OPERATING MANUAL

MICRO CENTRIFUGE

BCMR-103

CE ISO9001 CERTIFIED

www.biolabscientific.com

INDEX

1. Preface

In order to ensure safe operation of this centrifuge, please read through this instruction manual carefully and follow the instructions before use or maintain this centrifuge. Please paste the Operational Program (attached separately) at the working area.
The centrifuge should be operated by trained specialists only.

 Failure to follow this instruction and safety information in this instruction manual will result in the expiration of the seller's warranty.

2. Safety and cautions

Safety and Cautions: safety and cautions aim at the safety operation of the centrifuge which was described in this instruction. In the interest of your own personal safety, please read it carefully before you install, operate, maintain and repair this centrifuge. Knowing this safety caution and proper operating skills, the operator can avoid the hurting as well as avoid the damage to the centrifuge.

2.1 Installation and maintenance cautions

·The centrifugal chamber may contain rotors and other accessories in it, please open the lid to check and get out of it (if any) before installing. (If you order the machine with one rotor only, the rotor may already been installed onto the spindle properly).
·When maintaining this centrifuge, all the parts which needed to remove the cover may cause electric injury. Make sure you already cut off the electricity and pulled the plug from the socket before maintaining this instrument. The maintaining work should be done by professional staffs.
·Please use only rotors, accessories, replacement parts for this centrifuge which has been approved by us.
·A safety zone of at least 30 cm must be maintained around the centrifuge. People, dangerous substances or objects must be kept out of the safety zone during the centrifugation run.

2.2 Electric cautions

·To reduce the danger risk of the electric shocks, this centrifuge adopts three core plug which must be connected with three core socket which connects with earth wire.
·Make sure the socket on the wall connects well with the earth wire. Make sure the power voltage must conform to the voltage this centrifuge required.
·Do not use three-hole changing to two-hole expansion power adapter.
·Do not use two wire expansion socket or multi-use power adapter which is not connect with the earth wire.
· Do not put the container which is full of liquid on or near the centrifuge, because if the container is knocked over, the liquid may penetrate into the centrifuge, which would damage the components.
·The main plug must be freely accessible at all times. Pull out the power supply plug or disconnect the power supply in an emergency.

To avoid can't disconnect the mains from the centrifuge in the event of errors occurring in time, an

emergency switch which is separate from the centrifuge must be available, this switch should be outside the room in which the centrifuge is operated or next to the exit of the room.

2.3 Fire prevention cautions

·Please use the same type specification overload insurance fuse. This machine use
the type specification for the fuse is LFT 10A L250V φ5x20.
·This centrifuge is not designed to separate flammable and explosive materials. Do not use this centrifuge to centrifuge these materials, do not put these kinds of materials in the centrifuge, or put such material in the safety zone.

2.4 Operation cautions


Do not start the centrifugation run before you cleaning the centrifuge chamber, otherwise damages might occur!


Always ensure the rotor has been securely fastened on the spindle, the samples have been balanced and the rotor lid (if equipped) has been screwed on the rotor tightly before each run.


Make sure the setpoint speed for the rotor you are going to run do not exceed its max speed allowed before each run.

· Do not start the centrifugation run when the lid is open.
· Never open the lid until the rotor has completely stop and this has been confirmed in the display.
· In case of fault or emergency release, disconnect the centrifuge from the mains first,
open the lid only during rotor standstill.
· Please do not lean on, lift up, or move the centrifuge before the rotor stop running.
· Do not stretch anything into the centrifuge when the rotor is running.
·When the centrifuge is running, according to EN / IEC 61010-2-020, no persons, dangerous substances or objects may be within the safety margin of 30 cm around the centrifuge. Please don't work in that range unless you need to debug the machine.


To avoid damage to the compressor, wait for at least 5 minutes after switch off the machine before switching on the machine again.

2.5 Chemistry & Biology cautions

·Routine operation may include all kinds of solution and test samples which may be pathogenic, toxic or radioactive material, all the materials should not be centrifuged by this centrifuge unless protective measures have been adopted.
·Please pay attention to the description of the solution on the original solution container before you are going to centrifuge it.
·Be careful when you holding the liquid because they are contagious.
·The operator should obey this instruction manual and method of the laboratory strictly when they

operating this centrifuge.
·All the waste solution must be destroyed according to the safety and protection demand of the environment.
When you ask for after-sale service, please make sure you had cleaned up the centrifuge, thanks in advance for your support.

3. Symbols & its meanings

No.	CODE	GB No.	MEANING
1	~	4706.1	AC POWER
2	|	5465.2	CONNECTED (MAIN POWER)
3	○	5465.2	DISCONNECTED (MAIN POWER)
4		4728.2	PROTECTIVE GROUNDING
5		4793	WARNING!
6		2894	CAUTION !
7		2894	DANGER!
8		2894	WATCH OUT FOR FIRE!
9		2894	DANGER ELECTRIC SHOCK!
10		2894	BEWARE OF BIOLOGICAL HAZARDS!

Table 1

4. Product introduction

4.1. Working principle

The centrifuge is a instrument which use the powerful centrifugal force which was generated by the high speed running of the rotor to accelerate the settlement of particles in solution, to make the samples of different subsidence coefficient and different density of the substance to be separated, concrete and pure.

When operate a centrifuge, loading equivalent volume solutions into each centri-
fuge tubes / bottles which you are going to centrifuge and load these centrifuge tubes / bottles into the positions of the rotor symmetrically (the centrifuge tube / bottle must be opposite each other to make sure the rotor can run at a balance state).

The relative centrifugal force (RCF) depends on rotational radius " r " and rotational speed (revolutions per minute) " n ", its computational formula as following:
RCF=1.118x10-5xn2xr(xg)
Among the formula:
n -- rotational speed (r/min)
r -- rotational radius (cm)
G -- gravitational acceleration (9.8 newton/kg)

The required centrifugal time T for particle separation sediment in the mixture solution was counted as the following computational formula:

$$T = \frac{27.4\times(1nR_{max}-1nR_{min})\mu}{n^2 r^2(\sigma-\rho)} \quad (\min)$$

Figure 1

Among the formula:
ρ -- mixed solution density (g/cm³)
μ -- mixed solution viscosity (P)
n -- rotational speed (r/min)
r -- rotor rotational radius (cm)
σ -- particle density (g/cm³)
Rmax -- the horizontal distance from bottom surface of centrifuge solution to axis (cm)
Rmin -- the horizontal distance from solution surface to axis (cm)

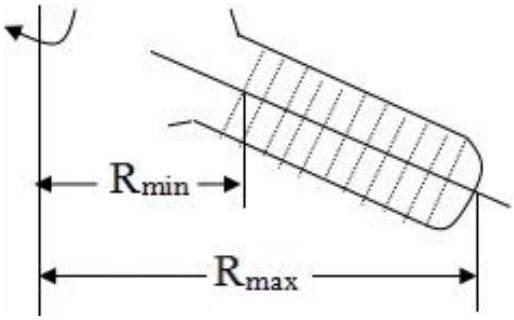


Figure 2 (fixed-angle rotor)

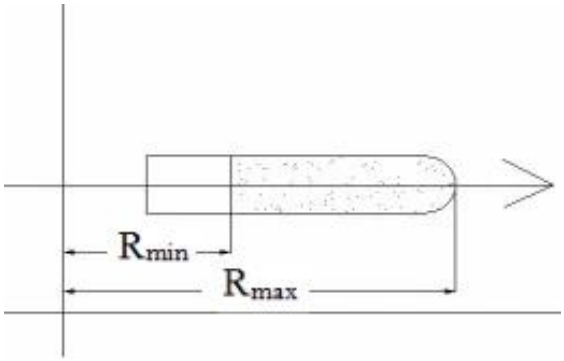


Figure 3 (swing-out rotor)

Our centrifuge is with automatic rpm / rcf conversion function, do not need to manual calculation.

4.2 Product features

This refrigerated microcentrifuge (hereinafter called centrifuge) adopts induction motor driving (brushless), microprocessor control, user-intuitive touchscreem interface, corrosion-resistant 304 stainless steel centrifuge chamber, motorized lid latch and other safety technologies for safe operation. It can store 1 000 programs and there are 40 acceleration rates and 40 deceleration rates available for daily use. Frequency converter compressor and CFC-free refrigerant are adopted for the refrigeration system, has both pre-cooling function and standby cooling function. The operation parameters such as the running speed/centrifugal force, centrifugation time can be modified during operation. The self trouble diagnosis system can detect speed, lid lock, motor failure and many other kinds of fault automatically and show the fault code. The electronic lock system security the centrifuge work safely. The centrifuge can't start when the lid does not lock. All the rotors listed can reach below 4 °C at full speed and -10 °C at low speed.

4.3 Product use and application scope

This centrifuge is widely used in the field of biochemistry, agricultural science, environmental protection, clinical medicine, pharmacy, inspection and quarantine, radio-immunity and other research & manufacturing fields. It is a ideal separation equipment for colleges/universities, research institutes, and enterprises.

