Operation Manual

BCBHR-203

Benchtop High Speed Refrigerated Centrifuge

Thank you for Choosing Biolab products. Please read the “Operating Instructions” and “Warranty” before operating this unit to assure proper operation.

Safety Notices

We appreciate your business with Biolab. To prevent any potential accident, please operate centrifuges according to the following safety protocol.
1. Unplug the main power cord, when performing maintenance or when centrifuge is expected not being used for a long period of time.
2. Load the rotor with samples arranged symmetrically. Opposing tubes must be of equal weight. If necessary, use "water blank" tubes to balance sample tubes of unequal weigh. Do not conclude that tubes are balanced by sight over volume. Use the pan balance provided in the centrifuge room for balancing tubes in rotors for the centrifuge.
3. Never exceed the maximum speed posted for the rotor!
4. Never use the rotor that appears damaged (e.g. O-rings missing, scratched, corroded, and cracked).

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01 Application

Biolab centrifuge is widely used in the fields of clinic medicine, biochemistry, laboratory，blood Bank, genetic engineering and radio immunity, best choice to all labs of science units and hospitals.
This centrifuge is in accord with national standard GB4793.7-2001 and international standard IEC 61010-02-2.

02 Features and specifications

Brushless frequency motor for model BCBHR-203 and digital display which indicates the speed、time and temperature.
Frame is 3 tiers protection steel jacket, and with the stainless steel chamber.
Electronic lock and pneumatic spring and automatic locked cover can assure the security.
Small vibration, low noise and beautiful design. Adopt advanced CPU control system realizing microprocessor control, it can control rotate speed, temperature and relative RCF, digital display.

03 Technical data

Chart 1 Technical Parameters:

Max speed	21000rpm	Max RCF	30910xg
Max volume	6x100ml	Noise:	≤58dBA
Timer	0～99h59min	Net weight	82KG
Dimension(HxDxW	380×620×570mm	Power supply	AC 220V 50/60HZ
Temperature Range	-20℃~40℃	Temperature Accuracy	±1℃
Speed accuracy	±20rpm	Package	wooden box

04 Matched Rotor

Many rotors can be chosen to meet the different centrifugal requirements
Chart 2

Rotor No.	Rotor Type	Max speed(rpm)	Max capacity	Max RCF(xg)
30801	Angle rotor	21000	12*1.5/2ml	30910
30802	Angle rotor	15000	40*0.5ml	22920
30803	Angle rotor	17000	24*1.5/2ml	26460
30804	Angle rotor	13500	30*1.5/2ml	19340
30805	Angle rotor	16000	16x5ml	22020
30806	Angle rotor	16000	12x7ml	21380
30807	Angle rotor	10000	12x15ml	11840
30808	Angle rotor	15000	12x10ml	22680
30809	Angle rotor	15000	8x20ml	22680
30810	Angle rotor	14000	6x30ml	19060
30811	Angle rotor	13000	6x50ml	18840
30812	Angle rotor	12000	6x70ml	15570

30813	Angle rotor	12000	4x100ml	14850
30814	Angle rotor	10000	6x100ml	11380
30815	Angle rotor	16000	6x10ml	21500
30816	Angle rotor	18000	30x0.5ml	26660
30844	Angle rotor	13000	48x1.5/2ml	17930
30480	Swing rotor	15000	4x5ml	19920
30435	Vertical rotor	16000	16x5ml	16540
30676	Bucket rotor	4000	2x3x48 well	2300

05 Working principle

5.1 The principle of the centrifugation

Centrifuge will produce RCF during operation. Due to sedimentation caused by RCF make the subject dangling in the solution to form precipitation. The substance of the more proportion turned the direction of the largest radius rotor, the lighter substance is on heavier substance and let the subjects of different proportion to be separated hierarchically.

5.2 How to calculate the relative centrifugal force (RCF)

Centrifugation is depending on the RCF, RCF is depending on the speed and centrifugal radius, the formula of calculating the RCF as follows:

$$RCF = 11.2 \times R \times \left(\frac{N}{1000} \right)^2$$

The transfer coefficient 11.2 is a approx value, which is calculating according acceleration of gravity (1g = 9.81m/s2)

5.3 The confirmation of centrifugal time

Same RCF, centrifugation time is inversely proportional to centrifugal solution’s proportion description. The more of the proportion, the less of the time. The less of the proportion, the more of the time.
Same solution, centrifugation time is inversely proportional to RCF. The bigger

RCF, the less of the time. Contrary, the smaller RCF, the more of the time. Same RCF, centrifugation time is related to Min centrifugal radius, longer basket(test bottles) require a longer centrifugation time.
Therefore, the separation time is difficult to calculate. Usually it is decided by the general test.

