal force generated from uniform circular motion of liquid samples in the rotor driven by a motor. It is mainly used to separate solid particles from liquid in suspension or two kinds of liquids with different density and insoluble with each other in emulsion.

Microcentrifuge is mainly used to process liquid samples with a volume of or less than 1.5/2 mL and needed to be operated at low temperature. It has a speed over 10,000 r/min.

Such product is applicable to daily needs of molecular biology application in labs, such as nucleic acid kit extraction and tissue protein separation.

1.4 Product features

- Quick precooling. Only take 8 min to lower to 4 °C from room temperature in order to cut waiting time.
- Stable temperature control. Stabilize below 4 °C even at the highest speed to avoid sample inactivation.

- Compact size.
- Mechanical lock design for the microcentrifuge lid to enable easy opening and closing.
- Touch screen + functional keys. Quick and convenient setting and use of parameters.
- Preset program to enable easy calling during operation.
- Small vibration and noise during equipment running. Less interference to samples and users.

1.5 Environmental requirements for equipment

Please prepare the instrument operating environment according to the conditions listed below to ensure the operability and safety of the system.

	Description
Working environment	Temperature: 5 ℃ ~ 40 ℃
	Humidity: 15% - 75% (non-condensing)
Storage environment	Temperature: -20 ℃ ~ 60 ℃
	Humidity: 15% - 75% (non-condensing)
	Air pressure: 50 kPa ~ 106 kPa
	Class of pollution: 2
Operating voltage	AC 220V, 50 Hz, rated voltage 3 A, maximum voltage 6 A

1.6 Product parameters

Parameters	**Description**
Product dimension	≤500 mm × 300 mm × 280 mm
Product weight	≤35 kg
Display size	4.3 inch
Screen pixel	800*480 px
Speed	100-15,000 rpm
Centrifugal force	1g-21,130 g
Centrifugation time	00:30-09:59:59, ∞, 30 s-36,000 s
Set temperature	-10 ℃ ~ 40 ℃

1.7 Product list

Configuration	**Name**	**Quantity**	**Description**
Standard	Host	1	Microcentrifuge
Standard	Rotor wrench	1	Tool for fitting rotor
Standard	Power cord	1	Power connection
Standard	Waste water tank	1	For storing condensate water
Standard	Rotor	1	M-F24G

2-System safety

2.1 Main purposes

The equipment is applicable to daily needs of molecular biology application in labs, such as nucleic acid kit extraction and tissue protein separation.

2.2 Personal protection

The equipment can only be operated and managed by trained professionals. Please carefully read the User Manual and get acquainted with the operating steps before use.

2.3 Operating restrictions

1) It is prohibited to use the equipment in rooms with explosive substances.
2) It is prohibited to use the equipment for processing explosive or highly active substances.
3) It is prohibited to use the equipment for processing substances that can producing explosive gases.

2.4 Operating safety

Operation of the equipment should be in strict accordance with the User Manual. The following general precautions should be followed during operation. Failure to follow these precautions will be considered as violation of safety standards and intended use of the equipment. RWD will not be responsible in any case your misuse of the equipment or failure to follow basic safety requirements.

2.5 Safety symbols

The User Manual and the equipment may contain the following safety symbols and common signs. If you have any question or suggestion regarding safety, please contact RWD for after-sales support. Please carefully follow these instructions in order to prevent equipment damage and prolong service life of the equipment.

Risk of hand injuries

When the microcentrifuge is in use, the rotor will run at high speed. Therefore, failure to follow the safety precautions and the User Manual will result in risk of hand injuries.

Warning – general danger zones

When such sign appears on the equipment, the following instruction should be strictly complied with. Safety precautions on the equipment cannot be ignored.

Warning –Power supply safety

The equipment can only be started when the equipment and the power cord are not damaged and correctly connected. In case of dangerous situations, the

equipment power should be immediately cut off and the plug should be removed from the equipment or the power socket.

Hazard in flammable environment

It is prohibited to use the equipment in environment with flammable gases

Hazard of electromagnetic interference

Please operate the equipment under controlled electromagnetic environment to avoid danger from equipment faults. It is prohibited to use signal transmitters including mobile phones near the equipment. In case of faults and/or needs for maintenance, please turn off the equipment and contact RWD after-sales service.

