

Tabletop High-speed Centrifuge TG-1850

Operation Manual

Thanks to use SHUKE centrifuge products

Please read this manual before the installation, using and maintenance in order to achieve the best performance and security.

1. Cautions

Security and Cautions based on the description of the safe operation of centrifuge requirements. Please read it carefully before the installation, operation, maintenance and repairs . Understand the security and the matters needing attention and the right operation, This will help you avoid the operating personnel injuries and the use of centrifuge damage performance.

1.1 Installation and maintenance

- The machine centrifugal indoor may have placed the rotor accessories packaging. It must be sure to open the door cover and take it out.
- During maintenance process, anywhere need to remove the cover may lead to electric shock and human injury. Be sure to shut down all the power supply button before the machine maintenance , and the power cord plug from the socket of has been plucked; Maintenance work need by professional personnel.
- Replace its component must be has been proved to meet the requirements of the centrifuge.

1.2 Electric protection

- To avoid the electric shock , The centrifuge using the three core type plug which must have the ground with three core socket connection.
- Make sure the wall socket and ground wire is connected, Power supply voltage must be determined with this centrifuge corresponds with the use of voltage.
- DO NOT use three holes become two hole expansion power adapter.
- DO NOT use two line of the expansion socket or Use no ground the multi-purpose power adapter.
- DO NOT put the filled with liquid containers on the machine or Close to the local machine.the liquid will go inside the machine and damage electrical or mechanical components if carelessly overturned container.

1.3 Fire protection.

- Please use the same type specification overload insurance fuse. This machine use the type specification for the fuse is BGXP $\phi 5 \times 20$ 250V 10A.
- The centrifuge is not for separation has characteristics of inflammable and explosive material design .DO NOT do operation on this kind of material , Neither dressed up these

substances in machines or will such material in all the surrounding distance 30cm range..

1.4 Operation security

- Please use our company for the design of this centrifuge rotor and accessories.
- Please make sure the centrifugal indoor has to clean up, without sundry before starting it.
- Please make sure the centrifugal rotor of indoor the screw has tightened before starting it.
- Please don't make it to the rotor speed more than the maximum speed limit during the working.
- Please don't force centrifuge slow or stop the rotor with your hand.
- When the centrifuge not stop rotating rotor, please don't lift and move it.
- Please don't open the door cover during the operation.
- During the operation it must remain other objects 30 cm away. Please don't work in that range, except in the commissioning. DO NOT reach anything into the centrifuge when it work.
- Strictly no turned idling! Otherwise easy cause spring chuck cracking.

1.5 Chemical and biological security

- The conventional operation may include all kinds of solution and test samples, They can be the pathogenic, poisonous or radioactive substances. Such material is not can use this centrifuge operating, Unless has taken necessary protective measures.
- Please pay attention to the instruction of the liquid in the original containers before the operation.
- Holding the liquid must be careful Because they are contagious.
- During the operation ,it must be strictly obey the the provisions and way of the laboratory.
- The destruction of all waste solution must comply with the safety and environment protection requirements.

1.6 Environmental conditions

In order to ensure the centrifuge works stably and reliably, which it should be fulfil the following conditions:



- environment temperature: $5^{\circ}\text{C} \sim 40^{\circ}\text{C}$
- relative humidity: $\leq 80\%$

- supply voltage: 220V±22V, 50Hz±1Hz
- the inside of the centrifuge should be daughty ,without dust,flocs and metal filing
- no corrosion gas and electromagnetism interference.
- put the centrifuge in the steadiness platform table.

When you ask our service man to come to ,you must to clean your centrifuge very carefully-----it's your duty.

2.Codes and Meanings

Chart 1

No.	CODE	GB No.	MEANING
1	~	4706.1	AC
2		5465.2	CONNECT (TOTAL POWER)
3	○	5465.2	BROKE (TOTAL POWER)
4		4728.2	GROUNDING
5		4793	CAUTION!

3.Product instruction

3.1 Product use and application scope

Tabletop high speed centrifuge (hereinafter referred to as the machine), is widely used in biological physical and biological medicine and health, agriculture science and environmental protection scientific research units and production department, is the ideal instruments and equipment in the colleges and universities, research institutes, blood center, biological pharmaceutical enterprise .