06 Unpacking the

6.1 Check the package before opening the packing box
6.2 Examine the Centrifuge for any shipping damage. If any damage was found, please contact our service department.

07 Installation

7.1 The work table should be smooth and stable, the four feet of the centrifuge should touch the surface of the work table firmly
Warning : In order to ensure safety, please keep 30cm space around the instrument, and stay out of the safety space in operation, do not store any inflammable and any other dangerous goods in the safety space.

7.2 Electrical source should be 220V Single phase, with independent earth line
Caution! Error voltage or the voltage over 10% will damage the instrument. You need to check the voltage before connect the power.

7.3 This instrument only can be used indoor and it is better to operate under 20℃ (constant temperature) condition. maximum relative humidity is 80% for 31℃, while 50% for 40℃, and avoid placing the centrifuge under heat producer(e.g sunshine, heating pipe and radiator)
Caution! In order to assure ventilation effect, you should keep enough space for centrifuge devices. Overheating and poorly ventilated room will damage the instrument.

8.4 Use the attached power cord
Danger: Centrifuge rear over with power socket ! , the security identity is enclosed. socket is 220V, be careful when connecting the socket.

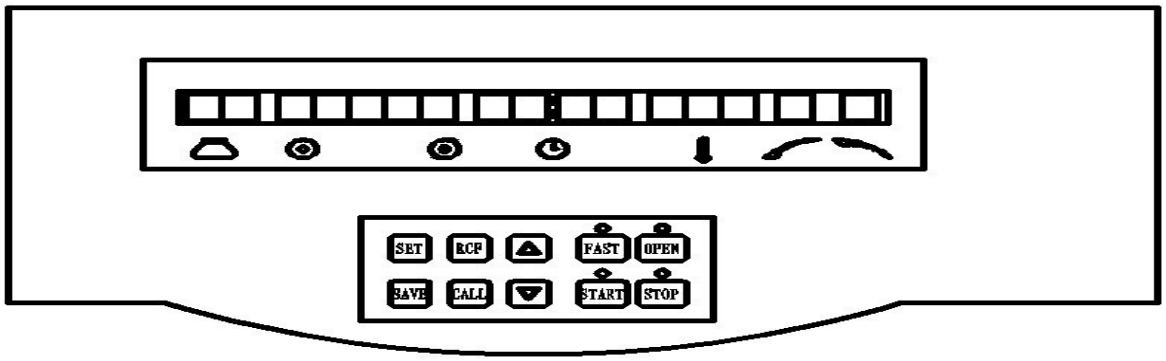
08 Operation

8.1 Plug in the centrifuge

There is a switch on the lower right side, on pressing the switch, the compressor starts to work, the digital tube on the panel will light; now the centrifuge is electrified.

