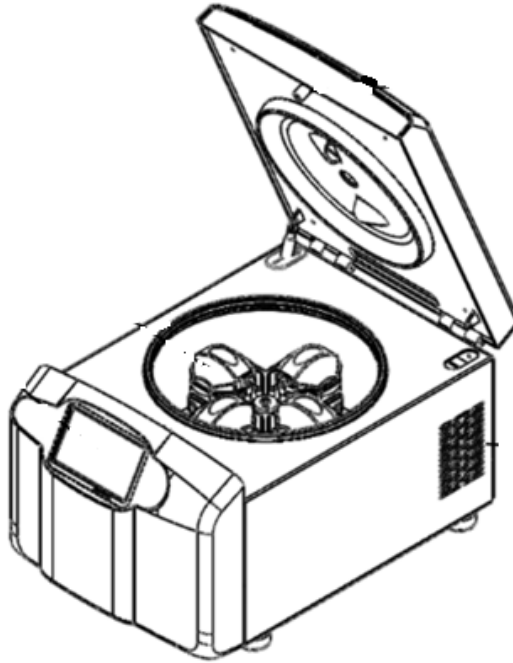


Large capacity high speed centrifuge

Instruction Manual



CEFC

12302845

Ver.20250623

Before operating and using the centrifuge, please read this instruction manual carefully to fully understand the precautions related to safety.

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Safety alert

Symbols are international safety signs, please read carefully and fully understand the following safety rules: 

Please read and fully understand the following safety matters carefully

- Use the centrifuge strictly in accordance with the operating instructions in this manual to ensure safety
- Please read all safety information in this manual carefully
- The symbols of the safety tips in this manual, "Warning" and "attention" are represented by this figure.  The operation or event with this icon indicates that it may cause danger. Pay attention to the operation method.

The details are as follows:

 **Warning: Personal Injury** This warning indicates any operation or use that, if not performed strictly in accordance with the operating manual, could result in personal injury or death.

 **Caution: Possible damage to the equipment** This caution indicates any operation or use that, if not performed strictly in accordance with the operating manual, may result in permanent damage or destruction of the

instrument.

- Do not operate the centrifuge in any manner not directed or described in the operating manual, and contact the original equipment manufacturer if there are any problems with use.
- The descriptions in this manual attempt to cover all possible operational risk warnings. If unexpected conditions occur during use that are not described in this manual, please contact the original equipment manufacturer.



warn

- This centrifuge is not explosion-proof designed, do not operate with explosive and flammable samples.
- Do not place the centrifuge in or near an area of flammable gases and chemicals.
- Do not place hazardous materials within 30cm of the centrifuge.
- Before using toxic and harmful samples, please prepare the necessary safety measures. Handling samples with radioactive or harmful microorganisms is at the user's own risk.
- If the centrifuge, rotor and accessories are contaminated with toxic,

hazardous or radioactive substances, the cleaning procedure shall be carried out in accordance with the relevant operating procedures.

- If the cleaning work requires customer service, please carry out the necessary harmless treatment before transferring the cleaning material to the customer service staff, and inform the customer service staff of the relevant details.
- Do not touch the centrifuge power switch with wet hands to avoid electric shock injury.
- To be on the safe side, do not enter the radius of 30cm of the centrifuge while it is working.
- Do not force open the door of the centrifuge compartment while the centrifuge is working.
- Do not perform unauthorized repairs, disassembly, and other repairs on the centrifuge. Contact the vendor service office or your nearest dealer if you have questions.



Warnings

- Make sure the centrifuge is placed on a firm and flat horizontal table

top.

- Make sure the centrifuge is level before running.
- Make sure the top cover is at an Angle greater than 70 degrees from the housing when opening the top cover.
- Do not place your hand between the top cover and the case when closing the cover.
- Do not move or rely on the centrifuge while it is running.
- When there is liquid in the centrifuge chamber, dry it promptly with a dry cloth to avoid contaminating the sample.
- Ensure that the centrifuge chamber is clean before running the centrifuge, and be sure to remove foreign objects in the centrifuge chamber, such as centrifuge tube fragments.
- Tips for the rotor:
 - (1) Before using the rotor, check the rotor surface for corrosion or damage, if there is such a problem, then stop using.
 - (2) The centrifuge set speed cannot exceed the minimum speed allowed in the rotor assembly and accessories (rotor, adapter), and be sure to keep the centrifuge running below the minimum allowable speed.

