

USER MANUAL



Before using centrifuge, please carefully read this user manual for efficient operation and safety.


Contents

Safety Reminder.....	1
1.Intended use	3
2.Specifications.....	3
3.Declaration of Conformity.....	4
4.Required Operational Conditions.....	4
4.1 Basic operational conditions.....	4
4.2 Transport and storage conditions.....	4
5.Installation.....	5
5.1 Location.....	5
5.2 Connection of the power cord and grounding.....	5
6.Structure.....	6
7.Operation panel.....	6
8.Rotor Preparation.....	7
8.1 Prepare the samples.....	7
8.2 Inject the samples into tubes	7
8.3 Keep the tubes balanced.....	8
8.4 Inspect the rotor.....	8
8.5 Symmetrically load centrifuge tubes into rotor.....	8
9.Operation.....	8
9.1 Normal operation.....	9
10.Maintenance.....	11
10.1 Cleaning.....	11
10.2 Rotor Installation.....	12
11.Troubleshooting.....	12
11.1 Possible problems and solutions.....	12
11.2 How to open the door.....	13
12.Instructions for the rotor and tubes.....	13
12.1 Rotor instructions.....	14
12.2 Tubes.....	14
13.Calculate RCF.....	16
14.Returning and Disposal.....	16
14.1 Returning Devices.....	16
14.2 Disposal.....	16
15. Warranty.....	17
15.1 Warranty of centrifuge.....	17
15.2 Warranty of the rotor.....	17
After-sales service.....	17

Safety Reminder

Common safety precautions

Carefully read the following safety precautions for a thorough understanding.

- Follow the instructions and procedures described in this manual to operate this centrifuge safely.
- Carefully read all safety messages in this manual and the safety instructions on the centrifuge.
- Safety messages are labeled as indicated below. They are in combination with signal words of "WARNING" and "CAUTION" with the safety alert symbol  to call your attention to items or operations that could be dangerous to you or other persons using this centrifuge. The definitions of signal words are as follows:



WARNING: Personal Danger

Warning notes indicate any condition or practice, which if not strictly observed, could result in personal injury or possible death.



CAUTION: Possible damage to centrifuge

Caution notes indicate any condition or practice, which if not strictly observed or remedied, could result in damage or destruction of the centrifuge.

NOTE: Notes indicate an area or subject of special merit, emphasizing either the product's capability or common errors in operation or maintenance.

- Do not operate the centrifuge in any manner not described in this User Manual. When in doubt or have any troubles with this centrifuge, ASK FOR HELP.
- The precautions described in this User Manual are carefully developed in an attempt to cover all the possible risks. However, it is also important that you are alert for unexpected incidents. Be careful operating this centrifuge.



WARNING

- This centrifuge is not explosion-proof. Never use explosive or flammable samples.
- Do not install the centrifuge in or near places where inflammable gases are generated or chemicals are stored.

- Do not place dangerous materials within 30cm of the centrifuge.
- Prepare all necessary safety measures before using samples that are toxic, radioactive or contaminated with pathogenic micro-organisms. Use of these is at your own responsibility.
- If the centrifuge, rotor and accessories that have been contaminated by solutions with toxic, radioactive or pathogenic materials, clean it according to the decontamination procedure as specified.
- If you require service at site, please sterilize and decontaminate the centrifuge in advance, and then notify the service center the details of the materials and procedure.
- To avoid electrical shocks, insure hands are dry before handling the power cord or turning on/off the power switch.
- For safety purposes, do not enter within 30cm around this centrifuge when it is in operation.
- While the rotor is rotating, never release the door lock.
- Unauthorized repairs, disassembly, or modifying the centrifuge except by our service center are strictly prohibited.



CAUTION

- This centrifuge must be located on a firm and level table.
- Make sure the centrifuge is horizontal before running.
- Do not move or relocate the centrifuge when it is running.
- If fluid spills in the rotor chamber, please promptly clean and dry with a dry cloth to avoid sample contamination.
- Ensure to remove any objects and fragments of the tubes dropped inside the rotor chamber before running the centrifuge.
- Cautions with rotor
 - (1) Always check for corrosion and damage on the rotor surface before using it. Do not use the rotor if an abnormality is found.
 - (2) Do not set the speed beyond the allowable minimum speed of the rotor kits (rotor and adapters). Make sure to run it below the allowable maximum speed.
 - (3) Do not exceed the allowable imbalance.
 - (4) Use the rotor and tubes within their actual capacities.