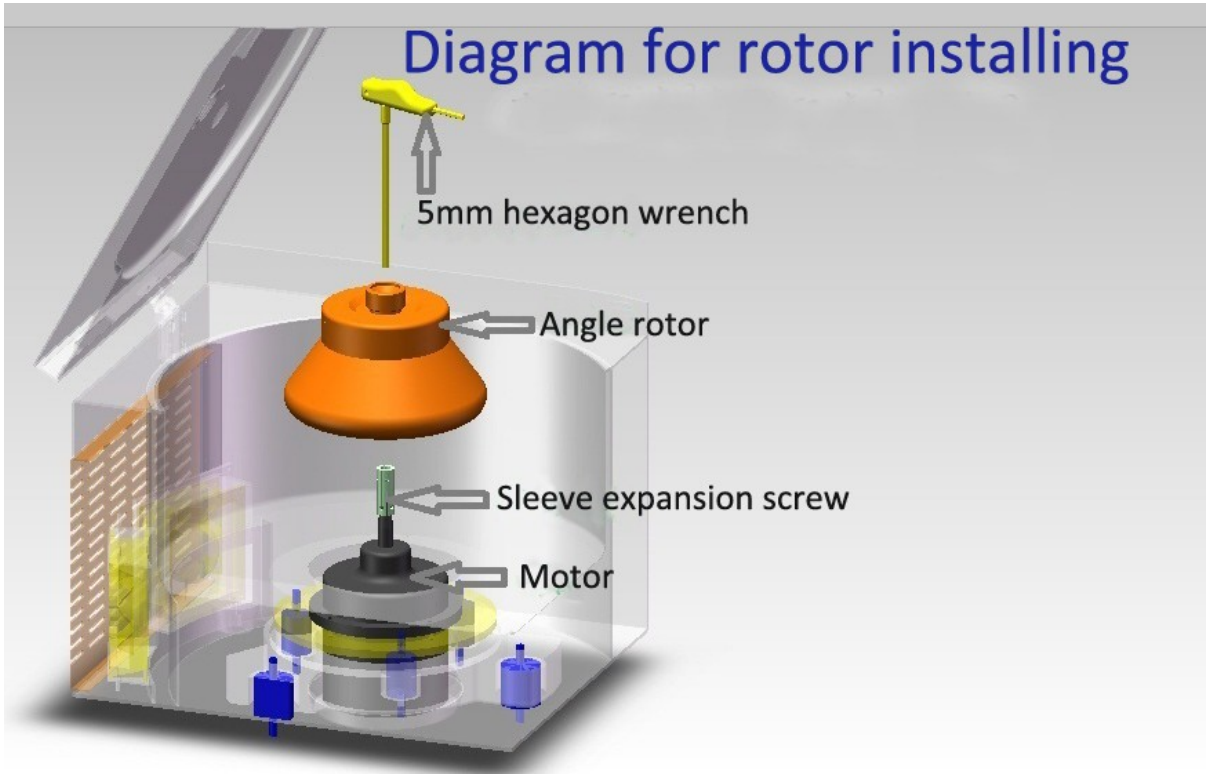
8.2 Open the cover

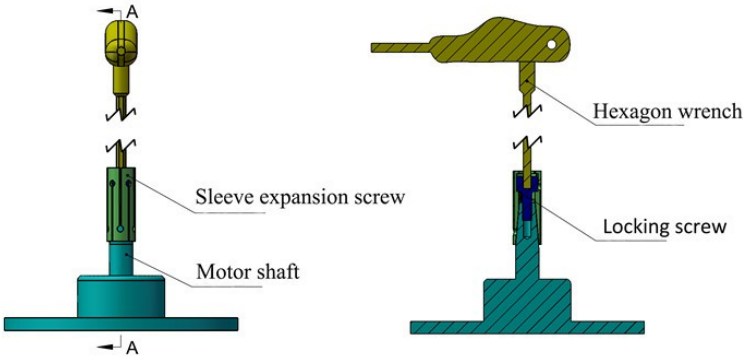
There is a “open the lock” button on the controlling board, as the following diagram, press the “open the lock” button, the lock will be unlocked, pull the cover in upward direction, the gas spring will help you open the cover.



8.3 Install the rotors

(a) You should check whether the rotors have crack and corrosive maculation (especially the bottom of the centrifugal hole) every time before putting them into use. The rotors which has corrosive maculation are forbidden to use, the rotors which beyond the warranty time are also forbidden to use, there is an in the of the centrifuge.
(b) Install the rotor correctly: (pay attention to this part carefully)