- (3) Do not exceed the permitted unbalance.
- (4) The centrifugal tubes used should be within their permitted capacity.
- (5) If the rotor has a cover, make sure to screw the cover tightly before running.
- In the process of running strange noise and other abnormal phenomena, please stop immediately, contact the service center, and inform the fault code displayed.
- Earthquake may cause damage to the centrifuge, if there is an abnormal situation, please contact the service center.

1. Performance indicators

Maximum RPM	300-16000rpm, step: 1 rpm
Maximum relative centrifugal force	28621xg
capacity	4x400mL

Timing	30s-99h59min59s /HOLD (continuous running)
Acceleration / Deceleration Levels	9↑9↓
Program storage	100
Motor type	DC brushless motor
Noise levels	≤70dB
Power supply	100-240V, 50-60Hz 650W
Size (LxW xD)	658x440x375mm
Weight	70Kg
Allow ambient temperature humidity	5-40 °C, 80%RH

2 Comply with the declaration

Meet the following safety specifications:

EN61010-1

EN61010-2-020
Meets the following EMC specifications:
EN61326-1/FCCPart15SubpartB/IECS 001
Compliance with relevant EU indicators:
EMC-guidelines:2004/108/EC Instrumentguidelines:2006/95/EC
This ISM device complies with Canadian ICES-001.

3 Environmental conditions

3.1 Basic operating conditions

(1) Power supply:

100-240V, 50-60Hz

(2) Working temperature: 2°C ~ 40°C.

(3) Working humidity: ≤80%.

(4) There is no vibration and airflow affecting the performance around.

(5) There is no conductive dust, explosive gas and corrosive gas in the surrounding air.

3.2 Transportation and storage conditions

- (1) Ambient temperature range: $-40^{\circ}\text{C} \sim 55^{\circ}\text{C}$.
- (2) Relative humidity range: $\leq 93\%$.

4. Installation

In order to ensure the user's normal and safe use of the centrifuge, be sure to strictly follow the instructions in the operation manual. Ensure that the rotor is removed before moving the centrifuge.

Warnings

- An incorrect power connection can damage the centrifuge.
- Check that the power supply meets the requirements before connecting the power supply.

4.1 Installation Position

- (1) The centrifuge must be installed on a solid, flat and level table, and ensure that the four feet of the centrifuge are in contact with the table. Do not install the centrifuge on the sliding table surface, otherwise it is easy to cause large vibration.
- (2) The ideal ambient temperature is $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$, and the ambient temperature should not exceed 30°C to avoid direct sunlight on the

centrifuge.

- (3) Ensure a 10cm gap on both sides of the centrifuge and a 30cm gap on the back side of the centrifuge to ensure the air cooling effect of the centrifuge.
- (4) There can be no heat source or water leakage near the centrifuge, otherwise it will easily lead to sample temperature rise or centrifuge failure.

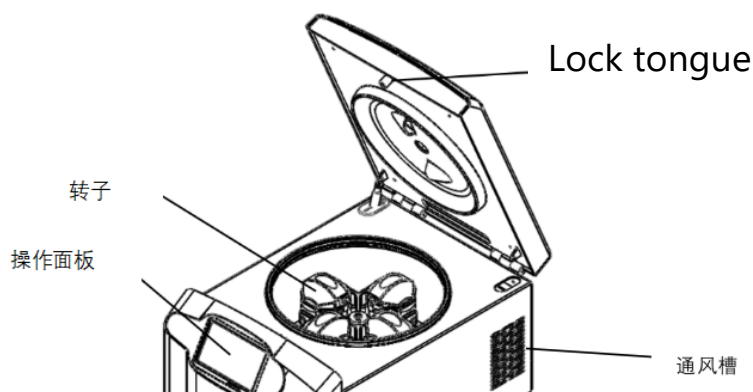
4.2 Connection of power cables and ground cables

Warnings

- Do not touch the power cord with wet hands to prevent an electric shock.
- The centrifuge must be well grounded.

The rated current of the power strip should be more than 10A, and it should meet the local electrical safety requirements to ensure that it has a good protective ground end.

