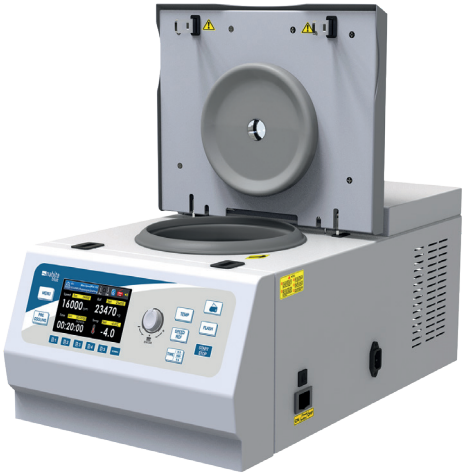
CENTRIFUGA REFRIGERADA DE ALTA VELOCIDAD
HIGH-SPEED REFRIGERATED CENTRIFUGE
CENTRIFUGEUSE RÉFRIGÉRÉE À GRANDE VITESSE

Modelo | Model | Modèle 2821R



Este manual es parte inseparable del aparato por lo que debe estar disponible a todos los usuarios del equipo. Le recomendamos leer atentamente el presente manual y seguir rigurosamente los procedimientos de uso para obtener las máximas prestaciones y una mayor duración del mismo.

This manual should be available for all users of these equipments. To get the best results and a higher duration of this equipment it is advisable to read carefully this manual and follow the processes of use.

Ce manuel est une partie indissociable de l'appareil et doit être mis à la disposition de tous les utilisateurs de l'équipement. Nous vous recommandons de lire attentivement ce manuel et de suivre scrupuleusement les procédures d'utilisation afin d'obtenir des performances maximales et une plus longue durée de vie de l'appareil.

LANGUAGE INDEX

SAFETY INSTRUCTIONS

To avoid damage to persons, surrounding objects and the environment, follow all safety instructions in this User Manual. In addition, local laws and regulations for the installation of the centrifuge, accident prevention, environmental protection and recognised professional standards for occupational safety and health must be carefully observed.

- Read this manual carefully when using this appliance for the first time.
- Centrifuges may only be operated by trained and authorised personnel.
- The equipment may only be serviced by qualified technicians.
- Do not put the following materials into the centrifuge:
  - Flammable or explosive substances
  - Aggressive chemicals
  - Toxic or radioactive substances
  - Pathogenic micro-organisms
- If the operator encounters a situation not mentioned in this manual, contact your dealer for technical assistance.
- Use the accessories supplied by the manufacturer. If the user uses other accessories, Auxilab S.L. will not be responsible for any adverse consequences.
- This centrifuge must be inspected and maintained at regular intervals.
- Do not plug or unplug the power plug or activate the power button when liquid is on your hands.
- Do not unplug the power cord when the appliance is switched on.
- It is strictly forbidden to maintain and clean the centrifuge in the switched-on state.
- It is strictly forbidden to install the appliance on a work surface with unevenness and vibrations.

ENVIRONMENTAL CONDITIONS OF USE

The following factors can damage the centrifuge; take them into account to ensure safe operation:

- Chemical effects
- Environmental impact, including natural UV radiation
- Corrosion and wear of safety parts
  - Indoor use only
  - Altitude: ≤ 2000m
  - The permissible ambient temperature is +5 °C to +40 °C.
  - The permissible relative humidity is ≤80%.
  - There must be sufficient ventilation in the working room
  - No vibrations and draughts around the centrifuge
  - No conductive dust in the surrounding air, no explosive gas or corrosive gas