The equipment is designed and tested in accordance with group A of CISPR 11 for Class A devices that emit radio interference as specified in EN 61326-1/EN 55011.

Warning: Class A devices are used in industrial environments. There may be potential difficulties in ensuring EMC in other environments due to conductive and radiation harassment in use.

Radiation Hazard

When processing radioactive samples, please follow all applicable radiation safety procedures. When processing radioactive pollutants, please take appropriate disinfection and safety measures. Wear protective suit (such as particle protection mask, gloves and protective shoe covers) according to rules and regulations on processing of radioactive pollutants in your labs. Dispose radioactive pollutants based on relevant regulations.

Biological infection hazard

Samples used during intended operations of the equipment can be infectious. Therefore, it is recommended to follow the general lab regulations on infection control procedure. Refer to the *Laboratory Biosafety Manual* of WHO (1984) for information concerning decontamination media and its use, dilution and effective application scope. Please comply with all applicable safety procedures when processing infectious samples. Please take appropriate disinfection and safety precautions when processing infectious substances. Wear protective suit (such as particle protection mask, gloves and protective shoe covers) according to infection control procedures in your labs. Dispose infectious wastes based on applicable regulations.

Waste treatment

Dispose all debris, wastes and infectious and radioactive pollutants generated from operations based on application lab regulations. Disinfectants, cleaning fluids and biological wastes must be disposed according to special waste disposal regulations! Reagents must be disposed according to MSDSs of their manufacturers.