5. Structure



Rotor

Operation panel

Ventilation slot

Figure 5-1 Front view of the centrifuge

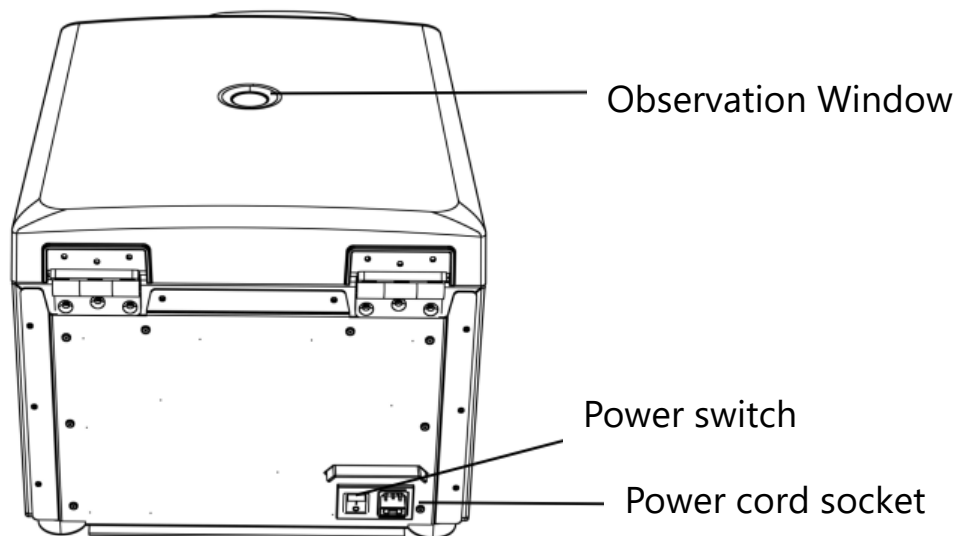
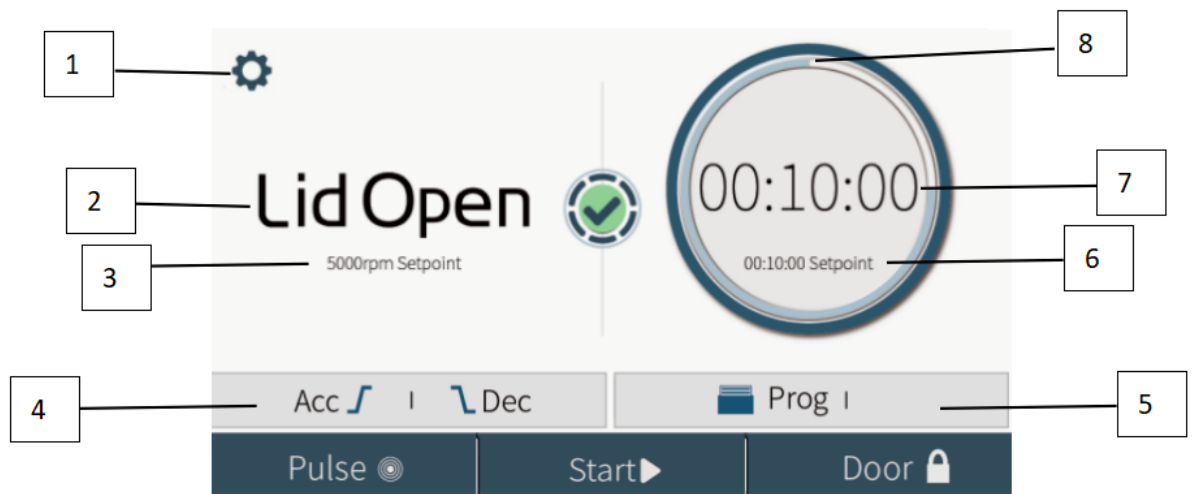


Figure 5-2 Back of the centrifuge

6 Operate the panel

6.1 Main Interface



Serial number	Name	Features
1	Settings	Click to enter the parameter setting interface, you can adjust the speed, running time, cooling temperature (air cooled models do not have this).
2	Top tip/Current speed or centrifugal force display	When the machine opens the upper cover, it displays Lid open; When the upper cover is closed, if the setting mode is rpm mode, the set speed will be displayed, and the current motor

		running speed will be displayed when the machine is running; If the setting mode is xg mode, the set centrifugal force will be displayed. When the machine is running, the centrifugal force of the current motor will be displayed. Click here to switch to the parameter setting interface.
3	Speed Setting	If the setting mode is rpm mode, the set speed is displayed; If set mode to xg mode, display set centrifugal force. Click here to switch to the parameter setting screen.
4	Lift gear Settings	Display the current speed up and down gear, click here to switch to the parameter setting interface.
5	Stored program Settings	Display the current stored program

		number, click here to set the program storage number, to call different programs, update centrifugal parameters.
6	Run time Settings	Display the current centrifugal time setting value, click here to switch to the parameter setting interface.
7	Run time countdown/positive timer	If the machine is not running, show the current set centrifugal time, if the machine is running by Start, show the run time countdown.
8	A Progress bar.	When Start is running, the countdown progress bar is displayed according to the proportion of the countdown running time.