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1. INTRODUCTION

1.1 Appearance

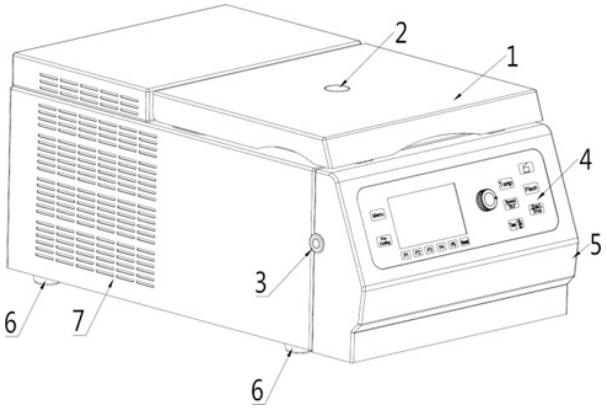


Figure 1: Front profile of the centrifuge

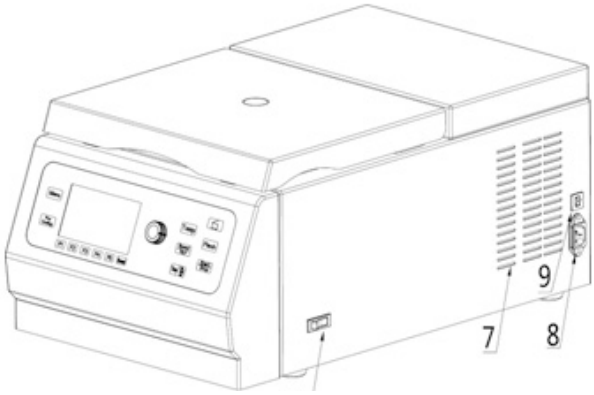


Figure 2: External view of the rear

1. Door cover
2. Visualisation area
3. Emergency door opening (always works when the machine is switched off)
4. Control panel and display window
5. Front cover
6. Leg
7. Heat dissipation holes
8. Exit
9. Electronic overload/short-circuit protector
10. Power switch

1.2 Summary

The high-speed refrigerated centrifuge is a device used for routine analysis in medical laboratories, biochemical and molecular biology research, and industrial laboratories. It can be widely used in clinical medicine, biology, chemistry, genetic engineering, immunology and other fields.

1.3 Security protection

This centrifuge has several safety protection mechanisms:

- The frame and protective ring are made of sheet steel, and the chamber is made of stainless steel.
- The lid adopts an explosion-proof structure, and there is a locking mechanism on the front of the lid. Only when the centrifuge is switched on and the rotor is stopped, you can press the release button on the control panel to open the lid. The centrifuge can only be started if the lid is closed.
- Overspeed: When the operating speed of the rotor exceeds the set speed by 400rpm, the machine will give an alarm. When the operating speed exceeds the maximum rated rotor speed by 400rpm, the rotor will stop automatically. The cover can only be opened after the rotor has come to a complete stop. After the problem has been solved, the machine will restart.
- Unbalance: If the rotor rotates unevenly during operation, causing the shaft to shake beyond the specified range, the machine will stop running in a timely manner and issue an alarm warning; usually the rotor load is unbalanced. Once operation is completed, open the cover and, after the problem is solved, operation can be restarted.
- Overtemperature: When the temperature in the centrifugal chamber exceeds the set temperature by 10℃, the machine will stop working in a timely manner and issue an alarm warning. It can only be restarted after cooling down the centrifugal chamber.
- Emergency opening of the lid: During operation of the rotor, if there is a sudden power failure or a malfunction of the machine that makes it impossible to open the door with the panel button, the lid can be opened manually.

2. OPTIONAL ACCESSORIES

Various rotors are available to users for the centrifuge model 2821R. You can purchase the centrifuge according to your actual usage requirements (for details, see “Table 1: Rotor types and technical parameters”).

Table 1. Rotor types and technical parameters

Code	Capacity	Maximum speed	Maximum relative centrifugal force (xg)	Tube type
GLK027	1.5/2 mL	16000 rpm	24100 xg	PP round/conical bottom with lid
GLK017	50 μL	12000 rpm	13600 xg	Capillary and Ø 1.5 mm × L75 mm
GLK018	5 mL	16000 rpm	18140 xg	PP round bottom with lid
GLK028	0.2 mL	14800 rpm	16200 xg	PP conical-bottom PCR tube with cap
GLK029	0.5 mL	15000 rpm	16350 xg	PP conical bottom with lid

3. PREPARATION BEFORE USE

3.1 Transport and installation

The approximate net weight of the machine is 47 kg. When handling, lift from both sides and balance the force. Handle the machine vertically.

When transporting or moving the product over long distances, use specialised packaging boxes, properly secured and kept upright, and handle them with care.

3.2 Location requirements

The placement of this equipment must meet the following requirements:

- When the equipment is in operation, leave a safety distance of 30 cm around it.
- The stand or table on which the centrifuge is placed must be sturdy. If a mobile stand or trolley is used, it must be one with a locking device.
- To ensure good air circulation, the distance between the back and sides of the unit and the wall should be greater than 15 cm and 20 cm respectively.
- It should be placed away from windows to avoid direct exposure to heat and sunlight.
- The four support feet of the centrifuge must rest evenly on the table and be adjusted horizontally.
- Keep the environment clean, with ambient temperature between +5 ºC and 40 ºC and relative humidity ≤ 80%.

