

Instruction Manual

for

LD-6M Floor Standing Low Speed Large Volume Refrigerated Centrifuge

Thanks for using our centrifuge.

In order to play the best performance and security, please read this instruction carefully before you installing, using or maintaining this instrument.

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Enclosed documents: **Certificate of compliance; product warranty card; packing list.**

1. Safety Cautions:

Safety Cautions: safety caution is aimed at the safety operation of the centrifuge which is 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.

1.1 Installation and maintenance

- The centrifugal chamber may contain rotors and other accessories in it, please open the lid to check and get out of it before installing.
- When maintaining this centrifuge, all the parts which needed to remove the cover may cause electric injury. Make sure you have cut off the electricity and pulled the plug from the socket when maintaining this instrument. The maintaining work should be done by professional staffs.
- The replacement parts should be confirmed to conform to the demand of this centrifuge.


To disconnect the mains supply from the centrifuge in the event of errors occurring, 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

1.2 Electric protection

- To reduce the danger risk of the electric shocks, this centrifuge adopts three core plugs, which must be connected with three core socket which connects with ground wire.
- Make sure the socket on the wall connects well with the ground wire. Make sure the power voltage must conform to the voltage this centrifuge uses.
- 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 ground wire.
- DO NOT put the container which is full of liquid on or near the centrifuge. If the container is knocked over, the liquid may penetrate into the centrifuge, which would destroy the components.

Since this big centrifuge is a high-power machine, we do not provide the machine with a Euro plug power cable. For safety, this centrifuge adopts single-phase three core plug to ensure good grounding. We send the machine with a three hole socket to make you can use the machine properly as usual, you just need to connect the socket to your power line, then connect the plug

with the power cable, we suggest you ask your local electrician for help during this process.

 **When you connect the three core power cable to the plug, please note the red line is live wire, the green line is null line, the yellow line is earth wire, you must strictly obey this connection rule before you switch on the machine, otherwise you will damage the machine.**

1.3 Fire prevention.

- Please use the same type specification overload insurance fuse. This machine use the type specification for the fuse is BGXP $\phi 10 \times 38$ 250V 32A .
- This centrifuge is not designed for separating 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 all the surrounding distance within 30cm range.

1.4 Operation security

- Please use our company's rotors and accessories which designed for this centrifuge.
- Please make sure the centrifugal chamber is clear and no sundries before you start it.
- **Do not begin centrifugation before the rotor has been securely fastened.**
- Please make sure the speed of the rotor does not exceed its max speed when it at work.
- Please do not use your hand to force the rotor to decelerate or stop.
- Please do not lift or move the centrifuge before the rotor stop rotate
- Please don't open the lid when the centrifuge is at work.
- When the centrifuge is working, make sure there is no other objects was putted surround the centrifuge within the distance of 30 cm. Please don't work in that range, except you need to debug the machine. **DO NOT** stretch anything into the centrifuge when it at work.



1.5 Chemistry & Biology notice

- 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 strictly obey the operating procedure and method of the laboratory strictly when they operating the 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 have cleaned up the centrifuge, which is your responsibility.

2. Symbols & its meanings

Chart 1

No.	CODE	GB No.	MEANING
1	~	4706.1	AC POWER
2		5465.2	CONNECT POWER
3	○	5465.2	OFF POWER
4		4728.2	CONNECT TO THE GROUNDED (EARTH)
5		4793	CAUTION!

3. Product introduction

3.1 Product use and application scope

This floor standing low speed large volume refrigerated centrifuge (hereinafter referred to as the machine) is mainly used in hospital, blood bank, biological enterprise, biological pharmacy enterprise, agricultural science enterprise and other research and manufacturing institutions which need a high capacity at a low speed. It was widely adopted for its reliable performance feature. This machine can spin 12 bags of 400ml blood bag per time. Maximum RCF of 5180Xg can be achieved with capacity of 6 x 1000 ml. Four frequently used swing bucket rotor and one angle rotor selectable, other various angle rotors, swing-out rotors and continuous flow rotors can be customized if needed.