4.4 Position of parts

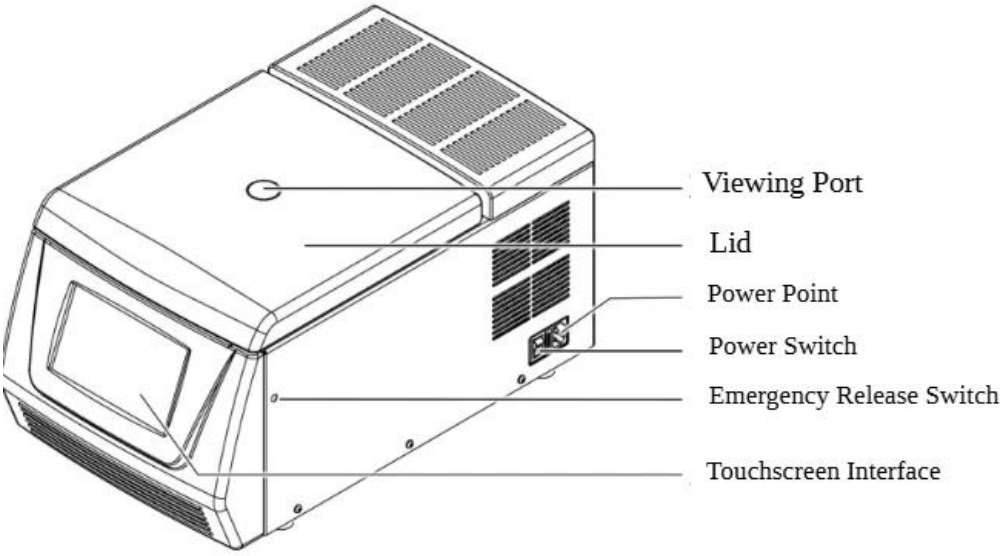


Figure 4

5. Install & Debug

5.1 Installation requirements

This centrifuge should be installed in the indoors, on a good, stable base, such as installed on a horizontal rigid solid laboratory worktable. No corrosive, conductive dust or damaging insulating air, and no powerful vibration source nearby, avoid direct sunlight.
To make sure the centrifuge can work properly, the install environment should fulfill the following conditions:
Environment temperature:5°C ~ 40°C
Relative humidity: ≤80%
Atmospheric pressure: 860hPa ~ 1060hPa
Supply voltage: AC 200 - 240V,50/60Hz

1. Space requirements
In order to ensure the in-out vent of cooling air the centrifuge demand, the set-up location must be well-ventilated at all times.

A safety zone of at least 30 cm must be maintained around the centrifuge. When the centrifuge is running, according to EN / IEC 61010-2-020, no persons, dangerous substances or objects may be within the safety margin of 30 cm around the centrifuge.

The dimensions of the centrifuge are shown in the diagram below:

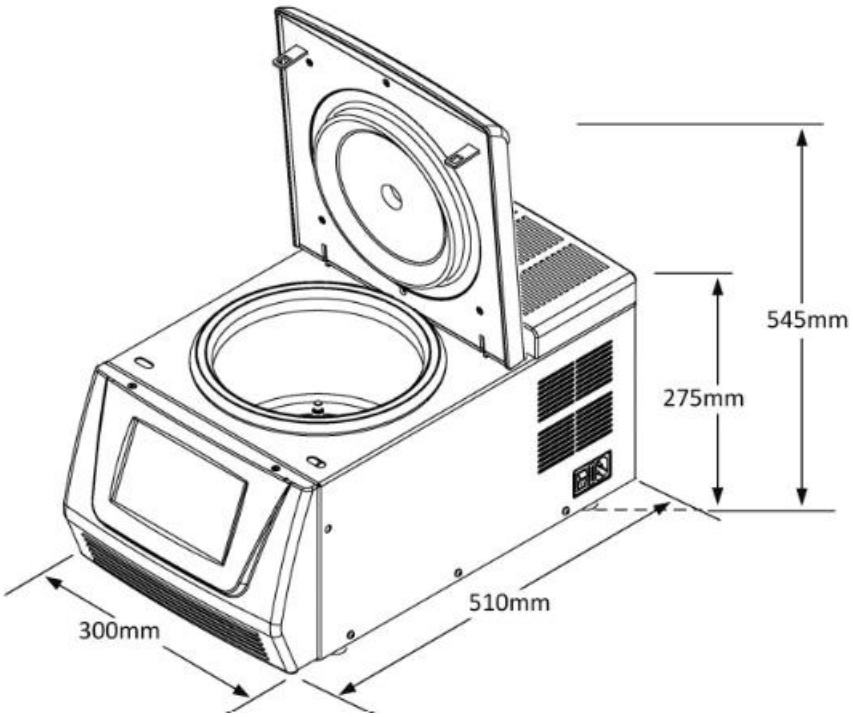


Figure 5

2. Power supply requirements

The power for this centrifuge is single-phase 200-240V, 50/60Hz, 10A. The power should have protective earth wire. Do not use null line to instead of protective earth wire. If you are not sure about the power you are using, please contact your distributor or local electricity board.

For ensure the good grounding of the centrifuge, this centrifuge connects with a single-phase three core plug. If the plug can not put into your socket, please contact electrician to change your original socket to ensure the safe action of the single-phase three core plug.

To avoid can't disconnect the main from the centrifuge in the event of errors occurring in time, an emergency switch which is separate from the centrifuge must be available, this switch should be outside the room in which the centrifuge is operated or next to the exit of the room.

5.2 Machine installation

Remove the package (by the user)

Users should check the package appearance when receiving the product. Severe impact, recumbency and upend etc. should not happen during transportation. The package appearance should be well. Please contact with the cargo agent and inform our company in time if any damage is discovered.

First, open the package, get out of the rotor and accessories; Second, get out of the centrifuge from the package and place the centrifuge in a stable and level manner in a suitable place, such as place in the reserved horizontal rigid solid laboratory worktable . During set-up, the required safety margin of 30 cm around the centrifuge is to be kept according to EN / IEC 61010-2-020. Last, properly deal with the package and packing, not to pollute the environment, or save these for possible future transport of the centrifuge.

Below is a schematic diagram of unpacking.

(1) Use scissors or knives to remove the packing belt and open the packaging box.

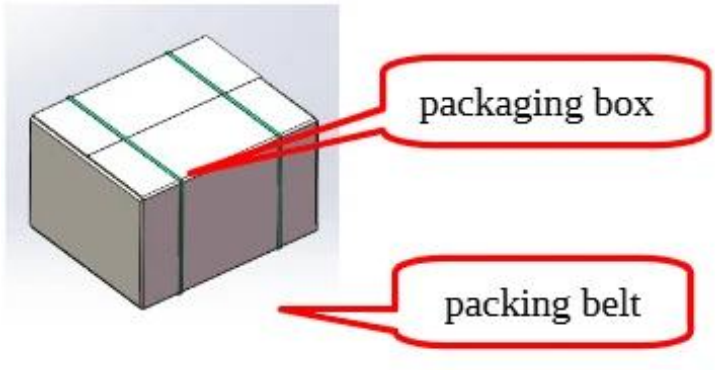


Figure 6
(2) Remove the upper foam.

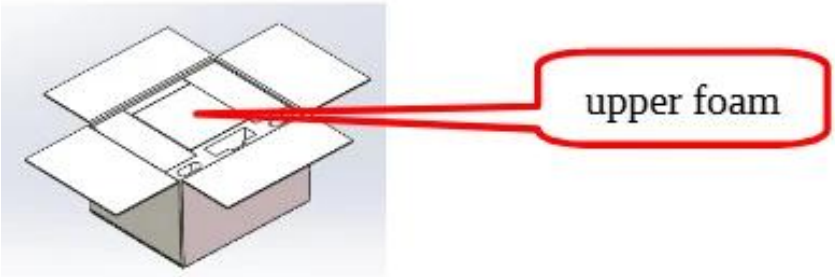


Figure 7

(3) Remove the foam on the right side, and take out the rotor, installation tool, power cord, and other accessories placed in the foam groove.

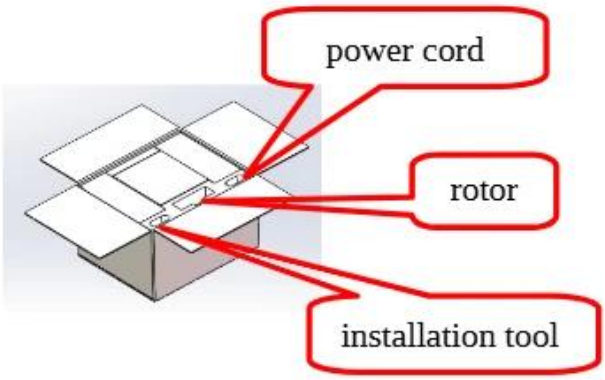


Figure 8

(4)Remove the foam on the left side.

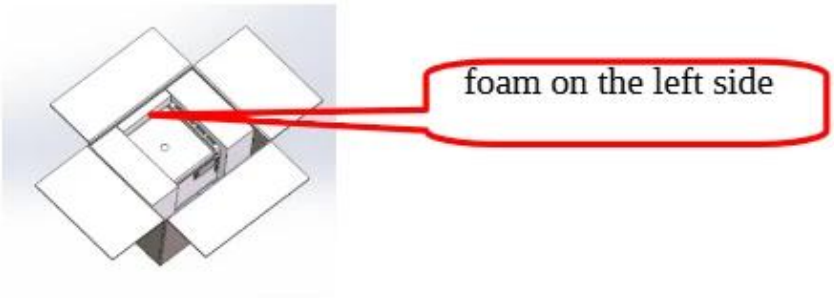


Figure 9

(5) Slowly move the centrifuge and then remove it along with the foam at the front and rear.