If any abnormal condition occurs during operation, please stop it immediately and contact our service center. Notify the service center is a warning code if displayed.

Vibrations are likely to damage the centrifuge, contact our service center if abnormality observed.

1. Intended use

This device is a medical product (laboratory centrifuge) within the context of the IVD Directive 98/79/EC. The centrifuge is used for the centrifugal separation of human blood or urine samples in the rotor in accordance with EN ISO 12772. Operator should be trained before using the centrifuge. Detailed operation, please refer to the **User Manual below**.

2. Specifications

Maximum speed	4000rpm
Maximum RCF	2490xg
Maximum capacity	12×10ml
Timer	0-99min59s
Noise	≤70dB(A)
Driving Motor	Brushless DC motor
Safety devices	Door interlock, Over-speed detector, Error code runtime display
Power requirements	Single-phase, 100V-240V, 50Hz/60Hz, 3A.
Ambient condition	
-Set-up site	Indoor only
-Altitude	Up to 2000 m above sea level
-Ambient temperature	5°C~40°C
-Humidity	80%
-Excess-voltage category	II
-Pollution degree	2
Device protection class	I
EMC	
-Emitted interference,	GB/T18268.1-2010 ClassA
Interference immunity	
Dimensions(mm)	320×270×210mm (L×W×H)
Weight	6.1kg
Additional features	Speed/RCF switch, LCD display of runtime status, buzzer notification & alert

3. Declaration of Conformity

Construction in accordance with the following safety standards:

GB 4793.1-2007

GB 4793.7-2008

YY/T 0657-2017

Construction in accordance with the following EMC standards:

GB/T 18268.1-2010

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

4. Required Operational Conditions

4.1 Basic operational conditions

- (1) Power: AC 220V 50Hz 10A.
- (2) Ambient temperature: 5 °C~40°C.
- (3) Relative humidity: ≤80%.
- (4) No vibration and airflow around.
- (5) No electric dust, explosive and corrosive gases around

4.2 Transport and storage conditions

- (1) Storage temperature: -40°C~55°C.
- (2) Relative humidity: ≤80%.

5. Installation

This section describes the instructions that you should abide when install the centrifuge to ensure your safety and the optimum performance. Before moving the centrifuge, the rotor must be removed.

WARNING

- Improper power supply may damage centrifuge.
- Make sure the power source conforms to the required power supply before connecting.

5.1 Location

(1) Place this centrifuge on a firm, flat and level surface, ensure the four feet of this centrifuge stand on the counter firmly. Avoid installing on a slippery surface or surface prone to vibration.

(2) Ideal ambient temperature is $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$, avoid placing the centrifuge in direct sunlight if temperature exceeds 30°C .

(3) Keep clear of the centrifuge at least 10cm on both sides and at least 30cm behind it to guarantee the cooling efficiency.

(4) Keep away from heat or water to avoid sample temperature issues or centrifuge failures.

5.2 Connection of the power cord and grounding

WARNING

- To avoid electrical shocks, ensure your hands are dry when touching the power cord.
- This centrifuge must be grounded properly.

An minimum 10A outlet providing a sufficient ground is required, and this must meet local safety requirements.

