Настольная высокоскоростная микроцентрифуга с охлаждением D1524R

руководство по эксплуатации

Ver.20211215

Before using centrifuge, please carefully read this user manual for its efficient operation and safety.

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Contents

Safety Reminder

Common safety precautions

Carefully read the following safety precautions for a thorough understanding.

- Follow the instructions and procedures described in this manual to operate this centrifuge safely.
- Carefully read all safety messages in this manual and the safety instructions on the instrument.
- Safety messages are labeled as indicated below. They are in combination with signal words of “WARNING” and “CAUTION” with the safety alert symbol to call your attention to items or operations that could be dangerous to you or other persons using this instrument. The definitions of signal words are as follows:

⚠ WARNING: Personal Danger

Warning notes indicate any condition or practice, which if not strictly observed, could result in personal injury or possible death.

⚠ CAUTION: Possible damage to instrument

Caution notes indicate any condition or practice, which if not strictly observed or remedied, could result in damage or destruction of the instrument.

NOTE: Notes indicate an area or subject of special merit, emphasizing either the product's capability or common errors in operation or maintenance.

- Do not operate this centrifuge in any manner not described in this User manual. When in doubt or have any troubles with this centrifuge, ASK FOR HELP.
- The precautions described in this User manual are carefully developed in an attempt to cover all the possible risks. However, it is also important that you are alert for unexpected incidents. Be carefully operating this centrifuge.

⚠ WARNING:

- This centrifuge is not explosion-proof. Never use explosive or flammable samples.
- Do not install the centrifuge in or near places where inflammable gases are generated or chemicals are stored.
- Do not place dangerous material within 30cm around the centrifuge.
- Make sure to prepare necessary safety measures before using samples that

are toxic, radioactive or contaminated with pathogenic micro-organisms at your own responsibility.

- If the instrument, rotor and/or accessories that has been contaminated by solutions with toxic, radioactive or pathogenic materials, clean it according to the decontamination procedure that you are specified.
- If you require services at site, please sterilize and decontaminate it in advance, and then notice the service center involved in the details of the particular materials.
- Do not handle the power cord or turn on or off the POWER switch with wet hands to void electrical shocks.
- For safety purposes, do not enter within 30cm around this centrifuge while it is in operation.
- While the rotor is rotating, never forcedly release the door lock.
- Unauthorized repairs, disassembly, and other services to the centrifuge except by our service center are strictly prohibited.

⚠ CAUTION

- This centrifuge must be located on one firm and level table.
- Make sure the centrifuge is horizontal before running.
- Make sure the angle between the door and cover is greater than 70 degrees when open the door.
- Be careful not put your fingers or hands between the door and cover when the

door off.

- Do not move or relocate this centrifuge while it is running.
- If fluid spills in the rotor chamber, please promptly clean and dry with a dry cloth to avoid sample contamination.
- Ensure to remove any objects and fragments of the tubes dropped inside the rotor chamber before running this centrifuge.
- Cautions on rotors

(1) Always check for corrosion and damages on the rotor surface before using it. Do not use the rotor if an abnormality is found.

(2) Do not set the centrifuge speed beyond the allowable minimum speed of the rotor kits (rotor or adapters). Make sure to run it below the allowable minimum speed.

(3) Do not exceed the allowable imbalance.

(4) Use the rotor and tubes within their actual capacities.

(5) If the rotor is attached with a lid, ensure it is tightened before operation.

- If any abnormal condition occurs during operation, please stop it immediately and contact our service center. Notify the service center is a warning code if displayed.
- Vibrations are likely to damage the centrifuge, contact our service center if abnormality observed.

1.Performance indicators

Maximum rotation speed	15,000rpm(200-15,000rpm) step: 100rpm
Maximum relative centrifugal acceleration	21,380×g, step: 10×g
Capacity	1.5/2ml×24; 0.5ml×36; PCR8 tube bank ×4; 5ml×12; 5ml×18;
Temperature setting range	Tabletop high-speed refrigerated micro-centrifuge: -20℃-40℃
Timing	30s-99 min; HOLD (continuous running)
Drive motor	DC brushless motor
Safety performance	Dual door locks, overspeed, overtemperature and Internal diagnosis system.
Power	Single phase 220-230V,5A, 50/60Hz, 400W 110-120V,5A,50/60Hz,490W
Dimensions (mm)	(L) 332× (W) 553× (H) 283
Weight	30kg

Acceleration and deceleration time	25s↑25s↓
Noise	≤56dB
Other functions	Rotation speed/RCF switchover, inching operation, running process indication and sound reminder; 9-step acceleration, 9-step deceleration; stored program capability.

2.Conformity to standards

The centrifuge:

Associated EU guidelines:
EMC：2014/30/EU；LVD：2014/35/EU
Construction in accordance with the following safety standards:
EN 61010-1；EN61010-2-020 CAN/CSA-C22.2 No.61010-1
Construction in accordance with the following EMC standards:
EN 61326-1

UL61010-1
This ISM device complies with Canadian ICES-001.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This centrifuge has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the centrifuge is operated in a commercial environment. The centrifuge generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user manual, may cause harmful interference to radio communications. Operation of centrifuge in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference.

3.Environmental conditions

3.1Basic operating conditions

(1) Power supply: single phase, 220-230V, 5A, 50/60Hz, 400W or 110-120V, 5A, 50/60Hz, 490W

(2) Ambient temperature: 2~40℃.

(3) Relative humidity: ≤80%.RH

(4) No vibration or air flow present nearby that might affect performance.

(5) No conductive dust, explosive gas or corrosive gas exists in ambient air.

3.2Transport and storage conditions

(1) Range of ambient temperature: -40℃-55℃.

(2) Range of relative humidity: ≤93%.RH

(3) The centrifuge must remain upright while in transit, suitably protected using wooden Kart box

(4) Lift the centrifuge by the chassis only.

(5) Pay attention to the centrifuge's weight while in transit (see the "performance indicators").