3.2 Product features

This machine adopts variable frequency motor, micro-processor control, LED and LED display, stainless steel shell and stainless steel centrifugal chamber and other advanced technology, the adjustment of the speed adopts the PID control method, it can store 12 program/memories and there are 40 levels of acceleration and deceleration selectable.

The feature is below:

- (1) Due to the unique of shock absorber and the special design, the anti-vibration effect is good.
- (2) The control system of the speed adopts PID control way, it's with a high precision, different level of acceleration and deceleration selectable, 10 levels in total. The variable frequency motor makes the machine working peacefully,

brushless and no carbon dust pollution.

- (3) Automatic calculation RCF value technical adopted; has the function of short spin.
- (4) Electronic locks system security the centrifuge work safely. The centrifuge can't work when the door does not lock.

3.3. Working principle

The centrifuge is a machine using the powerful centrifugal force which was produced by the high speed spin of the rotor to accelerate the settlement of particles in the liquid, make the samples of different subsidence coefficient and different density of the substance separate, concrete and pure.

4. Technical parameters

4.1 Centrifuge parameters.

Chart 2

Max Speed	6 000 r/min
Max RCF	6 880 Xg
Max Capacity	6 x 1000 ml
Speed Accuracy	±10 r/min
Temp Range	-20℃ to 40℃
Temp Accuracy	± 1℃
Timer Range	0~99H59 min/short spin
Motor	variable frequency motor
Noise	≤65dB
Power	200V-240V 50Hz 30A
Dimension	850×730×930 (L x W x H)mm
N G.	Approx.260 kg (not including the rotor)

4.2 Rotor parameters

Chart 3

Rotor NO.	Capacity	Max Speed	Max RCF
NO.1 Angle Rotor	6 x 500 ml	6 000 rpm	6 880 Xg
NO.2 Swing-out Rotor	6 x 1 000 ml	4 200 rpm	5 180 Xg
NO.3 Swing-out Rotor	4 x 1 000 ml		
NO.4 Swing-out Rotor	4 x 1 500 ml		
NO.5 Swing-out Rotor	12 x 500 ml		
Remarks: Various angle rotors, swing-out rotors and continuous flow rotors can be customized if needed			

5. Install & Debug

5.1 Machine elements

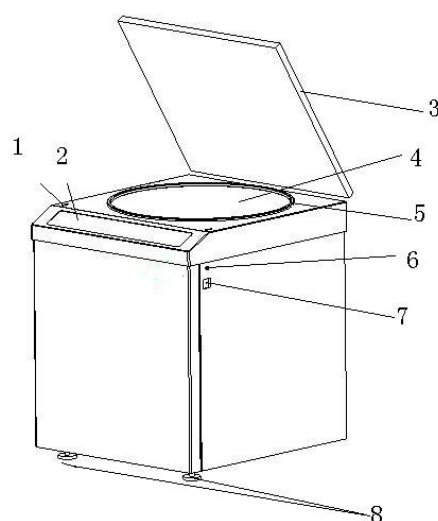


Fig. 1

- | | |
|------------------------|--|
| 1. Lock | 2. Control panel & display window |
| 3. Lid | 4. Centrifuge chamber |
| 5. Seal ring | 6. Emergency release |
| 7. Power switch | 8. Adjust leg |

5.2 Remove the package (by the user)

Users should check the package appearance when receiving the product. Severe impact, accumbency and upend etc. should not happen during transportation. The package appearance should be well. If the situation presented happens, please contact with the cargo agent and inform our company in time.

Unpack the small wooden box **first**, then unpack the big wooden case.

For the small wooden case: first, move the top cover of the wooden case, then get out of the rotor and accessories; second, properly deal with the package and packing, not to pollute the environment, or save these for possible future transport of the centrifuge.

For the big wooden case(we use it to package the centrifuge mainframe): first, move the top cover of the wooden case, disassemble the side face of the wooden case, then carry out the machine to the ground. **There are two adjust legs (the two front legs, see Fig.1, the No. 8 indicated) , after you carry the machine to the ground, screw the screw which on the two adjust legs by the big spanner equipped (screw the screw toward the negative direction), do this process until you can remove the machine easily by pushing the machine, there are omni-directional wheels on the bottom of the machine. After you move the machine to its installation site, screw the screw which on the adjust leg towards the clockwise by the spanner until you can't remove the machine by pushing it to fix the machine.**

5.3 Installation requirements

(1) Environment requirements

This machine should be installed in the indoors. No conductive dust, corrosive or damaging insulating air, and no powerful vibration source nearby, avoid direct sunlight.