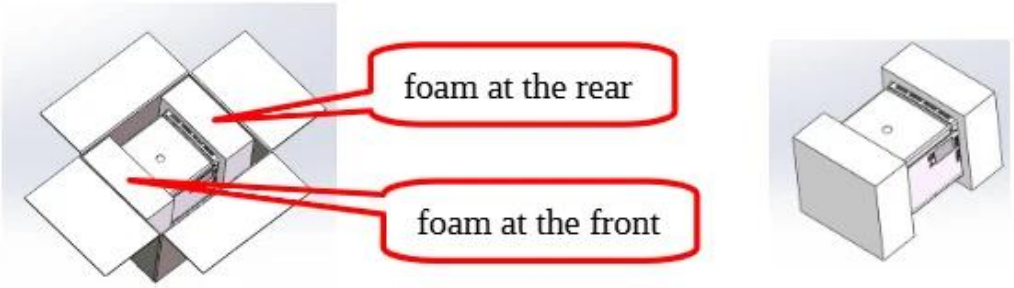


Figure 10

(6) Remove the front and rear foam covers, take out the centrifuge from the plastic bag, and be careful not to bump it.

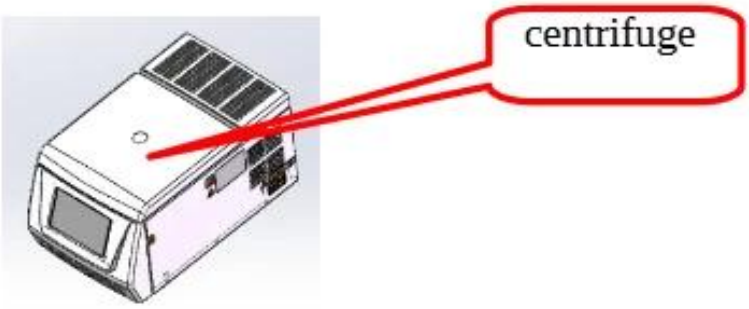


Figure 11

WARNING:

⚠ Never lift the centrifuge by the lid.

⚠ Always lift the centrifuge at the both sides on the bottom plate. Due to the net weight of this centrifuge is about 30kg, the centrifuge may need to be carried by two people. Avoid impact during the carry process, the centrifuge will be damaged by impacts.

After installation, the four rubber feet on the bottom of the centrifuge should afford uniform stress.

The horizontal leveling of the centrifuge must be checked every time after moving it to a different location.

After transportation, the centrifuge should be left to stand for at least 2 hours before connecting to the power supply!

5.3 Rotor installation

(1) Open the lid.

The lid can only be opened when the rotor is standstill.

There are two ways to open the lid:
1) Connect the centrifuge's plug to the power supply, switch on the power switch at the right side of the machine, then tap the icon "Door", after you hear a sound of unlock, lift up the lid.

2) Open the lid by using the emergency release switch.
Emergency release switch, there is a small hole on right side of the machine(with indicator label), use the 5 mm Allen key insert into it vertically and rotate it toward the anticlockwise then the lid can be open.

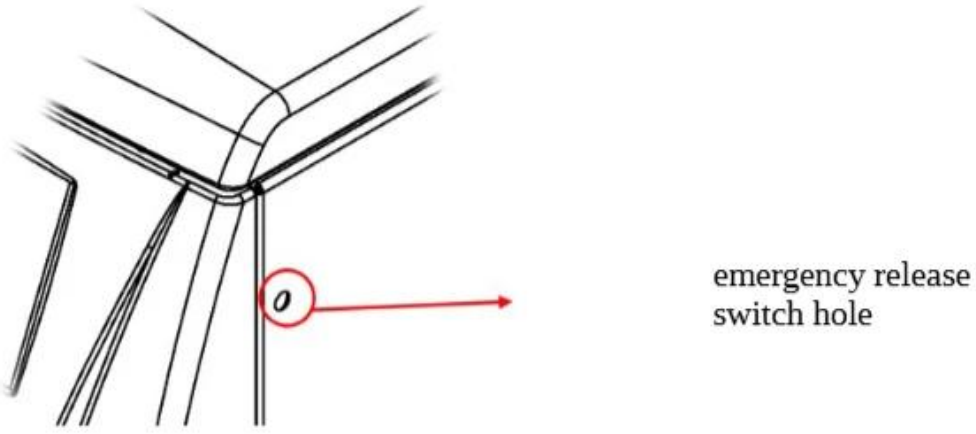


Figure 12

The emergency release switch should not be used at ordinary time, it can only be used when power failure or something is wrong with the lock.

Take out the rotor and accessaries from the centrifuge chamber (if any) after opened the lid.

(2) Installing the rotor.
First, align the center hole of the rotor with the motor spindle and place it vertically, so that the cylindrical pin is inserted into the rotor clamp slot (if it is not inserted, the nut cannot be tightened). Second, use the 5mm Allen key to pass through the inner hole of the rotor core and tighten the locking nut clockwise, then cover the rotor lid. For this refrigerated microcentrifuge, the rotor may already been installed onto the spindle before it been shipped out from factory if you ordered the centrifuge with one rotor only.

First step:

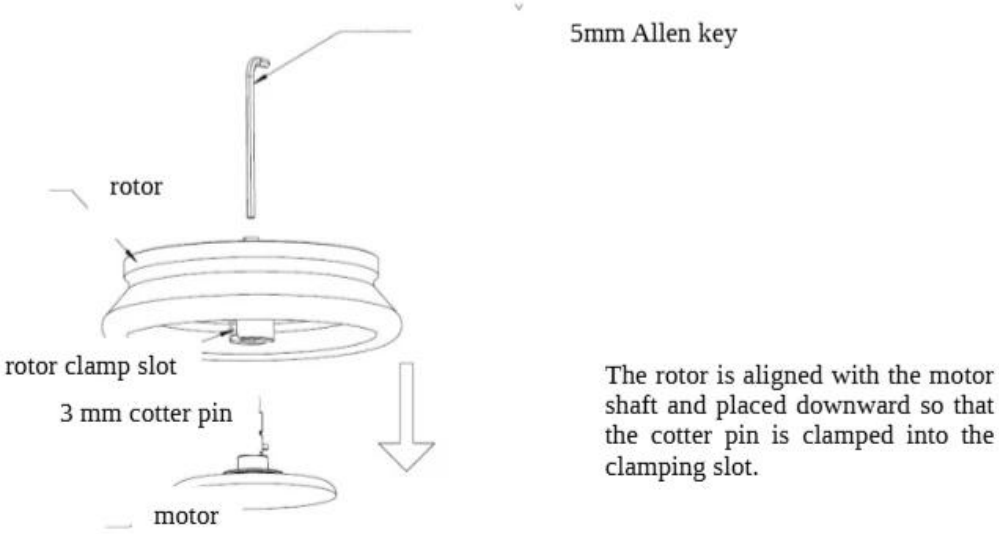


Figure 13

Second step: Tighten the compression nut clockwise with the Allen key, remove the Allen key, and the rotor installation is completed.

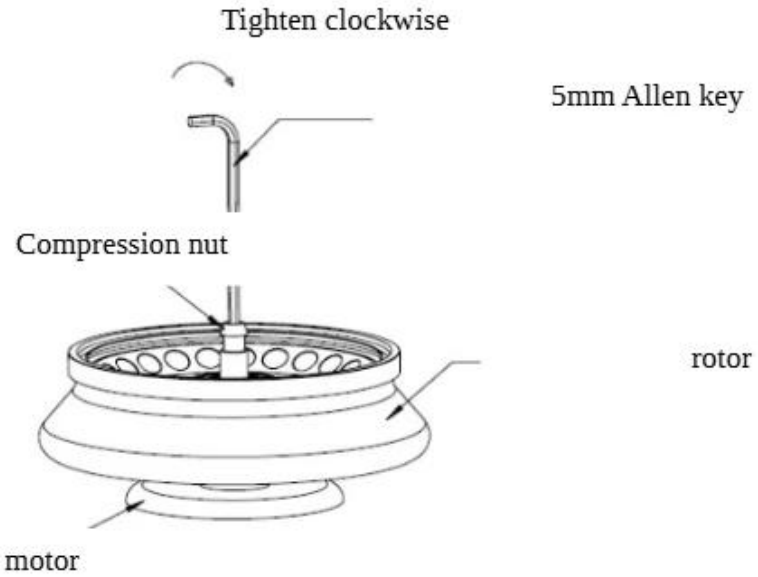


Figure 14

 For safety, always ensure the rotor has been securely fastened on the spindle before each run.

 Cover the rotor lid before each run.

(3) Discharge the rotor.
Use the 5mm Allen key to loosen the locking nut on the rotor counterclockwise (about 8 turns), and then lift the rotor upwards to complete the discharge.

5.4 Loading Rotors

Always balance the samples.
Push the button or screw to take down the rotor lid (if rotor lid is equipped).
To ensure safe operation of the centrifuge, the rotor must be evenly loaded at all times. The centrifuge tubes / bottles must be filled with same volume solutions, the loaded centrifuge tubes / bottles must be opposite each other, the weight difference of the loaded tube racks / buckets (for swing-out rotor) should not exceed 1 g. Imbalanced running is strictly prohibited. There is serious accident will occur due to the imbalanced running.