(6) Centrifuges with cooling device, should be left for about 1hour after being relocated to a new position to stabilize the refrigerant in the compressor.

4.Installation

Users must strictly comply with the installation instructions contained in this chapter.

Be advised! Remove the rotator before moving the centrifuge.

⚠Warning

- Improper power connection might damage the centrifuge.
- Before connecting the power supply, please check the power supply for compliance with the requirements.

4.1Mounting position

(1) This centrifuge must be mounted on a solid, flat and tabletop with contact between the four feet of the centrifuge and the tabletop. Don't mount the centrifuge on any sliding tabletop, otherwise significant vibration might occur. Carefully place the centrifuge to avoid damage.

(2) The ideal ambient temperature is 20°C ±5°C and the ambient temperature should not be more than 30℃. Avoid direct sunlight on this centrifuge.

(3) Place the centrifuge at >30cm distance from the wall and other instruments if using multiple units together to ensure effective cooling.

(4) Ensure that there is no water leakage/ heat loss near the centrifuge as it may cause the rise in temperature and thereby leading to centrifuge failure.

4.2Connection between power cable and ground wire

> ⚠Warning
>
> - Don’t touch the power cable with wet hands and avoid electric shocks.
> - Ensure that the centrifuge is well grounded.

(1) This centrifuge uses three-core power cable and three-core flat plug, the latter of which may be directly connected to the power socket.

(2) Ensure that the centrifuge is protected by good grounding terminal and that the label on it indicated the correct voltage (>10A) before connecting the device to power supply.

