


Centrifuge

Operating Manual



- ◆ Please read the operating Manual before using the device for the first time, especially the safety notes.
- ◆ Warranty and liability claims are excluded if they are due to any non-compliance with the safety instructions in this manual.
- ◆ Please retain for later use !

Safety

 This symbol is an international general safety alert mark, which stands for a potential hazard. Any non-compliance with the safety instructions will lead to injury or damage to persons and the device. In order to use the centrifuge correctly, please read the operating manual carefully and operate the device under the requirements of the manual.

Installing safety

- 1) This centrifuge must be located on a table with solid and even surface.
- 2) Ensure to remove the package material from the rotor chamber when installing this centrifuge.
- 3) Do not install the centrifuge in or near the places where inflammable gases are generated or chemicals are stored. Do not put any dangerous materials within 30cm of the centrifuge.
- 4) Make sure the centrifuge is horizontal before running.

Electrical safety

- 1) The centrifuge uses a three-wire electrical cord and plug. Make sure the wall socket is properly wired and grounded.
- 2) Do not use any two-wired socket extending for three-wired usage or sockets without grounding function.
- 3) Disconnect the power supply before moving the centrifuge to avoid potential electric shock.
- 4) Do keep the hands dry when handling the power cord or switching on/off the power to avoid the electric shock.

Operation Safety

- 1) Do not operate the centrifuge in any manner not described in this operating Manual.
- 2) Do not use the centrifuge for separating inflammables and explosives or samples that are toxic, radioactive or contaminated with pathogenic micro-organisms.
- 3) Make sure the rotor chamber is cleaned without any sundries before using this centrifuge. Check if the fastening nut on the rotor is tightened.
- 4) Do not open the centrifuge while it is running.
- 5) For safety purpose, maintain a safety distance of at least 30 cm (12 inches) around the centrifuge when it is running.
- 6) Do not move or lean against the centrifuge when the rotor is in motion.
- 7) When the centrifuge stops accidentally, do not try to slow down or stop the rotor with hand when opening the lid.
- 8) Hold the lid when it automatically opens to avoid the damage on the centrifuge or sample splash in the chamber. Ensure the angle between the centrifuge lid and body is over 70°.
- 9) In case of glass breakage, be careful to check and clean the sealing ring and rotor chamber to avoid injury by glass particles.
- 10) Always check if the adapter tubes and the rotor are in good condition before using this centrifuge. Do not use the rotor or adapter tubes with corrosion or crack, or out of service life limit.
- 11) Do not set the rotor speed beyond the allowed max. RPM.

- 12) The samples must be placed into the rotor symmetrically in pairs.
- 13) Make sure the sample tube for centrifugation can match the adapter tube.
- 14) If any abnormal noise occurs during operation, please stop the device immediately and send it to qualified personnel for check and maintenance.

Maintenance and service

- 1) Clean and disinfect the centrifuge chamber and rotor regularly to avoid contamination of samples by the remaining substance.
- 2) Make sure the centrifuge is power off and disconnected from the socket before any maintenance job. Maintenance must be done by professional staff.
- 3) If any replacement for the accessory of the centrifuge is necessary, please confirm if it can conform to the centrifuge requirements. Please contact with the manufacture if you are not sure.
- 4) Do not send it to any unauthorized personnel or institutions for repairing or maintenance expect the manufacture.
- 5) If any repairing or maintenance is required, Please clean and disinfect the centrifuge before returning it to the manufacturer. Please retain the original package for later use.

RCF calculation and Maximum speed setting

RCF calculation:

Relative centrifugal force(RCF) depends on the rotation radius "r" and rotation speed "n" .

The formula is:

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

n = speed in rpm

r = radius in cm

g = Acceleration of gravity (9.8 N/kg)

Maximum speed setting precaution:

The standard maximum speed of this centrifuge is verified and concluded by the experiment on samples with density less than 1.2kg/L. If the sample density is above this value, the permissible maximum speed setting must be reduced according to the following formula:

$$n=n_{max} \times \sqrt{(1.2/Rho)}$$

Rho=density in kg/L

n_{max} = Standard maximum speed

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1. Product description

Centrifuge equips with brushless DC motor and microcomputer. It has LCD display, rotor presetting, time setting function and features like stepless speed change, etc. It's applicable to centrifugation for serum, plasma, body fluid and biological sample in pharmacy, blood bank, clinical and biological lab. 10ml/15ml centrifuge tube and whole series of vacuum blood collection tubes can be used in this centrifuge.