 Please check the maximum permissible revolutions of the test tubes / bottles (producer indication) .
For the fixed-angle rotor, the loaded test solution for each tube / bottle should not exceed 75% of its nominal capacity as usual unless you can make sure the test tube / bottle can be 100% sealed. The test tubes / bottles must be loaded with equal weight solutions and must be loaded into the rotor symmetrically to make sure the rotor can run at a balance state.

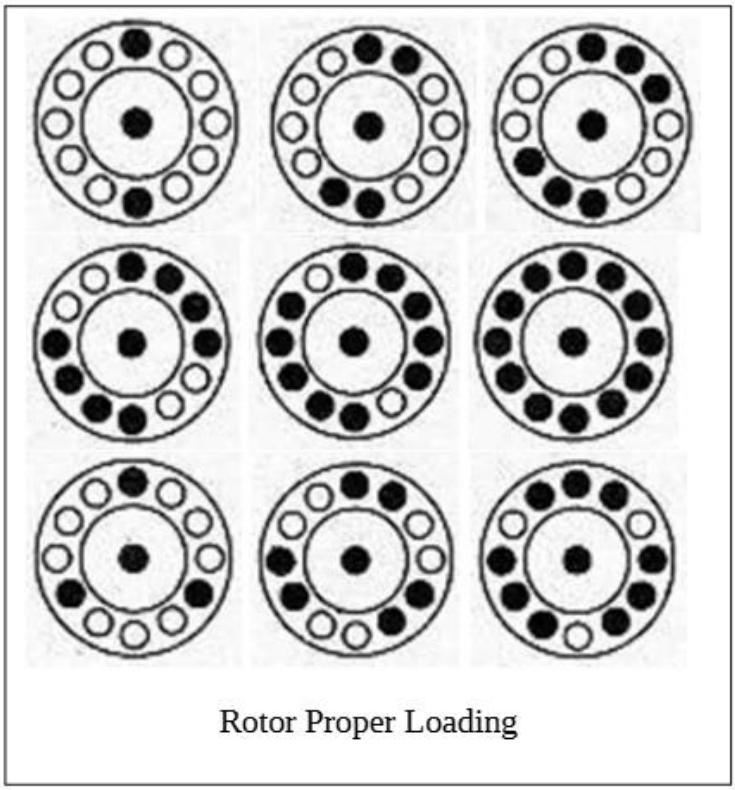


Figure 15

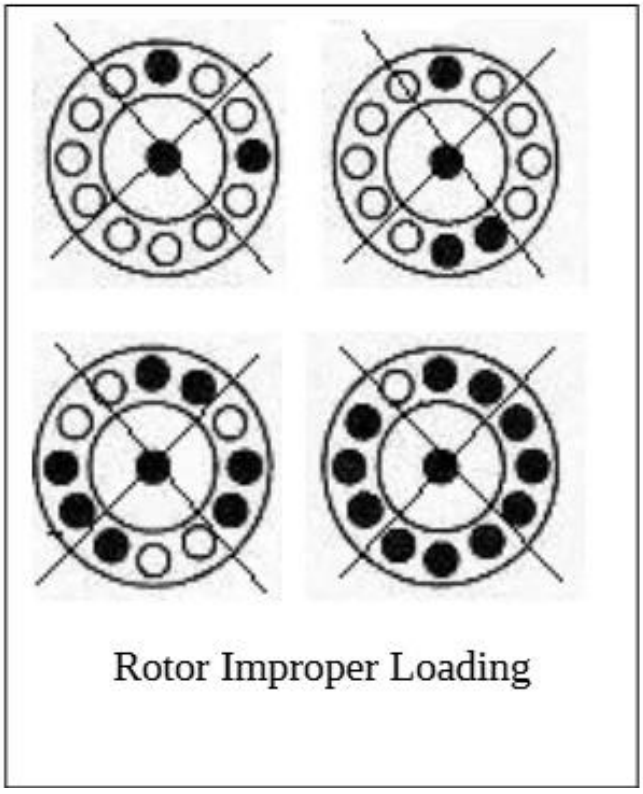


Figure 16

5.5 Close the lid

Cover the rotor lid if the rotor lid was equipped (some of the fixed-angle rotors equipped with a lid) after the tubes / bottles were well placed, then press the lid down, the lid was locked after you heard a sound. For this refrigerated microcentrifuge, servo motor was adopted for lid open & lid lock. After switched on the machine, tap the icon "Door", the lid will be unlock and you can open the lid. When you need to close the lid, close the lid gently, the lid will be lock automatically.

 If the machine did not switch on, the lid can't be lock due to the lid adopt a servo motor for lid open & lid lock.

 Do not put your fingers between lid and the housing.

 Do not bang the lid shut.

5.6 Connect the power

Make sure the power connected with an earth wire before you connect the machine to the power, then switch on the power switch.

5.7 Debugging.

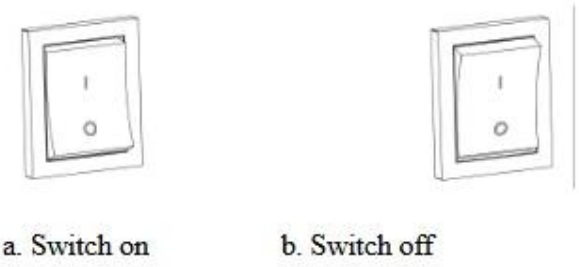
WARNING: Do not start the centrifugation run before you cleaning the centrifuge chamber, otherwise damages might occur!

Operate the centrifuge like the operation sequence No.6 described below, first choose low speed running(2000 rpm), then increase 2000 rpm gradually to the highest speed, if there is no exception, the debugging is successful.

6. Operation

6.1 Basic operation steps

Before operating the centrifuge, you need to understand the type of rotor being used, the required speed/centrifugal force, runtime, and operating temperature. For detailed parameter settings, refer to Section 6.3. The basic operation process of the centrifuge is as follows:
(1) Connect the power supply and turn the power switch to (|), which will illuminate the display screen.



a. Switch on b. Switch off

Figure 17

(2) Tap the icon "DOOR" to open the lid and lift it up.
(3) Select the appropriate rotor.Loading rotors to complete sample loading, then close the lid.
(4) Set the operational parameters: select the rotor model (automatic recognition models do not require manual setting), and set the speed/centrifugal force, temperature, runtime, acceleration rates and deceleration rates. For detailed operations, refer to Section 6.3 Set Centrifugation Parameters.
(5) Tap the icon "RUN" to begin the centrifugation run.
(6) Wait for the time to end or tap the icon "STOP" to end the run;
(7) Once the rotor has completely stopped and a prompt sound is heard, tap the icon "DOOR" to open the lid. After hearing the unlocking sound, lift the lid, take out the samples, and clean the chamber.
(8) After use, switch off the centrifuge power.

6.2 Operating system description

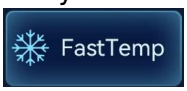
This centrifuge adopted graphic user-intuitive touchscreen interface. The home screen shows as below.

Figure18

More explanation about the icon in the home screen

1) 

Program group: Display the program group number and name being called, with the temporary program group "000" displayed by default; Tap the icon to enter the program group interface, where you can view, modify, and call program groups.

2) 

FastTemp: Tap this icon will cause the system to run at 5000rpm and cool at maximum power. When the temperature in the centrifuge chamber reaches the set temperature, the rotor will automatically stop running and prompt. (Please confirm that the rotor is installed before starting this function!)

3) 

Stop/Run: Tap to start/stop running. Tap the icon " Run" to start running, and the icon will change to " Stop" during runtime. Tap the icon to " Stop" to terminate the running.

Long press icon " Start" to start short run centrifugation, and the system will run to the set speed at the maximum rate; Stop the running after releasing the icon. The maximum short run time is 2 minutes.

4) 

Indicate the status of the lid. The icon indicating that the lis is in the closed state. Tap the icon in this state can unlock the lid. The icon
indicates that the lid is in the open state and cannot start the run when the lid is open.

5) 

Display the running time. Tap to switch the time display mode to count down timing, or count up timing, or continuous centrifugation timing. The upward arrow indicates count up timing and displays the running time. The downward arrow indicates a countdown timming and displays the remaining running time. The symbol∞ indicats continuous centrifugation, the centrifuge will continue to run until the timing limit (99h59m59s), and the timing mode is count up timing.the timing mode is count up timing. During operation, the display mode can be switched, but it c annot be switched to continuous centrifugation.Continuous centrifugation can be switched in the shutdown state.

6.3 Set centrifugation parameters

(1) Set Speed / RCF value
Tap the rotation speed/centrifugal force icon on the left side of the main interface to access to the speed/RCF set interface, then enter the desire speed value or RCF value on the keypad directly, tap "OK" to save the setting. According to the current installed rotor, the set speed value will be converted to centrifugal force automatically and displayed (The centrifugal force will also be automatically converted to rotational speed when setting centrifugal force, thus just set the speed or set the RCF is ok). If the speed set point or centrifugal force setpint is greater than the upper limit of the rotor installed, the set value cannot be saved.

Figure 19

Figure 20 (speed / rcf set interface)

Interface Description:

Exch Tap it to switch the current settings between the speed setting and the centrifugal force setting.

Del Delete key. Tap to delete the entered numerical value.

OK Confirm key. Tap to save the current set value.

Back key. Tap to back to the previous level.

Tap Exch to switch the current settings between the speed setting and the centrifugal force setting.

Enter the desired numerical value on the keypad directly, Tap OK to confirm the settings. Tap to

back to the previous page.