3-Introduction of product structure

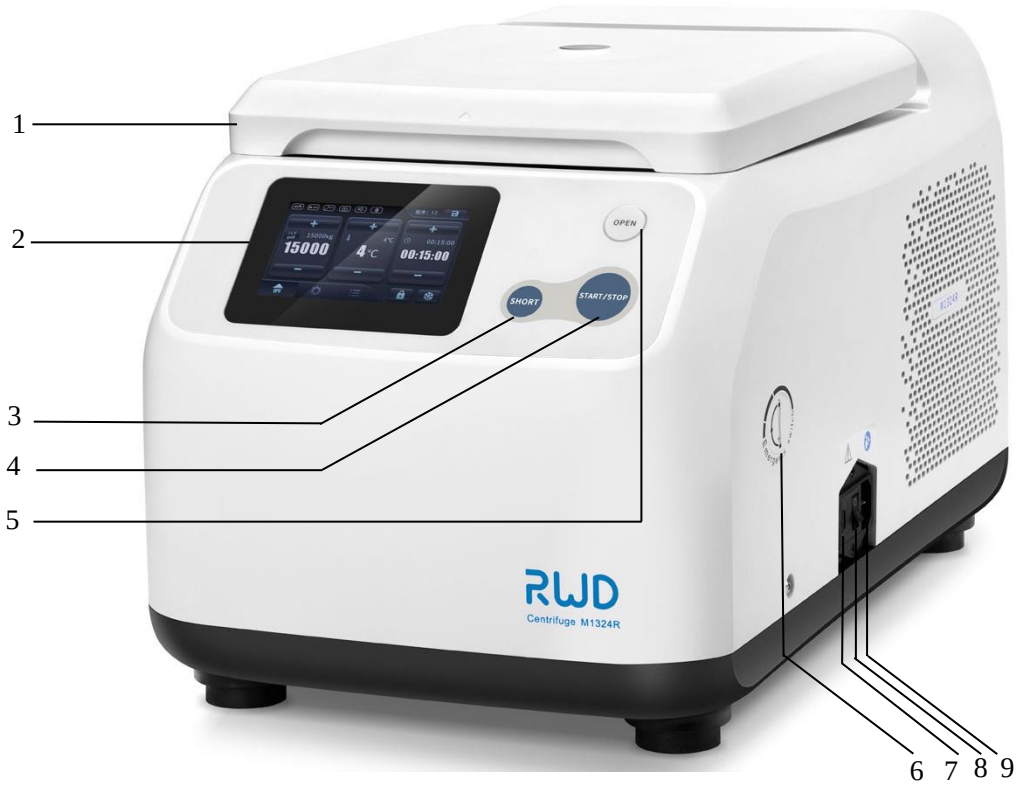


Fig. 3-1

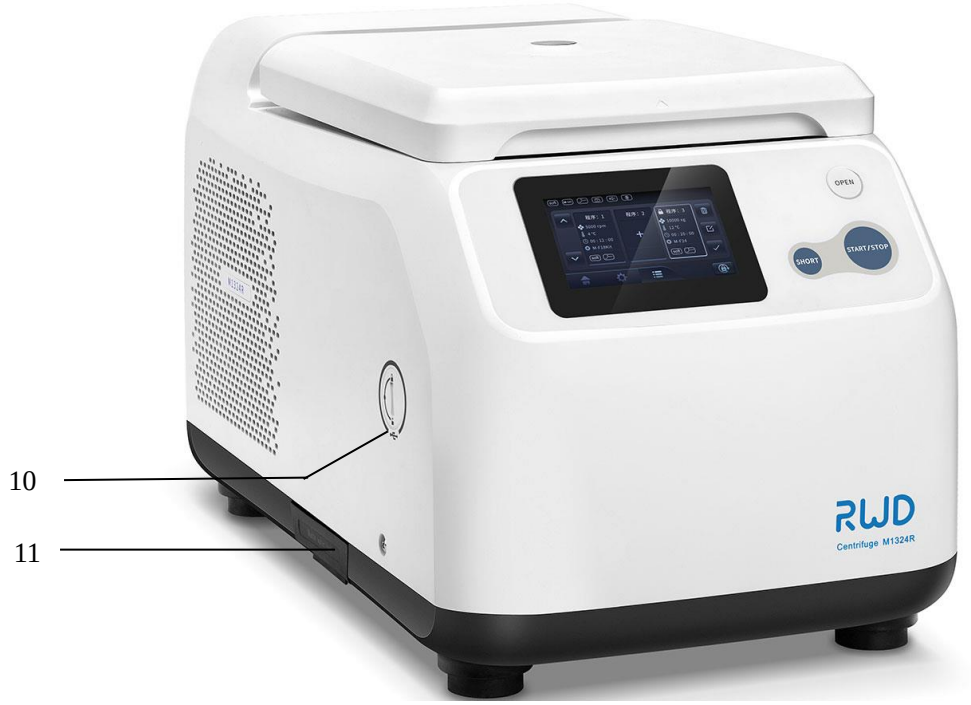


Fig. 3-2

S/N	Part name	Description
1	Microcentrifuge lid	Lid
2	Display screen	Display the user interface
3	SHORT button	Start short run
4	START/STOP button	Start/stop centrifugation run
5	OPEN button	Manually open microcentrifuge lid
6	Emergency switch	If the centrifuge cannot open the lid manually after centrifugation, loosen the emergency switch with a wrench to force open the lid
7	Fuse holder	For installing/replacing fuse
8	Power On/Off	For controlling power supply
9	Power socket	For providing power output
10	USB port	Software upgrading interface (voltage: 5V)
11	Waste water tank	Collect condensate water

4-Product assembling

Note: Please start the microcentrifuge 4 hours after its assembling.

1) Unpack first and take out fittings.
   Note: Take out the main body of the microcentrifuge under the cooperation of two persons by placing both hands under the microcentrifuge and carry it out together.
2) Place the microcentrifuge onto an appropriate bench and remove the plastic outer packing.
3) Wait until the equipment temperature rises to the ambient temperature and ensure all power supplies meet equipment requirements.
4) Connect the microcentrifuge to the power supply and press the power switch to turn it on. Wait for the display screen to light up and the microcentrifuge lid to open automatically.
5) Loosen the rotor nuts counterclockwise with rotor wrench, take out the protective styrofoam bag of the rotor and put the rotor back.