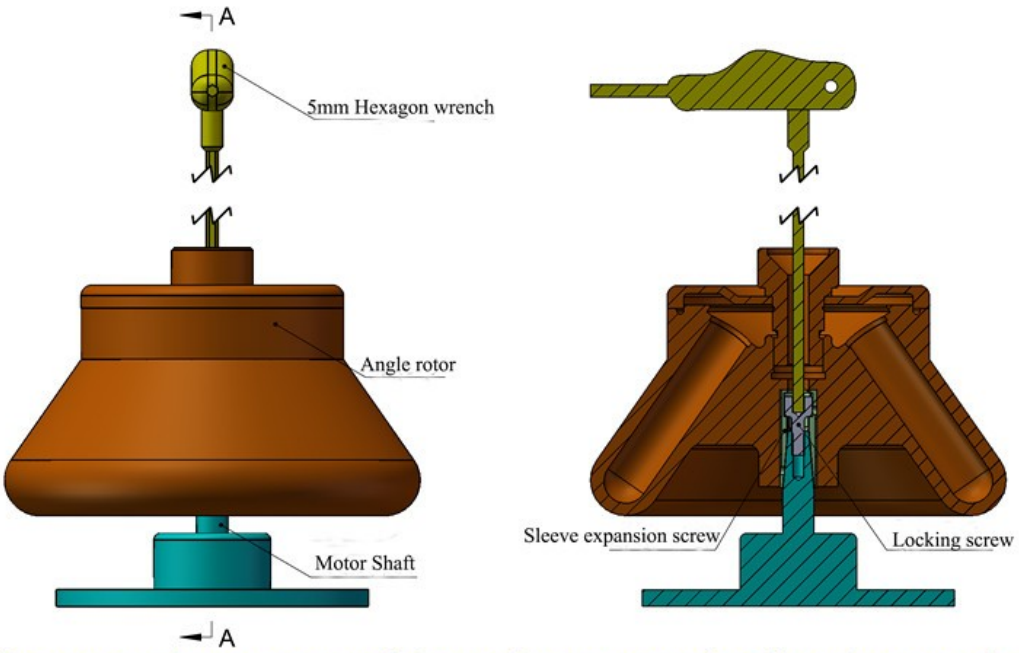




No.1 Please make sure the sleeve expension screw is very loose before putting into rotor.

No.2 If the rotor is fully installed down to the shaft,move up and down the rotor you could hear "bang bang " sound.

Diagram of angle rotor and the motor parts



Do remember,we can tighten the rotor only after the rotor is installed fully down to the shaft.

Take out the sleeve expension screw from the centrifuge chamber, put the sleeve expension screw into the motor shaft. Rotating with the wrench from closewise with 1-2 circles, then put the rotor. Check the sleeve expension screw to make sure it is very loose before putting into rotor. That is because only when the sleeve expension screw is very loose, the rotor can be fully installed down to the shaft which is correctly installed. If the rotor is installed fully: move the rotor up and down from the shaft, you could hear “bang bang...” sound. If you find the sleeve expension screw is tight and the rotor can not be installed down fully, rotating with the wrench from anticlosewise 3-4 circles to loose the screw and move the rotor up and down to check, if you can hear” bang bang”,it is correct, if not, continue to loose the screw till the rotor can be fully installed down to the shaft. Only after the rotor is fully installed down to the shaft, then you can tighten the rotor.

(c) adding test liquids into the centrifugal tubes(about 75% of the tube capacity) and then weighing them with the balance, the weight error of every tube should be less than 2 grams, if it is micro capacity tube, checking whether them are in the same level with your eye.

(d) the input centrifugal tubes should be even. The tubes input improper、

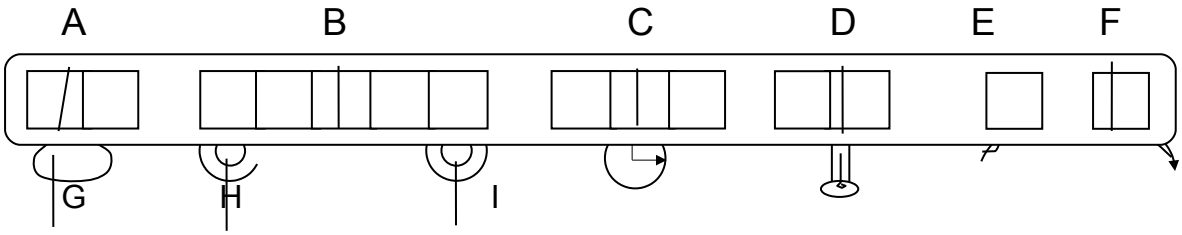
unserious weigh the tubes and imbalance working will result in accidents.
(e) fix the covers of the rotors and fasten the screw, checking whether the “O” shape seal is damaged and in the slot.

8.4 close the cover

Close the cover gently, the cover will lock automatically, if it is closed unwell, the engine won’t work when you push the “start” button, the screen will show “E-1”, it means that the cover is not closed.