5.Structure

D1524R

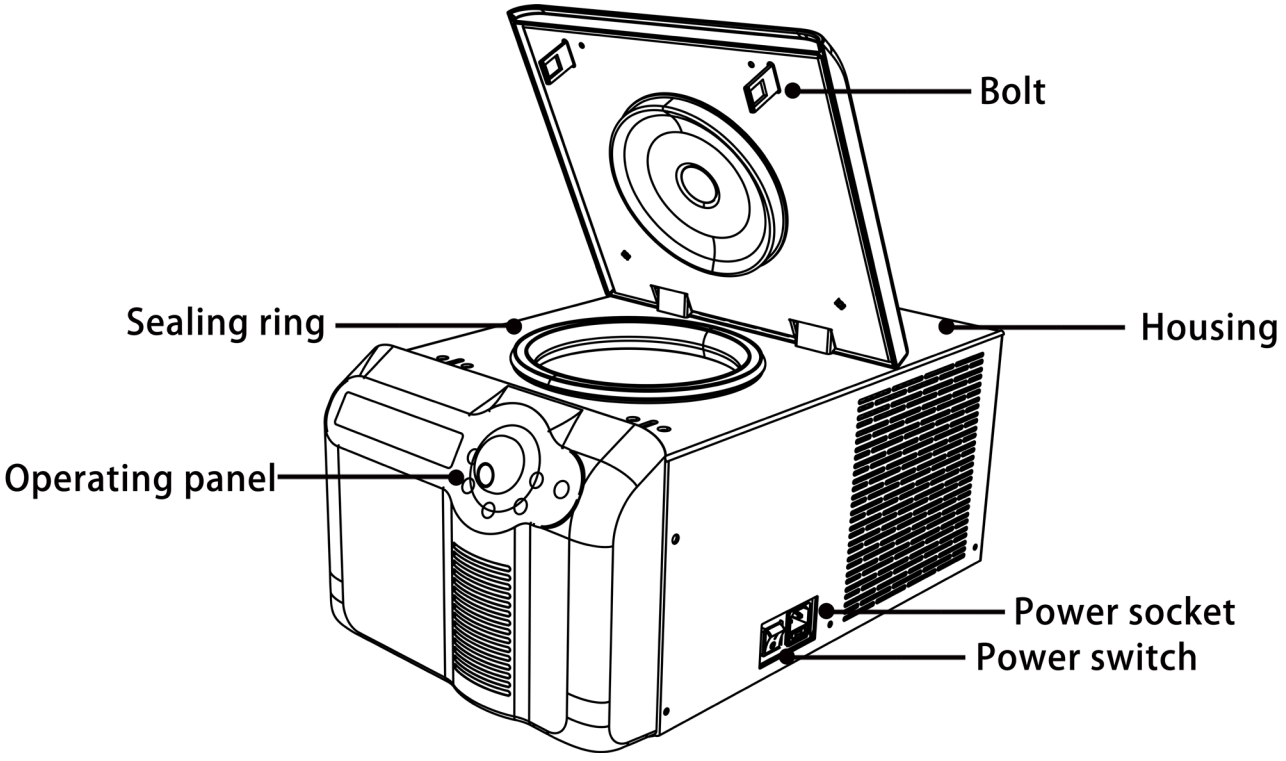


Fig. 5.3. Front view of centrifuge

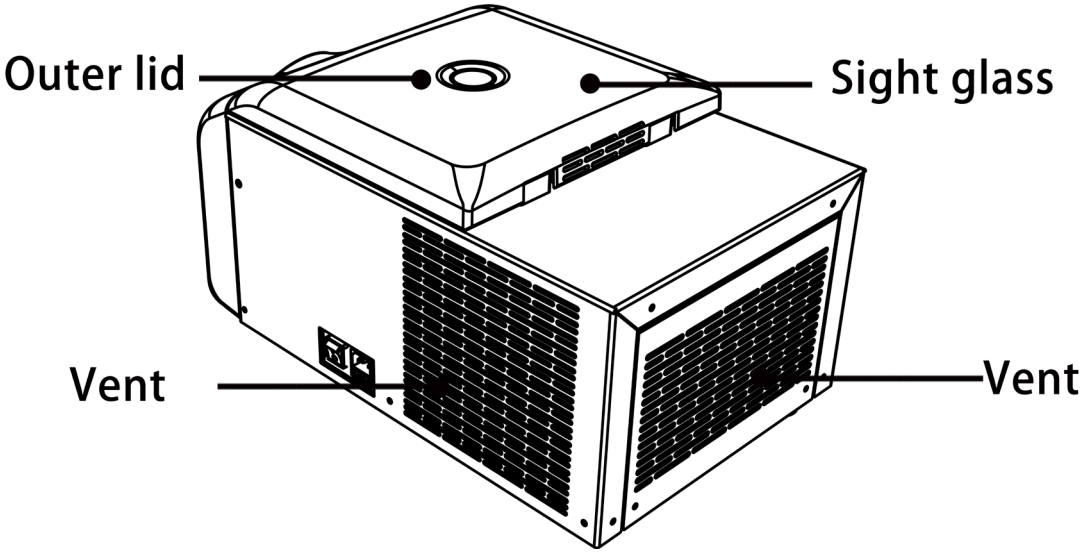


Fig. 5.4 Rear view of centrifuge

6.Operating panel

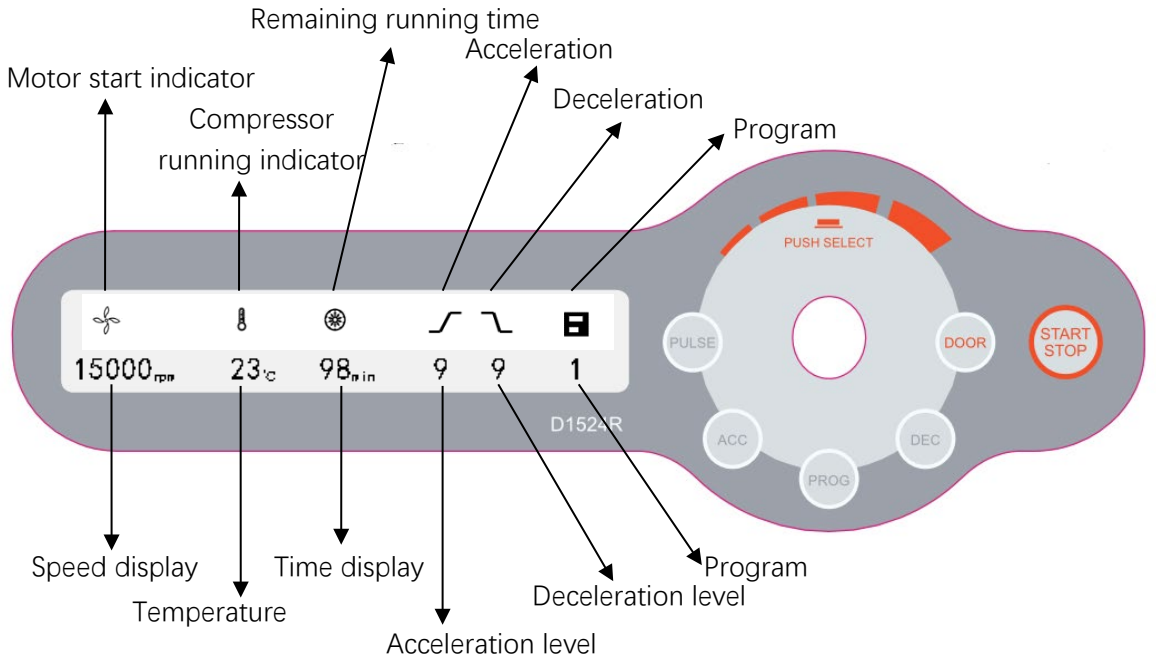


Fig. 6.1 Schematics of operating panel

No.	Legend	Name	Function
1	Acc	Acceleration level adjustment+ key	Press this key to increase the speed level by 1; acceleration level 1-9 cycle.
2	Dec	Deceleration level adjustment+ key	Press this key to decrease the speed level by 1; deceleration level 1-9 cycle.
3	Prog	Program key	Press this key to switch to the stored program +1, stored program, program 0-9

			cycle.
4		Door lock open key	When the speed is zero, press this key to release the door lock. When the speed setting is above zero, the door locks automatically.
5		Inching key	When the outer lid is locked tightly, by pressing and keeping this key, the centrifuge runs up to the set rotation speed. Press and hold this key
6		Running/stop key	When the speed is zero, press this key to start run operation While the centrifuge is operating, press this key to stop its run.
7		Parameter input key	Turn this key clockwise to increase the parameter; turn this key counterclockwise to decrease the parameter. Press this key to choose the speed setting, centrifugal force setting, temperature setting and time setting.

The following table provides comparison between acceleration and deceleration time in 1-9 positions: (error ±10%)

Position	□ Acc (0—15,000rpm)	Dec (15,000-0rpm)
1	75s	73s
2	52s	44s
3	44s	42s
4	35s	38s
5	30s	36s
6	28s	34s
7	26s	31s
8	24s	28s
9	23s	26s

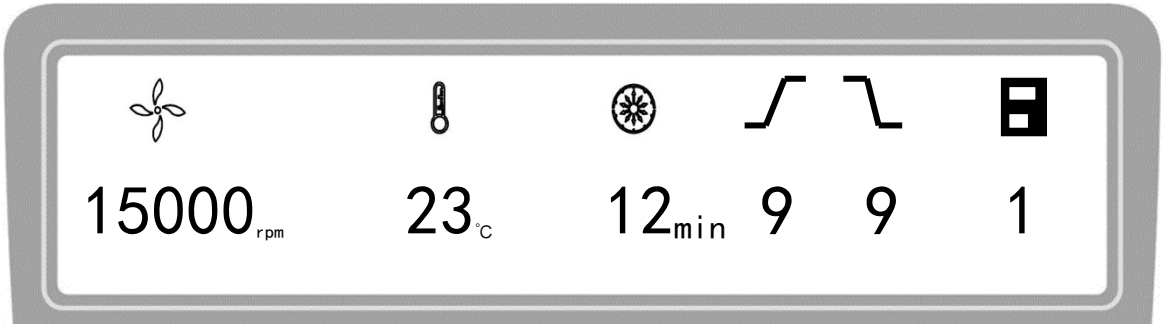


Fig. 6.2 Schematics of main display

The D1524R main display is shown in Fig. 6-2. At this time, the speed is set at 15,000rpm, indicating the presumed sample temperature of 23℃ and the set running time of12 min.