2. Technical data

Rated Speed: 100-4500 rpm, increment: 10rpm/100rpm (Fast turning the dial)

Maximum RCF:

Rotor 1: 2258×g, increment: 1×g/10×g/100×g (Fast turning the dial)

Rotor 2: 2200×g, increment: 1×g/10×g/100×g (Fast turning the dial)

Speed Accuracy : ± 10rpm

Maximum capacity: 24×10ml

Running Mode: Timing/Continuous/short-run

Timing Range: 10s-99min 59s increment: 1s/1min(Fast turning the dial)

Rotor type: 24-bore angle rotor (No.1) / 12-bore angle rotor (No.2)

Safety function : lid electrical lock, monitor for lid open/close condition, over-speed protection, automatic internal diagnostic

Driving motor: Brushless DC motor

Input power: 300W

Output power: 94W

Mains connection: Single-phase 100-240V, 50/60Hz, 4A

Noise level: < 60dB

Temperature rise: < 0.3 °C/min

ACC/DEC:

Acceleration: Fast(Accelerate to max speed: < 23s), Soft (Accelerate to max speed: < 66s)

Deceleration: Fast(Decelerate to stop: < 23s), Soft(Decelerate to stop: < 66s),

Normal (According to the specimen mass)

Dimension: 450×340×230mm

Net weight: 10Kg

3. Environmental condition

3.1 Operation condition

Ambient Temperature: 0 °C ~ 40 °C

Relative Humidity: ≤80%

Atmospheric pressure : 860hPa ~1060hPa; No obvious airflow or vibration is allowed during operation

Power supply: Single-phase 100-240V,50/60Hz, 4A; This centrifuge should work in environment free of conducting dust, gas or steam which is explosive, corrosive or isolation-breaking.

3.2 Transport and Storage condition

Ambient Temperature range: -20 °C ~ 55°C

Relative Humidity: ≤80%

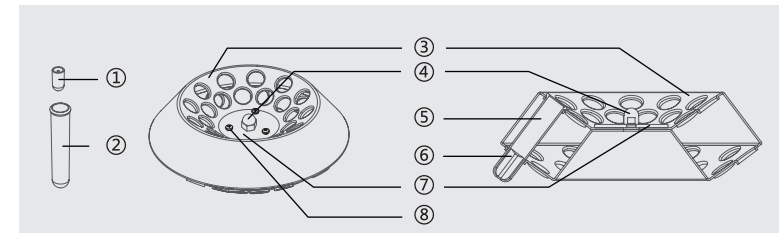
Storage: Make sure the whole package is in good condition. Put it in the place where is well-ventilated and no corrosive gas around.

Transport: Make sure the device is well packed in the original package. Violent shock, Rain, upside-down and sunlight exposure is prohibited.

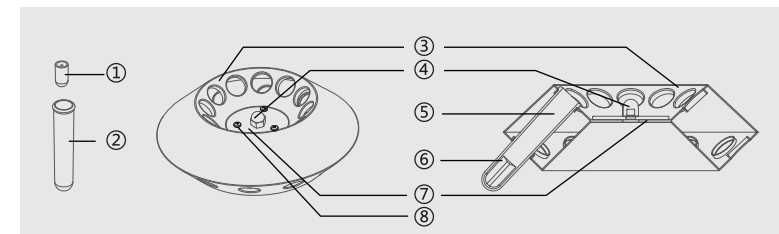
4. Rotor and adapter tube

4.1 Rotor structure

24-bore rotor



12-bore rotor



①Rubber cushion ②Adapter tube ③Angle rotor ④Fastening nut
⑤Adapter tube ⑥Rubber cushion ⑦Fastening plate ⑧Screw

4.2. Rotor and adapter tube

Rotor NO.	Rotor Description	Tube Specifications	Tube Quantity	Tube Size (diameter*length)	Max. Speed	Max. RCF	Adapter Size (diameter*length)	Accessory (Rubber Cushion)
1	24-Bore Angle Rotor	8.5-10ml (Test tube)	24	Ø16 × 107 mm	4500rpm	2558 ×g	Ø16×85mm	—
		4-7ml (Test tube)	24	Ø13 × 106 mm		2558 ×g		—
		1.5-5ml (Test tube)	24	Ø13 × 82 mm		2264 ×g		23mm
		4-7ml (Test tube)		Ø16 × 75 mm				
2	12-Bore Angle Rotor	8.5-10ml (Test tube)	12	Ø16 × 107 mm	4000rpm	1968 ×g	Ø17×105mm	23mm
		4-7ml (Test tube)	12	Ø13 × 106 mm		1968 ×g		23mm
		1.5-5ml (Test tube)	12	Ø13 × 82 mm		1681 ×g		48mm
		15ml (Culture tube)	8	Ø17 × 120 mm		2200 ×g		—