3.2 Product features

The machine adopts computer control, touch panel, LCD display, electronic locks, brushless dc motor drive and other advanced technology, speed PMW control method, 12programs can be stored, 19 levels acceleration and deceleration can be adjusted. Its features:

- (1) Due to the unique of shock absorber, the anti-vibration effect is good.
- (2) The speed control adopt PID way, high precision can choose different raising and lowering speed time, Brushless dc motor make sure the machine working peacefully, to meet the requirements of the laboratory, it's no need to change carbon brush ,without dust pollution.
- (3) Automatic calculation RCF value; Have the point start function (short-term centrifugal);
- (4) Electronic locks security protection function; When the door does not cover well, the centrifuge can't work.

3.3 Product name and the classification

tabletop high speed centrifuge, the highest speed 18500 r/min.

According to the classification of medical devices catalogue belongs to medical laboratory equipment management category 1st kind of instruments.

· According to shock protection with the protection measures of grounding belongs to class

1 common equipment.

· According to the structure belongs to tabletop high speed centrifuge.

· According to rotating speed,belongs to high-speed centrifuge .

3.4 Working principle

Using the centrifuge spins the powerful rotor produce centrifugal force, 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.Main technical parameters

4.1 Host performance parameters.

Max speed: 18500 r/min

Max RCF: 23800 x g

Max capacity: 4* 500 ml (4000rpm)

Speed accuracy: ± 10 r/min

Time range: 1min-9999min59s/inching

Power: AC220V 50 Hz 10 A

Noise:<60 dB(A)

Dimension: 550 mm * 450 mm * 365 mm

Weight: 60 Kg (not include the rotor)

4.2 Rotor parameters

Rotor		Capacity	Max Speed	Max RCF
NO.1 Fixed-angle Rotor		12x1.5/2.2ml	18500rpm	23800xg
NO. 2 Fixed-angle Rotor		12x5ml	15000rpm	18270xg
NO. 3 Fixed-angle Rotor		24x1.5/2.2ml	15000rpm	21630xg
NO. 4-1 Fixed-angle Rotor		12x10ml	13000rpm	15620xg
NO. 4-2 Fixed-angle Rotor		36x1.5/2.2ml		
NO. 4-3 Fixed-angle Rotor		8x15ml		
NO. 5-1 Fixed-angle Rotor		6x50ml conical bottom	12000rpm	15970xg
NO. 5-1 Fixed-angle Rotor		6x50ml round bottom		
NO.5-2 Fixed-angle Rotor		48x1.5/2.2ml		
NO. 6-1 Fixed-angle Rotor		4x100ml	10000rpm	10640xg
NO. 6-2 Fixed-angle Rotor		8x50ml round bottom		
		8x50ml conical bottom		
No.6-3 Fixed-angle Rotor		12x15ml		
No.7 Fixed-angle Rotor		6x100ml	8000rpm	7720xg
NO. 8 Swing-out Microplate Rotor		2x3x96 holes	4000rpm	1970xg
NO.9 Swing-out Rotor	4x250ml		4000rpm	3100xg
	Adaptor	8x50ml		
		20x15ml		
		36x10ml		
		40x7ml Vacuum Vacuum blood collection tube		
		48x2-7ml Vacuum Vacuum blood collection tube		
		64x2-7ml Vacuum Vacuum blood collection tube		

NO.10 Swing-out Rotor	Round hang cup	4x500ml	4000rpm	3400xg
	Adaptor	12x50ml		
		36x15ml		
		76x2-7ml Vacuum Vacuum blood collection tube		
	Swing bucket rotor	20x50ml		
		40x15ml		
		80x10ml Vacuum Vacuum blood collection tube		
		112x2-7ml Vacuum Vacuum blood collection tube		
		100x1.5ml		
	Hang cup	148x5ml RIA tube		
		96x2-7ml Vacuum Vacuum blood collection tube		
	Microplate rack	4x2x96 holes		
		20x50ml		
		48x15ml		
		96x2-7ml Vacuum Vacuum blood collection tube		
According to your needs, various specifications of angle, swing-out rotors and adapters can be customized.				

