

LABSTAC



OPERATION MANUAL

Tabletop Centrifuge

CEN16-15

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Environmental Conditions



In order to ensure the safety of using the machines, the centrifuge may be damaged by following factors:

- Chemical effects;
- Environmental impacts, including radiation of natural UV;
- The corrosion and abrasion and wear of shield and other security components.

- * Indoor use;
- * Altitude: $\leq 2000\text{m}$;
- * The applicable temperature range for the instrument is: $+5^{\circ}\text{C} \sim +40^{\circ}\text{C}$;
- * Relative humidity is $\leq 80\%$;
- * The scope of power supply for the instrument is AC230V 50HZ/60HZ 10A;
- * Adequate ventilation should be available indoor;
- * There isn't any vibration or airflow around which maybe effect the performance of the instrument;
- * There isn't any conductive explosive dust or corrosive dust around;

Safety Tips

- * Please read this manual carefully for the first-time using!
- * CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge can only be operated by trained or authorized persons;
- * The maintenance of the instrument can only be done by authorized dealers
- * Please NEVER use the following materials in the centrifuges:
 - Inflammable and explosive materials;
 - Strengthen chemical materials;
 - Toxic or radioactive substances or pathogenic micro-organisms and so on.
- * Only qualified maintenance personnel using the appropriate tools can do operation on the system maintenance of High-speed Benchtop Air-refrigerate Centrifuge.
- * If the operator encountered the cases not mentioned in the manual, please contact authorized dealers from. and ask the right approach.
- * Use the accessories supplied by as far as possible. If you want to use other accessories, will not be responsible for the adverse consequences. However, users can submit an application to the to verify compliance with the equipment accessories requirements.
- * Inspections and maintenance of the High-speed refrigerated centrifuge must be conducted at the specified time intervals.

Security Warning Signs Description



Caution: Before using of equipment, please read the Manual carefully!



Caution: High pressure dangerous! Electricity!



The meaning of Security Statement

In order to avoid any hurt or damage to the person, equipment or environment, please comply with all the security statements in this manual.

Besides the measures for accident prevention, environmental protection and the security and professional career common rules, the user should obey all the rules and laws of the country and local region.

The consequences of ignoring safety procedures

Any action ignoring the safety procedure, the law and rules, or other relative rules will cause damage and danger to the person, device and environment.

01. Terms of Use Security

CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge is based on current technology and safety standards:

GB4793.1-2007《Measurement, control electrical equipment for laboratories safety requirements part1 : General safety requirements》；

GB4793.7-2001《Measurement, control electrical equipment for laboratories safety requirement special requirements for laboratory centrifuge》；

GB191-2000《Transportation packaging logo icon》；

GB6587.6-86《Transport-Test of Electronic Measurement Instruments》；

GB/T14710-1993《Medical electrical equipment environmental requirements and test methods》；

Therefore, using must be in accordance with the requirements of the design. If incorrect or inappropriate use happens as follows, when using CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge, it will result in equipment damage or personal injury：

- Use not in accordance with design requirements;
- Operation and maintenance staff to use without training;
- User changes content inappropriately without authorization of the design；
- Not pay attention to or understand the rules of safe use.



Any person who involving the use or maintenance of CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge should read and understand the using way and rules of safe-using of this manual.

Following rules must be totally enforced to avoid accidents:

The "Manual" is one of the elements of device components of "CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge," which should be consistent with the High-speed refrigerated centrifuges together in order to access the operator.

The CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge is designed for clinical medicine, biology, chemistry, genetic engineering, immunology and so on. The maximum separation speed can not exceed the density of the sample 1.2g/cm^3 ; when the sample is

greater than the density of 1.2g/cm^3 , the maximum rotor speed must be reduced accordingly. When the CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge process is running (in the separation of the sample or when the rotor rotation), to make sure that the operator may not stop there, or the existence of hazardous substances, no items blocking vents centrifuge within 30 cm around the centrifuge.

If in the use of CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge, the non-compliance with the following safety precautions happens, the centrifuges would cause the operator or other personnel injury or make damages to centrifuge separation plant and the internal sample:

- Centrifuge design is neither anti-corrosion, nor is proof, therefore, ensure no centrifuges corrosion in the environment and the possibility of an explosion happen in the use of the environment;
- The use of centrifuges is strictly prohibited in the following materials:
 - Flammable and explosive materials;
 - Strengthen the role of materials science;
 - Toxic or radioactive substances or pathogenic micro-organisms and so on.
- For the separation of corrosive substances and pathogenic micro-organisms cell effective sealing measures should be carried out in advance and effective disinfection measures should be carried out after use. Details, see "repair and maintenance issues - sterilization" in the contents.
- The substances for the separation of corrosive can cause damage and destruction of centrifuge internal material or weaken the rotor mechanical strength, so when separate of corrosive substances, the corrosive substances must be kept in the protective container.

1.1 Operation Notes

- Before centrifuge run (sample separation), it must be confirmed with appropriate rotor and ensure a solid installation.
- When in the process of running centrifuges (rotors turning) or in the process to stop centrifuge (but when the rotor is still rotating), do not manually open the door or move the centrifuge;
- The components used in CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge must be dedicated accessories provided by. A number of common components, such as: glass and plastic containers used for the separation, it should be confirmed to meet the requirements to use the products, which shall conform to the corresponding rotor speed and the largest of the greatest use of centrifugal force, etc.
- Do not open the door of the cases when using the centrifuges or in separation of sample;
- The replacement of the mechanical parts of the centrifuge and electronic devices, must be implemented by relevant personnel designated by the;
- When the operator uses the centrifuges, it is important to choose an appropriate load of the rotor, and shall not overload the use of the rotor;
- Ensure regular checks of the rotor, if the rotor has obvious corrosion or obvious signs of damage, using must be stopped;
- After using for a period of time, the provisions of maintenance should be strictly in accordance with the "cleansing and disinfection,"



1.2 The relevant quoting standards

- GB4793.1-2007<<Part I of Safety Requirements of Measurement, control of laboratorial electrical equipment:General safety requirements>>;
- GB4793.7-2001<<Safety requirement of measurement and control of laboratorial electrical equipment & special requirements of laboratorial electrical centrifuge.>>;
- GB191-2000<<Icon of packaging & Transportation>>;
- GB6587.6-86<<Transport-Test of Electronic Measurement Instruments>>;
- GB/T 14710-1993<<Environmental requirement & test way of medical electrical equipment>>;
- Enterprise Standard:《High-speed refrigerated centrifuge》 ;