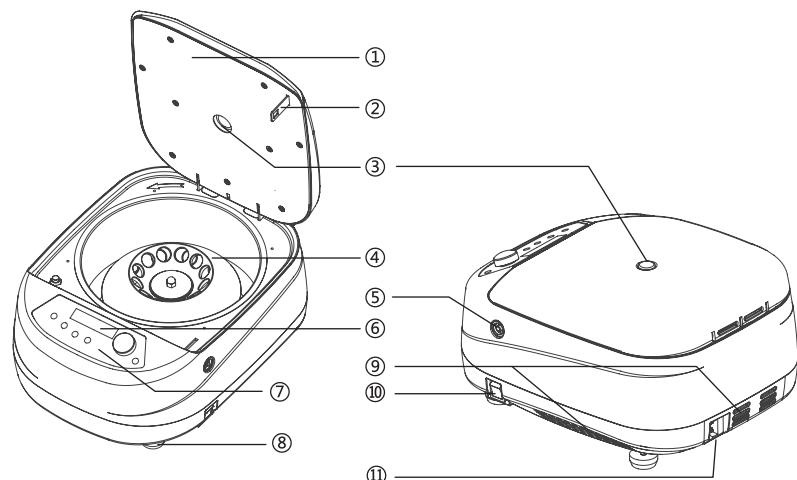
⚠ Attention:

The service life of the rotor is 5 years, after that the rotor must be changed.

While using, check regularly if there is any corrosion or crack on the rotor. Do not use rotors if any corrosion or cracks found.

Adapter tubes are wear parts. Please check regularly if they are out of shape or have cracks on, Change them if any defects like the above found.

5. Main illustration



①Centrifuge lid ②lock hook ③Monitoring glass ④Angle rotor ⑤Emergency lid release
⑥LCD display ⑦Operation panel ⑧Rubber feet ⑨Air vents ⑩Mains power switch ⑪ Mains connection

6. Installation

6.1 Location

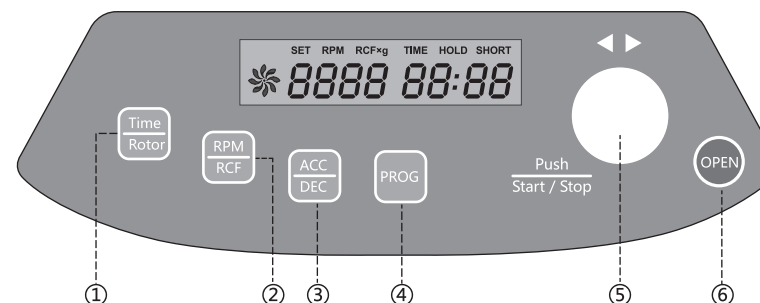
- 1) This centrifuge must be located on a table with solid and even surface while running.
- 2) Keep enough clearance around the centrifuge and a clearance of at least 10cm behind it to guarantee efficient heat dissipation.
- 3) Keep away from heat source and water leakage to avoid sample temperature rise or centrifuge failures.

6.2 Installation steps

- 1) Open the out package, take out the centrifuge carefully (together with the foam pack) and locate it on a table with solid and even surface.
- 2) Take off the foam pack and locate the centrifuge steadily on the table.
- 3) Open the lid, press the emergency lid release with right hand and hold the lid with left hand until the door fully opens.
- 4) Check the centrifuge chamber, take out all the objects except the rotor and then clean the chamber.
- 5) Check if the rotor, tools, accessories and documents come completely along with the device according to the packing list.