(2) Set run time

Tap the icon 

on the home screen to access to the time set interface then enter the desire time value on the keypad directly, tap "OK" to save the setting. If the time setpoint is greater than or equal to 1 hour, the timer in the home interface will automatically display hours : minutes; if the time setpoint is less than 1 hour, the timer in the home interface will automatically display minutes : seconds.

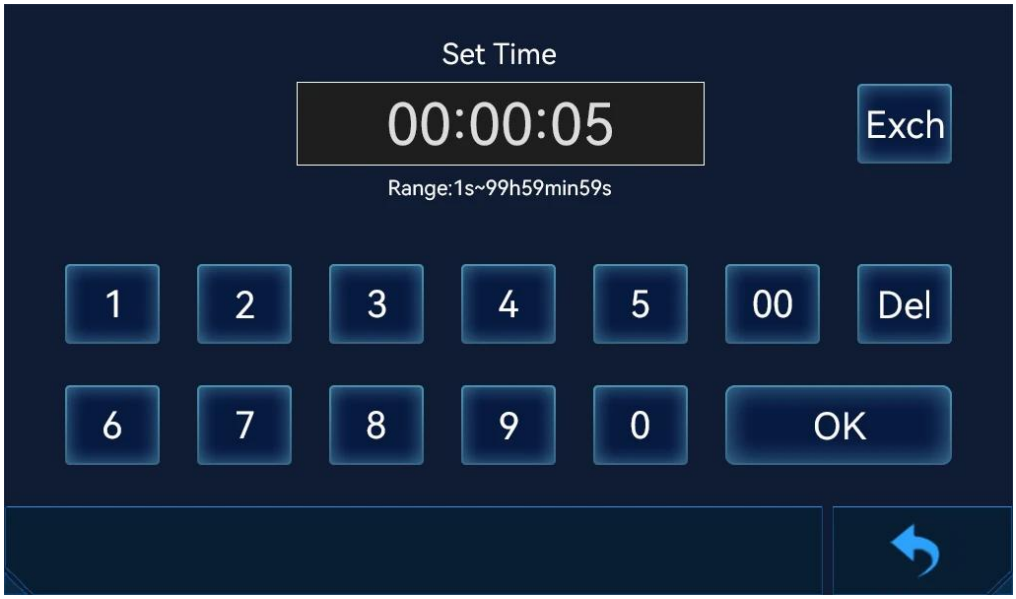


Figure 21

Interface Description:

Tap it to switch the temperature value to either above zero or below zero.

Delete key. Tap to delete the entered numerical value.

Confirm key. Tap to save the current set value.


Back key. Tap to back to the previous level.

(4) Set acceleration and deceleration rates

Tap the icon 

on the home screen to access to the acceleration and deceleration rates set interface then enter the desire acceleration and deceleration on the keypad directly, tap "OK" to save the setting. The acceleration and deceleration set range is 1 to 40, 1 is fastest, 40 is the slowest(the declaration rate 40 is unbraked deceleration). The acceleration and deceleration rates time are varies according to the different capacity rotor, the larger the capacity of the rotor the acceleration and deceleration time will be longer, the smaller the rotor capacity is the faster the acceleration and deceleration.

Tap the key Exch to switch between acceleration and deceleration rates settings. Enter numbers by using the numeric keypad and tap the icon OK to confirm thesettings, or tap the back key to cancel the setting and back to the previous level.

Figure 22 (acc/dec set interface)

(5) user-defined programs
For user convenience, this centrifuge can store 1 000 programs, including the 999 user-defined programs numbered from 001 to 999 and 1 temporary program numbered 000. After modify the parameters of the program which called from the stored program group on the home screen, the modified parameters are automatically stored as the temporary program No. 000, and the parameters of the original program will not be modified. If you want to modify the parameters of the original program, please enter into the program group interface to modify it.
The preset program group has stored initialization data at the factory, users can modify it by themselves.
1) Tap the icon 001 on the home screen to access to the program group interface. You can choose program or edit program parameters after enter into the program group interface. Tap the program number can call the program to the home screen. Tap any parameter of a program to enter the edit interface then can modify the parameter.
2) After modify the parameters of the program called from the stored program group on the home screen, the modified parameters are automatically stored as the temporary program No. 000, and the parameters of the original program will not be modified. If you want to modify the parameters of the original program, please enter into the program group interface to modify it.

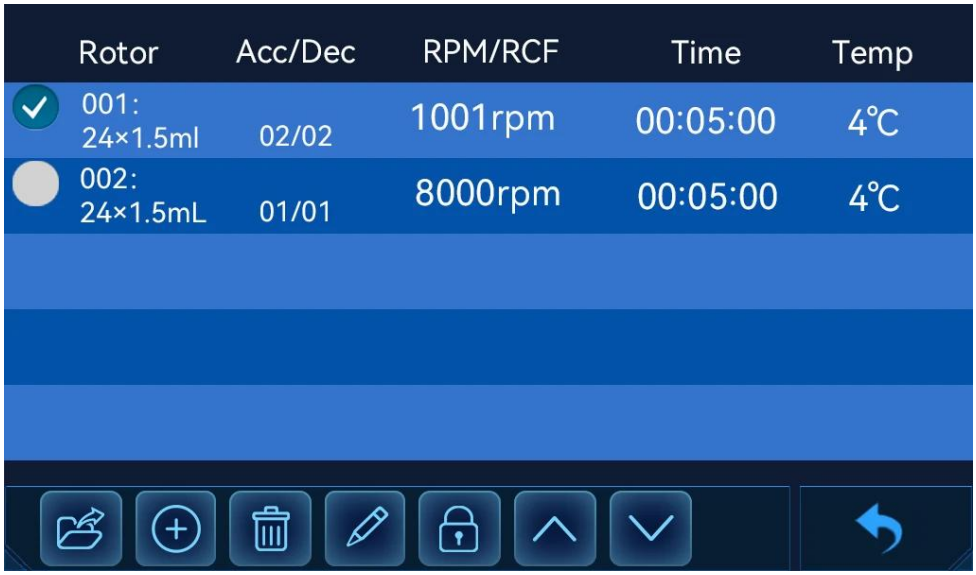


Figure 23 (program group set interface)

Program group setting instructions:
1). Call a program group

After selecting the program group, tap the icon  to call this program group. If a temporary program group needs to be returned after calling, it can be achieved by modifying parameters on the main interface.
2). Add a program group

Tap the icon  to add a new program group and set the program group parameters in the pop-up window. The program name can be entered with 1-15 characters, including uppercase and lowercase letters, numbers, and regular symbols.
3). Delete a program group

After selecting the program group, tap the icon  to delete the program.
4). Modify a program group

After selecting the program group, tap the icon  to modify the program group notes and parameters.
5). Lock/Unlock Program Group

After selecting the program group, tap the icon  to lock the program or tap the icon  to unlock the program group. The locked program group requires setting a password. The locked program group cannot be modified or deleted.

6.4 Function menu explanation

Tap the function menu icon on the home screen to access to the function menu interface. On this interface, you can modify the user's permissions and passwords, adjust system settings, view device information, etc.

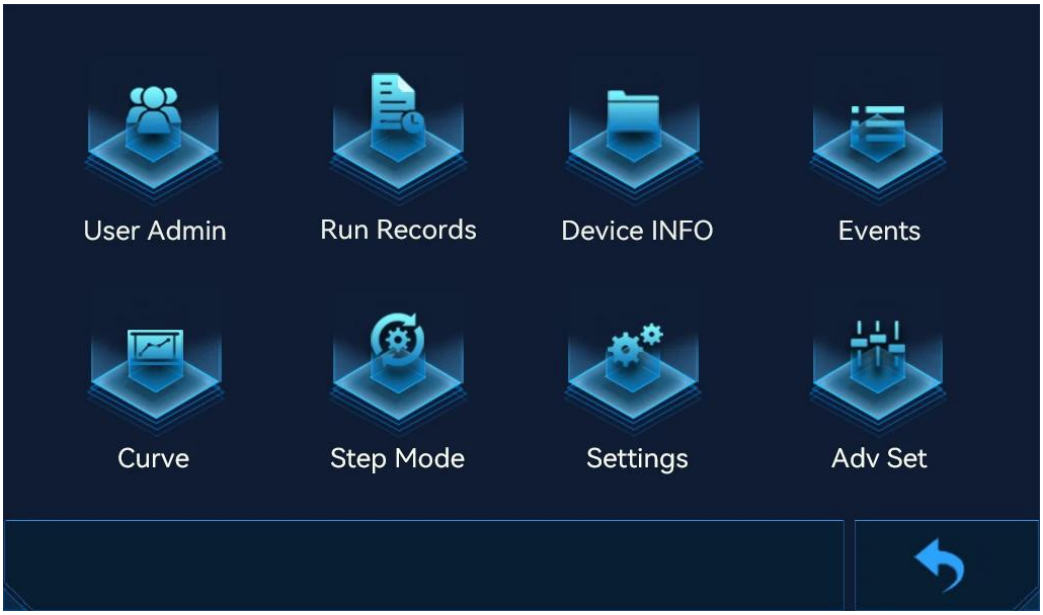


Figure 24 (function menu interface)

Function icon explanation
1) User Administration
Tap the user administration icon to enter into the user administration interface where you can set user account passwords, operation permissions, etc.
The system is divided into three levels of permissions: administrator, technician, and operator.
The default administrator account for the system is 001, the username is Administrator, the password is 1111. You can modify the username and password of this account.