3.3 Positioning the centrifuge securely

Once the centrifuge is in place, do not move it at will. If it is moved, reconfirm or adjust the level, and make sure that the four support legs on the bottom of the machine rest evenly on the table. Make sure that the platform or table on which the machine is placed is firm and cannot shake or vibrate.

3.4 Connecting the power supply correctly

The power cord of the centrifuge must use a separate power outlet which must be properly grounded. Confirm that the power cord used by the centrifuge meets the safety specifications of the country and region in which it is located. The power supply voltage and frequency applicable to the centrifuge must meet the requirements specified in this manual or the specifications marked on the nameplate of the centrifuge. Use the power cord supplied with the machine, connect it correctly to the machine's power socket and connect it firmly to the mains. When the power switch is closed, it is "|", and when the power switch is turned off, it is "O".

4. INSTRUCTIONS FOR USE

4.1. Introduction to the control panel and the display interface

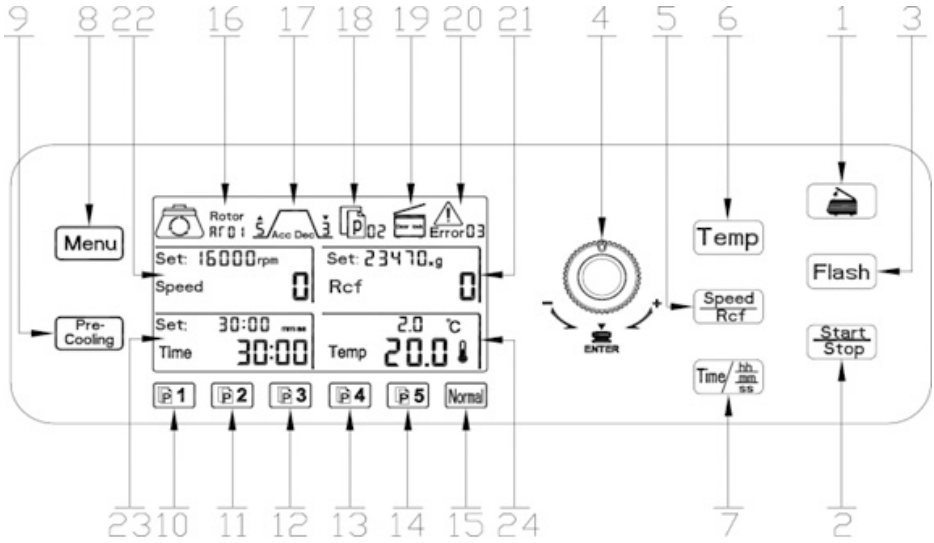


Figure 3: Schematic of the control panel/display interface

1. Lid release button
2. Stop/Start button
3. Short centrifugation key (Flash)
4. Parameter setting wheel
5. Relative centrifugal speed/force adjustment key
6. Temperature adjustment key
7. Time setting key
8. Menu setting key
9. Pre-cooling/Quick-cooling button
10. 10-14 Direct access keys to the programs in memory
15. Press this key during non-programmed operations to instantly adjust various centrifugation parameters (NORMAL).
16. Display area for rotor adjustment
17. Display area for speed adjustment
18. Storage programme
19. Lid status display area
20. Information display code area (fault)
21. Display area of the maximum relative centrifugal force.
22. Set speed display area
23. Set time display area
24. Programmed temperature display area

4.2. Start-up

Connect one end of the power cord to the power socket and the other end to the mains. The power supply must use a separate socket. The power supply range used in this machine is 220VAC±10%, 50/60Hz. After connection, turn on the ON/OFF switch. The colour LCD display on the control panel lights up. Once the self-inspection is completed, access the home screen, and you can proceed to the next step.

4.3 Opening the cover

Press the lid open key on the control panel, the buzzer will emit a warning sound. The lid status display area shows the lid open symbol and then the lid needs to be lifted by hand to open it fully and the inner chamber will be displayed in front of the user.

Note: If a malfunction occurs and the lid cannot be opened automatically, if samples need to be removed from inside the chamber, manual opening of the lid can be used.

4.4 Closing the cover

Hold both sides of the lid with both hands at the same time and close it gently. Once the lid is closed, the machine will emit a warning tone and the lid status display area will show the door closed symbol.