When the speed icon rotates, it indicates that the machine is in run mode.

The temperature display icon indicates three states: when it is lit ON, it indicates the presumed sample temperature; when it is OFF, it indicates the set temperature; when it flashes, it indicates the compressor starts refrigerating to control the temperature of the centrifugal chamber.

The time display icon divides the entire runnig time into 10 equal parts, displaying the ratio of elapsed time to the total time.

7.Rotor preparation

7.1Prepare the samples to be separated

7.2Place samples into the centrifuge tube

The amount of sample should not exceed the allowed maximum amount set forth in this user manual.

⚠Caution: Adding excessive samples into the centrifuge tube will result in leakage, therefore don't add excessive samples.

7.3Ensure the balanced centrifuge tube

- Although this centrifuge may be used with visually confirmed balance, it is suggested that samples be weighed using a balance to ensure balanced centrifuge tube in order to prolong the service life of centrifuge.
- Although the partial imbalance is allowed, don't run this centrifuge under poor balance conditions.

7.4Check the rotor

Check the rotor for any corrosion or scratch before use

⚠Caution:

●Avoid using the rotor with scratches or corrosion.

- Never use the rotor of other brands/ specifications on this centrifuge.
- Do not expose the rotor and its accessories to direct sunlight/Ultraviolet.

7.5Insert the centrifuge tubes symmetrically onto the rotor in place without imbalance

⚠Caution:

- Ensure to tighten the rotor to the main shaft firmly and the lid is secured properly on the rotor. Otherwise, the rotor might fall OFF while the centrifuge is in operation, resulting in centrifuge or rotor damage.
- Tighten the rotor lid and rotor firmly.

8.Operation

8.1Normal operation

When the power switch is turned ON, the display screen is lit and the centrifuge shows HELLO page, as shown in Fig. 8-1.

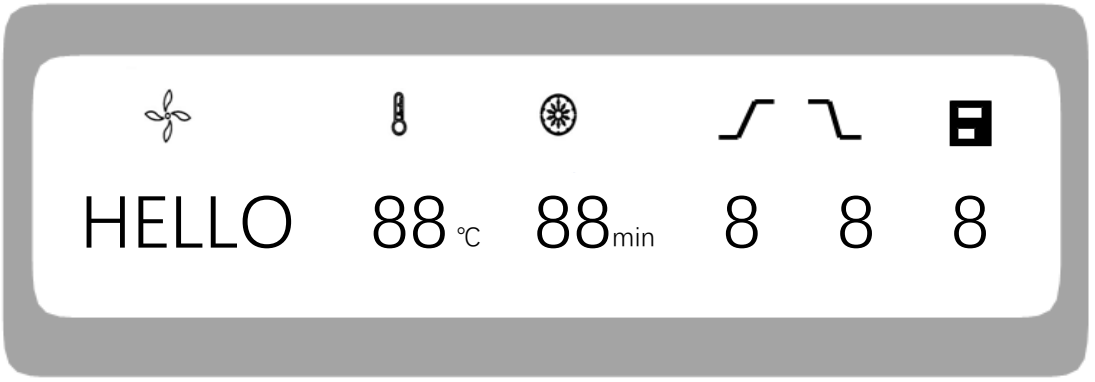


Fig. 8-1. Self-test page of centrifuge

The centrifuge shows the centrifuge model 1524R and program version 1.0, as shown in Fig. 8-2.

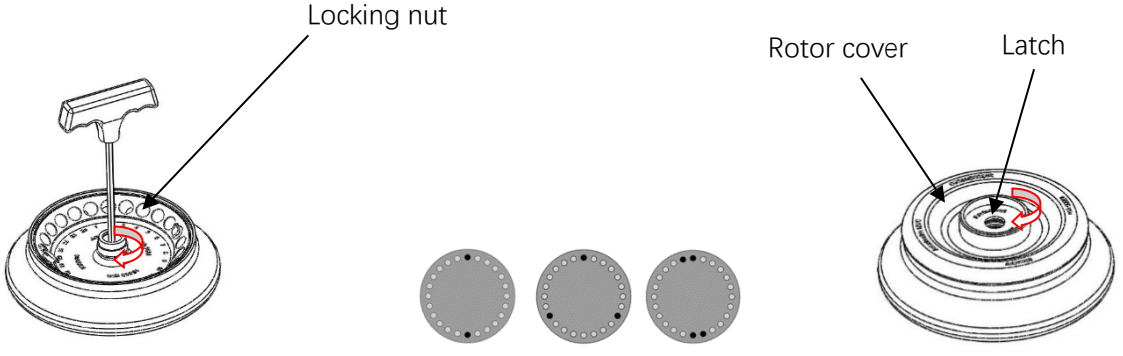
Fig. 8-2 Model and version interface

Then, the centrifuge displays the last operating parameters, as shown in Fig. 8-3.

Fig. 8-3. Last operation interface

- Speed set at 15000rpm, time set at 12 min and centrifugal chamber temperature 25℃.
- The outer lid lock is released.

8.1.1Rotor installation and replacement



Mount the rotor on the main shaft Mount the tubes symmetrically Mount the rotor cover.

Fig. 8-4. Rotor installation

⚠Caution

- Place the rotor on the main shaft and ensure full contact between the rotor and the main shaft. Screw up the nut on the rotor tightly using a wrench to connect the rotor with the main shaft firmly, otherwise the rotor might fall OFF, causing damage to the centrifuge.
- Tighten the rotor and the lid firmly.