Types of rotors	**Description**
M-F24G	Maximum speed: 15,000 rpm; capacity: 24 × 1.5 mL; gas tightness
M-F24	Maximum speed: 15,000 rpm; 24 × 1.5 mL
M-F4PCR	Maximum speed: 15,000 rpm; 4 PCR tubes
M-F18Kit	Maximum speed: 15,000 rpm; 18 spin columns

5- Operation instruction

Operating procedures:

1) Firstly set various parameters such as target centrifugal speed, time of centrifugation, acceleration mode, ATset mode and target temperature as needed or directly call preset program before start of experiments.
2) Turn on precooling.
3) After the microcentrifuge reaches the set temperature, loosen the microcentrifuge lid, put in the microcentrifuge tubes and start centrifugation.
4) After centrifugation, open the equipment and take out the microcentrifuge tubes from the rotor.
5) Leave the microcentrifuge open, turn off the power and wait until the condensate inside evaporates.

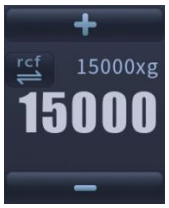
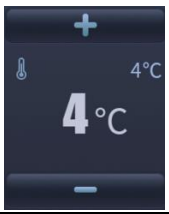
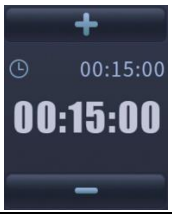
5.1 Start-up

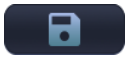
Press the power button to start the equipment for the first time to enter the main system interface as follows.

Fig. 5-1

Meanings of interface icons

Type	Icon	Description
	soft	This icon shows that Soft mode has been enabled. At this time, the rotor accelerates and decelerates gently. This icon disappears when corresponding function is disabled. In this case, non-soft mode is started and the

Status icon		rotor accelerates and decelerates quickly.
		ATset mode: indicates the time when centrifugation timing starts.  indicates that centrifugation timing starts when operation starts;  indicates centrifugation timing restarts when 95% of the set relative centrifugal force or speed is reached.
		 indicates that the highest rotor speed is the target speed during short run;  indicates that the set speed is the target speed during short run.
	 =Sound  =Sleep  =Auto-open  = continuous cooling	
Parameter setup icon		Click to enter [System Setup] page.
		Click to enter [Program] page.
		 shows target centrifugal force;  shows real-time centrifugal force. Click  to switch to  , namely to corresponding speed display.
		 shows target temperature;  shows real-time temperature.
		 shows target centrifugal duration  shows past centrifugal time;.
		Click “+” or “_” to increase or decrease corresponding set values.

		Save button. Click to enter [Save Program] page.
		Click once to start [Quick Precooling] and click again to end [Quick Precooling] or wait for the rotor cavity temperature to reach target temperature to automatically end quick precooling.
		Parameter lock button. Start/cancel parameter lock function. This function is mainly used to lock homepage parameters to prevent changes.

5.2 Rotor/Short

Click [System Setup] icon  to enter [Rotor] and [Short] setup interface by default. As shown in the figure, the rotor selected by default is: M-F24G

Fig. 5-2

Click rotor name to enter the following rotor selection interface. This interface shows parameters of the rotor and you can select by your need and click  to save.

Note：Before select the rotor, please make sure that have been replaced the corresponding rotor.

Fig. 5-3

After rotor selection is completed, select mode of [Short], which means to select [Set] or [Max] for short run after click “Short” to start short run.

Be unable to select rotor during centrifuging.

5.3 Setup

Click or to enter the previous or next page in the system setup interface and click to enable other system functions, such as Sleep, Sound, auto Auto-open or continuous cooling or click to switch between Chinese and English in the system language tab. In the following section, the setup of [Continuous Cooling] will be introduced as an example and setup of other functions will not be explained here.