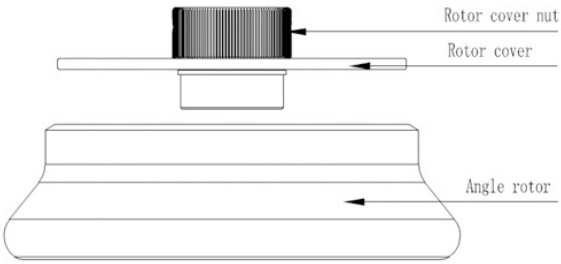
Note: When the lid is not properly closed, the centrifuge does not work. Please confirm that the lid is properly closed.
When closing the lid, close it slowly with both hands, and do not use excessive force to close the lid. avoid injuring the palm of your hand or damaging the lock hook.

4.5 Rotor installation

The rotor used must be supplied by the centrifuge manufacturer. Specifications of various rotors available from the manufacturer are included in this manual (see “Table 1: Rotor types and technical parameters” for details).

Note: The use of unsuitable centrifuge rotors and tubes will result in poor centrifuge performance. centrifuge or even damage it.

The steps to install the rotor are as follows:
- Turn the ON/OFF switch on and wait until the self-inspection is completed.
- Press the lid release button, open the lid and confirm that the chamber is clean and free of foreign matter.
- Clean the surface of the motor shaft.
- Prepare the rotor you wish to use. Hold the rotor with both hands, align the centre hole of the rotor with the motor shaft, lower it vertically, place it on the bottom of the shaft, release both hands, and then press the rotor down with your hands.
- Use the special hex spanner to tighten the locking nut clockwise.



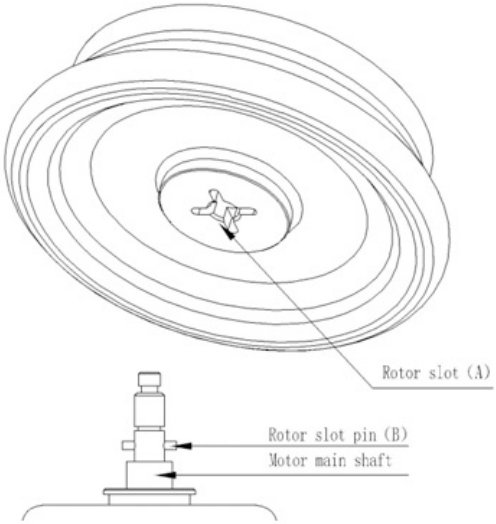


Figure 4: Angle rotor installation diagram A

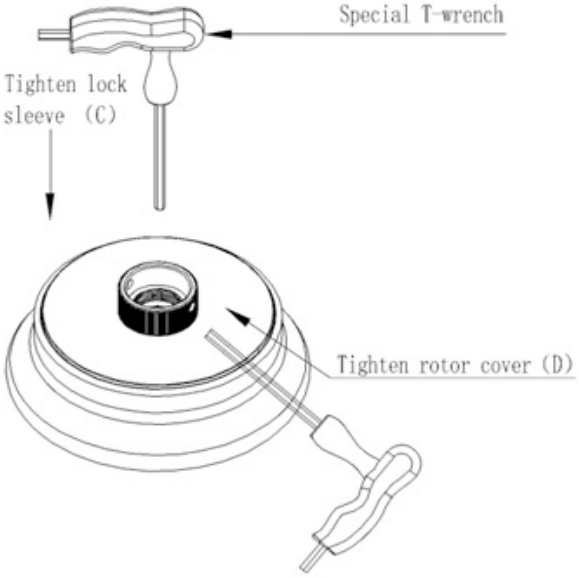


Figure 5: Angle rotor mounting diagram B

Note: After installing the rotor, check if its position changes before or after each use. If necessary, retighten the locking nut to ensure that the rotor is securely in place.

4.6 Rotor load calculation

Calculation of the maximum load capacity:
When the high-speed centrifuge operates at low speed there is an enormous centrifugal force; when each rotor is designed, it is required to have sufficient mechanical strength when operating at maximum rated speed, i.e. to have a 'safety factor'; however, this 'safety factor' regulation requires that the rotor load does not exceed its maximum rated load.
If you place the samples together in the rotor, and the total exceeds the maximum rated load of the rotor, you must reduce the weight of the samples or calculate the permissible operating speed (NPERM) of the rotor, to ensure that the load on the rotor does not exceed its maximum rated load.

The permissible rotor speed (NPERM) is calculated as follows:

NPERM = Nmax × (maximum permissible load÷actual load) 0,5
Nmax: maximum rated speed

Note: Do not overload the rotor, or it will explode, and the debris generated by the explosion will damage the centrifuge.