6. Structure

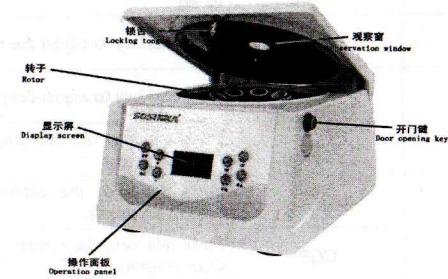


Figure 6-1 Front view of the centrifuge

7. Operation panel

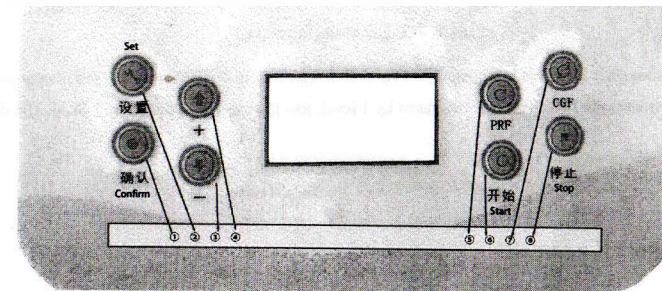


Figure 7-1 Operation panel

Item	Smbol	Name	Function
1	Confirm/确认	Confirm key	Press this key to select the parameters to be set.
2	Set/设置	Set key	Press this key to select the parameters that need to be set.
3	"-"	Down	Press this key to adjust the parameter values.
4	"+"	Up	Press this key to adjust the parameter values.
5	PRF	PRF	Press this key, the centrifuge can start running the PFR program.
6	Start/开始	Start key	Press this key, the centrifuge can start running custom programs.
7	CGF	CGF	Press this key, the centrifuge can start running the CGF program.
8	Stop/停止	Stop key	Press this button to stop the centrifuge operation.



Figure 7-2 The main interface

The main interface is shown in Figure 7-2. The default speed is set to 4000 rpm, and the time is set to 20 minutes. The rotor number is 1, the speed is increased by 1 level, and the speed is reduced by 1 level. The door cover is not closed.

8. Rotor Preparation

8.1 Prepare the samples

8.2 Inject the samples into tubes

CAUTION

Do not overload samples into the centrifuge which will cause leaking.

- Do not exceed the actual capacity allowed in the user manual.

8.3 Keep the tubes balanced

- Although the centrifuge can accept sample balancing by eye, we recommend that you keep this centrifuge in a well-balanced condition to extend its life expectancy.
- Never intentionally run the centrifuge under an unbalanced condition even though the allowable imbalance is not exceeded.

8.4 Inspect the rotor

Check the rotor for corrosion or scratches before using,

CAUTION

- If any abnormality such as corrosion or scratches are found, stop using the rotor and contact our service center.
- Only manufacturer's rotors must be used with the unit.

8.5 Symmetrically load centrifuge tubes into rotor

CAUTION

- Make sure the rotor lid is securely fixed on the rotor, as well as the rotor and shaft are tightened. Otherwise, the rotor may be moved off while rotating and cause damage to the centrifuge and rotor.
- Firmly tighten the rotor lid to the rotor.

9. Operation

CAUTION

- Do not push or lean against the centrifuge while it is running.
- Do not run the centrifuge when fragments or sample solutions are left in the centrifuge chamber. Always keep the centrifugal chamber clean.
- If the centrifuge makes strange noise during operation, stop it immediately and contact our service center. Notify them of the warning code if displayed.

9.1 Normal operation

Turn on the power switch, centrifuge will display the running interface last time after passing the self-diagnostic checks.

9.1.1 Preloaded Programs Operation

1) User-defined Program

- (1) Press the Start key down start to running.
 - The door must be locked before rotor starts spinning.
 - Timer will operate once the speed setting value is reached, the screen displays the remaining run time.
- (2) View and modify the operation programs
 - Press the setting key. When the speed parameter flashes, press the up key or down key to modify it. Press the setting key again, When the time parameter flashes, press the up key or down key to modify it.
- (3) Warning display
 - If an error occurs during the operation, the centrifuge will brake to stop automatically, and display the error code on the time/display area. The error code can be checked in the table 11-1, and corrective actions can be applied accordingly.

2) PRF Program

- (1) Press the PRF key down to start to running.
 - The door must be locked before rotor starts spinning.
 - Timer will operate once the speed setting value is reached, the screen displays the remaining run time.
- (2) View and modify the operation programs
 - The program cannot be modified.
- (3) Warning display
 - If an error occurs during the operation, the centrifuge will brake to stop automatically, and display the error code on the time/display area. The error code can be checked in the table 11-1, and corrective actions can be applied accordingly.