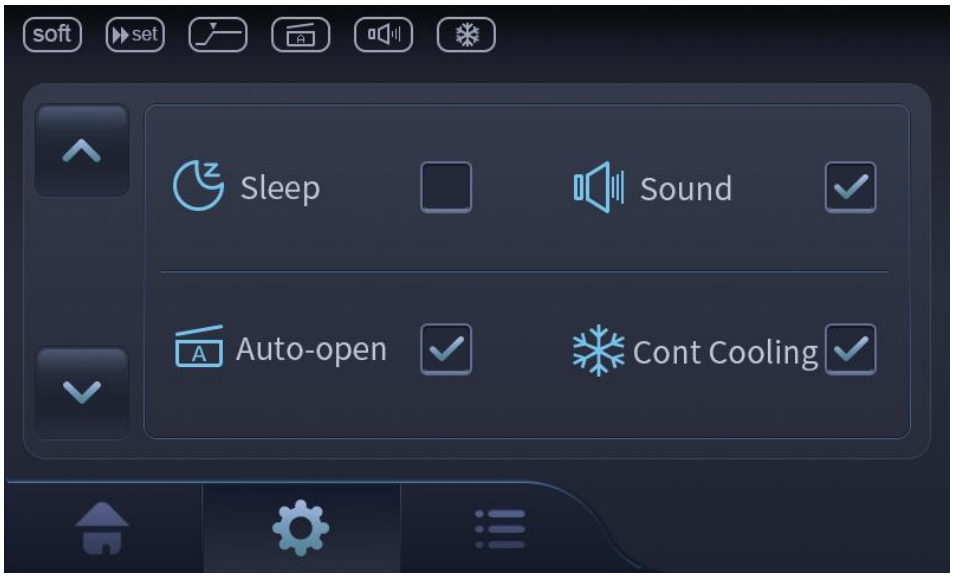


Fig. 5-4

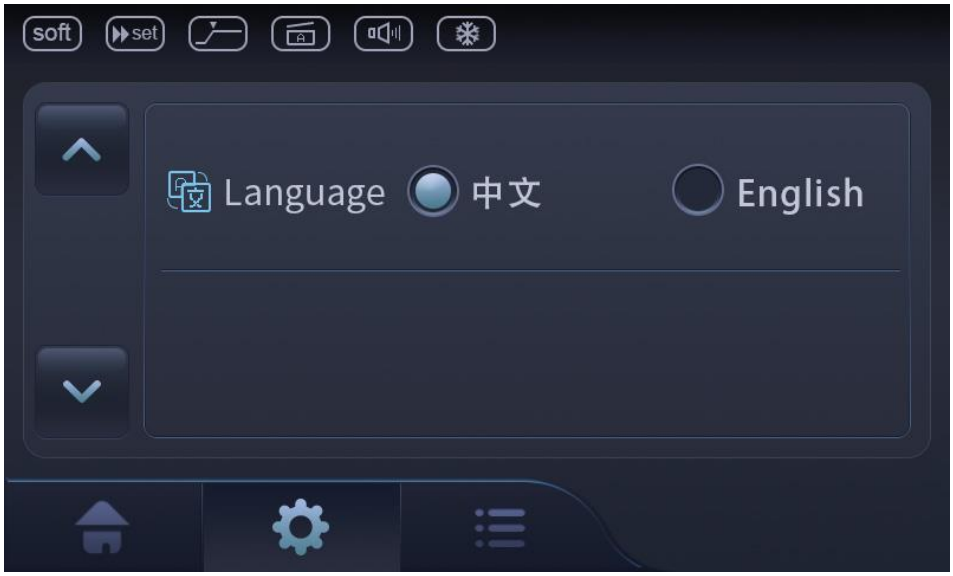


Fig. 5-5

5.3.1 Continuous cooling

When select [Continuous Cooling], the rotor cavity temperature can be kept at set temperature if the following four preconditions are met when the rotor stops moving.

1) The microcentrifuge is started.
2) The microcentrifuge lid is closed.
3) The set temperature is lower than ambient temperature.
4) The microcentrifuge is not in sleep mode.

When [Continuous Cooling] is not checked, the equipment will keep cooling for 8 hours and then cooling is automatically turned off to enter the sleep mode.

During continuous cooling, the set temperature will be shown on the screen. Whatever the set temperature, the rotor cavity temperature will not be lower than 4 °C in order to avoid freezing of rotor cavity and the samples as well as forming of more condensate inside the equipment. Because the rotor is still at such time, temperature adjustment becomes slower.