(2) Space requirements


The install place should be hard and flat, the distance between the back side of this centrifuge and the wall should be no less than 30 cm, in order to ensure the in-out vent of cooling air demand. The room temperature should not exceed 35°C to ensure the best performance of the centrifuge.

After installing, the four legs on the bottom of the centrifuge should afford uniform stress, otherwise the user should increase block and readjust to demand.

(3) Power supply requirements

The power for this centrifuge is single-phase 200V-240V, 50Hz, 30A. The power should have protective earth wire. Do not use zero 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.

Since this big centrifuge is a high-power machine, we do not provide the machine with a Euro plug power cable. For safety, this centrifuge adopts single-phase three core plug to ensure good grounding. We send the machine with a three hole socket to make you can use the machine properly as usual, you just need to connect the socket to your power line, then connect the plug with the power cable, we suggest you ask your local electrician for help during this process.

 **When you connect the three core power cable to the plug, please note the red line is live wire, the green line is null line, the yellow line is earth wire, you must strictly obey this connection rule before you switch on the machine, otherwise you will damage the machine.**

5.4 Installing

(1) Open the Lid.

First open. When you receive the machine, you can connect the power cable to the power (please obey the rule mentioned above strictly when you connect the power cable to the power), switch on the power switch, press the “ENTER” button first, then press “Stop & Open” button, after you hear a sound of unlock, lift up the lid. Or you can open the lid by the use the “Emergency release” way.

Emergency release, there are two lines inside the machine, one is on the right side of the machine (see Fig. 1, No. 6 indicated, another is on the left side of the machine, its site is almost the same position like the right one), these two lines are used when power failure or something wrong with the

lock. Unscrew these two nuts with the small hex wrenches which has been equipped, you can see a line connect to the nut, pull these two lines at the same time, after you hear a sound of unlock, the door of the lid will be unlocked, lift the lid is ok. This emergency release should not be used at ordinary time.

Press the “Stop & Open” button to open the lid during your ordinary use, after you hear a sound of unlock, lift up the lid.

(2) Installing the rotor.

Examine the rotor before every use, and make sure there is no any crack or corrosion spot on rotor, especially the hanger and the bottom of the carriers. Strictly prohibited use the rotor which has crack or corrosion pit on it, strictly prohibited use the rotor which is out of guarantee period (guarantee period are showed in chart 6 below).