Chart1:

4.3.working principle

when operating the centrifuge, putting equal quantity solution (such as centrifuge bottles and centrifuge tubes) in the places of the rotor symmetrically,high speed revolution of the motor make solution to separate, the relative centrifuge force (RCF) depends on turning radius “r ” and turning

speed “n”,computational formula as following :

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

Formula:

n——speed (r/min)

r——turning radius (cm)

g——gravitational acceleration (9.8 newton/kg)

computational formula of particle separation in mixture liquid time needed T:

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

Formula:

ρ ——mixed liquid density (g/cm³)

μ ——mixed liquid viscosity (P)

n ——speed (r/min)

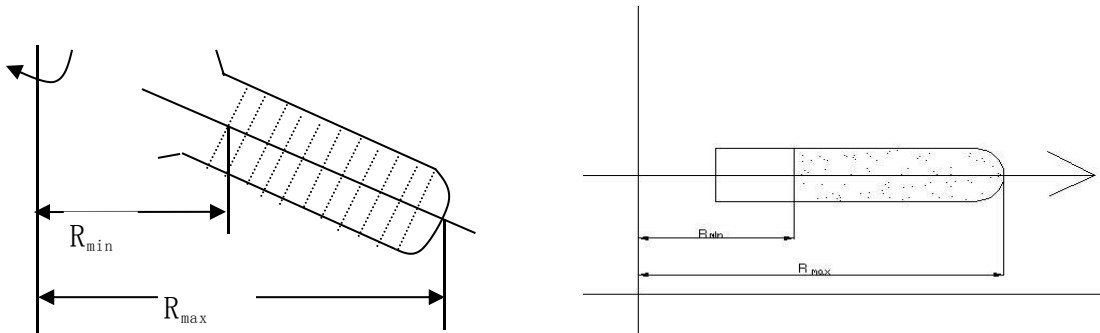
r ——rotor/turning radius (cm)

σ ——particle density (g/cm³)

R_{max} ——the horizontal distance from bottom surface of centrifuge solution to axis
axis

(cm)

R_{min} ——the horizontal distance from solution surface to axis (cm)



The series of centrifuge is an automatic conversion centrifuge for force function,do not need to manual calculation.

5.centrifuge structure and electric diagram.

5.1 centrifuge structure diagram.

The centrifuge is composed of organism, rotating part, shock mitigation system and control system, the structure diagram as showed below:

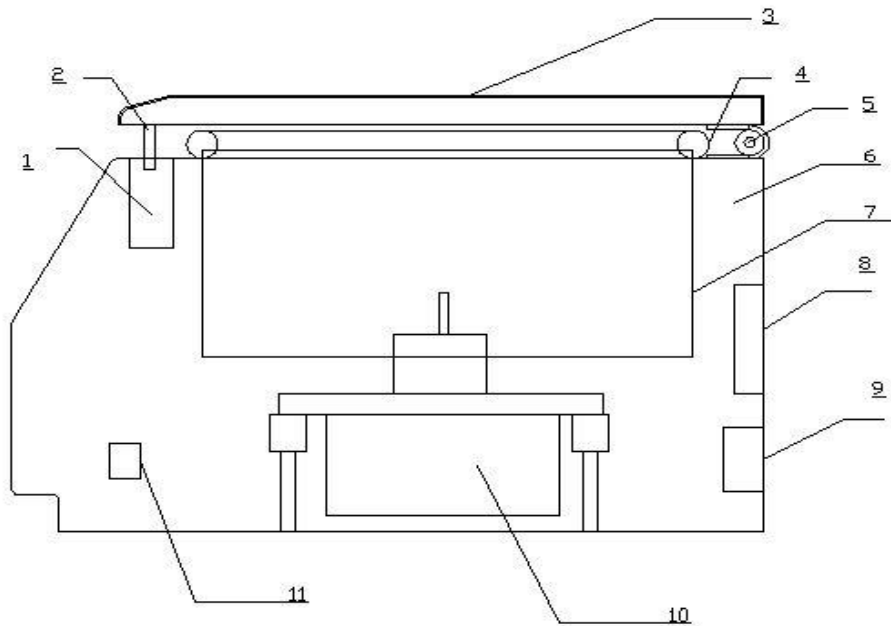


Chart 2 centrifuge structure diagram.

- | | | |
|---------------------------|--------------------------------|-----------------|
| 1.electronic door lock | 2.stainless steel lock | 3.door lid |
| 4.sealing strip | 5.door hinge | 6.chassis |
| 7.stainless steel chamber | 8.heat dissipation draught fan | |
| 9.power socket | 10..motor | 11.power switch |

5.2 centrifuge electric diagram.