- When placing the rotor, ensure the full contact between the rotor and the main shaft.
- After placing the rotor in place, rotate the rotor gently with hands to check for normal operation of the rotor. Check and adjust the rotor position once again.
- Rotate the locking nut clockwise using the rotor wrench and tighten the rotor and main shaft firmly.
- Place the rotor lid and rotate it clockwise to screw the rotor tightly. Close the outer lid and run the centrifuge.
- The rotor is dismantled in a manner opposite the aforesaid, with the tightening direction being counterclockwise.

8.1.2Set operating parameters

The parameter key  is used to input and modify the operating parameters. Press the parameter key  gently so that the centrifuge enters into adjustment mode. Press and select the parameter to adjust its value to desired setting. Adjust the values only when the required parameter icon flashes. The minimum rotation speed is 100rpm, the minimum step of centrifugal force is 10g and the minimum step time is 1second if within 1 minute and if not it is 1 minute.

(1) Set the rotation speed

- Press the parameter key  to choose the rotation speed parameter value in rpm.
- Set the speed value to desired setting when it enters into the adjustment mode and flashes.
- The minimum set speed is 200rpm, and the minimum step is 100rpm.
- The parameter increase or decrease is cyclic. Turn the parameter key  clockwise or anticlockwise to increase or decrease the adjusting parameter values.

(2) Set the run time

- Press the parameter key  to select the time parameter and wait until its value flashes.

- Set the time parameter value to desired setting within the range of 10s-99min.
- Turn the parameter key  to input the set time within a range of 10 s-99min.
- When the time enters HD, it indicates that the instrument is in continuous run mode.

(3) Set the operating temperature

- Press the parameter key  to set the temperature and wait until its value flashes.
- Turn the parameter key  to adjust the temperature within a range of -20℃ ~ 40℃.
- When the temperature icon  flashes, it means the refrigerating system is working, otherwise the refrigerating system is not working.

8.1.3Start Run

(1) Press the 

key to start operation.

- The rotor starts rotating.
- Timer starts to operate after the instrument reaches the set rotation speed only.
- The screen displays the actual time left to complete the running operation.

(2) Inquire and change the operating parameters

- The operating parameters can be modified after the centrifuge operates at a steady speed.
- Press the parameter key  to return to ready mode interface with set operating parameters.
- Press the parameter key  gently and required parameter to modify the set values.
- After 7 seconds of no activity, the centrifuge will return to the normal operating state with the new operating parameters.
- In case if there are any changes in the operation time setting, the elapsed time will not be zeroed.

(3) Error message

- The centrifuge will automatically stop if any failure occurs in the run mode, with the failure code indicated on the time display window. By looking up table 10-1, the cause of failure can be found and appropriate action should be taken.

8.1.4Stop running

(1) When the set run time is completed the centrifuge stops its run operation automatically or it can be stopped by pressing the 

.

(2) The outer lid lock is opened.

- The centrifuge beeps when the rotor ceases to rotate, indicating that the operation is over.
- After the end of operation, the outer lid lock on the centrifuge remains closed and the outer lid lock should be opened by pressing Door key. Open the outer lid to remove the samples and rotor.
- The centrifuge will automatically retrieve the last set parameters as soon as it is switched ON.

8.2RCF operation

Turn power switch ON and Set the RCF (relative centrifugal force).

⚠Caution

- The relative centrifugal force set should not exceed the maximum relative centrifugal force allowed by the centrifuge tube and its adaptor.
- The relative centrifugal acceleration is calculated based on the maximum centrifugal radius and operating speed of the rotor. (See Table 11.1 for the maximum centrifugal radius).

- Press the parameter key  to choose the rotation speed unit as *xg*. If the

RCF value flashes it indicates that the RCF value can be set as it is in adjustment mode.

- Turn the parameter key  to adjust the relative centrifugal acceleration, in increments of *100xg*.
- The instrument will automatically enter into ready mode from adjustment mode, if it is left in operated for more than 7seconds.

Set the operating conditions

See Section 8.1 for operation of other parts.

8.3Transient operation

This function is generally used to remove the samples attached to the inner wall of the centrifuge tube.

Reminder: this key works only when the rotor is inactive and the outer lid is locked firmly.

(1) Turn power switch ON, fix the rotor on the main shaft and secure tightly with the rotor lid.

(2) Close the outer lid.

(3) The centrifuge enters into ready mode and displays the last operated parameter values.

(4) Press and hold the Pluse key down to increase and set the rotation speed.

(5) Release the Pluse key to start decelerating and shutdown.

9.Maintenance and servicing

9.1Cleaning

> ⚠Caution
>
> - Disconnect the power supply before cleaning the centrifuge.

(1) centrifuge.

- The color of housing might change and the label thereon might fall OFF if the centrifuge is exposed to ultraviolet for a prolonged period of time and hence cover the centrifuge with cloth to avoid exposure to light.
- Clean the centrifuge using a cloth/ sponge soaked with neutral cleansing agent in case if it is dirty after use
- The centrifuge can be sterilized using cloth soaked with 70% alcohol solvent.

(2) Centrifugal chamber

⚠Caution

- Never pour water or other solvents directly into the centrifugal chamber as they might enter into the drive unit and cause corrosion or damage to the bearings.

(3) Drive shaft

- It is suggested that the drive shaft be subjected to periodical maintenance by wiping it using soft cloth and applying a thin layer of silicone grease on it.

(4) Outer Lid

- Clean or sterilize the outer lid in the same manner as mentioned under subsection (1) centrifuge.

(5) Rotor

- If the rotor is left unused for a prolonged period of time, remove the rotor and its lid from the centrifugal chamber, and place the rotor upside down to dry the rotor hole and prevent corrosion.
- Clean the rotor using mild detergent with PH value of 6-8 and immediately dry the aluminum portion after cleaning by putting it into a warm-air dryer at a temperature not exceeding 50℃.

(6) Drainage

- D1524R is equipped with drainage slots, which need to be drained when a substantial amount of water is accumulated in those slots.

9.2Sterilization

If the centrifuge tubes contain infectious materials leaks, you must immediately sterilize the rotor and/or centrifuge.