4.7 Filling of samples into the container

When the centrifuge is in operation, the better the balancing performance of the rotor, the better the centrifugation effect achieved. Therefore, the samples should be filled into the centrifuge vessels as evenly as possible, in order to achieve a better equilibration effect during operation. All samples should be placed in suitable containers. Check carefully whether the container (centrifuge tube) used complies with its maximum permissible nominal acceleration (centrifugal force); if the requirements are met, reduce the operating speed for use.

Note: Pay attention to the service life of the centrifugal containers used, especially when operating at the maximum permissible load and speed; check the containers used for damage and replace them if necessary.

4.8 Safe use of the rotor

- Samples shall be loaded accurately and symmetrically, and tubes shall be positioned prior to rotor operation.
- If the centrifuge is to be used several times, check whether the locking nut is loose after several uses. If it is loose, it must be tightened before starting the centrifuge.
- Centrifuge tubes must be loaded symmetrically (permissible weight error ≤ 1,5g). If samples are loaded asymmetrically, it is not permitted to start the machine.

4.9 Example of the parameter settings

When the centrifuge is configured with the AT01 rotor (1.5/2.2 mL). The specific operation is as follows: turn on the power - turn on the power switch of the device - the colour LCD display will light up. For example, the following parameters need to be set:

Rotor	Speed (rpm)	Time (min)	Temp (ºC)	ACC	DEC
AT01	16000	30	4	5	3

Setting: Press this key NORMAL to cancel the memory operation and set various centrifugation parameters immediately. At this time, the stored programme icon 'P+number' P 2 will be hidden.

Rotor number setting: The device automatically recognises the rotor model without adjustment, and the rotor number display area shows a numerical value during automatic recognition Rotor AT01 ; when automatic recognition fails, see section 5.10.7 for manual adjustment.

Temperature setting: Click on the key Temp - make the numbers in the temperature display area flash - turn the parameter setting knob to set the temperature to 4.0.

Speed setting: Click on the key SPEED RCF - make the numbers in the speed display area flash - turn the parameter setting knob to set the speed to 16000. Note: The Rfc value is automatically converted with the speed value.

Time setting: Click on the key Time/hh.mm/ss - choose the desired time unit (hours, minutes or seconds) - the numbers in the time display area flash - enter the required time.

ACC/DEC setting: the acceleration and deceleration settings for starting the machine at speed set and stop the machine running have values ranging from 0 to 9. The higher the value, the shorter the time it takes. Enter the second level menu interface.
Click on the key Menu - flash the numbers on the ACC display bar - turn the knob on the parameter setting knob to set the speed to 5 - Click again on the key Menu - flash the numbers on the DEC display bar - turn the knob on the parameter setting knob to set the speed to 3. Note: When DEC is set to 0, the stop is free, and the system has no braking intervention.

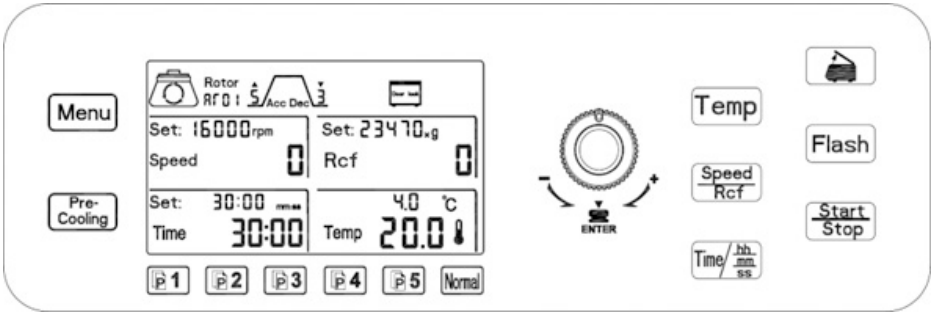


Figure 6: Example of completed parameterisation

4.10 Configuration of other parameters

■During the parameter setting process, if an alarm occurs due to machine malfunction or incorrect parameter setting, press the key [START STOP] to cancel the alarm and reset it according to the rotor number.

■Press the START key and the machine will start to run (if you need to stop halfway, press the STOP key). The time will gradually decrease from the set value to zero. When the time value is displayed as zero, the centrifuge will stop automatically. At this time, the speed will gradually decrease from the set value to zero (the time it takes for the speed to decrease from the set value to zero is related to the deceleration setting). When the speed reaches zero, the machine will emit a shutdown sound. Press the STOP key to stop the sound. Centrifugation is completed.

■If short spin time is required: Press and hold [FLASH] key on the control panel, and the speed will keep increasing. Release the key to stop. The maximum speed during this time will be the set speed corresponding to the rotor number and the time will increase in seconds.