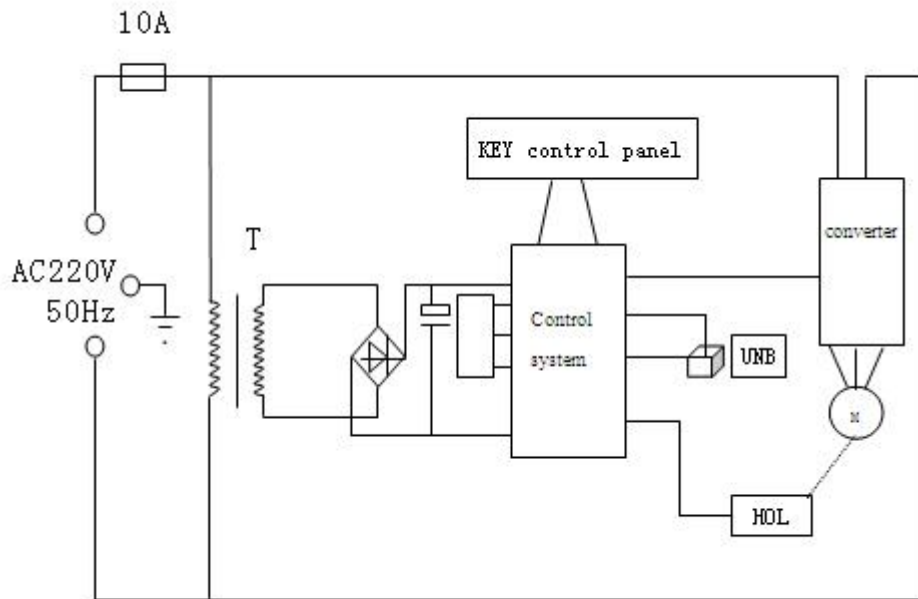


Chart 3 centrifuge electric diagram

6.Installation & Use

- the centrifuge should be installed in indoors with flat ground, and without conductive dust in the air, no corrosive or destroy insulating gas, and no strong vibration sources nearby .
- **Installation space requirement:**The centrifuge should be installed with safety space not less than 30 cm,which can not put objects within the space.
- **Installation power requirement:**This machine used power of single-phase ~ 220 V, 50 Hz,10A ,Power supply must have independent ground connection. It is strictly prohibited to use zero line instead of ground connection.
- **Centrifuge installation:**taking out the centrifuge and spare parts from the package and putting on the horizontal table or ground.open the lid by emergency switch,then open power switch and plug in.
- **Rotor installation:**open the lid when the centrifuge stop working ,install the rotor head to the motor spindle(put the rotor centre bore downward,screw rod will come out when finish installation.)fit on the gasket and nut,tighten up with wrench.swing out rotor need to be hung up pendant,angle rotor need

to be put tube cover.(Chart 4 and 5)