7 Prepare the rotor

7.1 Prepare the sample to be separated

Warnings

- Adding excess samples to the centrifuge tube can cause leaks, so do not add excess samples.
- The total amount of samples should not exceed the actual load of the rotor.

7.2 Place the sample into the centrifuge tube

7.3 Ensure that the centrifuge tube is balanced

- Although the centrifuge allows the use of the visual balancing method, in order to extend the life of the centrifuge, it is recommended that the sample be weighed using a balance to ensure balance.
- Do not run the centrifuge in poor balance conditions, although unbalance is permitted.

7.4 Checking the Rotor

The rotor needs to be checked for corrosion or scratches before use.

Warnings

- Discontinue use if corrosion or scratches, etc. are found on the rotor.
- Do not use other brands or specifications of rotors on this machine.

7.5 Ensure that the balanced centrifugal tube is placed symmetrically into the rotor hole

Warnings

- Make sure to screw the rotor tightly to the spindle and that the cover is securely attached to the rotor. Otherwise, the rotor may fall off while the centrifuge is running, causing damage to the centrifuge or rotor.
- Screw the rotor cover securely with the rotor.

8. Operation

8.1 Loading and unloading rotors

Warnings

- Never push and pull while the centrifuge is in operation
- Never run the centrifuge while there is residue in the centrifuge compartment, and ensure that the centrifuge compartment is clean before running
- In the process of operation, strange noise and other phenomena, please

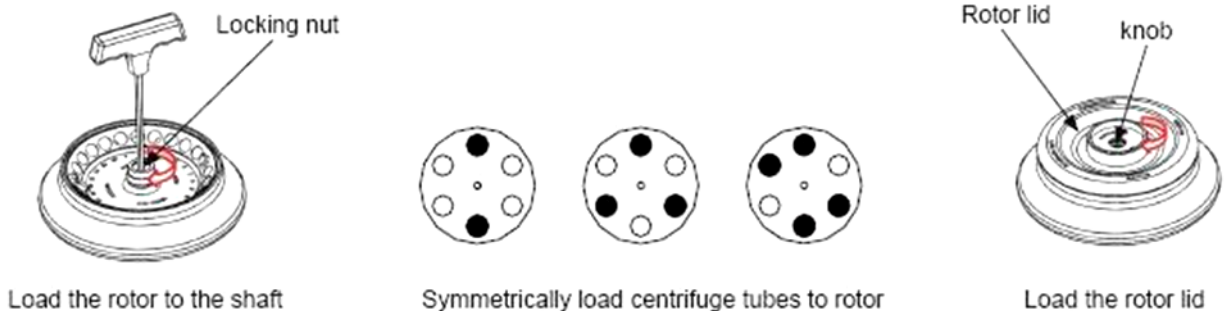


Figure 8-1 Installing the rotor

Warnings

- Before installing the rotor and rotor shaft, ensure the position of the

rotor and connecting shaft and lock the rotor and shaft locking nut to prevent the rotor from damaging the centrifuge.

- Make sure the rotor cap is locked with the rotor
- Make sure the rotor is in the correct position with the rotor shaft before installing the rotor.
- The "click" should be felt when the rotor is properly docked to the rotor shaft. If not, the two are not properly docked. Check the joint carefully for any foreign objects, and try docking again after cleaning.
- Gently turn the installed rotor with your fingers to feel if the rotor is running smoothly. If it feels like the rotor is bouncing or not running smoothly. Check to re-check the installation.
- Use a wrench to tighten the rotor clockwise with the rotor shaft.
- Install the rotor cover into place with the rotor and tighten the latches clockwise. Close the hatch and turn it on.
- Remove the rotor by reversing the steps above.

8.2 Setting Running Parameters

8.2.1 Speed setting

Click the  icon in the upper left corner of the screen or any parameter icon to enter the parameter setting interface, as shown in Figure 2. Select the speed mode as rpm or xg. Click the speed setting box and adjust the speed setting using the keyboard on the right side of the interface.

8.2.2 Setting the running time

Click the  icon in the upper left corner of the screen or any parameter icon to enter the parameter setting interface, as shown in Figure 2. Click the running time setting box, and adjust the running time setting value through the right keyboard. When "continuous" is selected, it means that the machine goes into continuous running mode.