■Setting the reminder tone: Press and hold [SPEED RCF] and [Time hh/mm ss] for 3 seconds. The following numbers flash, turn the parameter setting knob to set the type of reminder tone. Numbers 1-4 correspond to the reminder tone type and number 5 corresponds to the closing reminder tone.

■Storage memory configuration: The device provides 10 sets of customised memory programs for different experimental parameters. P1-P5 is a commonly used shortcut key on the control panel. For P6-P10, press the key [Menu] . To cancel storage and switch to normal operation mode, press the key [NORMAL]

■Pre-cooling setting: To use this function, install a rotor and close the lid, otherwise the expected effect cannot be achieved! Press the key [Pre-Cooling] on the control panel. At that moment 'Pre-C' appears on the display Rcf- the fixed speed is 3000 rpm, and the fixed temperature is 0.0 ºC. When the temperature drops from room temperature to 0.0 ºC the countdown runs for 3 min (keeping the temperature inside the centrifuge chamber at depth) and the status bar appears. Press the key [START STOP] to terminate this function.

■Manual setting of the rotor number: If the automatic recognition of the centrifuge fails or the error code Error12/Error17/Error18/Error19/Error20 appears, an alarm is triggered. Press and hold the keys [Temp] and [SPEED RCF] simultaneously for 5 seconds until the number appears on the display [Rotor 1801] . At this point, the spindle number is set manually.

■After the machine speed stabilises, if necessary, the parameters such as speed/centrifugal force, time, acceleration/deceleration can be changed again.

■Before adjusting the parameters, the rotor must be correctly installed on the shaft.

■If an error is detected during the parameter setting process, it is possible to reset the parameters.

■Calculation of centrifugal force: Relative centrifugal force is generally thousands of times the Earth's gravity (g). It is a unit used to measure the effectiveness of centrifuges in separating objects. The calculation of centrifugal force is related to centrifugal velocity and radius, and is calculated according to the following equation: $RCF=11.18\times(n/1000)^2\times r$ | r: Centrifugal radius, cm | n: centrifugal speed in rpm (revolutions per minute)

Note: "The value of the maximum centrifugal force is related to the maximum centrifugal radius". The set "centrifugal force value" must consider the radius of the rotor and the shape of the centrifugal bowl.

5. MAINTENANCE

5.1 Cleaning/Decontamination

Do not attempt to clean the centrifuge when the power cord is plugged in, or the ON/OFF switch is on. If the equipment or accessories are contaminated by pathogenic, toxic or radioactive materials, it is the responsibility of the user to perform proper cleaning/decontamination. The cleaning/decontamination method selected may damage the equipment; consult your supplier first. If you plan to send equipment or accessories for service, you must ensure that they are clean and safe for the human body. Do not use organic solvents because they may break down the grease in the motor bearings; during the cleaning process, liquids, especially organic solvents, must not encounter the motor shaft and bearings. Regular cleaning and maintenance work should include the centrifuge housing, the inner chamber and the rotor. This is to prevent contaminants from remaining on the surfaces, causing corrosion and environmental pollution.

5.2 Maintenance

- Do not use sharp objects to hit the rotor. Avoid shocks during handling and disassembly. Avoid cracks in the rotor during use due to scratches or trauma.
- Periodically check the rotor assembly for corrosion spots, scoring or small cracks. If any of the above conditions are found, discontinue use of the rotor and contact Technical Service.
- Note: When disassembling the rotor, hold it with both hands and lift it vertically without shaking it from side to side.
- Normally, the rotor should be cleaned once a week. If used for saline solutions or other corrosive samples, wash it immediately after use. If the sample spills on the rotor, it should be immediately drained and partially cleaned.
- When cleaning the rotor, clean it with a mild detergent moistened with a sponge or cotton cloth, and then remove the detergent with distilled water. Do not spray or splash the rotor with water, as the liquid may remain somewhere and cause corrosion. Allow to invert and dry after washing.
- Use rags or tweezers to remove dirt residues from the centrifugation chamber.
- The connecting parts of the motor shaft and the rotor shaft bore shall be coated with lubricating oil.
- Steps for the maintenance of the motor shaft:
  - Turn on the ON/OFF switch and wait until the self-inspection is completed; press the key to open the centrifuge lid.
  - Use the special tool supplied to disassemble and assemble the rotor, unscrew the locking nut, remove the rotor and clean the tensioning sleeve. Note: Clockwise is for tightening the locking nut, counterclockwise is for loosening the locking nut.
  - Clean the conical surface of the motor shaft, and do not leave any dirt. Add the appropriate amount of lubricating oil or use lubricating paper to coat it.
- When disassembling and reassembling the machine, first turn off the power and unplug the power cable connected to the rear wall of the machine. Live operation is not permitted to avoid electric shock to personnel or damage to the machine. Note: This operation may only be carried out by specially trained maintenance personnel.
- Use only spare parts supplied by the manufacturer.
- The power supply must be switched off when the centrifuge is not in use.
- Transport and storage
- This machine is a precision device. During transport and storage, pay attention to protection against moisture and shocks. Do not place it horizontally or upside down.