- Infectious substances might enter the centrifuge if the centrifuge tube breaks or is overfilled.
- Danger of infection might occur through contact. Personnel shall be provided with suitable protective measures.
- Be aware of the allowed filling volume and loading limit of the centrifuge tubes.
- When contamination occurs, the operator must ensure that others are not endangered.
- The contaminated portion must be sterilized immediately.
- Take further protective measures if necessary.

9.2.1Sterilize using common neutral sanitizers

The rotor and the centrifugal chamber must be treated with common neutral sanitizers. The most suitable way is to spray the spray-type sanitizer evenly over the rotor and accessories.

Sterilize the rotor and accessories as follows:

(1) Disconnect the power supply.

(2) Unscrew the rotor from the rotating shaft.

(3) Remove the rotor and pull it up vertically from the rotating shaft.

(4) Take out the centrifuge tubes and adaptors and sterilize or dispose of them when necessary.

(5) Treat the rotor and rotor lid (soaking or spraying) according to the sanitizer instructions.

(6) Drain the sanitizer by turning the rotor upside down and then flush it with water.

(7) Remove the residual sanitizer in an effective way.

(8) The aluminum rotor must then be treated with anti-corrosion oil.

(9) All sealing rings must be re-lubricated.

9.2.2Sterilize using bleaching alkali liquor

⚠Caution
Bleaching alkali liquor contains highly concentrated erosive hypochlorite, therefore it may not be used for aluminum rotor.

The following are the protective measures for plastic rotor:

(1) Avoid high temperature and ensure the temperature of bleaching solution and rotor is not more than 25℃.

(2) Do not bleach longer than necessary!

(3) After sterilization, flush the rotor thoroughly with distilled water and dry it.

(4) All sealing rings must be re-lubricated.

9.3Wearing parts

Please replace the below wearing parts in time according to the suggestions in the following table or whenever it is necessary.

No.	Wearing part	Replacement conditions
1	Rubber seat of temperature sensor	Crack
2	Sealing ring of centrifugal chamber	

9.4Replacement of rotor seal

9.4.1Introduction

Three rubber rings are used in order to achieve biological sealing, as shown in the following figure. After multiple autoclaving runs, the rubber rings might age or fall off and need to be replaced or remounted.

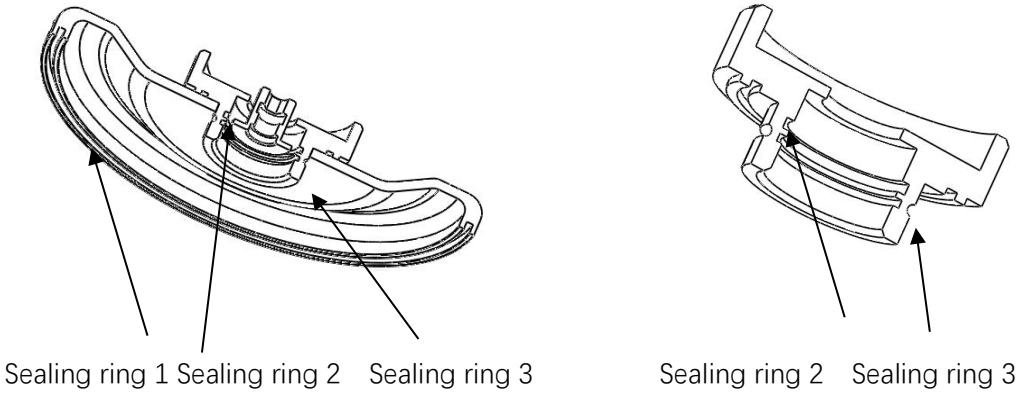


Fig.9-1 Rotor sealing ring

9.4.2How to replace

(1) Clean the rubber ring groove using neutral cleaning solution before air drying it.

(2) Apply glue evenly inside the rubber ring groove before placing the rubber ring into its groove and evenly pressing it to make the rubber ring contact with the groove bottom and firmly adhered.

(3) Leave it for 20 min and wait for the glue to completely solidify.

9.5Routine check

(1) Ensure that the centrifuge is placed on a solid, level and flat table top surface and ensure that 3/4th of it is on the table surface.

(2) Ensure that the machine is reliably grounded: using a multi-meter, check whether the grounding pin in the power cable plug and the centrifugal chamber and motor shaft are short-circuited. In case of short-circuit, it indicates reliable grounding. In case of disconnection, identify the causes and eliminate the failure before the centrifuge operation.

10.Common failures and solutions

10.1List of common failures

This centrifuge is capable of self diagnosis. When the centrifuge fails, the time display window will indicate the failure code, leading to the immediate identification of possible failure causes.

Phenomenon	**Possible cause**	**Solution**
No display after power ON	· No power supply to the power socket.	·Eliminate the failure and reconnect the power

		· Fuse burned out.	supply. · Replace the fuse.
Alarm code indicated on the time display	E-02 Outer lid failure	·The door opens while in operation. · START STOP is pressed when the door is opened.	· Immediately close the cover. ·Close the outer lid before operation.
	E-04 Temperature abnormality	·The housing vent might got blocked. · The cooling fan might got damaged.	·Unblock the vent. ·Replace the cooling fan.
	E-06 Abnormal rotation speed setting	·Change the set rotation speed value.	·Change the set rotation speed value.
	E-10 ~ 86	·Check the service manual.	·Contact the service representative.

Table 10-1 Common failures and solutions

■ Failure code E-1 ~ E-6 is related to erroneous operation. The centrifuge may continue running after elimination of the failure.

10.2How to open the outer lid

10.2.1When turned ON

Reminder: When the centrifuge is switch power ON, open the outer lid only when the rotor is not running.

(1) When the centrifuge is turned ON, the outer lid opens automatically.

(2) At the end of centrifuge operation, the outer lid remains locked.

(3) When the rotor stops, press Door key and unlock the outer lid and one can observe that the lid can be opened now.