3) CGF Program

- (1) Press the CGF key down to start to running.
 - The door must be locked before rotor starts spinning.
 - Timer will operate once the speed setting value is reached, the screen displays the remaining run time.
- (2) View and modify the operation programs
 - The program cannot be modified.
- (3) Warning display
 - If an error occurs during the operation, the centrifuge will brake to stop automatically, and display the

error code on the time/display area. The error code can be checked in the table 11-1, and corrective actions can be applied accordingly.

4) End the operation

- (1) The centrifuge will brake when it reaches the set time or button is pressed.
 - When the rotor stops rotating, the centrifuge will start beeping to alert the operation has finished.
- (2) Open the door
 - When the operation stops, the door needs to be opened manually.
 - With the door closed, you are able to press the button to open it.
 - After the operation is completed, the program will resume displaying user-defined programs.
- (3) Open the door and take out the rotor and samples.

10. Maintenance

10.1 Cleaning

CAUTION

- If do not follow the recommended instructions for cleaning or disinfecting this may damage the centrifuge.

(1)Centrifuge

- If the centrifuge is exposed to ultraviolet rays for a long time, the color of the door may be changed or the label may be peel off. After using, cover the centrifuge with a piece of cloth to protect it from direct exposure.
- If the centrifuge needs cleaning, clean it with a cloth or sponge moistened with a neutral detergent solution.
- Sterilize the centrifuge by wiping with a cloth moistened with 70% ethanol solution.

(2)Rotor chamber

CAUTION

- Do not directly pour water, neutral detergent or disinfectant solution into the rotor chamber, otherwise fluids may leak into the drive units and cause corrosion or deterioration to the bearings.

- If the rotor needs cleaning, clean with cloth or sponge moistened with a neutral detergent solution. Sterilize the centrifuge by wiping with a cloth moistened with 70% ethanol solution.

(3)Drive shaft

- We recommend regular maintenance for drive shaft. You can wipe the drive shaft with soft cloth, and then apply a thin coat of silicon grease.

(4)Door

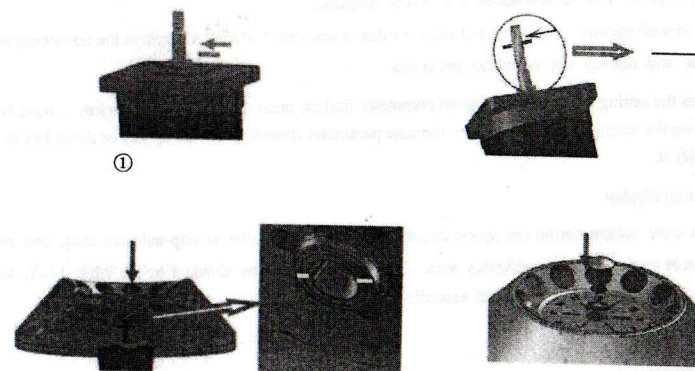
- Clean and sterilize the door using the same method as the section(1)above.

(5)Rotor

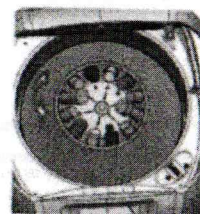
- To prevent corrosion, remove the rotor from rotor chamber. If not in use for a long term, then detach the rotor lid and turn upside down to dry the tube holes and keep clean.
- For sample leaks in the rotor, rinse the rotor with water. Apply a thin coat of silicon grease to the rotor when it is completely dry.
- The rotor should be checked every 3 months to ensure the tube and rotor holes keep are clean and apply a thin coat of silicon grease.

10.2 Rotor Installation

(1)Installation



(2)Adjustment



Observe here!

Before lock the rotor, rotate it, and observe carefully if there is obvious vibration, if so, please take off the rotor, turn some angle and install it again, until the rotor rotates smoothly, then, lock it firmly.

11. Troubleshooting

11.1 Possible problems and solutions

This centrifuge has a self-diagnostic function. If a problem occurs, an error/warning code will be displayed on the time display screen, and the operator can determine the malfunction with the alarm code below.