02. Introduction of High-speed Benchtop Air-refrigerate

2.1 Introduction of the outlook of CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge

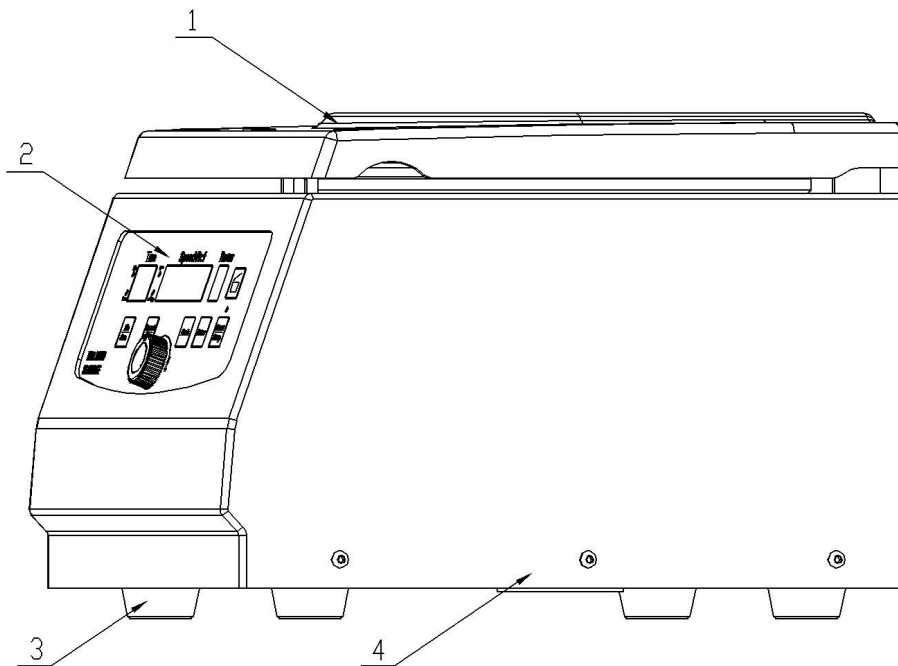


Figure 1: Picture of anterior appearance of CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge



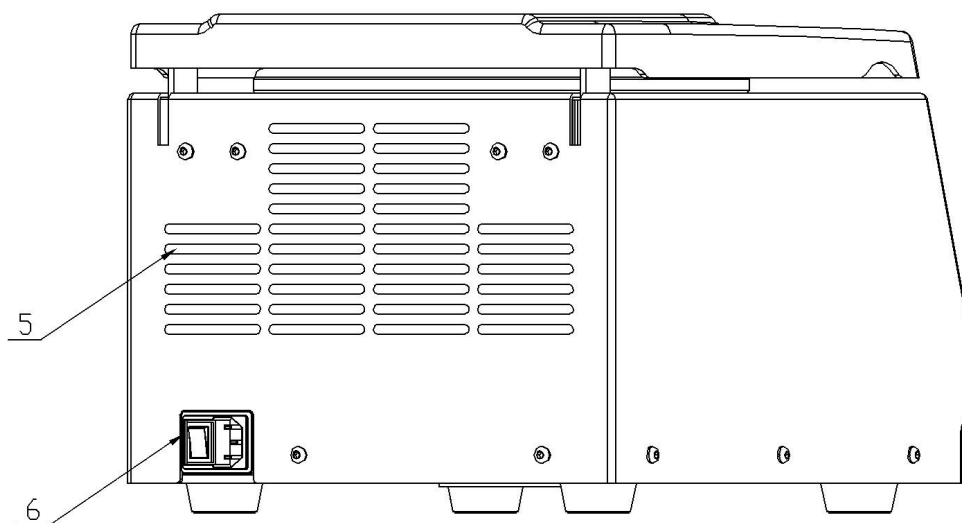


Figure 2: Picture of appearance of after side of CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge

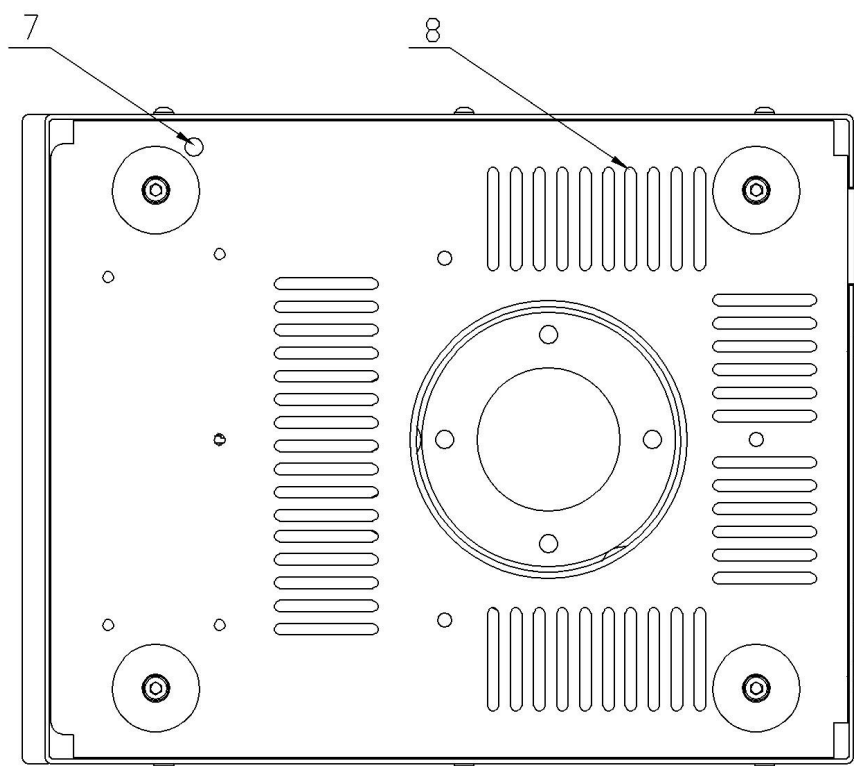


Figure 3: Picture of appearance of bottom side of CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge

Introduction of Figure 1, Figure 2, Figure 3:

1. Door / cover
2. The control panel and display area
3. Floor mat
4. Fuselage shell
5. Air intake



6. Power outlet and Switch
7. Emergency lock cord
8. Bottom air intake


2.2 Overview


CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge can be widely used in clinical medicine, biology, chemistry, genetic engineering, immunology and other fields, which is the conventional instruments in the laboratory for centrifugation and sedimentation. The rotor configuration of the machine details, see "Additional one: the rotor type and technical parameters".

2.3 Instrument Structure Introduction

This equipment is consisted by the the door and cover system, chamber system, drive system, rotor system, base system, power supply system, control system, display system and components such as alarm system.