Figure 25 (user management interface)

Setting Instructions:
1. Add new user

Tap the icon  to add a new user. The username length is 1-15 characters, and the password length is 4-9 characters. The username cannot be duplicated.
2. Delete user

Select the account and tap the icon  to delete the user.
3. Modify user

Select the user and tap the icon  to modify the username, password, or permissions.

2) Run history
Tap the icon "Run Records" to enter into the page, then you can view the historical usage records. The system only records complete operational data, including the rotor information used, run speed, run time, acceleration rates, deceleration rates, temperature, and system time during the operation. Up to 1000 records can be recorded, and if exceeded, it will automatically overwrite from the first record onwards.
3) Device information
Tap the icon "Device INFO" to enter into the page. You can check the main unit information, current installed rotor information, and all rotor types that can be matched with this model, including the rotor type, parameters, production date, rotor radius, and remaining usage times.
4) Events
Tap the icon "Events" to enter into the page. You can view the system operation records, including recording time, operating user, event ID, and event details.
5) Curve
Tap the icon "Curve" to enter into the page. You can view the real time curve graph of the current device's run speed, centrifugal force, temperature, and vibration over time. This function records data and draws a graph from the moment the host is turned on.

6) Step mode
Tap the icon "Step mode" to enter into the centrifugal mode interface. The centrifugation mode can be switched to regular centrifugation or multi-stage centrifugation, and the multi-stage centrifugation parameters can be edited.

Figure 26 (centrifugal mode interface)

Centrifugal mode setting instructions:
1 .General mode
Set the centrifugation parameters normally, stop centrifugation after the running time is over, and the parameters will not change midway. Switch the button to 

, which indicating that it is general mode.
2. Multi-stage mode
According to the running time set for each centrifugal stage, the system automatically adjusts the speed and temperature according to the parameters of the next centrifugal stage after the time is reached, without stopping or requiring personnel operation. This system can set up to 7 centrifugal stages.In multi-stage centrifugal mode, parameters cannot be modified from the main interface, and modifications must be made by entering the centrifugal mode interface.

Switch the button to 

, indicating that it is currently in multi-stage centrifugal mode.
This system can set up to 7 centrifugal stages. The parameter setting method is as follows:
1. Add centrifugal segments

Tap the icon  and set the parameters for adding a centrifugal segment in the pop-up window.
2. Modify parameters

Select the centrifugal segment to be modified, tap the icon  and modify the corresponding parameters in the pop-up window.
3. Delete centrifugal segments

Select the centrifugal segment to be deleted, tap the icon  to delete it.
4. General parameter settings

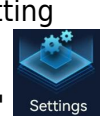
Tap the icon 

to select the rotor model to be used, this setting is suitable for all centrifugal segments.

Tap the icon 

to set the accelerate rates and decelerate rates, this setting is suitable for all centrifugal segments.

7) System setting

Tap the icon " 

" to enter the system settings.. It can set the system sound, touch screen sound, users login, timing mode, cooling system, temperature control mode, imbalance detection sensitivity, and lock screen time. The icon  indicates the option is on. The icon  means the option is off.

Figure 27 (System setting interface)

Setting Instructions:
1. System sound
Turn on or off the system sound.

2. Touch sound
Turn on or off the touch sound.

3. Users Login
Enable or disable user login function. Enter username and password to enter the system after enabling it.

4.. Logout

Tap the icon  to activate the automatic logout function and adjust the logout time in increments of 30 seconds. The system automatically locks the screen after n seconds of operation.

5. Time mode
Tap to switch between the two timing modes. The "speed timing" means the timer count down after the speed setpoint reaches. The 'Run timing' means the system immediately starting timing after tapping the icon "Run".

6. IMBA set(imbalance sensitivity set)
Tap to set the imbalance level. There are 4 levels in total, the D1 has the highest sensitivity. The higher

the sensitivity, the lower the system's tolerance for imbalance.

7. Language
Tap to switch the system language between Chinese and English.

8. Cool system
Turn on or turn off the refrigeration system.

The following settings will only be effective when the cool system turned on:

Temperature control mode: Switch between two temperature control modes. "Economy" means energy-saving mode, while "performance" means keep to operate at its optimal state.

Stop temperature control time: The machine can be set to automatically stop cooling after a certain interval in both open lid and standby modes. The increments of the "open lid" setting is 1 minute, and the increments of the "standby" setting is 10 minutes.

8) Advanced setting
Tap the icon "Adv set" to enter the advanced settings interface, which is used for device debugging at the factory.

6.5 Other functions

1) Short runs

Long press the start run icon "  ", and the centrifuge will run with the current set parameters. Press and hold the icon, and the machine will continue to run. The main interface will display the running time. Release the icon, time stops accumulating and the machine immediately decelerates and stops. The short runs shall not exceed 2 minutes.

2) Change the setting during the centrifugation run

The parameters like speed, relative centrifugal force (RCF), running time, acceleration rate, deceleration rate, temperature can be modified during the centrifugation run. When the centrifuge is running, if you changed the settings (set the new running parameters like the new speed, new running time and confirmed it by tapping "OK"), the original program is overwritten while the user tap "OK" and the machine will run to the new parameters just set.
After the new parameters are set successfully, the centrifuge will immediately run according to the new parameters, reset the previous centrifugation time to zero, and start timing again. In multi-stage centrifugal mode, parameters cannot be modified during operation.

3) Standby cooling, rotor pre-cooling and rotor pre-heating
The temperature set-point can be adjust from -10°C to 40°C. The real-time temperature in the centrifuge chamber always displayed on the display window. For all the listed rotors, the temperature in the centrifuge chamber can reach below 4 °C at full speed and -10 °C at low speed.

 Don't open the lid for a long time while the machine is power on, otherwise the ice in the centrifuge chamber will change into condensate water later and it may wet the motor.

1. Standby cooling
When the rotor is at standstill, the centrifuge chamber is cooled down to the pre-set temperature once the user tap "OK" to confirm the pre-set desire temperature.

2. Rotor pre-cooling
If the sample is "temperature sensitive", it is critical to pre-cool the centrifuge. Installed the desired rotor on the spindle and set the temperature, tap the icon"Fast Temp", then the pre-cooling begins. After the set temperature reached, the rotor will stop running.
3. Rotor pre-heating
If you want to pre-heat the rotor or rise the centrifuge temperature in the centrifuge chamber (rise the temperature for melting the ice in the centrifuge chamber after a long time low temperature run. Users use this way to dry and clean the centrifuge chamber before switch off the machine after the use as usual), you can set a higher temperature value, such as select 30 °C, then start the centrifuge run to spin the rotor at full speed for a while, the temperature will rise to the set temperature soon.

6.6 Start

After all the parameters were set or selected a saved program, tap the icon "Run", the centrifuge begins the centrifugation run. After the speed value reached the set speed value, the centrifuge's timer starts to count down the centrifugation time toward the zero.
The Timer has count up and count down function, you can tap the current time on the "Home" screen for switch the time counting method.

⚠ Always balance the samples before each run. The rotor must be evenly loaded at all times. Imbalanced running is strictly prohibited. There is serious accident will occur due to the imbalanced running.

⚠ Please check the maximum permissible revolutions of the test tubes / bottles (producer indication) .

⚠ Please observing if the machine can work properly after you tap the icon "Run" to start the centrifugation run, tap the icon "Stop" to interrupt the run if there is any abnormal phenomenon, such as the abnormal noise generated. Checking where is the problem if it exist and eliminate it, then start the centrifugation run again.

6.7 Stop

When the centrifuge is running, the running time decelerates to zero (timer count down) or reach the set time(timer count up), the centrifugation run will stop according to the decelerate rate which has been set. When the rotor stop running completely and the machine give a audible signal of stop, the user can tap the icon "Door" to open and lift the lid.
The centrifugation run can be interrupted by tapping the icon "Stop". If the user want to stop the centrifugation run before the centrifugation run finished, the user can tap the icon "Stop", the machine will stop the centrifugation run according to the decelerate rate the user set.

Warning:

⚠ When need to change rotor, discharge the rotor with the 5mm Allen key equipped, then get out of the rotor and install the desired rotor the experiment required.

⚠ For fixed-angle rotors, the solution in the test tubes / bottles should not exceed 75% of the nominal capacity as usual unless you can make sure the test tube / bottle can be 100% sealed.

⚠ Make sure the test tubes / bottles were loaded with same volume solutions and the test tubes / bottles were loaded into the rotor at a symmetric balance state. Imbalanced running is strictly prohibited.

⚠ Do not lean on, lift up, or move the centrifuge before the rotor stop running.

⚠ Never open the lid until the rotor has completely stop and this has been confirmed in the display.

⚠ Waiting for at least 5 minutes after switch off before switch on the machine again to avoid damage the compressor of the machine.

⚠ Discharge the rotor and take it out from the centrifuge chamber before you are ready to transport the machine.

7. Troubleshooting

To solve the potential problem at the shortest time, you can contact us and describe the fault phenomenon in detail then we will respond you within 24 hours.

The error messages are listed below to help find possible errors faster.
The possible errors referred to below may not always be the case, as they are theoretically occurring errors and solutions.