Symptom Code meaning	Causes	Solutions
E1 Unbalanced protection	Unbalanced protection input switch is closed.	Detection switch for detect unbalance
E2 exceed the speed limit	Speed up too fast	Lower the upshift gear.
E3 Door cover protection	Door cover input signal is not closed.	Check the door cover input switch and wiring.
E7 No speed measurement	No motor operation detected.	Whether the motor phase line and Hall line are connected properly.
EB Can't reach the set speed	The motor power is insufficient or the external power supply voltage is low.	Determine the matching of load and control system power. Ensure that the power supply is normal.
EC Lock in position signal	Feedback lock does not detect in-place signal.	Check the door cover line and lock the switch in place.

Table 11-1 Possible problems and solutions

- Alarm codes E1~EC are related to incorrect operation/programming. You can continue running the centrifuge after implementing corrective procedures.

11.2 How to open the door

1) In the case of power on

CAUTION

- The door just can be opened while the power is on and rotor stops rotating.

- Turn on the power switch, release the door automatically
- The door will be released automatically once the operation is finished.
- It is available to release the door by press button once the rotor stops.

2) In the case of power outage

The door cannot be opened automatically if there is a power outage. It is available to be opened manually as follows.

- Ensure if the rotor has stopped rotating.
 - Listen carefully to ensure no rotating sound can be heard.
- Insert a screw driver into a hole to open door.
 - Holes are located on the left and right sides of the unit.
 - Insert a screw driver into the two holes and push forward to release the door.

12. Instructions for the rotor and tubes

CAUTION

- Read the instructions thoroughly, to properly load and use rotor.
- Do not exceed the allowable maximum speed of rotor, tube and adapters etc. Ensure the allowable maximum speed of adapters is lower than the rotor's maximum speed.

12.1 Rotor instructions

1) Rotor structure

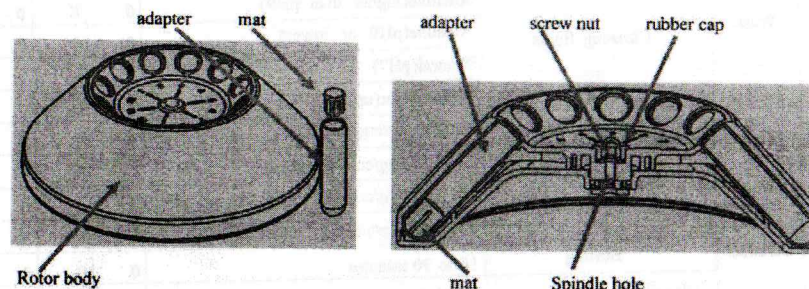


Figure 12-1 The rotor structure

2) Available rotors and adapters

Number	Rotor type	Capacity	Maximum speed (rpm)	Maximum RCF (xg)
NO.1	Angular rotor	12*10ml	4000	2490

Table 12-1 Rotors and adapters

Materials: Rotor: ABS+PC; Adapters:ABS

3) Notice

- The centrifuge rotor can separate samples with a density lower than 2.0g/ml. If the samples density is over 2.0g/ml, please calculate allowable speed depending on the following formula.

$$\text{allow speed}(rpm) = \text{max speed} \times \sqrt{\frac{2.0(g/ml)}{\text{sample density}(g/ml)}}$$

4) Autoclaving

A12-10P rotor is made of plastic, cannot be high-pressure sterilization and UV irradiation, only ordinary sterilization can be used.

12.2 Tubes

1) Cleaning and sterilizing tubes

O. Applicable X: Inapplicable

		Materials	PA	PC	PP
Wash	Cleaning fluids	Acidic(pH5 or lower)	X	X	X
		Acidic(higher than pH5)	0	0	0
		Alkaline(higher than pH9)	0	X	0
		Alkaline(pH9 or lower)	0	0	0
		Neutral(pH7)	0	0	0
		Warm water(up to 70°C)	0	0	0
	Ultrasonic cleaning	Neutral detergent(pH7)	0	0	0
Disinfect	Autoclaving	115°C(0.7kg/cm ²)30minutes	0	0	0
		121°C(1.0kg/cm ²)20 minutes	X	0	0
		126°C(1.4kg/cm ²)15 minutes	X	X	X
	Boiling	15 to 30 minutes	0	0	0
	Ultraviolet sterilization	200-300nm	X	X	X
	Gas sterilization	Ethylene oxide	0	X	0
		Formaldehyde	0	0	0