2.3.1 The door and cover system, including door cover, door hinges and distortion springs, door locks, door alarms, emergency cord, such as door locks. The door hinges are in the rear rack, the door locks is in front of the rack, only in the case of door locked, you can start the centrifuge running, otherwise the door alarm system will start to work(buzzer sound), the machine could not be activated.

To open the door cover, press on the machine control panel door button  to open the door. When the door cover open to a certain height, the door hinge and distortion spring will be able to hang on the door cover.

In the situation of power failure or door button  fail, and the samples needed to be taken in time, you need to use the emergency lock cord , a slow pull down of the cord can manually open the door cover. (The position of emergency lock cord can refer to 2.1 Figure 3.)

When the rotor of the device is turning or the power supply is on, don't open the door cover manually !



2.3.2 Chamber system consists of stainless steel basin, rubber air tight seals. Chamber system can provide a stable working environment.

2.3.3 The device uses variable frequency electric motor to drive the rotor which loads the samples. Cone-driven system connected with the rotor shaft with high precision and smooth operation.

2.3.4 Rotor system consists of a variety of test-tube centrifuge rotors (For more detail, see Table 1: Rotor types and technical parameters.) and other related accessories. The role of the rotor is loading samples to a certain degree of load rotation speed, resulting in a relative centrifugal force field, so as to achieve the purpose of separation of samples. As a result of high-speed rotation , the centrifugal force of the rotor is thousands of times of the Earth's gravitational acceleration g, so it is vital important to use the rotor safely and maintain it carefully!




2.3.5 The base system is composed by the protection steel, plate, shell and rubber body support legs.

2.3.6 Power supply system, including power outlet and switch, which is responsible for the machine's electricity supply from the power net.

2.3.7 Control system includes speed and centrifugal force settings, operating time settings, accelerate/decelerate choice settings, the whole display system and alarm control systems etc.,. In order to make sure the right operation of the machine and the operator's safe, please do not disassemble the device!


2.3.8 Display system consists of the liquid crystal display panel and PVC keyboard touch panel (control panel). It is the interface for human-computer dialogue. It can simultaneously display settings of the parameters, and track display the actual change of the parameters, in addition, it can display and alarm a variety of errors.

2.3.9 The alarm system covers alarms such as door cover fault, over speed, imbalance, over pressure etc.. When the machine has error conditions such as over speed, door cover open, imbalance, etc., the system alarms, the control panel will blink, buzzer sounds alarm sound, the machine will not boot (not allowed to start), the running machine will automatically shut down until troubleshooting, then the machine can be restart. Note: To mute the alarm sound, press the start/stop button  on the control panel.

2.4 Security Protections

CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge has a series of security protections:

- Rack and the steel protection are produced by steel plates, the internal cavity is produced by stainless steel liner;
- The door/cover uses explosion-proof structure, the door/cover has a lock. Only when the

centrifuge is power on and the rotor is stoped , the open door button  can be pressed to open the door, only when the door/cover is locked, the centrifuge can start to run.

- Over speed

When the centrifuge rotor runs faster than the speed setted by 400r/min, the machine will issue a warning sound; when the rotor runs faster than the maximum rated speed by 450r/min, the rotor will automatically stop. After the rotor completely stopped, open the door/cover, remove obstacles and re-run.

- Imbalance

When running, the rotor rotates imbalanced, resulting in excess of the shaft of the rate of shaking, the machine will stop running in time, and issue alarm; generally because of unbalanced rotor load. After the rotor completely stopped, open the door/cover, remove obstacles and re-run.

- Emergency door open

In the running of the rotor, if there is a sudden power failure or machine fault, and the door could not be opened by the door keys, the door/cover can be opened through manual method.(see "Fault Handling").



2.5 Machine Placement requirements

2.5.1 The machine should be placed on a sufficient level of rigid surface and away from the equipment with the impact of vibration, avoid heat and direct sunlight exposure.

2.5.2 There should be 10 cm to 15 cm away from all the space of the machines for machines's cooling ventilation.

2.5.3 Level should be adjusted after installation, and make the four supporting legs at the bottom of the foot support the equipment evenly on the horizontal surface.

2.5.4 The scope of the equipment working power supply is AC230V 50/60HZ 10A.



The machine must be totally grounding and power ground lead should be connected to ground lead of electricity grid. Don't cut the electricity when the rotor is running, or it will damage the the control circuit.

03. Rotor type and technical parameters

MGold provide CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge for a variety of users with different rotor specifications .You can buy it at the same time when you buy High-speed Benchtop Air-refrigerate Centrifuge, according to your actual purchase request (see Table 1: Rotor types and technical parameters) .

If you need to purchase this optional auxiliary parts, please contact with the manufacturer or TOPSCIEN., or consulate with authorized dealers.

Please contact with the manufacturer or the agents authorized. to consult the relevant about optional auxiliary parts and procurement code.

Table 1:Rotor types and technical parameters

No. (Rotor)	Capacity (ml×Test-tube Amount)	Maximum speed (r/min)	Maximum Rcf (×g)	Test-tube type
1501 angle rotor	1.5/2.2×24	15000	20375	PP cone bottom with cover
1502 angle rotor	Capillary hematocrit tube×24×24	12000	15455	Diameter 1.5mm
1503 angle rotor	5×10	13500	12920	PP round bottom with cover
1504	PCR lath rotor	14800	16200	PP cone



angle rotor	head 0.2×8×4			bottom with cover
1505 angle rotor	0.5×36	13500	13250	PP cone bottom with cover

04. Pre-Use Preparation

4.1 Transportation and and Installation

High-speed Benchtop Air-refrigerate Centrifuge uses the box to transport, which has the materials of buffer protection in internal. Please open the box and removed the materials of buffer protection in internal.

The net weight of the machine is about 16Kg, in order to prevent damage to the spindle, please remove the rotor out before moving the centrifuge. Please don't shake the machine! Long-distance transport or handling, please use the dedicated box, and firmly keep it fixed properly and maintain the vertical state, and handle it with care.

4.2 Choose the reasonable settlement places

CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge can only be used in indoor, placement should be in accordance with the following requirements :

- When the centrifuge in run-time, a safe distance must be retained in around 20cm, from this safe distance hazardous substances should not be placed, and the relevant personnel shall not stay;
- Scaffold or horizontal for centrifuge placement should be firm and can not shake or vibrate; If you use removable stents or trolley, locking devices should be used as well to ensure the safe operation of centrifuges;
- If the centrifuge is placed in the wall or corner, in order to ensure smooth flow of air circulation and cooling cycle of the equipment, please ensure that the the distance away from centrifuge's back,right ,left sides and the posterior wall, respectively, not less than 10 cm, 15 cm.
- Centrifuge should be placed away from the location of the windows to avoid heat and direct sunlight exposure.
- After the centrifuge being placed ,the four supporting legs evenly in the horizontal surface to support and the leve be adjusted.
- The room for centrifuges installation must be constant temperature room at ambient temperature 5°C~40°C, between environmental humidity ≤ 80%, and the environment must be clean.