If you need to stop cooling, please manually open the microcentrifuge lid.

5.4 Precooling

Click  to start precooling. Precooling icon will be displayed at the real-time temperature button during precooling: 

Fig. 5-6

Click + − to adjust precooling temperature. When the set precooling temperature is reached, the cooling stops and the system gives off intermittent prompt tone to inform operators that the precooling is completed.

Click / [START/STOP] button to stop precooling early.

5.5 Placement of microcentrifuge tube

Vertically remove the rotor, loosen the rotor cover, put in the microcentrifuge tube, restore the rotor to its original position vertically and tighten the rotor nuts clockwise with rotor wrench until the rotor is firmly fastened (nuts must be tightened firmly). Close the microcentrifuge lid.

Note: Don’t put your hands between the microcentrifuge and the lid when opening and closing the microcentrifuge lid.

5.6 Centrifugation

5.6.1 Preset time/continuous run

Click any parameter block in the main interface including centrifugal force/speed, temperature or duration to enter the following parameter setup interface.

Fig. 5-7

Click parameter value to pop out a numeric keypad for entering a value within the range prompted in the interface. Here also to set ATset mode and to select the acceleration mode of Soft or NonSoft.

Preset time and continuous run modes are identical in above parameter setup, except that for continuous run, ∞ should be selected at duration tab. Manually click the [START/STOP] button to end the centrifugation process is required when start continuous run.

After parameter setting, click [START/STOP] button to start centrifugation. When the set timing reaches the target centrifugation duration, the operation stops automatically. Click [START/STOP] button to stop preset time run early before the target duration is reached.

5.6.2 Short run

Press [SHORT] button on the main panel of the centrifugation to start short run but end it by releasing button. See Section 5.2 for introduction of short run.

5.7 Treatment after operation

5.7.1 Remove rotor

When the microcentrifuge lid opens, rotate the rotor nuts counterclockwise with rotor wrench to loosen the rotor and vertically take out the rotor.

5.7.2 Remove microcentrifuge tube

Remove the microcentrifuge tube.

5.7.3 Leave the microcentrifuge open

Leave the microcentrifuge open and turn off the power. Wait until the condensate inside to evaporate.

6-Alarm information

Alarm information prompt	Alarm reasons	Treatment method
“Operation abnormality! Wait until the rotor stops and restart the device. If still abnormal，contact the after-sales personnel! ”	The microcentrifuge lid is forced open when the face plate is locked	Wait until the rotor stop moving, open the lid and then close it, restart centrifugation.
“Lid cannot be locked! Reclose the lid or restart the device. If still abnormal, contact the after-sales personnel!”	The lid cannot be locked.	1) Open and then close the lid. 2) Restart the equipment or contact the after-sales service.
“Lid cannot be unlocked! Click "OPEN", restart the device, or turn off the power supply and press the emergency unlock button to open it!”	The lid cannot be unlocked.	1) Click OPEN to open the lid; 2) Restart the equipment and again click OPEN to open the lid; 3) Turn off the power supply and use the emergency unlock button to open the lid.
“Device is unbalanced! Check whether the samples and rotor are abnomal, or else restart the device!”	The motor is uneven with too large vibration.	1) Check whether the sample is placed symmetrically; 2) Check whether the rotor is installed correctly; 3) Restart the equipment.
“Motor stalling! Restart the device. If still abnormal, contact the after-sales personnel!”	The asynchronous motor stalls.	1) Turn off the equipment and wait for 5 min before restarting. 2) If the fault remains, please contact the after-sales service.
“Hall sensor abnormality! Restart the device. If still abnormal, contact the after-sales personnel!”	Hall sensor is damaged.	1) Equipment; 2) If the fault remains, please contact the after-sales service.
“Refrigeration abnormality! Restart the device. If still abnormal, contact the after-sales personnel!”	Failed to start the compressor.	1) Turn off the equipment and wait for 5 min before restarting; 2) If the fault remains, please contact the after-sales service.
“Refrigeration failure! Contact the after-sales personnel! ”	Compressor over-current protection circuit fault	Contact the after-sales service