7.1 Error codes of circuit board, possible causes and their solutions

Common fault code	Screen display content	Probable Causes	Solutions
1	Communication Failure	Specifically refers to the malfunction caused by the loss of contact between the control screen and the main control board	Check the screen wiring
2	Drive overheating	IPM temperature is detected by ADC, frequency converter overheating or motor driver overheating	Wait for cooling before use

3	Drive overcurrent	Hardware overcurrent such as IPM fault pin output signal, inverter overcurrent, or motor drive overcurrent	Power off and restart
4	Overvoltage	Refers to voltage overvoltage of IPM, frequency converter, and motor driver	Check the brake system, power off and restart
5	Undervoltage	Refers to undervoltage of IPM, frequency converter, and motor driver	Check the power system, power off and restart
6	Motor overcurrent	Sampling resistor detects overcurrent, software overcurrent or motor overload	Power off and restart
7	Velocity anomaly	Sudden speed changes in the previous and next moments	Power off and restart
8	The speed has not returned to zero	Tap the icon run when the speed is not zero	Wait for the speed to drop to zero
9	The lid lock has been opened	Open the lid when there is rotational speed	Please pay attention to safety
10	Overspeed warning	During operation, the speed exceeds the set speed by 500 revolutions per minute	Please check the speed control system
11	No rotational speed	5 seconds after operation, no speed measurement is taken	Check for motor blockage, power off and restart
12	The lid lock is not locked properly	Running when the lid is not locked	Please lock the lid
13	No rotor detected	The rotor was not recognized	Please reinstall the rotor
14	The rotor does not match	The installed rotor is inconsistent with the set rotor no.	Please change the rotor
15	Rotor identification fault	There is a problem with rotor identification (the rotor has not been identified for three consecutive times)	Power off and restart
16	Imbalanced communication	Imbalanced communication failure, or imbalanced board not plugged in	Check the imbalanced device, power off and restart.
17	Rotor imbalance	Imbalance detection exceeds the threshold	Balance the samples before each run
18	Speed exceeds the limit	Set the speed to exceed the rotor speed limit	Set a lower speed.
19	The rotor deadline is approaching	Insufficient lifespan of rotor	Please replace the rotor with a new one as soon as possible.

20	The lifespan of the rotor has expired	The lifespan of the rotor has expired	Please replace the rotor with a new one
21	Motor overheating	Motor overheating	Wait for cooling before use
22	Other faults	Other errors	Power off and restart
23	Communication blockage	Specifically referring to the control screen, when the data sent is full, new commands cannot be recorded and sent, resulting in a fault prompt	Power off and restart
24	Secondary communication failure	Inverter, mounted secondary communication equipment, additional secondary faults	Power off and restart
25	Abnormal temperature collection	Abnormal temperature collection	Temperature sensor malfunction, power off and restart
26	Temperature exceeds the limit	The temperature exceeds the upper limit of 40 degrees for the machine by 2 degrees	Please check the refrigeration system!

Table 2

7.2 Other errors and its solutions

Fault phenomenon	Reason analysis	Elimination methods
No display	Main circuit fuse(10A) fused.	Change the fuse with the standby fuse.
	Cable which connect to the display board is loose.	Open the housing, connect the cable well.
There is display but the centrifuge did not work properly	Did not confirm the set parameters after set it.	Set the parameter again and tap "OK" to confirm it after set it.
	Lid did not closed.	Closed the lid.
	Low voltage, poor speed.	Change power supply.
Loud noise	Spare parts is loose.	Tighten the spare parts.
	Motor is broken.	Replace the motor with a new motor, please contact manufacturer.
	Buckets or rotor was corrosion by long-term inappropriate or incorrect use.	Replace with new buckets or rotor, please contact manufacturer.
	Centrifuge is at heeling condition.	Make sure the machine is at horizontal condition.
	Worktable for place the centrifuge is not stable.	Put the centrifuge on the stable horizontal worktable.

Table 3

Exclude the above mentioned errors, the machine still can't work properly, please contact with us or our service station for help.Many thanks in advance for your support.

8. Maintenance notice & Repair notice

8.1 Maintenance notice

(1) The service life of this machine is 10 years. Please properly handle it to avoid damage to the environment after it reached its service life. Please refer to the nameplate for the production date.
(2) The service life of the rotors is 8 years, or 50 000 times cumulative frequency use, or 15 000 hours use. The rotor was prohibited to use when any of these three service life was reach.
(3) To keep the motor do not to be wet by the condensate water or by the test solution, please

⚠ Don't load too much test solution in the each test tube. For angle rotor, the solution in the tube should not exceed 75% of the nominal capacity as usual unless you can make sure the test tube / bottle can be 100% sealed.

⚠ Don't open the lid for a long time while the machine is power on, otherwise the ice in the centrifuge chamber will change into condensate water later and it may wet the motor.

⚠ If the test solution was spill into the centrifuge chamber or spill on the rotor, dry it with cotton cloth immediately.

⚠ Switch off the centrifuge after use, dry the centrifuge chamber with cotton cloth and leave the lid open.
(4) It is recommended to regularly check and clean the condensate tank at the bottom of the machine. The condensate tank is located at the bottom of the rear of the machine and can be horizontally pulled out to remove the condensate tank. After cleaning, insert the sink inward to complete the installation.

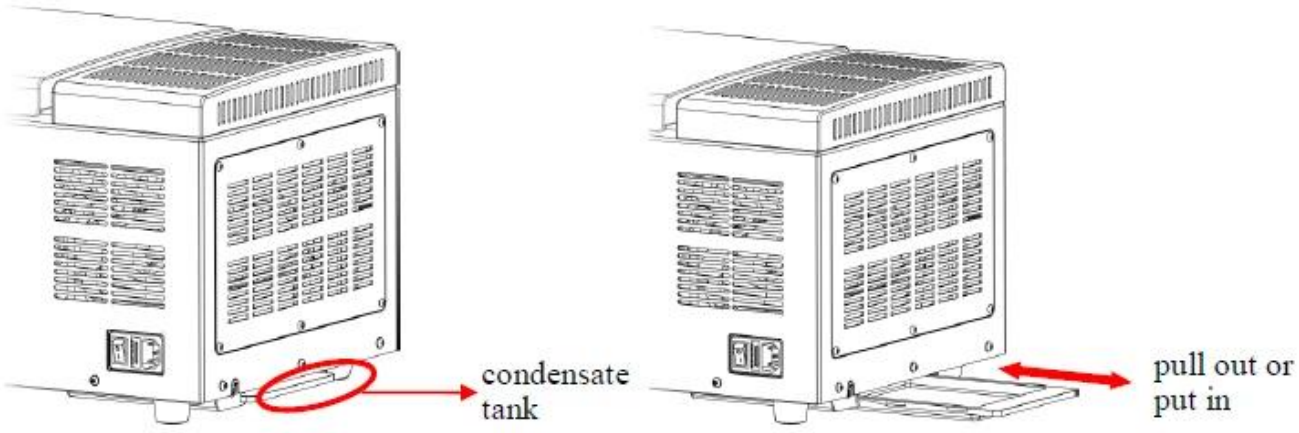


Figure 28
(5) Inspect the rotor regularly, stop use the rotor and keep us informed when discover any crack or corrosion spot on its rotor/rotor cross, buckets.
(6) In order to prevent the spindle being bended, please be gently when you install the rotor onto the

spindle or discharge the rotor from the spindle. Always put down or taking out the rotor vertically.
(7) For the fixed-angle rotor, the lid (if equipped) of the fixed-angle rotor must not be fastened tightly during storage.
(8) Do not use rigidity object impact the rotor, be careful when carry the rotor or during the install & discharge process.
(9) To protect the oxide layer of the rotor, please use cotton cloth/ sponge which with neutral cleaning mixture on it to clean the rotor, then wash off the neutral cleaning mixture by using distilled water or erase the neutral cleaning mixture by using 70% ethyl alcohol, dry it after the wash.
(10) Clean the centrifuge chamber after every use. Put few grease on the spindle for protection, put some desiccant bag in the centrifuge chamber to avoid spindle corrosion as well.
(11) When you are not going to use this machine in the near future, clean the chamber, dry it. Take out the rotor from centrifugal chamber, clean it with neutral cleaning mixture, dry it with a clean cotton cloth, preventing chemical corrosion, put it in a dry and ventilated place. The center hole of rotor should have a little grease for protection.
(12) When you are not going to use this machine in the near future or are ready to maintain it, make sure you have pulled the plug from the socket. Because if you just switch off the power button but not pull the plug from the socket, the machine is still with electricity, under this circumstances, the accident may occur, especially when the machine is under maintain.
(13) When using stainless steel tube, the speed should be reduced to a maximum speed of 80% or less to ensure safe use, if Proportion of liquid is greater than 1.2, you need to recalculate the max speed according the following method:
$N= n\sqrt{1.2/S}$
(the "N" is the max speed allowed; "n" is the maximum speed of the original; S is the proportion of the centrifugation liquid).
The centrifuge tube should be replaced regularly, strictly prohibit to use the tube which is about to burst.
(14) Polypropylene (PP) tube (bottle) can't loading concentrated nitric acid (95%), aqua regia, toluene, benzene, gasoline, kerosene. Polycarbonate (PC) centrifuge tube (bottle) can't come with hydrofluoric acid, hydrochloric acid (30%, 50%), sulfuric acid (10%), nitric acid nitric acid (95%), aqua regia, potassium hydroxide, magnesium hydroxide, ammonium hydroxide, aluminum fluoride, ammonium sulfide, ammonium acetate, ammonium carbonate, sodium nitrate, chromic acid (50%), toluene, benzene, gasoline, acetaldehyde, acetone, ethanol, isobutanol, ethyl ether, cresol, and others to use together. Polyethylene (PE) centrifuge tube (bottle) can not loading sulfuric acid (50%, 75%), benzene, gasoline, kerosene.