10.2.2When power is OFF

When the outer lid cannot be opened in case of unexpected power failure, the outer lid may be opened as follows:

(1) Check whether the rotor is in run mode.

■ Listen carefully to ensure that there is no rotation sound.

(2) Insert a wrench into the housing hole to open the outer lid lock.

- The hole is located above the front end of the right side panel.
- Insert the wrench into the right hole to push forward and rotate ⇄ clockwise to open the outer lid lock and then the lid.

10.3Replace the fuse

(1) The D1524R centrifuges fuse is 250V, 10A, fast-acting, size: Φ5×20, one fuse.

(2) The centrifuges 250V, 10Afuse is on the power socket. It may be replaced by taking the fuse box out of the power socket; 250V,3.15A fuse is on the circuit board, It may be replaced by taking the fuse box out of the circuit board.

11.Introduction to rotor and centrifuge tube

⚠Caution

●Carefully read the user manual and correctly install and use the rotor correctly.

●Don‘t exceed the maximum allowed speed of the rotor, test tube and adaptor. The maximum allowed speed by certain adaptors is lower than the maximum speed of the rotor and check before operation.

11.1Rotor description

11.1.1Rotor structure

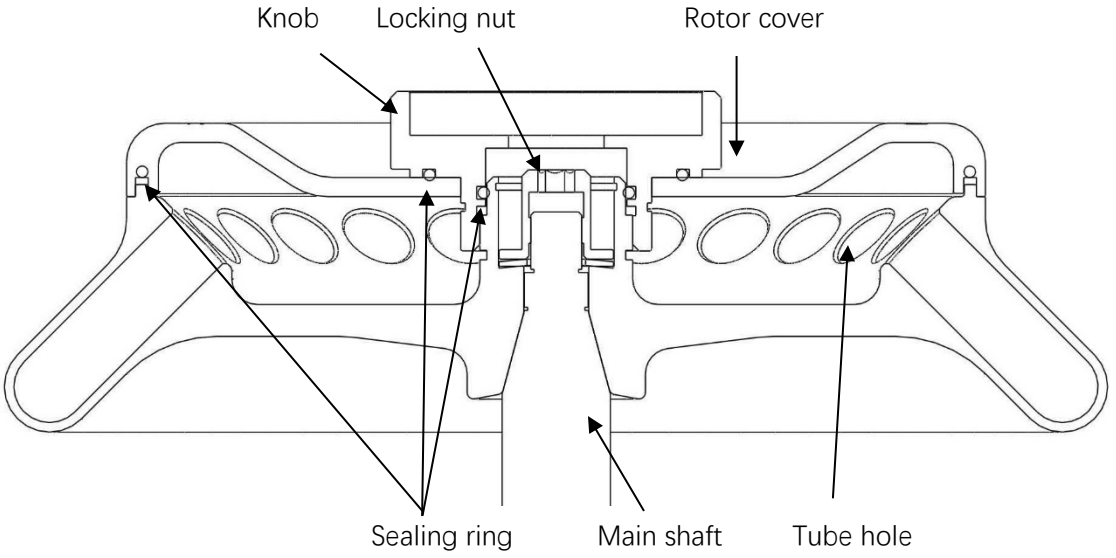


Fig.11-1 Rotor structure

11.1.2Rotor and adaptor

All rotors are bio-sealed such that centrifuge tube is sealed inside the rotor and when the rotor lid and rotor are secured tightly to ensure no sample leakage during the centrifuge operation. While the rotor lid is not used, the rotor will be incapable of bio-sealing. The rotors and adaptors which are suitable for use with this centrifuge are listed as follows:

Table 11.1 List of rotors and adaptors

Rotor number	Rotor name	Centrifuge tube	Adaptor	Maximum speed (rpm)	Maximum centrifugal radius r_{max}(cm)	Maximum relative centrifugal force RCF (×g)
1	AS24-2	2/1.5mL centrifuge tube		15000	8.5	21380 (program correspondence)
		0.2mL PCR tube	A02P2	15000	6.9	17350
		0.5mL micro-tube	A05P2	15000	7.6	19100
2	AS36-05	0.5mL micro-tube		15000	8.5	21380 (program correspondence)
		0.2mL PCR tube	A02P05	15000	7.6	19100

3	AS4-PCR8	PCR8 tube bank		15000	6.5/7.2	16350/18100
4	AS12-V5	5mL conical tube		15000	8.5	21380
5	AS18-5	5mL culture tube		15000	8.5	21380

11.1.3Precautions

(1) The density of sample that the centrifuge rotor can separate is less than 1.2g/ml. If the density of sample to be separated exceeds 1.2g/ml, please calculate the allowed rotation speed using the following formula:

Allowed rotation speed (rpm) = maximum rotation speed × (1.2 (g/ml) /sample density (g/ml)) $^{1/2}$

(2) If the rotor is left unused for long time, please remove the rotor from the centrifugal chamber, remove the rotor lid and place the rotor upside down to dry the rotor hole and prevent corrosion.

(3) If any sample leaks into the rotor hole, flush the rotor hole with clean water and

apply a thin layer of silicone grease on the rotor surface after it dries up.

(4) It is suggested that the rotor to be cleaned once in every three months to ensure cleanliness of the tube hole and main shaft hole before applying a thin layer of silicone grease.

11.1.4Autoclaving

This rotor is made of high-strength aluminum alloy and may be autoclaved at 121℃（1.0kg/cm^2）for 20 min.

11.1.5Bio-sealing

The rotor of this device employs bio-sealed structure and uses three high-temperature-resistant rubber rings for sealing. After multiple autoclaving runs, the rubber rings might age or *fall off* and need to be replaced or remounted using the method detailed in 9.4.

11.2Centrifuge tube

11.2.1Please clean and sterilize the centrifuge tube by reference to the following table.