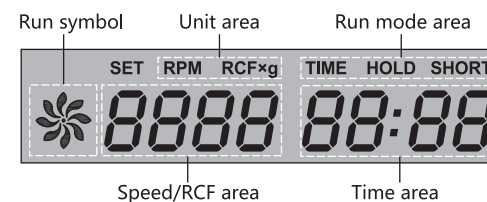
7. Operation panel and display

7.1 Operation panel



NO.	Name of Button	Function
①	Time/Rotor	Press this key and turn the dial to set the centrifugation time, Press it for 2 seconds to choose rotor number.
②	RPM/RCF	Press this key and turn the dial to set the centrifugation speed . Press it for 2 seconds to check or set the RCF.
③	ACC/DEC	Select combination of acceleration and deceleration mode: "FF" = Fast acceleration and fast deceleration; "FS" = Fast acceleration and Slow deceleration; "FO" = Fast acceleration and normal deceleration; "SS" = Slow acceleration and slow deceleration; "SF" = Slow acceleration and fast deceleration; "SO" = Slow acceleration and normal deceleration.
④	PROG	Press this key to save the set parameters for future use, or recall the 10 groups of stored programs.
⑤	Start/Stop /Parameter input /Short-run	Parameter increase when turning the dial clockwise, decrease when turning anticlockwise. The centrifuge starts to work/stop working when pressing this dial. To make a short-run, keep it pressed.
⑥	OPEN	When the speed shows 0, press this key, the centrifuge lid opens. When the centrifuge is running, this button is not available.

7.2 Display



NO.	Name	Meaning
1	Run symbol	Centrifuging in progress when the fan-like four petals display alternately. No display means device stop.
2	SET	Parameters are under setting when it is displayed.
3	RPM	Speed is displayed or is in set.
4	RCF×g	g-force(RCF) is displayed or is in set.
5	TIME	Timing run is in progress or is in set.
6	HOLD	Continuous run in progress.
7	SHORT	Short-run in progress .

8 Rotor preparation

8.1 Sample preparation

Collect samples into the blood collection tubes or centrifuge tubes, close the cap tightly to avoid cap falling off while centrifuging (⚠Attention: The samples or centrifuge may be damaged if the cap is not tight on the tube)

8.2 Check rotor and chamber

Remove all objects and sundries except the rotor inside the rotor chamber (⚠Attention: The samples or centrifuge may be damaged if there are any objects and sundries except the rotor in the chamber)

Always check if any corrosion or crack on the rotor surface before using. Do not use the rotor if corrosion, scratch or crack found. Rotors of any other specifications are not allowed to use in this centrifuge.

8.3 Tighten rotor

The rotor was tightened on the motor shaft by the manufacture before delivery. However, to prevent looseness during transportation, please check carefully if the rotor is tightened by the fastening nut on the motor shaft before running the centrifuge.(⚠ Attention: It' s obligatory to check if the rotor is tightened, or else the centrifuge and the rotor may be damaged during centrifuging)

8.4 Put samples into adapter tube

Put the rubber cushion and adapter tubes which can match the sample tube into the rotor (see Chapter 4 – “Rotor and adapter tube”).

Please put sample tubes into the adapter symmetrically in pairs. (It is allowed to judge if it is balanced by visual observation, but to guarantee service life of the centrifuge and rotor, it is suggested that the samples should be weighed to keep balance.)

9. Operation

Make sure the power supply can meet the requirement of this device (This centrifuge uses a three-wire single phase ac power of 100-240V,50/60Hz), Connect the centrifuge with the power cord first, then plug in the socket, press the “-” of the switch on the right side to turn on the centrifuge.

The LCD display will be on. After the internal system check of the centrifuge finished, the lid will be released automatically if the door closed. Then the display will show “OPEN” . After closing the lid, the last run parameter will show on the display. (⚠Attention: While closing the lid, please press it hard until a “click” is heard, which means the centrifuge lid is completely closed. Check it again if necessary before running)

9.1 Centrifugation with time and speed setting

For example, set the parameter as following:

Speed: 4500rpm, Time: 15 min, ACC and DEC mode: FS , Rotor: 24-bore rotor (No.1)

1) Rotor set

Normally, the rotor No. has been pre-set according to the rotor in the centrifuge by the manufacturer. However, to ensure safe run, check if the setting of rotor is right when using the device for the first time.

a) Press “Time/Rotor” key for 2 seconds, rotor no. “01 or 02” will show in the Speed/RCF area. Turn the dial, select “01” , and press “Time/rotor” key again to confirm.

b) For second and future use, if no change on the rotor No. choice, The system will work with the previous choice at the first time.

2) Time set

Press “Time/Rotor” and value flashes in the time area, turn the dial to set time as 15:00(turn clockwise to increase and anticlockwise to decrease. Turn slowly for adjusting time in second/increment, fast for adjusting time in minute/increment). And “TIME” will be displayed in the run mode area. Press “Time/Rotor” again to confirm the time.