4.3 Fixed Machinery

After the centrifuge once placed, do not move it, if mobile, the level of the machine should be re-confirmed or adjusted, and keep the four supporting legs evenly in the horizontal surface to support Scaffold or horizontal for centrifuge placement should be firm and can not shake or

vibrate.

4.4 Correct connection of power supply

Centrifuge's power wire should use a separate power outlet, the power outlet must be well grounded. Confirm the power wire used in centrifuges in line with the safety requirement in the countries and regions. The applicable supply voltage and power frequency to centrifuge should be consistent with the description of the requirements of the mark or centrifuge nameplate specifications. Please use the attached power wire, with the correct access to the machine outlet and a solid network of power connections. Power switch on when " | " ,power switch off when "O".

05. Operating Instructions

5.1 Control Panel and Display Interface Introduction

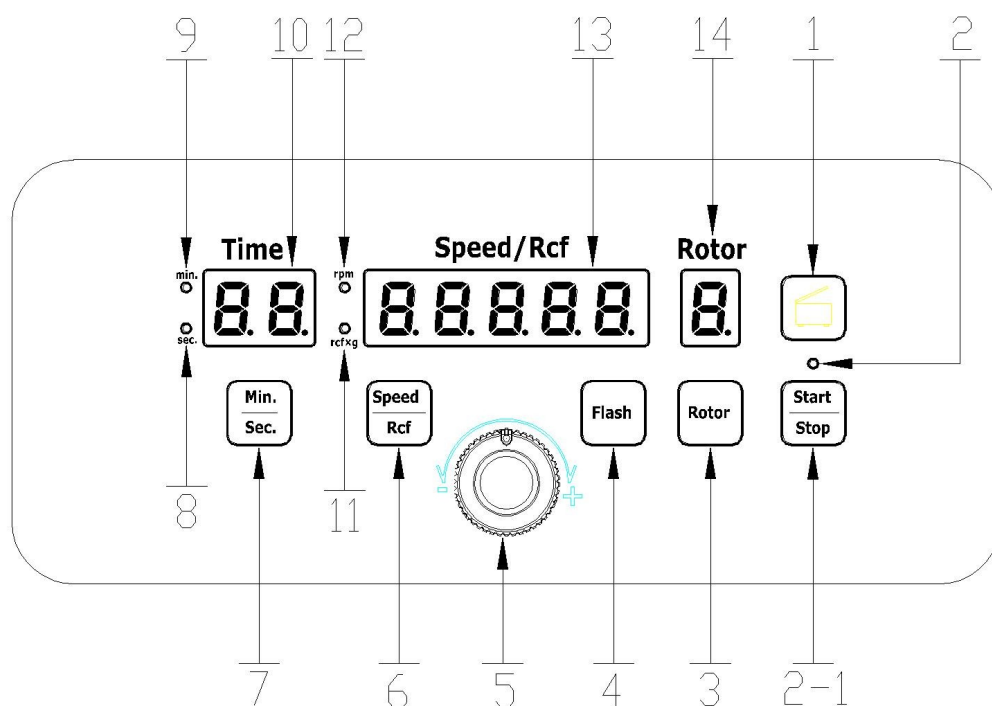


Figure 5: Schematic drawing of control panel

Figure 5 Description: The control and display interface functions

Button to open the door

1. Open door button
2. Start / Stop light
- 2-1. Start / Stop button
3. Rotor No. set button


4. Fast centrifugalize button
5. Parameter setting wheel
6. Speed / centrifugal force Setting (Speed/Rcf)
7. Centrifugal time setting (Min/Sec)
8. Second light
9. Minute light
10. Run time countdown
11. Relative Centrifugal Force light
12. Speed light
13. Real-time speed / centrifugal force (Speed/Rcf) / status indicator
14. Rotor No. Display

5.2 Start the machine

Push the attached power wire head into the outlet on the back side of the machine, access the other side to the power net. The power net should use an independent socket. The power range of this equipment is AC230V 50HZ/60HZ. After connection, open the power switch at the right side of the back of the machine. With a short buzzer alarms, the LCD screen on the control panel turns on, after the machine self-test complete, comes out the main interface, then enter the next step.

5.3 Open the door



Press the control panel button  to open the door , the door / cover in the role of distortion spring will automatically open up a certain height, then cover up the door by hands until the door completely opened, and the cavity will now come to the face of users.

Note: To open the door, the door / cover will be automatically bounce up to a certain height, at this point the head or other items should not be above the door in order to avoid danger!

If a malfunction occurs and the door cover can not be opened automatically , at this time if the items must be removed from the body cavity, you can open the door manually, specifically see "Troubleshooting."

5.4 Close the door

Press down the door / cover until the hook on the side door over the locked pin, then the hook at the bottom of the door will be exposed to trip switch and the door will have been locked well.



Please press the door cover properly.
Don't overexert, or the hook will be damaged.

5.5 Install the rotor

The rotor used must be the products confirmed and designated through TOPSCIEN., otherwise they will cause fault, accompanied by this statement are rotor model specifications confirmed by TOPSCIEN.. TOPSCIEN. manual advises users to use the specified types of rotor model specifications (see Table 1: Rotor types and technical parameters")




Poor centrifuge effect or even damage of the centrifuge may happen if inappropriate type of rotors or centrifuge tubes are used.

Steps to install the rotor is as follows (indicated in Figure 5, Figure 6)

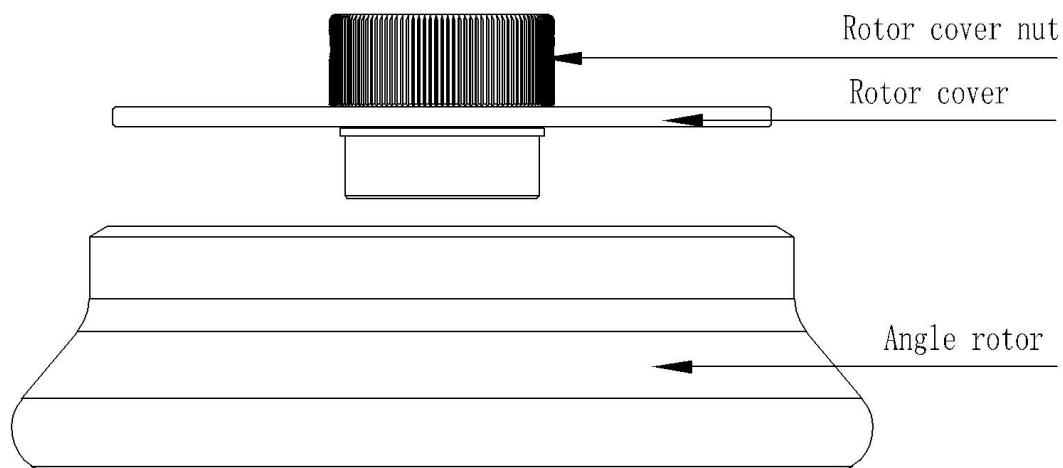
● Switch on the power, wait for the self-test to finish;