fragile upwards moisture-proof

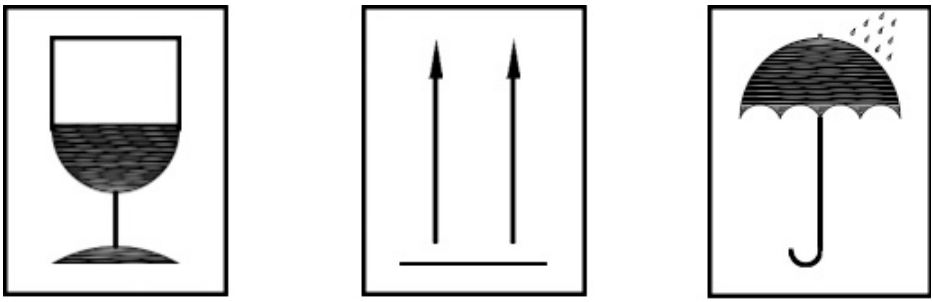


Figure 7: Transport and storage precautions

6. PROBLEM SOLVING

6.1 Emergency opening of the lid

During normal use, due to an accidental power failure or lid opening failure, you will not be able to use the automatic lid opening function. In this case, you can use the manual lid opening method to open the lid and remove the samples. Note: This method can only be used in an emergency and should not be used casually.
Note: In case of power failure, the rotor stops running without braking function. It takes a long time to stop completely. Please wait patiently.
The steps for the emergency opening of the lid are as follows:

- Confirm that the rotor has come to a complete stop.
- Turn off the ON/OFF switch.
- Use the tool provided, insert it into the emergency opening and turn it in the direction of the emergency opening.
- Clockwise until the lid opens; you can then remove the samples.

6.2 Fault alarm information

The following list shows the alarm information indicated by the centrifuge, the causes of the related faults and the remedy methods, so that you can eliminate the faults according to the indications. If the user is still unable to clear the fault after attempting to do so or the alarm information indicated is not in the following list, the user should immediately contact the Service Department.

Note: In case of any anomaly, first disconnect the power supply, then identify the fault according to the error message and act accordingly.

Table 2. Fault alarm information

Error code	Meaning	Troubleshooting
Error 01	Imbalance	1- Place the samples in equilibrium, with an admissible imbalance. of ≤ 1,5 g 2- Check if both ends of the output line of the unbalance protection switch are short-circuited and closed (under normal circumstances, it should be in open circuit state). 3- Contact the distributor to replace the accessories.
Error 02	Speeding	When it is detected during operation that the speed exceeds the maximum rotor speed by 600rpm; this usually occurs in the acceleration stage and the acceleration gear must be downshifted.
Error 03	Lid not closed	1- Check if the signal wiring of the cover is properly plugged in. 2- Check for an open circuit at both ends of the door cover sensing switch lead wire (must be in a closed short-circuit state under normal door cover closure).
Error 04	Low voltage failure	Failure of the drive card or low input voltage of the supply mains
Error 05	Braking overpressure	1- Check whether the braking resistor is connected correctly or whether it is burnt out. 2- Reduce the DEC value
Error 06	Overcurrent	1- Accelerate too fast under heavy load, reduce the ACC value. 2- Inverter board failure or high external supply voltage. 3- Engine failure
Error 07	No speed measurement	1- Check that the speed measurement cable is connected. correctly 2- The Hall motor speed measurement sensor is defective and the speed measurement plate at the motor end needs to be replaced.
Error 08	Communication error	1- Check if the communication cable (grey 10-pin flat cable) is connected correctly. 2- The unit board is defective and needs to be replaced.
Error 09	Overvoltage	Make sure that the mains voltage of the power supply external voltage coincides with the nominal voltage of the machine
Error 10	Failure to open lid	The door is broken