*Note: For the air-cooled model (DG1616), when operating at speeds above 10,000 rpm, it is recommended that each run not exceed 1 hour to avoid overheating inside the chamber.

8.2.3 Program Setting and Saving

Tap the icon in the upper left corner of the screen or any parameter icon to

enter the parameter setting interface, as shown in Figure 2. Tap the “Prog” icon in the upper right corner to enter program setting. Select a program number to enter its parameter setting. After setting is completed, tap “Save” to save the program.

To use this program again, simply select the corresponding program number under the “Prog” icon.

8.2.4 Setting the timing mode

Click the  icon in the upper left corner of the screen or any parameter icon to enter the parameter setting interface. Click on the "Other" icon, as shown in Figure 3. Select the timing method to be positive or countdown.

8.2.5 Pulse Mode Setting.

Tap the “Pulse” icon to start continuous operation based on the current settings. Tap the “Stop” button, and the centrifuge will decelerate until it comes to a complete stop

8.2.6 Speed up and down Settings

Click the  icon in the upper left corner of the screen or any parameter icon

to enter the parameter setting interface. Click on the "Other" icon, as shown in Figure 3. Click on the Settings box to the right of ACC-Dec to bring up the speed up and down Settings screen. Figure 4. The speed up and down gear setting can be done at this point.

The following table is the comparison table of the lifting speed 1-9 gear (the rotor is SR4-400, the set speed is 5000rpm, the error is $\pm 10\%$)

Rotor model	Up gear	Speed up time /s	Load condition	Down gear	Downshift time /S
SR4-400	1	230	Empty hanging basket No adapter	1	165
	2	170		2	150
	3	137		3	143
	4	114		4	132
	5	98		5	118
	6	87		6	98
	7	72		7	81
	8	66		8	66
	9	55		9	57

8.2. 7 Date and time Settings

Click the icon in the upper left corner of the screen or any parameter icon to enter the parameter setting interface.  Click on the "Other" icon, as shown in Figure 3. You can do date, time Settings.

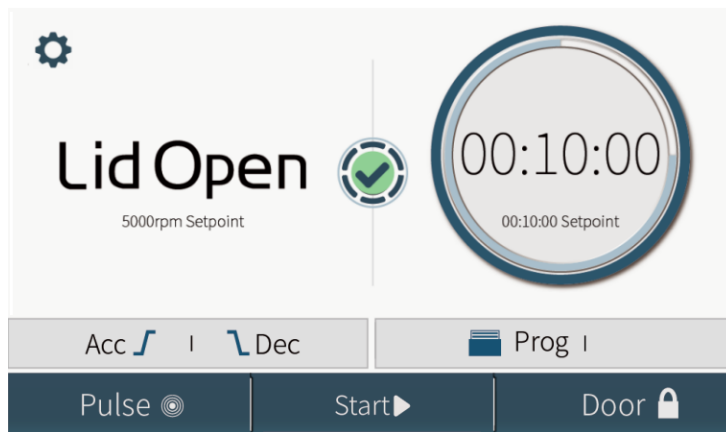


Figure 1

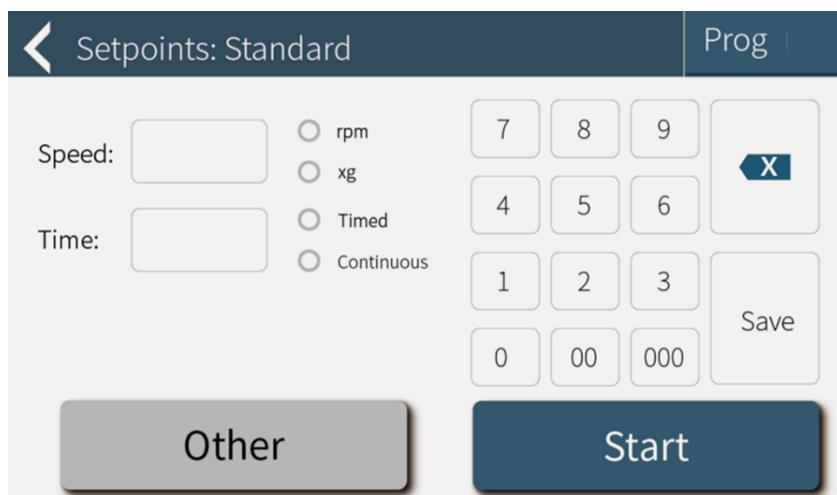


Figure 2



Setpoints: Other

Start Timer: ☐  ☐ 

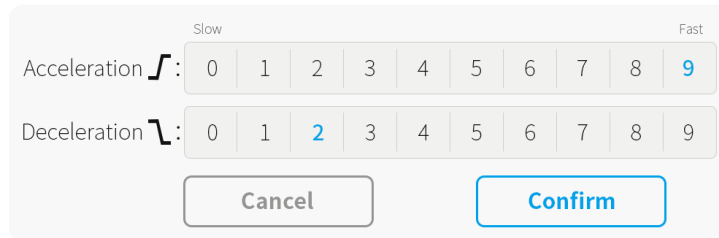
Acc-Dec: -

Date:

Time:

Navigation buttons:   7 8 9 4 5 6 1 2 3  0 

Figure 3



Slow Fast

Acceleration : 0 1 2 3 4 5 6 7 8 9

Deceleration : 0 1 2 3 4 5 6 7 8 9

Buttons: Cancel Confirm

Figure 4

8.3 Getting Up and running

Click  on the Run icon to start running and the icon changes to .

8.4 End Run

When the run time is up or the motor stop  icon, the centrifuge stops running.

When the speed drops to 0, you can click the door lock icon , open the top cover, and take out the rotor and sample.

9. Maintenance

9.1 Cleaning

Warnings

- Failure to follow the operating instructions below to clean the centrifuge may result in component damage.

(1) Body housing

- Centrifuges are exposed to ultraviolet light for a long time, which will cause appearance aging problems such as fading of the shell and falling off the label. Therefore, after use, please cover the centrifuge with the outer cover to avoid direct exposure.
- Use a rag or sponge to dip an appropriate amount of neutral chemical cleaning agent for cleaning.
- Use a rag or sponge to dip the appropriate amount of 70% alcohol for disinfection cleaning.

(2) Centrifuge chamber

Warnings

- Do not introduce liquids such as water, cleaning agent or disinfectant

directly into the centrifugal compartment, this can cause damage to the drive components.

- Use a rag or sponge to dip the right amount of 70% alcohol into the centrifugal chamber to clean it.

(3) Rotor shaft

- It is recommended that users wipe the rotor shaft regularly, using clean and dry rags and sponges to wipe.

(4) The hatch door

- The cleaning of the hatch door can refer to the requirements of the body shell.

(5) Rotor

- To ensure the good condition of the centrifugal chamber and rotor. If not in use, please remove the rotor from the centrifugal chamber. Open the rotor top cover and place the rotor flat with the rotor cover for safekeeping.
- If the rotor is contaminated by the sample, immediately rinse with water and wipe it clean.
- The rotor should be maintained regularly (every 3 months) to ensure that

the rotor and rotor holes are clean.

9.2 Daily inspection

(1) Before the inspection, place the centrifuge on a horizontal, stable and flat table.

(2) Check the ground wire of the centrifuge: Use a multimeter to check the status between the ground pin of the power cord and the rotor shaft. If it shows that it is connected, it means that it is really grounded; If it is open, you need to check the cause of the fault before use.

10. Fault check

10.1 Faults and solutions

The centrifuge is equipped with a self-diagnosis function. If an error occurs, an icon  will appear on the screen. Tap the icon to view the error code. Refer to the table below to identify the issue based on the displayed error code and corresponding symptoms:

Serial	Error code	Code meaning	The Fix
--------	------------	--------------	---------

Number			
1	E01	Communication errors	Restart the machine
2	E02	Leave the top cover on	1. Once the top cover is closed, press the start button again 2. Tap the error message on the screen to clear the error, then close the lid again. 3. Replace lock parts
3	E03	No signal for rotor identification	Reinstall the rotor or replace the rotor identification parts
4	E09	Unbalance protection	Use a balance to weigh the sample and install symmetry
5	E10	Motor not running	Restart the machine
6	E12	Motor overheating	Suspend the use and restart the machine after the machine has cooled for a period of time
7	E13	Drive overheat	Check that the motor is running properly

			Check whether the heat dissipation module of the drive axle on the drive board is installed properly and whether the fan is operating normally Replace the drive board
8	E15	High voltage error	Restart the machine
9	E20	overspeed	Restart the machine

Note: If the problem still cannot be solved according to the above methods, please contact your nearest sales or suppliers, do not disassemble the machine without permission, so as to avoid danger. If the machine is damaged due to unauthorized dismantling of the machine, it is not covered by the warranty.

11. Rotor and test tube introduction

Warnings

- Read through the following carefully to use the rotor correctly.
- When using rotors, please strictly follow the technical specifications of the corresponding rotors.