● Press the  button to open the door / cover, confirm the cavity be clean and without irregular subjects;

● Clean the surface of the spindle motor;

● First set the locking spindle fixed at the top of motor, location as shown in Figure 5, and then make the central hole at the bottom of the angle rotor through the lock set, so that the bottom of the angle rotor completely on the support surface of the spindle motor, then add the test-tube into angle rotor and tight it slightly by hand; Use the attached Hexagon Wrench covered at the center of the rotor hole, inserted into the locking sleeve at the top, lock the lock sets by counter-clockwise rotation, that is the angle rotor will completely be fixed on the spindle motor; Then within 5 mm insert hexagonal wrench into the two of the horizontal holes of the rotor cover nut, and lock the rotor cover by anti-clockwise rotating (Figure 5).



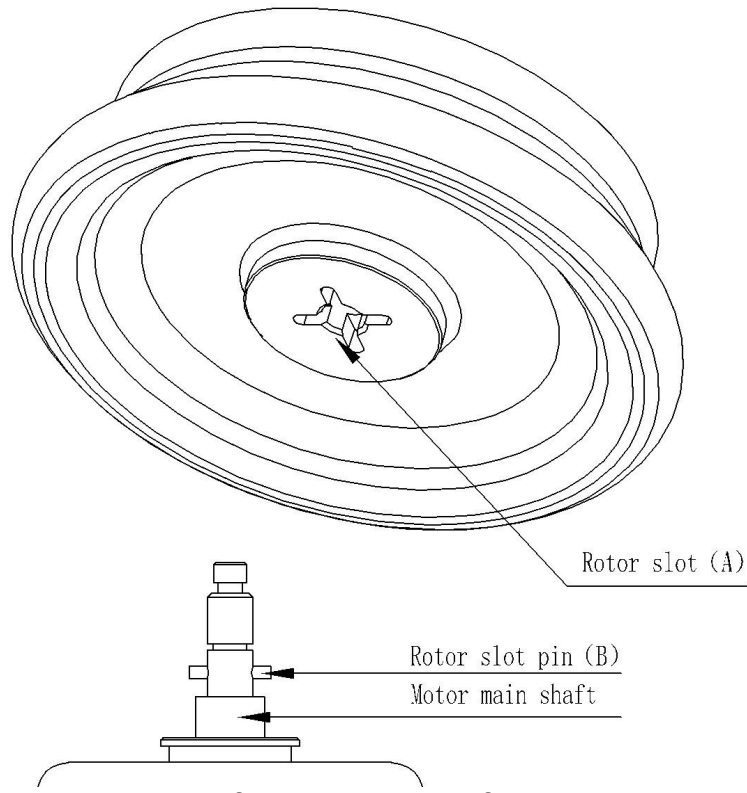


Figure 5: Schematic diagram of the installation of the rotor angle A

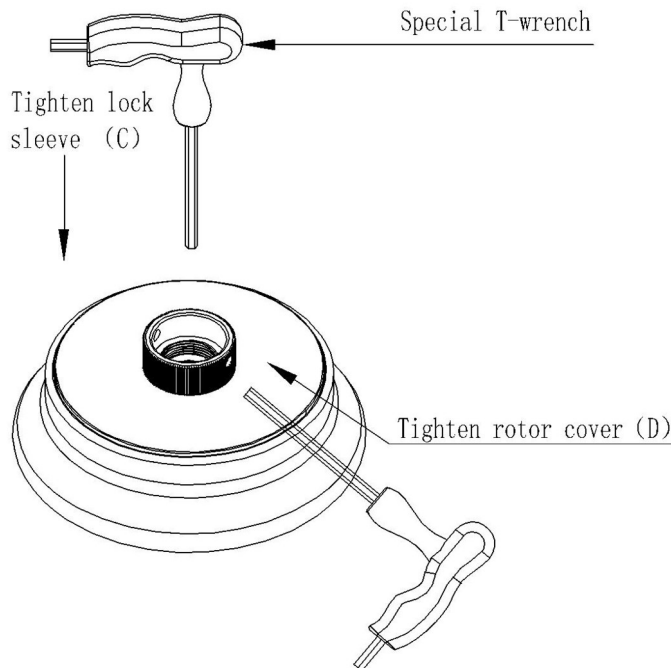


Figure 6: Schematic diagram of the installation of the rotor angle B



Completed the installation of the rotor, each time before use or after using for some time, you should check whether the installation of the rotor position is changed, when necessary, tighten up the lock sets again to ensure that the installation of a solid rotor.



5.6 Calculation of rotor load

- The calculation of the maximum load

When the CEN16-15 High-speed Benchtop Air-refrigerate Centrifuge is at a high speed operation, there is tremendous centrifugal force; each rotor is designed with the requirements under the maximum rated speed when there is sufficient mechanical strength - that is, "safety factor"; However, this "safety coefficient" require the rotor load shall not exceed its maximum rated load.

If you are separating the sample, putting the sample container into the rotor with the sample, if the sum exceeds the maximum rated load of the rotor, you must reduce the weight of the sample or of calculate the rotor speed allowed by the operation (NPERM), to ensure that the rotor load shall not exceed its maximum rated load.

The rotor allowing operation speed (NPERM) calculating method as follows :

$$NPERM = N_{max} \times (\text{maximum permissible load} \div \text{actual load}) \times 0.5$$

N_{max} : Maximum rated speed ;

maximum permissible load

actual load



Don't use the rotor overload, or it will cause explosion of the rotor and the debris will damage the centrifuge

5.7 The sample injection of centrifuge container

When the centrifuge runs, the better the balance performance, separation region of sample separation will not interfere with each other due to vibration, so the better the effect of centrifugal. Therefore, in the centrifugation container the sample should be injected evenly as much as possible in order to run the process to achieve a better balance effect. To place all samples, it is important to choose a suitable container.

Examine carefully the centrifuge container (centrifuge tubes, etc.) used to check whether it is consistent with its rated maximum allowed acceleration (centrifugal force); in line with the request, please use the lower speed operation.



Please note the using life of the centrifugal container. Check whether the centrifugal container (plastic, glass) is damaged or not when it's under maximum allowed load and maximum allowed speed. If there's anything damaged, please replace in time.