3) Speed set

Press “RPM/RCF” and value flashes in the speed area. “RPM” will be displayed in the unit area. turn the dial to set speed as 4500rpm (turn clockwise to increase and anticlockwise to decrease. Turn slowly for adjusting speed in 10rpm/increment, continuously and fast for 100rpm/increment). Press “RPM/RCF” again to confirm the speed.

4) Select ACC/DEC mode

Press “ ACC/DEC” key, “FF” will be displayed in the speed area(Default displays “FF”). Turn the dial to adjust the value as “FS” . Press “ACC/DEC” again to confirm the mode.

Function tip:

Fast Acceleration time: 0 to 1000rpm: 7s, > 1000rpm: 4s/1000rpm

Fast deceleration time: Max speed to 1000rpm: 4s/1000rpm, 1000rpm to 0: 7s

Slow Acceleration time: 0 to 1000rpm: 22s, > 1000rpm: 8s/1000rpm

Slow deceleration time: Max speed to 1000rpm: 8s/1000rpm, 1000rpm to 0: 22s

The normal deceleration time is based on the sample mass. The heavier the sample is, the longer deceleration time it will need.

5) Operation

After setting the parameters, press “START/STOP” key. The centrifuge will run with the set acceleration curve. When the speed comes to be stable, the time will be counted down on the display.

When the time is up or "START/STOP" dial pressed, the centrifuge will decelerate with the set deceleration curve to stop slowly. 2 seconds after stop, the centrifuge lid will release. Fully open the lid and take out the samples.

9.2 Centrifugation with time and RCF setting

For example, set the parameter as following:

RCF: 1255×g, Time: 15 min, ACC and DEC mode: FS , Rotor: 24-bore rotor (No.1)

1) Rotor set

See chapter 9.1 - 1)

2. Time set

See chapter 9.1 - 2)

3) RCF set

Press "RPM/RCF" key and value flashes in the speed area. "RCF×g" will be displayed in the unit area. Turn the dial to set RCF as 1255×g (Turn clockwise to increase and anticlockwise to decrease. Turn slowly for adjusting RCF in 1g/increment, continuously and fast for 10g/increment, continuously and much faster for 100g/increment). Press "RPM/RCF" again to confirm the RCF set.

4) Select ACC/DEC mode

See chapter 9.1 - 4)

5) Operation

See chapter 9.1 - 5)

9.3 Continuous centrifugation with speed setting

For example, set the parameter as following:

Speed: 4500rpm , continuous run, ACC and DEC mode: FS , Rotor: 24-bore rotor (No.1)

1) Rotor set

See chapter 9.1 - 1)

2) Run mode set

Press "Time/Rotor" key and value flashes in the time area, turn the dial until the display switches to "00:00" in the time area, then "HOLD" will be displayed in the run mode area. Press "Time/Rotor" again to confirm mode.

3) Speed set

See chapter 9.1 - 3)

4) Select ACC/DEC mode

See chapter 9.1 - 4)

5) Operation

After parameters set, press the "Start/Stop" dial, the centrifuge will run according to the set acceleration curve. When it needs to stop, press "Start/Stop" again, the centrifuge will decelerate to stop slowly according to the set deceleration curve. 2 seconds after stop, the centrifuge lid will release. Fully open the lid and take out the samples.

9.4 Continuous centrifugation with RCF setting

1) Rotor set

See chapter 9.1 - 1)

2) Run mode set

See chapter 9.3 - 2)

3) Speed set

See chapter 9.2 - 3)

4) Select ACC/DEC mode

See chapter 9.1 - 4)

5) Operation

See chapter 9.3 - 5)

Operation Tips:

1) Only four parameters: speed, RCF, time and ACC/DEC mode, can be set when centrifuge is running, others are not available.

2) If you need to switch for checking the real-time speed or RCF during centrifuge running, press "RPM/RCF" key for 2 seconds. See instructions in 9.1-9.4, if relevant parameters or run mode need to be adjusted.

9.5 Short run

1) Speed or RCF set

See chapter 9.1 - 3) for speed set, chapter 9.2 - 3) for RCF set.

2) Operation

Keep the "Start/Stop" dial pressed, the centrifuge accelerates to the set speed at the acceleration curve of "FF" mode. When the dial is released, the centrifuge decelerates to stop at the deceleration curve of "FF" mode.