Table 11.2 Conditions for cleaning and sterilization of centrifuge tube

O: Yes X: No

Condition \ Material			PA	PC	PP
Cleaning	Fluid cleaning	Acidic cleaning agent (pH5 or lower)	X	X	X
		Acidic cleaning agent (above pH5)	O	O	O
		Alkaline cleaning agent (above pH9)	O	X	O
		Alkaline cleaning agent (pH9 or lower)	O	O	O
		Neutral cleaning agent (pH7)	O	O	O
		70℃ hot water	O	O	O
	Ultrasonic cleaning	Neutral cleaning agent (pH7)	O	O	O
Sterilization	Autoclaving	115℃ (0.7kg/cm^2) 30min	O	O	O

		121℃ (1.0kg/cm^2) 20min	X	O	O
		126℃ (1.4kg/cm^2) 15min	X	X	X
	Boiling sterilization	15-30min	O	O	O
	Ultraviolet sterilization	200-300nm	X	X	X
	Gas sterilization	Ethylene oxide	O	X	O
		Formaldehyde	O	O	O

PA: polyallomer PC: polycarbonate PP: polypropylene

11.2.2PC centrifuge tube cleaning

PC material has relatively low chemical stability to alkaline solvent, therefore use of cleaning agent with pH value of over 9 should be avoided. Some neutral cleaning agents still have pH value of over 9 after being diluted as recommended by the

vendor, therefore use of cleaning agent with pH value of 7-9only is recommended.

11.2.3Autoclaving of PA, PC and PP centrifuge tube

PA begins softening at the temperature of 120℃, while PC and PP begin softening at 130℃. Generally, PA may be sterilized for 30 min at 115℃ （0.7 kg/cm^2）, while PC and PP may be sterilized for 20 min at 121℃（1.0 kg/cm^2）. Too high temperature would result in deformation of centrifuge tube.

When autoclave is used, take the following steps:

（1）Place the centrifuge tube upright with opening facing upward. If the centrifuge tube is placed in an inclined or horizontal manner, it will deform due to the effect of gravity.

（2）Remove the threaded cover and inner cover to prevent deformation or crack of the centrifuge tube.

（3）Take the centrifuge tube only when the autoclave cools down to the room temperature.

11.2.4Service life of centrifuge tube

The service life of plastic centrifuge tube depends upon the nature of sample, rotor speed and centrifugation temperature. When the plastic centrifuge tube is used for centrifugation of conventional neutral samples (pH5-pH9), its estimated service life

at the maximum rotation speed is as follows:

High-quality centrifuge tube (PA, PC, PP): 30-50 times.

Conventional centrifuge tube: about 10 times (frequency of use may be increased in case of low-speed application use)

The service life of centrifuge tube is also related to the cleaning and sterilization conditions.

Note: Never use any centrifuge tube with cracks.

12.RCF calculation

Relative centrifugal force (RCF) can be calculated using the following formula:

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

r-rotation radius, unit: cm; n-rotation speed, unit- rpm

13.Ordering information

Order code	Model	Description
9013111121	D1524R	Tabletop high-speed refrigerated micro-centrifuge

Accessories		
19400002	AS24-2	Rotor package, suitable for D1524R, maximum speed 15,000rpm, maximum capacity 2ml*24
19400003	AS36-05	Rotor package, suitable for D1524R, maximum speed 15,000 rpm, maximum capacity 0.5 ml*36
19400004	AS4-PCR8	Rotor package, suitable for D1524R, maximum speed 15,000 rpm, maximum capacity 4-PCR8
19400032	AS12-V5	Rotor package, suitable for D1524R, maximum speed 15,000 rpm, maximum capacity 5ml*12
19400012	AS18-5	Rotor package, suitable for D1524R, maximum speed 15,000 rpm, maximum capacity 5 ml*18
19500001	A02P2	0.2 ml rotor adaptor, suitable for A12-2/AS24-2 rotor, 24 pcs/pk
19500002	A05P2	0.5 ml rotor adaptor, suitable for A12-2/AS24-2 rotor, 24 pcs/pk
19500003	A02P05	0.2 ml rotor adaptor, suitable for AS36-05 rotor, 36 pcs/pk

14.Warranty

14.1Unit warranty

The entire unit will have two-year warranty period commencing from delivery date under the conditions of normal maintenance.

14.2Rotor warranty

The rotor will have 5-year warranty period from the date of delivery. Don't use any rotor damaged due to corrosion or fatigue. The damage to the entire unit or rotor due to any of the following reasons is outside the scope of warranty:

（1）Damage due to improper installation;

（2）Damage due to brutal or improper operation;

（3）Damage due to relocation or transport after completion of installation;

（4）Damage due to dismantling or modification by any unauthorized entity or individual;

（5）Damage due to use any parts not supplied by our company, such as rotor and adaptor;

（6）Damage due to natural disasters, including fire and earthquake;

（7）Wearing parts and parts with warranty period.

15.After-sales services

To ensure safe and efficient operation of the centrifuge, periodical maintenance is required. If the centrifuge fails, don’t attempt to repair it. Please contact the service center.

Контактная информация сервисных центров

Сервисный центр Диаэм в Москве:
Адрес: 129345, г. Москва, ул. Магаданская, д.7, стр.3
Тел.: +7 (495) 745-05-08 (многоканальный)
E-mail: service@dia-m.ru
www.dia-m.ru

Сервисный центр Диаэм в Новосибирске:
Адрес: 630090, Новосибирск, Академгородок, пр. Ак. Лаврентьева, 6/1, офис 100А
Тел.: +7 (495) 745-05-08 (многоканальный)
E-mail: service@dia-m.ru
www.dia-m.ru

Сервисный центр Диаэм в Казани:
Адрес: 420111, Казань, ул. Профсоюзная, д.40-42, пом. № 8
Тел.: +7 (495) 745-05-08 (многоканальный)
E-mail: service@dia-m.ru
www.dia-m.ru

Сервисный центр Диаэм в Санкт-Петербурге:
Адрес: 197022, Санкт-Петербург, ул. Профессора Попова, д. 23, лит. Д, офис 614 (БЦ «Гайот»)
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