5.8 The safe use of the rotor

5.8.1 Samples loading and test-tube placing should be accurate and symmetrically before rotor operation.

5.8.2 Angle rotor should not run over 2000r/min in critical speed regional time, otherwise the machine will have a big vibration, which will have impact on its service life.

5.8.3 In rotor replacement, use the incidental wrench to screw open locking sets by anti-clockwise rotation, and then change the rotor.





Don't start the machine before the screw is tighten on the shaft.


5.8.4 If the centrifuge needs repeated operation, then check whether the loosening of locking sets after the several use ,and if loose, it must be tightened before the boot operation.


5.8.5 Samples can be loaded centrifuge test-tube not at the same time, but it must be symmetric loaded (to allow the weight of error $\leq 1.5g$), asymmetric loading of samples is not allowed before boot and running.


5. 9 The examples of parameter setting operations


5.9.1 For example, the equipment configurate rotor by a horn is the NO1 #1501 angel rotor 1.5/2.2ml×24, then the concrete operation is as follows: access to power →open the power switch on the right side of the apparatus when the control panel LCD display area will be light up. For example, parameters to be set up as follows:

Rotor NO.	Speed r/min	Period min.	Speed Raise	Speed Deceleration
1	15000	10	5	3

5.9.2 Rotor number setting: Pressed down the  button on control panel→so that the number of Type flashing→ Rotary the knob settings button to set the Rotor No. 0001.

5.9.3 Speed settings : Pressed down the  button on control panel→so that Speed of SPEED/RCF flashing, the number flashing, the green RPM light light.→Rotary the knob settings button to set the number 15000.



5.9.4 Time setting : Press down the  button on control panel→so that the number of Time flashes→when the Min LED light, Rotary the knob settings button to set the number 10

Pressed down the knob settings button. Press down the  for twice continually, the Sed LED light, rotary the knob settings button to shet the Seconds.



The method to set the parameter selected: after finishing the parameters setting, press the setting knob key vertically or wait for the display system to flash for 3 times which indicate the settings are saved.

5.9.5 Acceleration and Deceleration settings (The accelerate to start the rotor velocity from zero to the set speed and decelerate to stop the machine velocity from set speed to zero,

value of 0 ~ 9, the greater the value, the shorter the time): Pressed down both the  and  buttons on control panel for 3 seconds→ Speed/RCF display area will flash with “ACC”,

which indicate entering the Acceleration setting status → rotary the knob settings button to set the number to 5 → Press the knob button vertically, the Speed/RCF display area will flash with “dEC”, which indicate entering the Deceleration setting status → rotary the knob button to set the number to 3 → Wait for 3 seconds without any button pressed, the system will exit the setting status automatically and save all the accelerate and decelerate parameters. (the parameters are hidden ones which will not display on the display panel directly.)
Figure after the completion of setting as follows:

Following is a figure of the display after setting :

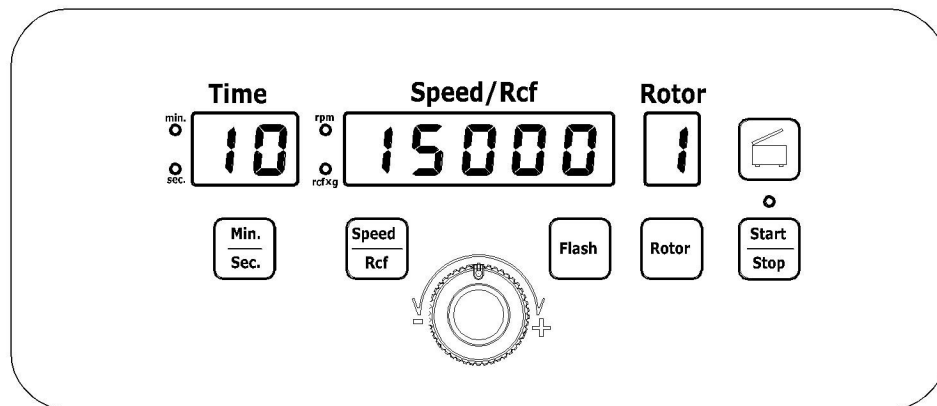





Figure 7: For the completion of parameter setting


5.10 Other parameter settings.


5.10.1 Centrifugal force settings: Pressed down the  button on control panel → so that RCF of Speed/RCF flashes, the RCF green LED lights up and the number flashes and the dot of the last number lights up. → rotary the knob button and set its value.

5.10.2 In the process of setting parameters, if as a result of mechanical failure or incorrect parameter settings, which resulted in the machine appears alarm, please press the stop

button  to cancel the alarm, and then re-set the parameter refer to the rotor No..

5.10.3 Press the start button , the machine starts running (if the machine need to be

stoped on half-way please press the stop button , The setting time will gradually decrease to zero, when the time value shows zero that the centrifuge will automatically shutdown, when the speed displayed will gradually decrease from set speed to zero (speed from the set value decrease to zero is related to the settings of the speed deceleration), when the speed becomes zero, the door / cover will automatically open, the machine will issue a

stopping sound, you may press the stop button  to stop the sound. Centrifugal

completed.



5.10.4 For an instant centrifugal, please continually keep pressing the Flash button, the speed will continue to increase, releasing will stop the rotation, during which the maximum speed of the rotor corresponding to its set speed and will accumulate with the seconds.



5.10.6 The sound settings: Press both the Min. Sec. and Speed Rcf button for 3 seconds, then the Speed/RCF display area will display "ACC" and flash, then vertically press the knob button 3 times continually, the Speed/RCF display area will display "SONG1" and flash, rotary the knob button to set the value. Wait for 3 seconds without any button pressed, the system will exit the setting status automatically and save all the parameters. (the parameters are hidden ones which will not display on the display panel directly.) SONG1-SONG4 are four kinds of sounds, SONG5 means mute the sound.

5.10.6 After the machine speed becomes stable, if needed, the speed / centrifugal force, time, parameters such as take-off and landing speed can be re-modified. After parameters re-set, there is no need to manually confirm while the system will automatically blink three times to confirm the settings.

- Before setting parameter with control panel, you must install the rotor on the shaft correctly.
- If operating errors were found in the parameter setting process, you may re-set the parameters.

5.10.6 Program settings, storage and uses

- Set the program number at the same time of setting the parameters of the centrifuge , the system will default these centrifugal correspond to the program at the same time when identifying the centrifuge parameters.
- Can store up to 10 procedures to meet the various needs.
- Through its activation to different program numbers, procedure deposited may be loaded into the process, calls its corresponding parameters of the centrifugation, there is no need to re-set it one by one .
- Parameters will be saved as a commonly used procedure, it will be convenient to use.
- Centrifuge will load on the last use of the procedure automatically after restarting.