8.5 contents in the showing window

A: rotors NO. B: speed/relative centrifugal force (RCF)
C: time/break down D: temperature E: acceleration
F: deceleration G: rotors NO. Light H: speed light
I: relative centrifugal force (RCF) light



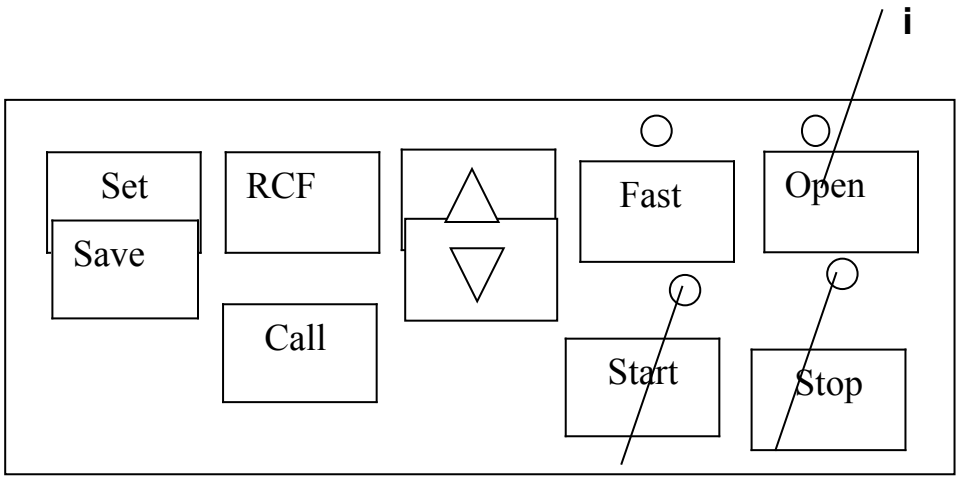
(A) rotors NO.
It shows the last 2 numerals of the rotors number, it can fully meet the requirements of every kinds of rotors equipped with this machine.
(B) speed/RCF
It shows 5 numerals, it shows 3 kinds of parameters, the first one is speed value; the second one is RCF value, the third one is the program number which stored or in using.
(C) time
It shows the time value and break down situation, the break down number as the follows:

Break down	Cover unclosed	Motor problem	Non-stop	Tempe transducer problem	Parameter receivin	Parameters confirmin	Over speed

					g proble m	g problem	
display	E-1	E-2	E-4	E-5	E-6	E-7	E-8

(D) temperature
It shows the temperature value.
(E) acceleration and deceleration
It shows 10 kinds of speed NO. In one numeral, the time spends on accelerating and decelerating is between 2-10minutes. The bigger of the numeral in showing, the shortest of the time spends on accelerating and decelerating.

8.6 set
There are 10 buttons on the controlling board (just as the following diagram),



“i”open light “ii”start light “iii”stop light

(a) Set button
You can set the “Rotors number”, “speed”,”Temperature”, “speed acceleration” and “speed deceleration” transferable with this button and the “△””▽” button. For example: Push the “set” button for two times when the centrifuge is in shut down status, the “speed”display will flash, then you can set speed use the “▽””△”button. The speed value will flash two times to be confirmed automatically

(in the process of flash, don't push any button) you can set all the parameters like this way.

(b) △button and▽button
Push the△button and hold on, the figure will become bigger and bigger, click the△button, the figure will become bigger one by one.
Push the▽button and hold on , the figure will become smaller and smaller, click▽button, the figure will become smaller one by one.

(c) "RCF" button,set the RCF.
Note: Press "RCF" button,the speed window will show RCF. Press the "RCF" button the second time,it will be back to show Speed. The RCF value comes with a dot to show,while speed value doesn't,for example,17180g the window will show 17180., at the same time,the RCF light is a red light;11000rpm,the window will show 11000,at the same time,the speed light is a green light.

(d) "Save"button,save the program,10 programs can be stored.How to set and save programs: Press "call" button,the speed window will show P0 or P1...P9,press △button and▽button to change from P0-P9.Now we set Program 0,when it shows P0,press "set" button,to set speed,rotor No.,time,temperature,acceleration/deceleration according to the above way.When you finish,press "save" button two times to save the program you set.

(e) "Call"button,call the program stored. Press △button and▽button to change from P0-P9.
how to calculate the centrifugal time: The calculation of the centrifugal time is in direct ratio with the RCF while in inverse ratio with the density of the liquids. The centrifugal time depends on the maximum RCF and minimum radius; the long bucket will inevitably result in long centrifugal time. The centrifugal time is hard to calculate, it is mainly depending on the experiment.