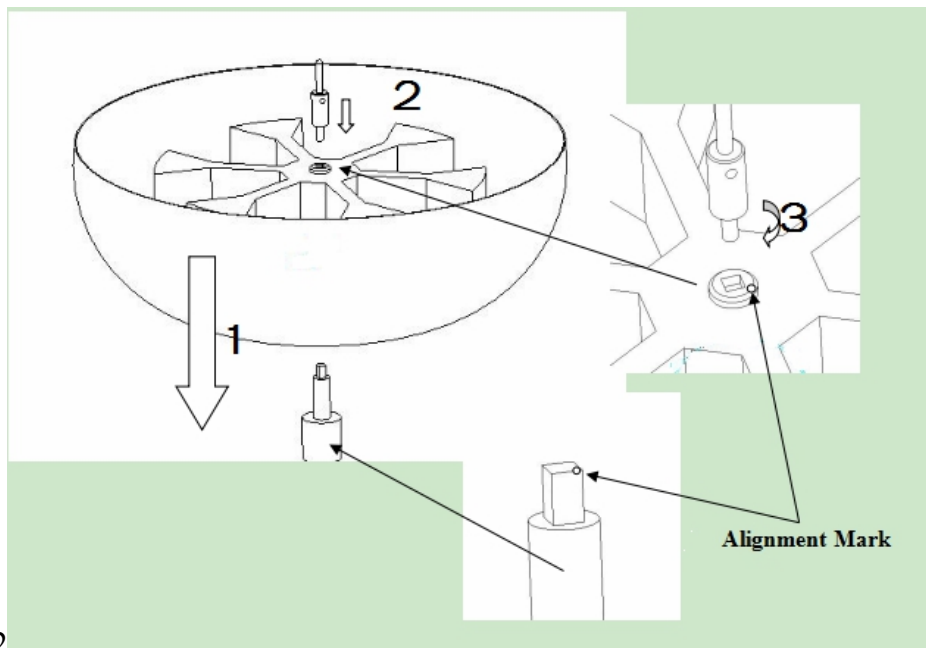


Fig. 2

Install the rotor like the Fig.2 describe above. **First**, put the rotor on the spindle(make the center hole aiming the spindle when you do this), make sure the square hole aiming the square column, notice the alignment mark. **Second**, put on the gasket and compress nut. **Third**, use the small iron stick which has been equipped to fasten the compress nut (do this process by crossing the hole of the compress nut with the small iron stick which has been equipped, then spin the compress nut clockwise by your hand. **Fourth**, load in all the carriers. **Please kindly note all the carriers must be load in during the centrifugation process and the test sample must be load in on a symmetry balance state.** The last step, put the upper wind cover on, aiming the cover center hole to the spindle when you do it, now the rotor install finished.

Do not begin centrifugation before the rotor has been securely fastened.

Put the test solution in the test tube(for the angle rotor, the test solution should not exceed 75% of the nominal), then weight it by mount pan balance, the weight error of each filled test tube should be $\leq 1g$, (when the solution is below 7ml, you just need to make sure it in balance by visual inspection will be ok).

For the angle rotor, the test tube must be loaded in the rotor in even number to make sure the rotor can spin in a balance state. **For swing-out rotor, all of the carriers must be loaded in** and the test tube/sample must be load in even number on a symmetry balance state to make sure the rotor can spin in a balance state. **Strictly prohibited imbalance rotate.** There is serious accident may occur for imbalance running or not weigh the weight carefully, because these carelessness make the rotor stressed asymmetric.

Closed the lid

Press the lid down, the lid was locked after you hear a sound.

(3) Connect the power

Make sure the power with an earth wire before you start connect the power, make sure you already connect the power cable to the power correctly and, then switch on the power button.

5.5 Debug requirements.

WARNING: DO NOT start the machine before you cleaning the centrifugal chamber, otherwise you will damage it!

Operate the centrifuge like the operating sequence of NO.6 described below, first choose low speed working, then to the high speed gradually. If there is no exception, the debugging is successful.

6. Operation

6.1 Button Instruction of Panel

There are 12 buttons on the panel in total

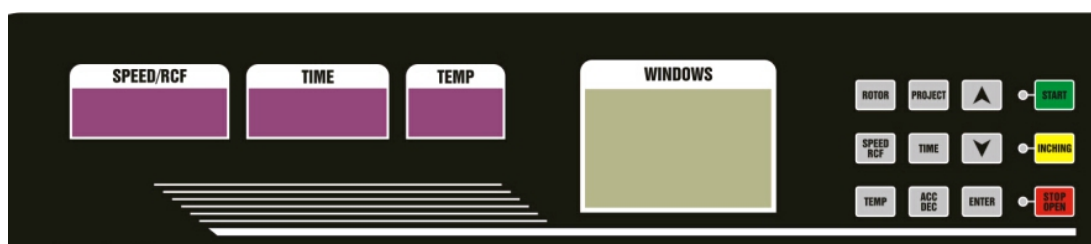


Fig. 2

6.2 Parameters setting

There are 12 buttons on the control panel (as mentioned above). When you press the button, the display window will show the corresponding parameter, then you can press the ▲ or ▼ button to set the parameter, press the “ENTER” button to save it.