“Compressor hot! Turn off the power supply and wait until the device is cool. If still abnormal, contact the after-sales personnel!”	Compressor casing temperature is too high.	1) Turn off the equipment for one hour before restarting; 2) If the fault remains, please contact the after-sales service.
“Sensor failure! Contact the after-sales personnel! ”	The rotor cavity temperature sensor is damaged.	Contact the after-sales service
“Drive hot! Turn off the power supply and wait until the device is cool. If still abnormal, contact the after-sales personnel!”	IPM driver module temperature is too high	1) Turn off the equipment for 20 min before restarting; 2) If the fault remains, please contact the after-sales service.
“Communication abnormality! Restart the device. If still abnormal, contact the after-sales personnel! ”	There is no communication between the display panel and the driver board.	1) Equipment; 2) Restart the equipment; if the fault remains, please contact the after-sales service;
"Voltage abnormality! Check whether the Voltage is range between 198V-253V! ”	Input power is not between AC180 - AC250.	Check whether the input voltage is within the working range of AC180 - AC250.
“Condenser hot! Wait until the device is cool. If still abnormal, contact the after-sales personnel!”	Evaporator temperature is too high.	1) Stop the equipment to cool for one hour before restarting; 2) If the fault remains, please contact the after-sales service.
“Temperature abnormality! Check the device ventilation, or turn off the power supply, wait until it reaches the room-temp, and restart the device.”	Temperature difference between the rotor cavity (displayed temperature) and the set temperature is too great.	1) Check whether air flow at the ventilation opening is unobstructed; 2) Let the ice melt or turn off the microcentrifuge for it to cool before restarting
“Drive abnormality! Check whether the rotor is abnormal, or else restart the device! If still abnormal, contact the after-sales personnel! ”	Difference between the set speed and the actual speed is too great.	1) Open the lid to check if the rotor is tightly fastened; 2) Restart the motor to remove the fault; if it remains, contact the after-sales service.
“Motor hot! Wait until the device is cool. If still abnormal, contact the after-sales	The motor spindle and the rotor skid.	1) Tighten the rotor and restart the equipment; 2) Restart the motor to remove

personnel! ”		the fault; if it remains, contact the after-sales service.
“Motor hot! Wait until the device is cool. If still abnormal, contact the after-sales personnel! ”	The motor is heating.	1) Stop the equipment to cool for one hour before restarting; 2) If the fault remains, please contact the after-sales service.
“Brake failure! Contact the after-sales personnel!”	Brake resistance circuit fault	Contact the after-sales service
“Cooling fan failure! Restart the device. If still abnormal, contact the after-sales personnel! ”	Compressor fan stalls	1) Equipment; 2) Restart the equipment; if the fault remains, please contact the after-sales service; 3) After the fan is damaged, please do not use cooling-related functions.
“Motor fan failure! Restart the device. If still abnormal, contact the after-sales personnel! ”	The motor fan stalls.	1) Equipment; 2) Restart the equipment; if the fault remains, please contact the after-sales service;

7-Troubleshooting

Problem	Possible cause	Solution
The lid cannot be opened.	1) The rotor hasn't stopped rotating.	1) Wait for the rotor to stop.
	2) Power failure	1) Check the microcentrifuge fuse. 2) Check the fuse of the lab. 3) Press emergency unlock of the lid
Unable to start the microcentrifuge	1) The lid is not closed	1) Close the lid
The microcentrifuge shakes during starting	1) The rotor is loaded asymmetrically	1) Shut down the microcentrifuge and load the rotor symmetrically 2) Restart the microcentrifuge
Even though Short button is pressed, the microcentrifuge brakes during short run.	1) Short button is quickly released for more than two times	1) Short button must be kept pressing during short run.
Temperature display flickers	1) Difference from the set temperature	1) Check setup 2) Check whether air flow at the ventilation opening is unobstructed 3) Let the ice melt or turn off the microcentrifuge for it to cool