8.7 start
Press the "start" button, the green light beside the "start" button will on, the centrifuge will start to work according the parameters you set. Centrifugal chamber temperature by cold hot in turn way in establishment temperature +/- 2℃ In scope automatic control temperature. The time parameter, starts the countdown.

8.8 stop
It will cut off the electricity automatically in the process of operation when the centrifugal time is 0, the red light will on , it will decelerating according the parameters you set, when you hear the buzz sound the rotors will stop, you can open the cover now. If you want to stop the machine, you should press the "stop" button, the machine will stop according the above procedure.

8.9 open the cover
You can open the cover till the "i"open light on .

09 Other function

9.1 over speed protection: for safe operation of this machine, the following protection for every kind of rotor is made in the program:
1. if the speed set by the operator exceed the maximum speed of the rotor, it can't work when you press the "open" button, you will see "E-8" in the break down window.
2. if the speed gets out of control and exceeds the maximum speed of the rotor for 500r/min, it will stop automatically and you will see "E-7" in the break down window.

Warning: over speed set by the operator is forbidden ! Which severely break the operational rules and will result in accident, which can not be identified, so the duty of the accident is fully on the operator, In case of accidents, the following operation is forbidden:
For example: the maximum speed is 3500r/min for NO.3 rotor, but the operator mistakes it for NO.1 rotor, which maximum speed is 5000r/min, if the operator set the speed at 5000r/min , it will working at the speed of 5000r/min, then severely accidents will be happened.

9.2 transferable showing of the RCF : the main parameter which set in the program is speed, the "speed" light will on, if you want to know the RCF in the operation, just press the "set" button, the "RCF" light will on, now the figure in the "speed" window is RCF. If you only know the RCF parameter of the test liquids, you can set the RCF as the main parameter; you can set it according the following procedure: press the "set" button, the "speed" light will flash, the RCF light will on, input the RCF parameter, and then press the "open" button, the machine will operate according the RCF parameter. If you want to know the speed in the operation, press the "set" button, the "speed" light will on, the figure showing in the "speed" window is speed.

9.3 memory function: When all the parameters are set, they will be memorized by the machine. The parameters in the window are what you set last time when you restart the machine.

9.4 this machine has the function of self-diagnosis, When the machine meets the following questions, it will cut off automatically; you are allowed to restart it till

the problem is solved.

1. the cover unclosed
2. over speed break down, when the speed exceeds the stipulated maximum speed for 500/min, it will cut off.
3. temperature measuring break down
4. speed transducer break down
5. parameters set error

Except the “rotors NO.” all the other parameters you can change in the process of operation, it will work according the changed parameters.

9.5 The switch of the cover will be off electricity automatically for safe operation, even you press the “open” button, and it can’t open. Press the “open” button, you can open the cover till the machine stops working.

9.6 When the cover is closed or the machine cuts off suddenly, and you want to take out the test tubes, then you can insert the 5(mm) wrench attached with the machine into the engine, which is in the front bottom of the machine, turn around, the cover will open.

10 Note

10.1 The rotor which has crackle is forbidden to use, or accidents will be happened
10.2 The corrosive rotor is forbidden to use.
10.3 The rotor which beyond the warranty time is forbidden to use, aluminum rotor has a 5-year life time. It can be used for 3000 times and 2000 hours. When the rotor is used for 5 years or 3000 times or 2000 hours, then it can’t be used anymore. It has attained its usage age.
10.4 The time between cut off and plug in must be more than 3 minutes, or the compressor will be damaged.
10.5 When repair the machine or it won’t be put into use for a long time, you should dismantle the plug.
10.6 You are forbidden to open the cover before the rotor stops, and you also can’t stop the rotor with your hand.
10.7 When the rotors damaged you can only move the centrifuge for 30(cm), make sure no dangerous subjects within 30 (cm) around the centrifuge.
10.8 The operator can’t lean on the centrifuge when it is in operation, non-worker

can’t stay around the centrifuge.
10.9 You should care for the overflowed harmful substance when open the rotor cover or clean the centrifugal chamber.
10.10 You should put up the note on your work place.

11 Warranty Policy

1. We have one –year warranty on our all products
2. After the machine fixed, our professional technician will file it and keep track of the usage of the machine.
3. We will pay attention to the feedback of the customers within 24 hours.
4. We won’t charge customers any money for repairing the machine in one-year warranty time.
5. We only charge for the accessories on repairing the machine beyond the one-year warranty time.

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