3) Open the lid

After the centrifuge fully stops, press "open" key to unlock the lid and take the samples out.

9.6 Centrifugation with stored programs

1) This centrifuge can save 10 groups running programs.

2)After all the desired parameters set, press "PROG" Key, the value will now flash in the speed area of the display. Turn the dial to select group number, press "PROG" key again to confirm and save the current setting.

3)When you need to call up the stored programs, press "PROG" Key and turn the dial to select the desired group number. All the saved parameters in this group will now flash in the display by one-second-intervals alternatively, which can still be adjusted by relevant keys. Press down "START/STOP" dial to confirm the select and run the centrifuge under this group.

10 Maintenance

1) Avoid storage in areas with strong UV radiation, or else the color of the centrifuge housing may change and the label on it may peel off. After using, cover the centrifuge with a cloth to protect it from direct exposure.

2) The centrifuge should be regularly inspected every 3 month if it needs to run frequently and constantly: check if there is any water, contamination on the motor and controlling unit, and if the fuse and fastening screws are all in good condition.

- 3) Take out the rotor if the centrifuge will not work for a long time. Clean the rotor by mild cleaning agent (value between 6 to 8), dry it with a lint-free cloth and keep it in dry and ventilated place. Grease the motor shaf slightly after cleaning.
- 4) Always install and take out the rotor vertically and lightly to avoid rotor dropping off which may damage the motor shaft.
- 5) Use mild cleaning agents to clean and disinfect the centrifuge chamber and dry it with clean cloth.
- 6) Check if there is any corrosion or crack on the rotor, please change it if any defects found.

11. Troubleshooting

Symptom/Message	Possible reason	Remedy	
No display after power connection	Power-off in the mains supply.	Connect the mains supply and correctly plug in the power cord.	
	Current-overload, fuse blowout	Change the mains fuse with same type and specification.	
Abnormal vibration	Rotor does not match with the motor shaft well	Re-install the rotor.	
	Rotor loaded unsymmetrically	Weigh the samples and put in samples symmetrically in pairs.	
	Centrifuge is not located horizontally	Choose another level location for the centrifuge.	
Error code	Open	Centrifuge lid is not well locked	Close the lid, and restart the centrifuge.
		Proximity switch failure	Contact with the manufacture service center.
	Er08	Motor stalling	Check if there is any objects or sundries in the rotor chamber, take out and restart the centrifuge.
			Samples are over-weight, reduce the sample weight within the allowed capacity, restart the centrifuge.
	Er16	Motor runs inversely	Wrong operation, switch off the power, then restart.
	Er09	motor over-speed	Reset the speed, check position of sample tubes, restart the centrifuge.
Er04/Er10/Er11/Er12/Er14/Er15/Er40		Contact with the manufacture service center.	

12. Returning and disposal

12.1 Returning

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

To protect our maintenance staff and the environment, we require a complete disinfection

before returning the device or accessories.

12.2 Disposal

Before disposal, the device must be decontaminated and disinfected to protect people and the environment.

Comply with all local rules and regulations.

13. Warranty and service

13.1 Warranty of the device

This centrifuge is guaranteed for one year from the date of delivery provided that it has been operated and maintained properly. Warranty and liability claims are excluded if they are due to any non-compliance with the safety instructions in this manual.

13.2 Warranty of the rotor

The rotor is guaranteed for 5 years from the date of delivery upon manufacturer. Please do not use the rotor if it has been corroded or fatigue damage. Warranty and liability claims are excluded if they are due to:

- (1) Failures caused by incorrect installation.
- (2) Failures caused by rough or improper operation.
- (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 from other manufacture
- (6) Failures caused by natural disasters including fire, earthquakes and so on.
- (7) Consumables and spare parts of limited warranty period.

13.3 Afer-sales service

To ensure safe and efficient centrifuge run, regular maintenance is necessary. Do not attempt to repair it by yourself if the centrifuge has problems. Contact the manufacture service center.

14. Packing List

Name	Centrifuge			
Type				
SN.				
Manufacture date				
Content	1	Centrifuge ×1		
	2	Power cord ×1		
	3	14# spanner×1		
	4	12-bore angle rotor×1	24 -bore angle rotor ×1	
	5	Φ17×105mm adapter Tube × 18	Φ16×85mm adapter tube × 36	
	6	48mm rubber cushion × 18	27mm rubber cushion	×18
Plug	European	American	British	Chinese