For example, before you start the machine, you need to set the TEMPERATURE, SPEED, SPIN TIME, etc., First, press the “TEMP” button, the display column will show the temperature value, you can press the ▲ or ▼ to set the temperature, after you set it, press the “ENTER” button to store it (this centrifuge has pre-cooling function, after you set the temperature, the compressor begins to work toward the temperature which you just set). Second, press the “SPEED/RCF” button, the window will show the speed value, then you can press the ▲ or ▼ to set the speed. Such as you want the centrifuge spin at 3000 rpm under 12 °C, you just set the TEMP. and press the “ENTER” button to store the TEMP. parameter first, then press the “SPEED/RCF” button, press ▲ button, the speed value will increase, when the value reaches 3000 rpm, just stop press the button, press the “ENTER” button to store it, then press the “TIME” button to set the spin time, press the “ENTER” button to store it, after all the parameters were set, then press the “START” button, the centrifuge will spin at speed of 3000 rpm under the temperature of 12 °C. If the Max speed for the rotor is 4200 rpm, you can set the speed you needed between 100 to 4200 rpm.

The procedure set is mainly based on the rotate speed. When you want to know the RCF during the operation, press the “SPEED/RCF” button will be ok (the SPEED value and RCF value can be exchanged freely when you press this button).

This centrifuge has a short spin function, when the machine is stop, press the “short spin” button, the centrifuge will begin centrifugation, it will stop when you stop press this button.

6.3 Acceleration and deceleration setting

Press “ACC/DEC” button, when there is letter “A 1” flicker in the display screen, its ACC setting status now, press ▲ or ▼ to adjust the letter, 1 is fastest, 40 is the slowest, 40 levels in total, after you choose it, press the “ENTER” button to store it.

Press ACC/DEC button, when there is letter “D 1” flicker in the display screen, its DEC setting status now, press ▲ or ▼ to adjust the letter, 1 is fastest, 40 is the slowest, 40 levels in total, after you choose it, press the “ENTER” button to store it.

6.4 Program store

For a more convenient use, there are 12 program memories storable for repeated routine operation.

Program store: set the parameters first, such as the number of the rotor, rotate speed, time, acceleration, deceleration, etc, then press the “PROGRAM” button twice, there will be letter “C 01” displayed on the screen, press

▲ or ▼ can change the parameters which displayed behind letter “C”, after all is ok, press “ENTER” button to store it. (note: the parameters behind letter “C” is the program memories / procedure serial number which you are going to store.)


For example, if you are going to store procedure 01 for rotor NO.2, 15 °C, 3 000 rpm, 20 minutes, ACC levels 4, DEC level 5. Now set the rotor to 2, then press “ENTER” button, set the TEMP. at 15 °C, then press the “ENTER” button to store it, set the spin speed to 3 000, then press the “ENTER” button, set the time to 20 minutes, then press the “ENTER” button, set the ACC to 4, then press the “ENTER” button, set the DEC to 5, then press the “ENTER” button. Press “PROJECT” twice, when there is letter “C 01” displayed on the screen, press ▲ or ▼ button to set the number to “C 04”, then press the “ENTER” button, now the procedure is stored.

6.5 Program recall

Press “PROGRAM” button once when the display screen displayed “P 01”, press the ▲ or ▼ button to choose the procedure you needed, then press “ENTER” button to recall this procedure. (note: the number behind the letter “P” is the program number you are going to recall.)

6.6 Start

After all the parameters were set, press “Start” button, when the green indicator light is on, the centrifuge begins to start. After reaching the given speed, the instrument starts to count down.

 **For swing-out rotor, please note all of the carriers must be loaded in and the tube which with solutions in it keeps symmetrical balance before running, the difference can not more than 1g.**

6.7 Stop


When it is working, the centrifugal time decelerates to zero; the centrifuge will speed down according to the parameters. When the rotors stop working totally, and hearing the alarm, the user can open the lid. If you want to stop the centrifuge during its working, press “Stop & Open” button, the machine will stop centrifugation process according to the above processes.

When the centrifuge gives out a fault alarm or showing a code “error”,


press the “Stop & Open” key to clear.


After the centrifuge stop, press “Stop & Open” button, after you hear a sound of unlock, lift up the lid.

Warning:

 **DO NOT** run rotors overspeed. The user should be responsible for the loss which is caused by overspeeding . **The tubes/test sample must be placed symmetrical balanced.**

The operator should discharge the rotor when they need to change it. Loose the lock nut with tool equipped, then get out of the rotor. To avoid the overspeed spin of the rotor, the relative rotor number must be reset after the rotor was changed, and reset the restriction of the Max speed for the rotor which you are ready to use as well.