5.10.7 The calculation of the centrifugal force

Relative centrifugal force is usually thousands of times of gravity (g). It's unit items to measure the efficiency of variety of instrument separation or precipitation. The calculation of centrifugal force has something to do with centrifugal speed and centrifugal radius. It's based on the following equation:

$$RCF = 11.18 \times (n/1000)^2 \times r$$

R: is the centrifugal radius, unit is cm;

n: centrifugal speed unit is rpm (revolutions per minute)

Note: The value of maximum centrifugal force has something to do with the maximum centrifugal radius.

The setting of value of centrifugal force should consider the radius of the rotor and the shape of centrifugal container.



06. Maintenance Matters

6.1 Cleansing and purification

If the hazardous substances spill or into the device, users have the responsibility to conduct appropriate purification.

Users should conduct cleansing and purification in accordance with the methods described in the Manual, in order to ensure equipment away from damage; Using of inappropriate cleaning agents and incorrect disinfection procedures, may cause damage to the centrifuge and the internal components;

6.1.1 The implementation of cleansing and purification



Please turn off the power switch and unplug the power cord before the doing cleaning or maintenance of the centrifuge!

The contents of clean operation and maintenance on a regular basis (or based on the use of) main against the shell of the centrifuge, cavity, the separation of the rotor and the use of containers, etc.; This is to prevent any contaminants left on the above, which can cause corrosion to the components for use and environmental pollution.



Don't use organic solvents because it can break down lubricants inside the motor bearing. During the process of cleaning, don't exposure liquid especially organic solvents to motor bearing spindle and bearing ball inside.

6.1.2 The implementation of steam sterilizer

The life expectancy of the annex is related to the number of sterilization time and the using, if the rotor and the separation container have a clear corrosion and damage, please immediately stop using.

Figure 2: Sterilization Parameters Table

Annex	Maximum temperature (°C)	the shortest period of time (min)	The longest period of time (min)	maximum number of times
Glass Tube	134—138	3	5	—
PC Tube	115—118	30	40	20
PP Tube	115—118	30	40	30
PA Tube	115—118	30	40	20



6.1.3 Maintenance

6.1.3.1 The rotor can not have a collision with tip objects, in the removal and disassembly should prevent bump, it is necessary to prevent scratches or injury which can cause rotor cracks in use.

6.1.3.2 Periodically inspect of rotor components (especially the at the bottom of tube-hole) to check the corrosion spots, grooves, small cracks,if found in either case, please stop using the rotor, and associated with the.



For the demolition of the rotor, please grasp the rotor and lift it vertically. Don't swag or shake.

6.1.3.3 Under normal circumstances, the rotor should be washed once a week, if in the separation of corrosive salts or other samples, cleaning immediately after using. If found the split of samples in use that the, baptist or drip on the rotor, it should be cleaned immediately and partial dried.

6.1.3.4 When wash the rotor, use neutral detergent damp cotton cloth or sponge to clean, and then wash detergent with distilled water. Do not sprinkle or spray water on the rotor, because liquid could stay somewhere and have a result of corrosion. Inversion and dry are allowed after washing.

6.1.3.5 After centrifugation at low temperature, heat it to 25 ~ 30 °C, about 2 minutes later open the door and then power off, and dry condensate water interior centrifugal with a clean sponge or cotton cloth, and maintain the centrifugal chamber dry.

6.1.3.6 Using the cloth or tweezers to move out spoil debris inside of centrifugal.

6.1.3.7 Motor shaft and rotor shaft hole to connect the site should be painted with grease.

6.1.3.8 Maintenance of the spindle motor steps:

- Open the power switch, until self-test to be finished;
- Press the button to open the door,Open the centrifuges door cover ;
- Use a dedicated random attached tool for disassemble rotor, screw loose locking sets and get out the rotor, clean the locking sets .NOTE: Clockwise to tighten up lock sets, anti-clockwise to release the lock sets;
- Clean the cone part of the spindle motor,do not left over spoil parts, an appropriate amount of lubricating oil or paper may be added.

6.1.3.9 When remove the machine mask in front, it is important to first cut off the power and unplug the power cord connected to the posterior wall of the machine, live operation are not allowed to prevent an electric shock or damage to the machine. Note: This operation can only be made by specially trained maintenance personnel from

6.1.3.10 The machine can only use equipment accessories provided by the

6.1.3.11 Ensure the power supply of centrifuge to be cut off.

6.1.3.12 Transportation, storage



The machine is a precision instrument and equipment, in the transport and store process, please note that moisture, shock, horizontally or rewind should be prevented.

Fragile

Upward

Moisture-proof

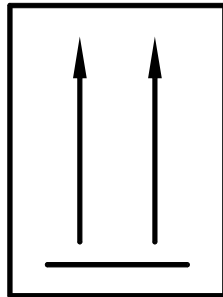
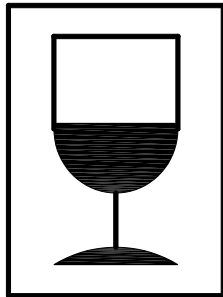


Figure 8: Transport and Storage Attention

6.2 Maintenance responsible Of.

High-speed Benchtop Air-refrigerate Centrifuge made by TOPSCIEN. will be maintenance once a year by special maintainer from TOPSCIEN.. And the content of maintenance is as following:

- Examination of electrical part.(Examination of internal circuit functions)
- Examination of stability of the resettlement of the centrifuge.
- Examination of electromagnetic locks and other security circuits.
- Examination of rotor locking device and spindle motor (driveshaft)
- Maintenance staff clean the rotor and check the performance.
- Charge when they provide on-site repair & maintenance service.

Details of charging amount will be told on the sales contract by both parties.

On the process of maintenance, if we find parts need to be replaced, it will be free of charge if in the warranty period. otherwise it will be charged.

6.3 Basis of warranty

Date of warranty will begin from the day user receive the product.Maintainer from TOPSCIEN. will provide free home repair service if the there is problem with the machine in the warranty period. If the component need be replace because of its quality but not improper use, we will replace it for free. Otherwise it should be paid, and Shell of the machine is not in the scope of warranty.

Basis of warranty are as following:

- Users should operate the machine as requirements of this manual.
- The operation of installation, commissioning, moving, adding accessories, maintenance etc should be designated by specialized or authorized staff of TOPSCIEN..
- Routine maintenance should be operated regularly as this manual required.
- If it's damaged because of improper-use, TOPSCIEN. will repair it but it's not free of charge. guarantee that if there's any problem with quality within 18 months after sales, we will repair for free. It's will be charged if the warranty period becomes due.