8-Maintenance

8.1 Considerations

1) Don’t let any liquid enter the equipment in order to prevent electric shock.
2) It is prohibited to spray to clean/disinfect on the casing.
3) The power can only be turned on when interior and exterior of the equipment are completely dry.
4) Before each use, please check air tightness of the rotor cover and the microcentrifuge tube; the rotor cover and the microcentrifuge tube must be clean and undamaged.
5) High-temperature disinfection temperature should not exceed 121 °C for no more than 20 min. After disinfection, please apply a thin layer of journal grease onto the rotor cover screw thread.
6) Please don’t close the lid when storing the rotor cover or the microcentrifuge tube.
7) It is prohibited to use any corrosive chemicals on the equipment and its fittings, such as strong and weak base, strong acid, acetone, formaldehyde, halogenated hydroxide or phenol.
8) When polluted by corrosive chemicals, the equipment should be cleaned immediately with neutral cleaner.
9) Don’t disinfect the equipment with UV, β, γ ray or other HERs. Avoid storing the equipment in areas with strong ultraviolet radiation.

8.2 Regular maintenance

1) Please shut down the microcentrifuge and unplug the power supply before maintenance.
2) Regularly empty and clean the waste water tank.
3) Clean surfaces of the equipment and its fittings with contact to operators’ skin with gentle cleanser at least once every week.
4) If the equipment is used to process samples with biological hazards, please regularly remove and clean the rotor and disinfect it at 120 °C. Clean the rotor with ethyl alcohol or ethyl alcohol-containing disinfectant.

   Note: If rotors with non-detachable sealing ring, which cannot be disinfected for more than 50 times and should be replaced when they have been disinfected for 50 times.

5) Brush away dust at ventilation opening of the microcentrifuge once every half a year.
6) Glass tubes may be broken inside the rotor cavity when used. If glass tubes breaks, please completely clean glass pieces and chips on the rotor, the rotor cavity and its fittings, and replace the sealing ring with a new one.

8.3 Cleaning and disinfection

8.3.1 Clean and disinfect microcentrifuge interior

1) Open the lid. Turn off the power and unplug.
2) Loosen the rotor nuts counterclockwise with rotor wrench to remove the rotor.
3) Clean and disinfect all contactable surfaces of the equipment (including the power cord) with a piece of soft cloth and recommended cleanser.
4) Completely rinse the rotor cavity with clean water.
5) Apply glycerin or talcum powder onto dry rubber seals to prevent rubber rupture. It is prohibited to apply grease on other parts of the equipment, such as the lid lock, the motor shaft or the rotor cone.
6) Clean the motor shaft with a dry and dust-free soft cloth.
7) Check whether the equipment is corroded or damaged.
8) Please leave the lid open when not in use.
9) Reconnect the power only when the equipment is completely dry.

8.3.2 Clean and disinfect the rotor

1) Check whether the rotor and its fittings are corroded or damaged. Do not use them if they are damaged.
2) Clean and disinfect the rotor and its fittings with recommended cleanser.
3) Completely rinse the rotor and its fittings with distilled water.
4) Leave the rotor and its fittings on a cloth for air drying.
5) Put completely dry rotor back into the cavity.
6) If the rotor is not used, leave its cover open.

8.4 Replacement of fuses

See *3-Introduction of product structure and buttons* for positions of fuses. Firstly, unplug the power, directly pull out the fuse holder. Both fuses can be removed and replaced.

8.5 Record keeping

It is recommended that the maintenance process should be recorded and kept after maintenance, including time, location, maintenance procedures, etc. for future reference.

8.6 Parts and materials

If you find that some parts or materials should be replaced during maintenance, please contact RWD for after-sales support.

9-Warranty

The warranty period of this equipment starts from the delivery date. During the warranty period, if the equipment cannot be used normally due to problems such as material and process defects, the Company should be responsible for providing after-sales services such as equipment maintenance and parts replacement.

Any damage caused by improper or over-range use is not covered by the warranty. If repair or replacement of parts is required, relevant costs will be borne by the user.

When the equipment to be reworked arrives, if it has been dismantled without authorization from RWD, the Company will not provide after-sales services such as warranty, free maintenance and parts replacement.

The warranty statement (including its restrictions) is exclusively issued by RWD and covers all other warranties.

The service life of equipment: 5 years

RWD Life Science

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