 **DO NOT** lift up or move the centrifuge when it is working.

 **DO NOT** open the lid when the rotor is rotating.

6.8 Troubleshooting

Chart 3

Error code display	Probable causes	Solutions
E 1	Rotor recognition error	Check the rotor or reset the rotor No.
E 2	Lid was not close tightly	Close the lid tightly.
E 3	Temperature detection problem	Check the temperature sensor and contact manufacturer.
E 4	Speed detection problem	Check the speed sensor and contact manufacturer.
E 5	Frequency changer problem	Contact manufacturer.
E6	Unbalance	Make sure the sample in the carriers are on a balance state.
E 7	Overspeed	Contact manufacturer

E 8	Overtemperature	Contact manufacturer
E 9		
E 10	No rotor or did not detect the rotor	Check the rotor

Exclude the above several faults, the machine still can't work normally, please contact with our company or the service station.

7. Maintenance & Repair notice

7.1 Maintenance notice

(1) Please clean the centrifuge chamber after every use. Put few grease on the shaft of the cone for protection, put some desiccant bag in the centrifuge chamber to avoid shaft corrosion as well.

(2) 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.

(3) In order to prevent the spindle being bended and damage the drive shaft of the rotor, please be gently when you install or discharge the rotor from the spindle. Screw out the bolt, then taking out the rotor vertically.

(4) 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 cloth (do not use electric hair drier to try the rotor), preventing chemical corrosion, put it in a dry and ventilated place. Do not use non-neutral detergent to clean rotor. The center hole of rotor should have a little grease for protection.

(5) 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)

(6) The centrifuge tube should be replaced regularly, strictly prohibit to use the tube

which is about to burst.

(7) Polypropylene (PP) tube (bottle) can't come with 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 come with sulfuric acid (50%, 75%), benzene, gasoline, kerosene.

7.2 Repair notice

Fuse replacement

- (1) Turn off the power, disconnect the plug between the wire and external power supply, then disconnect the plug between the wire and centrifuge.
- (2) There is a fuse holder below the power socket on the back side of the centrifuge (chart4), with a fuse symbolic identification, find the V-groove of the fuse holder (chart5); use a straight screwdriver to insert this groove, and pull out the fuse holder.
- (3) Take out the damaged fuse protector and discard it, take out the standby fuse protector from the holder and install it, the fuse protector specification of this centrifuge is BGXP $\phi 10 \times 38$ 250V 32A.
- (4) Insert the fuse holder into the power socket.