07. Fault Handling

7.1 Open cover in emergencies

In the process of normal usage, sometimes there's accidental power failure or fail to open the door, you can't open the door but you have to remove the samples, in this case, you can open the door cover manually, and remove the sample. Note: This way can be only used for emergencies. Don't use it as you like.



When there is power failure, it will take long time to let the rotor stop totally because rotor hasn't break function when it stops to run. Please wait patiently.

Emergency door, following these steps:

7.1.1 To confirm the complete cessation of the rotor;

7.1.2 Cut off the electricity.

7.1.3 Pull right the emergency cord firmly and flatly and slowly, then the door cover open, and you'll be able to separate centrifuge samples out of the centrifuge;

7.2 Information of trouble alarm

The table below shows the alarm information of the machine and the reason as well as the way to solve, you can rule it out according to the table. If users still can't solve the problem or the alarm information is not included, please contact maintainer from TOPSCIEN. immediately.



Please turn off the electricity first when there is any problem. And start it until the problem is solved.

Table 3: Data of error alarm

Symbols	Information of abnormal phenomenon	Troubleshooting
Erro1	<u>Imbalance</u> . Centrifuge stops to work because of detection of over-vibration	re-weight error allowed $\leq 1.5g$ <ul style="list-style-type: none"> • The device is placed acclivitous and the stress is unequal, please adjust the device to make the stress equal. • If the spindle motor is bent, please contact us to replace new one.
Erro2	Over speed. It stops to work because of detection of over speed of rotor	<ul style="list-style-type: none"> • Problem of microcomputer control system, please contact us. • Problem of speed sensor. Please contact us.

Erro3	Door cover protecting	<ul style="list-style-type: none"> ● Re-close the door cover ● Please contact us if the door cover is broken
Erro4	Input voltage too low	<ul style="list-style-type: none"> ● Check the Power Source
Erro5	Braking over voltage	<ul style="list-style-type: none"> ● The Power source voltage is too high, Or the braking resistor failed or brake too fast.
Erro6	Over Current	<ul style="list-style-type: none"> ● The Power source voltage is too high, Or the acceleration is too fast.
Erro7	No velocity measurement	<ul style="list-style-type: none"> ● The hall sensor failed or the motor failed
Erro8	Fault of communication	<ul style="list-style-type: none"> ● Check for the Communicate lines.
Erro9	Over Voltage	<ul style="list-style-type: none"> ● The Power source voltage is too high, Or the acceleration is too fast.

Table 4: Fault phenomenon, causes and troubleshooting

Fault phenomenon	Causes and Troubleshooting
No display	<ol style="list-style-type: none"> 1. check whether the power outlet and the connection is right; is the power supply on.. 2. whether the switch is right. 3. If you can't solve it, please contact staff of TOPSCIEN..
Stop to work suddenly	<ol style="list-style-type: none"> 1. The speed extend the maximum rated speed of the rotor. 2. Once the speed of the rotor extends rated speed of 250r/mi, the alarm of over speed will work. Then, You should wait until the machine stops and reset the speed. 3. The speed extends setting speed of the rotor. 4. If the motor is overheating, power supply will be cut inside the machine, and then the machine will stop working. 5. If there isn't any display on the keyboard panel, please check the power supply system of the machine. 6. Maybe the voltage is low, please check whether the voltage of the power supply is right.

Fault phenomenon	Causes and Troubleshooting
Door can't open	<ol style="list-style-type: none"> 1. The door can't open until the rotor finishes stopping turning. 2. Check the assembly of the door lock. 3. Check the electrical wires of the door lock. 4. Open the door manually. 5. If you can't solve it, please contact staff of TOPSCIEN..
Vibration of machine is a bit heavy	<ol style="list-style-type: none"> 1. The following situation is normal: The speed of rotor is over the critical speed and the machine vibrates. 2. Check whether the rotor is locked tightly or not. 3. Check the symmetry of the load of the rotor; check the working situation of the machine. 4. Check whether the rotor is installed correctly.

	5.Check the shaft: rotate it with hand and if it can't rotate smoothly, then maybe there's problem with shaft or motor. If you can't solve it, please contact staff of TOPSCIEN..
Indicator light of panel LED isn't up after switch on.	1.Power supply is not connected, please check the power. 2.The fuse of PCB board and power outlet is broken, please ask professional staff change the fuse. 3.If you can't solve it, please contact staff of TOPSCIEN..
Unusual display of operating panel	1.Maybe it's because of the interference of power grid, please shut down and start it after 1 minute, and then the display will be right.
The motor doesn't work after pressing start key	1.Electric control circuit is broken. Please change the electric control board.
Smell of burnt from the machine	1. Cut off the power. 2. whether the motor is burnt 3.whether the electrical components are burnt 4.Rotate the driving shaft with hand, if it can't drive smoothly, please contact professional staff of manufacturer to solve it.
Not the problems above	1.Please contact the professional staff of manufacturer to solve.

7.3 Performance Log

In order to ensure the normal operation of the machine to extend using time of the machine; and accumulate data of operation of the machine to do the diagnostic or get the reason of accident; please record the running of the operation every time, Recommended Record List can be as following:

Date	Sample Name	Weight of single-tube (Including samples)	Rotor No.	Speed	Time	Working condition of machine	Operator

08. Technical data

Function/ Parameter	Technical Data
Environment of Use	<ul style="list-style-type: none"> ● House supply ● There isn't any vibration or air-flow around which maybe effect the performance of the instrument. There isn't any conductive explosive dust or corrosive dust around ● Altitude: ≤2000m ● Relative humidity: ≤80%
Ambient Temperature	●+5°C~+40°C
Applicable voltage	● AC230V 50HZ/60HZ 10A
Setting time range	● 0~99Min
Maximum speed	●15000rpm
Maximum relative centrifugal force	●20375×g
Maximum capacity	●5mL×10
Climbing Speed	● It will take less than 20s from zero to maximum speed
Lowering Speed	● It will take less than 30s from maximum speed to zero
Noise (maximum speed)	●≤65dB(A)
Dimensions(machine)	● 280mm (L) *360mm (W) *250mm (H)
Net Weight	●16kg
Quoted Standard	●GB4793.1-2007《Measurement, control electrical equipment

	<p>for laboratories safety requirements spart1 : General safety requirements》；</p> <ul style="list-style-type: none">●GB/T14710-1993《Medical electrical equipment environmental requirements and test methods》；●GB4793.7-2001《Measurement, control electrical equipment for laboratories safety requirement special requirements for laboratory centrifuge》；●GB191-2000《Transportation packaging logo icon》；●GB6587.6-86《Transport-Test of Electronic Measurement Instruments》；●Industrial Requirements : Q/VARM 1-2008《High-speed Refrigerated Centrifuge》；
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Email: contact@labstac.com

Website: www.labstac.com