PA: Polyallomer PC: Polycarbonate PP:Polypropylene

Table 12-2 Cleaning and sterilizing conditions for tubes

2) Cleaning PC tubes

PC material is low in chemical resistance against alkaline solutions. Avoid using neutral detergents with pH higher than 9. Note that pH of some neutral detergents are still higher than 9 even if diluted according to the manufacturer's instructions. Use detergent with its pH between 7 and 9.

3) Autoclaving PA, PC and PP tubes

PA begins softening at about 120°C, PC and PP at about 130°C. Autoclave PA tubes at 115°C(0.7kg/cm²) for 30 minutes, PC and PP tubes at 121°C(0.1kg/cm²)for 20 minutes. If a certain temperature is exceeded, the tubes may be deformed.

When use a sterilizing chamber, please operate as follows:

- Place tubes in vertical position, mouths upward. If tubes are placed sideways, they may deform into an oval shape due to gravity.
- Remove locking nut and lid to prevent from deformation or rupture.
- Wait until the sterilizing chamber cools down to the room temperature before removing tubes.

4) Conditions and life expectancy of tubes

The life expectancy of plastic tubes depends on the characteristics of samples, speed of the rotor used, temperature applied and so on. When the plastic tubes are used for ordinary aqueous samples (pH between 5.0 and 9.0), their life expectancies are defined as follows.

Be operated at the maximum speed:

High quality tubes (PA, PC, PP): 30-50 operations

Ordinary tubes(PA, PC, PP):around 10 operations (Using in low speed can extend the tube life)

Life expectancy of tubes also depends on the pretreatment conditions such as cleaning and sterilization lifetime can be cut down.

Notice: Do not use damaged or cracked tubes.

13. Calculate RCF

An RCF can be determined with the following calculation formula.

$$RCF = 1.118 \times r \times n^2 \times 10^{-5}$$

r—rotating radius, unit: cm; n—rotating speed, unit: rpm

14. Returning and Disposal

14.1 Returning Devices



A Before returning the device, a transport securing device has to be installed.

If the device or its accessories are returned back, in order to provide protection for people, the environment and materials, it has to be decontaminated and cleaned before being shipped.

14.2 Disposal

Before disposal, the device must be decontaminated and cleaned to protect people, the environment and property. When you are disposing of the device, the respective statutory rules must be observed.

Pursuant to guideline 2002/96/EC(WEEE), all devices supplied after August 13,2005 may not be disposed as part of domestic waste. The device belongs to group 8 (medical devices)and is categorized in the business-to-business field.

The icon of the crossed-out trash can shows that the device may not be disposed as part of domestic waste.

The waste disposal guidelines of the individual EC countries might vary. If necessary, contact your supplier.

15. Warranty

15.1 Warranty of centrifuge

This centrifuge is guaranteed for two years from the date of delivery provided that it has been operated and maintained properly.

15.2 Warranty of the rotor

Plastic rotor lifetime is usually 3 years and we offer 3 years warranty from the date of delivery upon manufacturer. Please pay attention, do not use the rotor once it has been corrosion or fatigue damage. The warranties of the centrifuge and the rotor become invalid in the case of the following conditions even if within the guarantee period expires:

- (1) Failures caused by incorrect installation.
- (2) Failures caused by rough or improper handling.
- (3) Failures caused by conveyance or relocation after installation.
- (4) Failures caused by unauthorized disassembly or modification.
- (5) Failures caused by using non-standard spare parts or accessories and unauthorized modification of the rotor or centrifuge.
- (6) Failures caused by natural disasters including fire, earthquakes and so on.
- (7) Consumables and parts have a limited guarantee period.

After-sales service

In order to ensure to operate centrifuge safely and efficiently, it is necessary for regular maintenance. If centrifuge has problems, do not attempt to repair it by yourself. Contact our sales or service center.