11.1 Rotor Structure

11.1.1 Rotor structure introduction

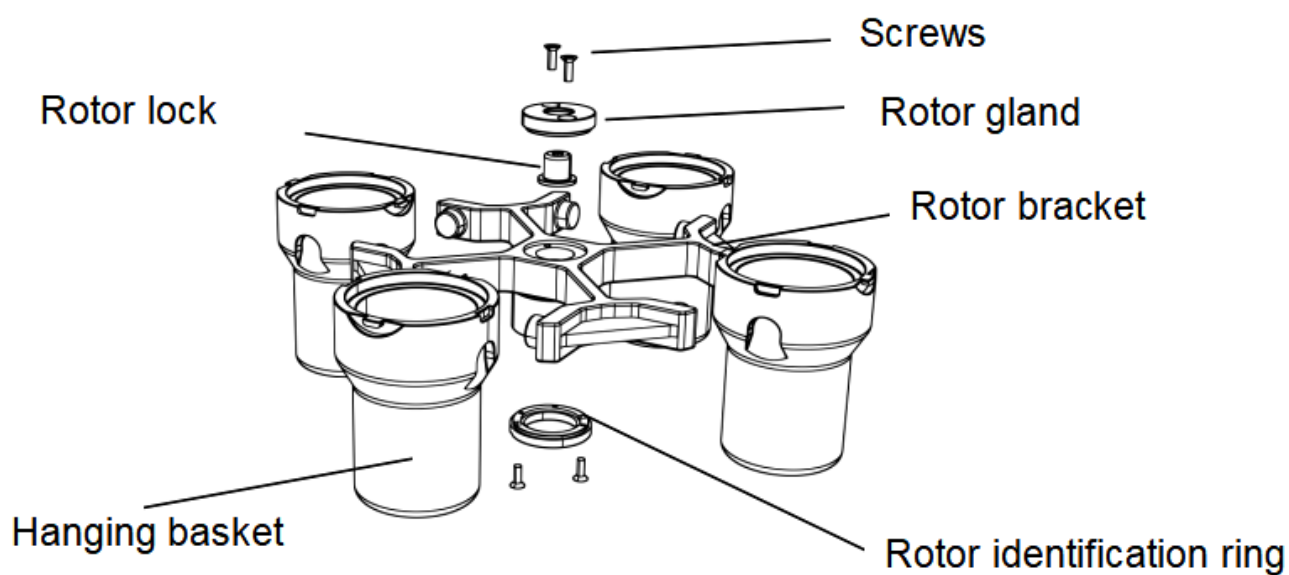


Figure 11-1 Rotor structure

11.1.2 Rotor and adapter tube

Rotor Model number	Capacity	Adapters	Centrifuge tube	Maximum relative centrifugal force	Centrifugal radius
SR4-400	4x400mL	-	400ML centrifugal	4639xg	16.6 cm

			bottle		
	4x100mL	100mL adapter	100mL centrifugal bottle with round bottom		
	16x50mL	50mL adapter	50mL pointy bottom tube		
	36x15mL	15mL adapter	15mL pointy bottom tube		
	76x7mL	5/7mL adapter	5/7mL sampling vessel		
	136x2mL	2mL adapter	1.5-2mL centrifuge tube		
SR4-MP	4x384 microplates /96microplates/Elisa plate ;	-	384 microplates/96microplates/Elisa plate	2969 xg	16.6cm
SR4-200	4x200mL	-	180mL centrifugal	5495xg	16.25 cm

			bottle		
	4x100mL	100mL adapter	100mL centrifugal bottle with round bottom		
	4x50mL	50mL adapter	50mL pointy bottom tube		
	20x15mL	15mL adapter	15mL pointy bottom tube		
	32x7mL	5/7mL adapter	5/7mL sampling vessel		
	48X2mL	2mL adapter	1.5-2mL microcentrifuge tube		
SE4-100	36×7ml	9 hole hanging rings	3-7mL blood vessel collection	2950xg	16.5 cm
	16×15ml	4 hole hanging	10/15mL centrifuge tube		

		rings			
	8×50ml	2 hole hanging rings	50mL centrifuge tube		
	4×100ml	Single-hole ring	100mL centrifugal bottle		
S2-MP	8X384 microplates /96microplates/Elisa plate ; 4x Deep well plates	-	384 microplates/96microplates/Elisa plate ; Deep well plates	2200xg	12.3 cm
AS6-50V	6x50mL 6x15mL	-	50/15mL centrifuge tube	17468xg	10cm
AS12-PCR8	12 x PCR8	-	PCR8	21912xg	10cm
AS18-5V	18x5mL	-	5mL pointy	25155xg	10cm

			bottom tube		
AS30-2	30x2mL	-	1.5/2mL microcentrifuge tube	28620xg	10cm
A8-50	8x50mL/16 x15mL	-	50/15mL centrifuge tube	3968xg	14.2 cm
AS60-2	60x2mL	-	1.5/2mL microcentrifuge tube	21912xg	10cm
A30-15	30 x 15mL	-	10mL /15mL centrifuge tube	3210xg	14.18 cm