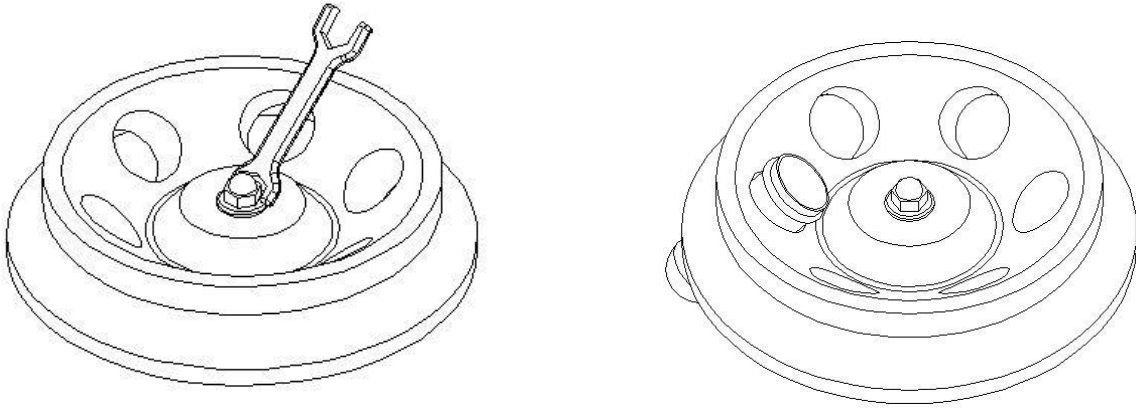


Chart 4 Angle rotor installation

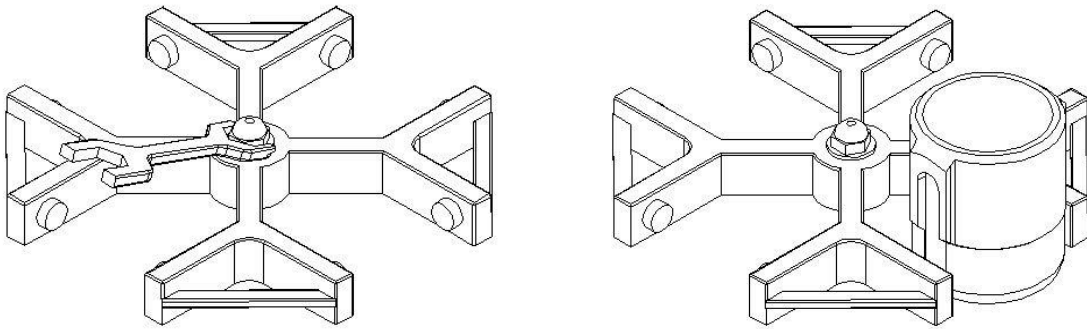


Chart 5 Swing out rotor installation

Installation Emergency switch: to prevent power cut when centrifuge out of control. Please install emergency switch far from indoor gate or outdoor.

7.The instrument panel key explanation



According to relevant function keys, press ▲ key or ▼ key can adjust the parameters

8. Use and operation

8.1 Start

Click "start" button, the green indicator, machines start to run, to set the speed, began to count down

8.2 Stop

During the machine running process, when the time comes back to decrease, centrifugal machine will slow down according to parameters. As the rotor completely stop working, you can open the door cover when heard the alarm. If you want to stop the running machine, press the "stop open the door" button, the machine will stop according to the above procedures.

When the machine is in error, you can clear it by click the "stop-open the door" key.

8.3 Open the door cover.

Click the "stop-open the door" button, push the door cover upward to open it. The machine has a wire at front below, you can use it to open it when there is a problem about power supply or lock-broken. At ordinary times is not to be used to open the door.

DO NOT use rotors overspeed. The user should be responsible for the loss, which is caused by overspeeding. (The solution in the tube should be 75% of the tube nominal capacity.)

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

DO NOT open the lid when the rotor is rotating.

8.4 Common fault code and ruled out

Chart 3

normal fault code	probable causes	solutions
E.3.	The centrifuge lid isn't closed when pressing the start key.	Close the lid tight.
	The installation of the lid testing micro switch doesn't reach the designated position or has been damaged.	Check and change another one

E.7	The motor operates without speed. Speed signal is not reliable. Or the speed sensor is damaged.	Check and change another one
	The motor doesn't work. The motor and rotor are locked.	Change motor
	Wires loosen or the powerful electroplax is damaged.	Check and change another one
E.6	Do not setting speed	Setting speed
E.2.	Overspeed protection:The rotor number is wrong or the powerful electroplax is not under protection.	Check and change another one
E 1	Do not install rotor or rotor installation is not correct	Install rotor correct

exclude the above several faults, the machine still can not work normally, please contact with our company or service station.

9.Installation and commissioning

9.1 Remove package(done by users)

You should inspect the appearance when you got the machine. There should not be a severe impact, lying down in the process of transportation, packing boxes appearance shall be in good condition,If anything like that happened you should let us know as soon as possible.

First dismantled the package on the cover , Take out the rotor and accessories, then the host, Finally packing boxes and packing should be deal with properly so as not to cause environmental pollution.

9.2Commissioning requirements.

WARNING: DO NOT start the machine when it is not clean up inside,or you will damage it!

·According to the provisions of article 6 operating instructions, first of all ,choose low speed running, and gradually increased to the highest speed operation. If there is no exception, the commissioning is successful.

10. Repair and maintenance

10.1 Take the rotor out from centrifugal chamber, clean it with neutral cleaning mixture, dry it with a clean cloth , prevent 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.

10.2 The rotor installed and take out should be lightly, take out the rotor vertical, to avoid the rotor drop and damage the drive shaft of the rotor.

10.3 You should clean chamber if you do not use the centrifuge for a long time, drying and taking out the rotor to grease on the drive shaft of the rotor for protection.