8.2 Repair notice

Fuse replacement
If the fuse of the centrifuge burns out during use, there is a new set of fuse inside the machine for replacement. You can choose to replace it yourself or hire a professional maintenance personnel to operate it.
The specific replacement steps are as follows:
(1) Turn off the power, disconnect the plug between the wire and external power supply, then disconnect the plug between the wire and centrifuge. This step is very important to prevent operators from being electrocuted.
(2) There is a fuse holder below the power socket on the back side of the centrifuge, with a fuse symbolic identification, find the V-groove of the fuse holder; use a straight screwdriver to insert this groove, and pull out the fuse holder.

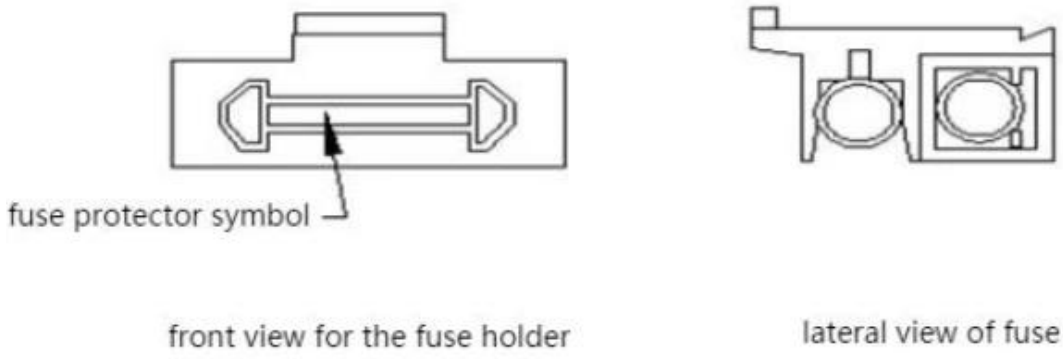


Figure 29

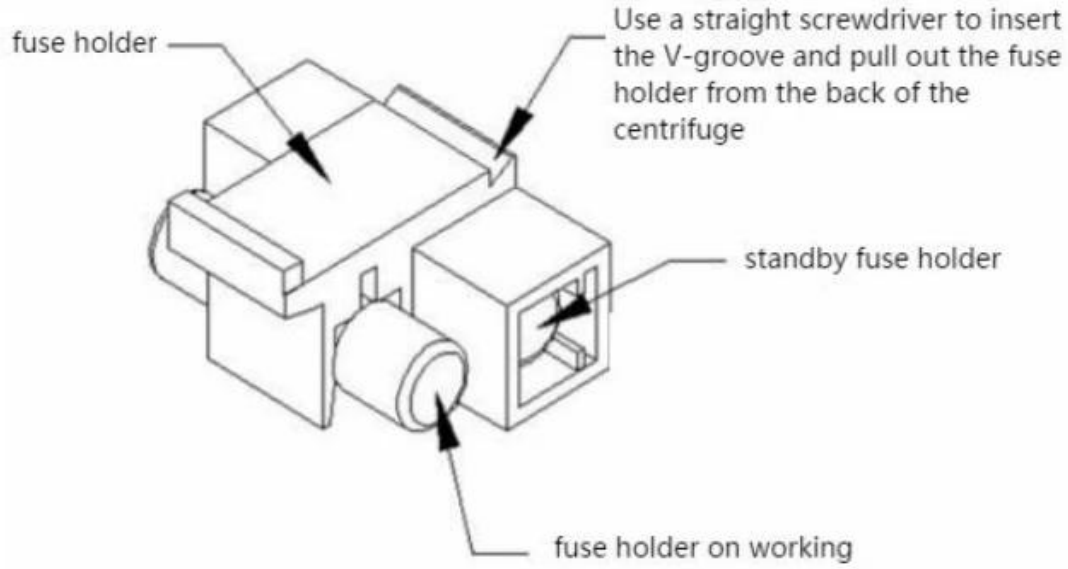


Figure 30

9. Transportation & storage

9.1 Transportation

When the centrifuge need a long distance transportation, carton or wooden case should be used. Discharge the rotor and take it out from the centrifuge chamber before you are ready to transport the machine. The centrifuge should be cover with dust mask, and fill up with damping materials all around the machine, it is strictly prohibited of collision, rolling and dipping in the rain or snow in the process of the transportation.

Movement indoor can do directly, but also should avoid big shock, collision, convert.
9.2 Storage
When the centrifuges will not put to use for a long period, the lid should be open, store in a ventilated, dry and clean room. The storage place should not have corrosive, inflammable and explosive materials.

Due to the technology constantly updating, if there is something different with this manual, please contact us for help.

10. Warranty regulations

All the products of our company, the buyers get one year warranty. The warranty time will begin from the 16th day after the centrifuge were delivered. When there is any problem with the machine beyond the warranty time, we will also provide the maintain service, the users only need to pay the parts cost and the shipping cost for the parts.

Any of the following conditions is not in the free maintenance range:
Failures which caused by incorrect installation, operation or maintenance
Failures which caused by trying to dismantle, change the relevant components parameters
Failures which caused by using rotors and accessories are not designed for this centrifuge
Failures which caused by force majeure, such as war, natural disaster, etc. In order to make people understand our product, and provide better service for customers, please keep the warranty card and maintenance record.

11. Appendix

User Permission Description Table

permission		administrators	technician	operator
Basic operation	Start centrifugation	✓	✓	✓
	Stop centrifugation	✓	✓	✓
	rapid precooling/FastTemp	✓	✓	✓
	Short runs	✓	✓	✓
	Open lid	✓	✓	✓
Information clearing	Warning type information	✓	✓	✓
	Alarm message	✓	✓	×
	Error message	✓	✓	×
Program group	Access program groups	✓	✓	×
	Call program groups	✓	✓	×
	Create and modify program groups	✓	✓	×

User Management	Add/Delete Users	✓	×	×
	Modify your username	✓	×	×
	Modify someone else's username	✓	×	×
	modify your password	✓	✓	✓
	Modify someone else's password	✓	×	×
View operation history		✓	✓	✓
View event log		✓	✓	✓
View device information		✓	✓	✓
View curve display		✓	✓	✓
Switch centrifugal mode		✓	✓	×
System settings		✓	×	×
System time modification		✓	×	×

Table 4

(notes" ✓ "Indicates having corresponding permissions," × "Indicates that you do not have this permission)

11.1 Technical specifications

Max. RCF	21 633 Xg
Max. Speed	15 000 rpm
Refrigeration System	CFC-Free
Max. Capacity	12 x 5 ml
Running Time	1 s ~ 99 h 99 min 59 s, Continuous, Short runs
Drive System	Direct, induction motor drive (brushless)
Speed Accuracy	±10 r/min
Programs	1 000 user-defined
Accel/Decel Profiles	40 / 40
Temp. Control Range	-10 °C to 40 °C
Temp. Accuracy	± 1°C
Noise Level	≤ 55 dB(A)
Power Supply	AC 200-240V, 50/60HZ or AC 110-127V , 50/60HZ
Max. Power Consumption	450 W
Dimension (W x D x H)	11.8 x 20 x 11 in / 30 x 51 x 28 cm
Weight w/o Rotor	64 lb / 29 kg

Table 5

Rotor No.	Rotor Capacity (places x volume, ml)	Max Speed (rpm)	Max RCF (g)
No.1 Fixed-Angle Rotor	24 x 1.5/2.0 ml (with adapters for 0.2/0.5ml tube)	15 000 rpm	21 633 Xg
No.2 Fixed-Angle Rotor	4 x PCR-strips	15 000 rpm	19 620 Xg
No.3 Fixed-Angle Rotor	12 x 5 ml	15 000 rpm	18 287 Xg

Table 6

11.2 Certificate of Compliance

This product is permitted to leave the factory after inspection.
Inspector:
Date:
Product Warranty Card
(maintained this card within the warranty period)

Product Name	Refrigerated Microcentrifuge BCMR-103		
Product number		Date of production	Jun., 2026
Purchase date			
Name of user and Department(stamped)			
Address:		Contact:	
Tel:	Fax:	E-mail:	
Comments and Suggestions to our products:			

Table 7

11.3 Packing List

Serial number	Name	Quantity	Unit	Remarks
1	Centrifuge BCMR-103, refrigerated, rotors/adapters are not included, 200-240 V, 50/60 Hz	1	set	

2	optional rotors/accessories	No.1 Fixed-angle Rotor 24x1.5/2.0 ml	1	set	
3		0.2 ml adapter	24	piece	
4		0.5 ml adapter	24	piece	
5					
6					
7					
8					
9	attachment tools/accessories	5 mm Allen key	1	set	
10		power cord	1	piece	
11		1.5 ml tube	24	piece	
12					
13	attachment documents	instruction manual	1	piece	
14		certificate of compliance	1	piece	
15		product warranty card	1	piece	
16		EC-declaration of conformity	1	piece	
17		packing list	1	piece	
18		operational program (separately)	1	piece	

Table 8

Packing person:
Date:

Biolab Scientific Ltd.
Trillium Executive Center, East Tower, 675 Cochrane Dr, Markham, Ontario L3R 0B8, Canada
Email: info@biolabscientific.com | Website: www.biolabscientific.com