Table 11-1 List of rotors and adapters

11.1.3 Attention

(1) Centrifuge by default can separate the sample density is not greater than 1.2g/mL, if the separation of the sample exceeds this value, please follow the following

Formula to calculate a reasonable speed:

Reasonable speed (rpm)= Maximum speed x (1.2(g/mL)/ sample density

(g/mL))

(2) To ensure the good condition of the centrifugal chamber and rotor. If not in use, please remove the rotor from the centrifugal chamber. Open the rotor top cover and place the rotor flat with the rotor cover for safekeeping.

(3) To protect experimental reagents and the motor, for the air-cooled model (DG1616), when operating at speeds above 10,000 rpm, it is recommended that each run not exceed 1 hour. For centrifugation tasks requiring durations longer than 1 hour, we recommend using our refrigerated model (DG1616R).

(4) If the rotor is contaminated by the sample, immediately rinse with water and wipe it clean.

(5) The rotor should be maintained regularly (every 3 months) to keep the rotor and the rotor hole clean.

11.1.4 High temperature disinfection treatment

- All drills are made of high-strength aluminum alloy or stainless steel and can be sterilized at 121 ° C (1.0kg/cm²) for 20 minutes.
- Some fittings are made of plastic and cannot be treated at high temperatures. You can use ordinary normal temperature disinfection method.

11.2 Centrifuge Tube

11.2.1 Wash and disinfect

Condition Material			PA	PC	PP
	Cleaner	Acid (pH5 or lower)	X	X	X
		Acid (higherthanpH5)	O	O	O
		Alkaline (higherthanpH9)	O	X	O
		Alkaline (pH9 or lower)	O	O	O
		Neutral (pH7)	O	O	O
		Warm water (up to 70C)	O	O	O
	Ultrasonic cleaning	Neutral detergent (pH7)	O	O	O
	High temperature sterilization	115 ° C (0.7kg/cm2) for 30	O	O	O
		121 ° C (1.0kg/cm2) for 20	X	O	O
		126C (1.4kg/cm2) for 15	X	X	X
	Steaming	15 to 30 minutes	O	O	O
	Uv sterilization	200-300nm	X	X	X
	Gigi Sterilize	Ethylene oxide (Ethylene	O	X	O
		Formaldehyde	O	O	O

PA: Nylon PC: polycarbonate PP: polypropylene

11.2.2 Pipe service life Different materials of pipes in different strengths after

a long time of use, there will be a phenomenon of mechanical property attenuation, the specific situation refer to the following information, the following letter is in the standard application (pipe sample PH5-9) under the conditions of the results. At the maximum operating speed: high quality pipe (PA, PC, PP): 30-50 uses Ordinary (PA, PC, PP): Use about 10 times (low-speed use can appropriately extend the service life). Whether the cleaning and disinfection are correct will also have an impact on the service life of the pipe. Tip: It is strictly forbidden to use the damaged pipe for separation operation

12. Relative Centrifugal Force calculation (RCF)

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

R -- rotor radius, unit: cm; n -- rotation speed, unit: rpm

13. Warranty

13.1 Centrifuge warranty

Centrifuges come with a 2-year warranty from the manufacturer's delivery date.

13.2 Rotor warranty

Rotors come with a 5-year warranty from the manufacturer's delivery date.

Please note that the following items are not covered by the warranty:

- (1) Incorrect installation damage
- (2) Incorrect operation damage
- (3) Damage caused by handling or transportation
- (4) Damage caused by unauthorized disassembly
- (5) Damage caused by the use of non-original parts
- (6) Earthquake, fire and other irresistible natural causes of damage
- (7) Accessories and consumables beyond the warranty period

14. After-sales service

In order to ensure the safe and efficient use of the centrifuge, it is necessary to carry out regular maintenance of the centrifuge. If there is a problem with the centrifuge, do not repair it on your own, contact your nearest dealer or manufacturer's after-sales service center.



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