10.4 Fuse replacement

- (1) Turn off the power, disconnect the plug between the wire and external power supply, then the plug between the wire and centrifuge.
- (2) There is a fuse holder below the power socket on the back side of the centrifuge (chart 4), with a fuse symbolic identification. Find the V-groove of the fuse holder (chart 5); 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 BGXP $\phi 5 \times 500$, 250V, 10A.
- (4) Insert the fuse holder into the power socket.

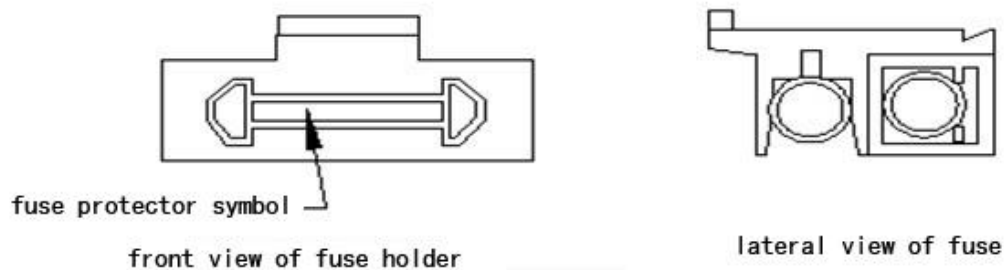


Chart 4

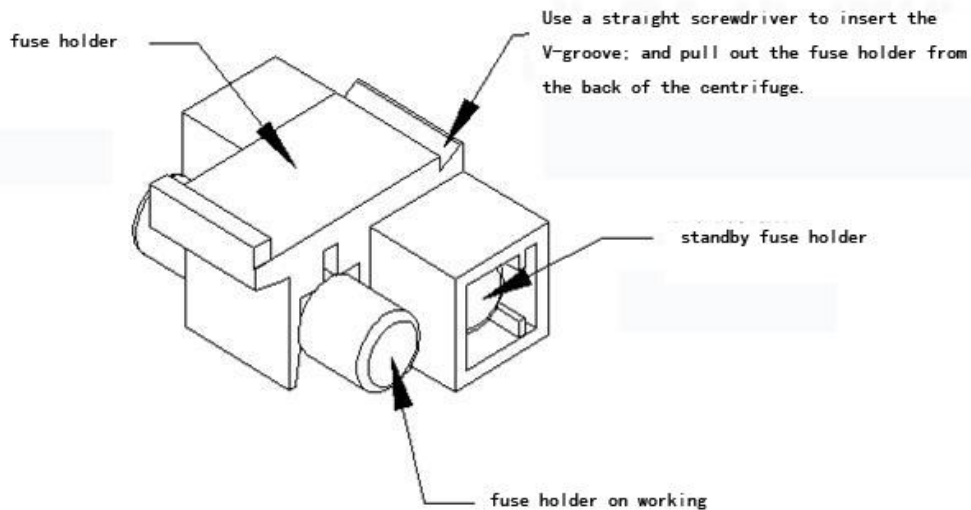


Chart 5

11. Transportation and storage

11.1 Transportation

- Long distance transportation, it must use wooden or paper packing boxes .and 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.

11.2 Storage

- The centrifuge don't use for a long time , should open the door cover, stored in ventilation, dry, clean room and the site should without corrosive substances and inflammable and explosive material.
- Due to the technology constantly updated, if there is something different with the manual, please contact our company.

Warranty regulations

All the products of our company, the buyers get two year warranty from the day they bought, We will take all cost because of quality defects during the guarantee period. Out of the warranty period, the users will charge the cost by themselves.

Any of the following conditions is not 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 pay attention:

Please keep the warranty card and maintenance record.

Benchtop high speed centrifuge

Certificate of compliance

Product Name: Benchtop high speed centrifuge

Factory Number: **19031203**

This product is permitted to leave the factory after inspection.

Inspector: _____

Date: _____

Product warranty card

(maintained by this card within the warranty period.)

Product Name	Bechtop high speed centrifuge		
Model	TG-1850	Product number	19031203
Date of production	Mar.,2020	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	Bechtop high speed centrifuge		1	set	
2	optional rotors	4X2X96 holes microplate	1	set	
3			1	set	
4			1	set	
5					
6	attachment tools	special spanner	1	set	
7		17-19 spanner	1	set	
8		power wire	1	set	
9					
10					
11	attachment documents	packing list	1	piece	
12		Operation manual	1	set	
13		Warranty card	1	set	
14					
15					

Packing person: Zeng Deyong

Date:2020-3-6