Error code	Meaning	Troubleshooting
Error 11	Failure to close lid	The door is broken
Error 12	Rotor identification failure	Rotor not installed in place
Error 13	Damaged lock	Detect that the door open signal in place and the door close signal in place are input at the same time, and check whether the locking signal is working normally.
Error 15	Speed cannot reach the set value	Contact the distributor
Error 16	Temperature measurement failure	1- Check if the sensor plug is connected. correctly. 2- Open circuit of the sensor, please contact the distributor.
Error 17	Hall sensor failure	Motor Hall sensor failure, check if the sensor cable is not connected to the motor. Hall sensor of the motor is connected correctly or if the Hall sensor is damaged
Error 18	Failure to recognise	Contact the distributor
Error 19	Magnetic steel identification	Rotor recognition only detects a magnetic steel signal; please contact the manufacturer.
Error 20	Rotor misalignment	Check if the set rotor matches the actual rotor

Table 3. Faults, causes and troubleshooting

Failure	Causes of faults and troubleshooting
Screen off or screen turns off suddenly	1. Check if the socket and connection are good, and if the socket is energised. 2. Check if the ON/OFF switch does not have a good contact. 3. Check the fuse. If it is blown, replace the fuse. 4. If the cause is not found, contact the Service Department.
Sudden stop during operation of the machine	1. The speed is higher than the maximum rated speed of the rotor. 2. Once the rotor exceeds its maximum rated speed by more than 600 rpm, the overspeed alarm will operate immediately. At this time, the speed must be restored after shutdown. 3. The speed is higher than the set speed. 4. When the motor overheats, the power inside the machine is cut off and the machine stops working. 5. If the keypad panel does not work, check the machine's power supply system. 6. The voltage may be too low; check whether the supply voltage meets the requirements.
Lid cannot be opened	1. The rotor has not come to a complete stop; the lid must not be opened. 2. Check the components of the lid lock. 3. Check the electrical wiring of the cover lock. 4. Open the lid by the manual method. 5. If the cause is not found, contact Technical Support.
High vibration of the device	1. Rotor exceeds critical speed; some machine vibrations are normal. 2. Check if the rotor is locked. 3. Check the symmetry of the rotor load and check the level of the machine. 4. Check if the rotor is correctly installed. 5. Check the drive shaft and turn it by hand. If it cannot turn smoothly, there may be a problem with the drive shaft or the motor.
The display shows an exception	May be caused by mains interference; switch off, to stop the interference. for one minute before start-up, the display will return to normal.
The engine does not tour after press the button home	The electrical control circuit is broken, replace the electrical control board.
The machine smells burnt	1. Switch off the power supply. 2. Check if the engine is burnt out. 3. Check for burnt electrical components.

7. TECHNICAL DATA

Function/Parameter	Technical data
Operational environment	Indoor use only No vibrations or draughts affecting the performance of the centrifuge. No conductive dust, explosive gas and corrosive gas in the surrounding air. Altitude: ≤ 2000m Relative humidity: ≤80%. Ambient temperature: +5ºC - 40ºC
Feeding	220VAC±10%, 50/60Hz, 10A
Power	650W
Protection system	Electronic short-circuit overload protector
Time range	1-99 hours/1-59 minutes/1-59 seconds. Three modes can be selected. Accuracy ± 1 second.
Maximum speed	16000 rpm±20 rpm The maximum rated speed of the different rotors is different. Below the nominal maximum speed, the speed can be arbitrarily adjusted.
Maximum Fcr	23470×g
Maximum capacity	50 mL (5 mLx10)
Acceleration	Acceleration time from zero to maximum speed ≤ 20 seconds
Deceleration	Time to decelerate from maximum speed to zero ≤ 18 seconds
Temperature	-20 ºC~+40 ºC /increment of 0.1 ºC /display accuracy of 0.1 ºC /control accuracy of ±2 ºC
Cooling effect and temperature stability accuracy	When the temperature of the centrifuge chamber is consistent with the ambient temperature, the cooling time of the centrifuge chamber to reach 0 ºC shall not exceed 15 minutes. At the highest speed and the corresponding load of the centrifuge, the lowest temperature of the centrifuge chamber can be cooled to -10 ºC. The accuracy of the temperature inside the centrifuge chamber shall not exceed ± 1 ºC.
Noise (at max. speed)	≤60dB(A)
Overall dimensions	360x600x280 mm
Net weight	47 kg

8. PACKING LIST

Number	Name	Quantity	Notes
1	Centrifuge model 2821R	1	
2	Power cable	1	
3	Rotor	1	According to the order
4	Special hexagon spanner	1	
5	Lubricating oil	1	20 mL
6	User manual	1	