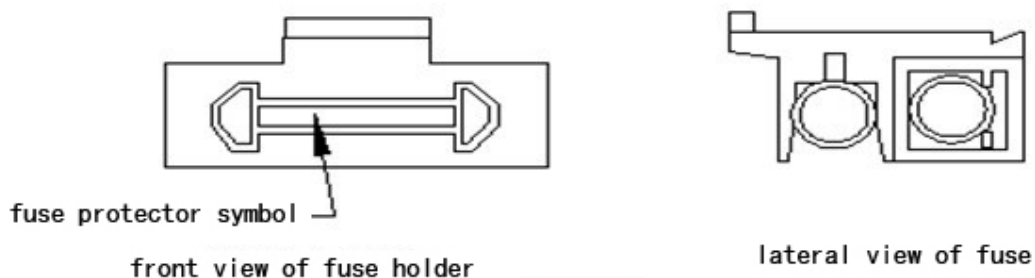
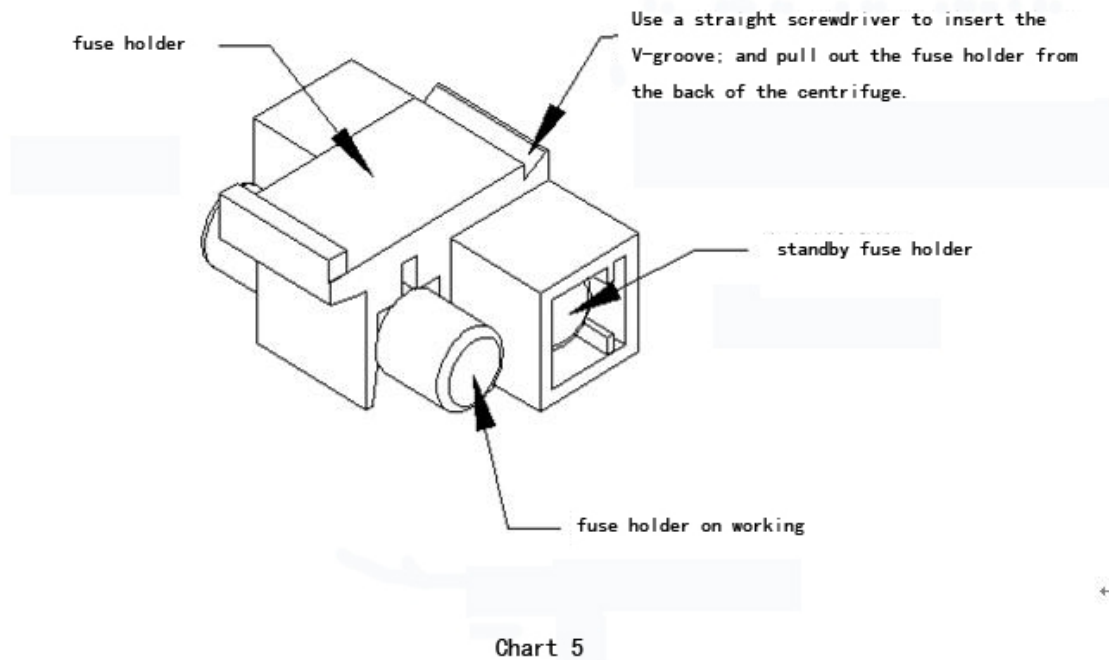


Chart 4



8. Transportation and storage

8.1 Transportation

- When the centrifuge need a long distance transportation, wooden case should be used. 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.

8.2 Storage

- When centrifuge 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 updated, if there is something different with the manual, please contact our company for help.

9. Warranty regulations

All the products of our company, the buyers get one and half year warranty from the today of they bought, we will take all cost because of quality defects during the guarantee period. When there is any problem with the machine at the time which out of the warranty period, we will also provide the maintain service, the users only need to pay the parts cost.

In condition of using correctly, the guarantee period and the service life of the rotor is as showed in the table below:

(chart 6)

Rotor style	Guarantee period	Usage Counter	accumulated use time
Angle rotor	5 years	1000 times	2000 hours
Swing-out rotor	3 years	1000 times	2000 hours

In order to run the rotor safely, the user should record the running status of the rotor carefully, including the solution, rotate speed, time, temperature, and the inspection record, any of that reach the service life above table mentioned, the rotor should be scrap.

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 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.

Certificate of Compliance

for

Floor Standing Low Speed Large Volume Refrigerated Centrifuge

Product Name: Floor Standing Low Speed Large Volume
Refrigerated Centrifuge

Factory Number: 16011102

This product is permitted to leave the factory after inspection.

Inspector:

Date:

Product warranty card

(maintained this card within the warranty period.)

Product Name	Floor Standing Low Speed Large Volume Refrigerated Centrifuge		
Product number	xxxxx	Date of production	xxxxx
Purchase date			
Name of user and Department(stamped)			
Address:			Contact:
Tel:	Fax:	E-mail:	
Comments and Suggestions to our products:			

Packing List

Serial number	Name		Quantity	Unit	Remarks
1	centrifuge mainframe		1	set	
2	optional rotors	6x1000 ml swing-out rotor	1	set	
3					
4					
5					
6	attachment tools	spanner	1	set	
7		hex wrenches	1	set	
8		small iron stick	1	set	
9		power cable	1	set	
10		three hole socket	1	set	
11					
12	attachment documents	instruction manual	1	piece	
13		certificate of compliance	1	piece	
14		product warranty card	1	piece	
15		packing list	1	piece	
16					
17					

Packing person:

Date: