globe® SCIENTIFIC INC.

GCH-24

Hematocrit Centrifuge

USER MANUAL

IMPORTANT: Carefully and completely read this user manual to ensure user safety and achieve most efficient operation.

USER MANUAL

GCH-24 Hematocrit Centrifuge

Contents

globe® SCIENTIFIC INC.

Version 1.0 19134

Important Safety Information

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

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 the centrifuge in any manner not described in this User Manual. When in doubt or if you have any troubles with this centrifuge, please CONTACT GLOBE SCIENTIFIC AND 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 careful 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 materials within 30cm (approximately 12 inches) of the centrifuge.
- Prepare all necessary safety measures before using samples that are toxic, radioactive or contaminated with pathogenic micro-organisms. Use of these materials are at your own risk.
- If the centrifuge, rotor and accessories have been contaminated by solutions with toxic, radioactive or pathogenic materials, clean them according to the decontamination procedure as specified.
- If you require service, please sterilize and decontaminate the centrifuge in advance and then notify the service center the details of the materials and procedure.
- To avoid electrical shocks, ensure hands are dry before handling the power cord or turning on/off the power switch.
- For safety purposes, do not come within 30cm (approximately 12 inches) around the centrifuge when in operation.
- While the rotor is rotating, never release the lid lock.
- Unauthorized repairs, disassembly, or modifying the centrifuge except by an authorized Globe Scientific service center or service technician is strictly prohibited.

Important Safety Information (Cont.)

⚠ CAUTION

- This centrifuge must be located on a 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 opening the door.
- Be careful not put your fingers or hands between the door and cover while the door is open.
- Do not move or relocate the centrifuge when it is running.
- If fluid spills in the rotor chamber, please promptly clean and dry with a dry cloth to avoid sample contamination.
- Ensure removal of any objects and/or fragments of the tubes dropped inside the rotor chamber before running the centrifuge.

Rotor Cautions:

- Always check for corrosion and damage on the rotor surface before using it. Do not use the rotor if an abnormality is found.
- Do not set the speed beyond the allowable maximum speed of the rotor kits (rotor and adapters).
- Do not exceed the allowable imbalance.
- Use the rotor and tubes within their actual capacities.
- If any abnormal condition occurs during operation, please stop immediately and contact our service center. Notify the service center of the warning code (if displayed) along with the model and serial numbers and a detailed description of the issue.
- Vibrations are likely to damage the centrifuge. Please contact our service center if any abnormality is observed.

1. Specifications

Maximum Speed	14000rpm(200-14000rpm) increment: 10rpm (GCH-24-ROT-1.5-2) 12000rpm(200-12000rpm) increment: 10rpm (GCH-24-ROT-H)
Maximum RCF	18620×g, increment: 10×g (GCH-24-ROT-1.5-2) 13680×g, increment: 10×g (GCH-24-ROT-H)
Maximum Capacity	GCH-24-ROT-1.5-2: 2ml/1.5mL/0.5mL/0.2mL×24 GCH-24-ROT-H: Capillary tubes×24
Timer	30seconds - 99minutes-HOLD, continuous operation
Driving Motor	Brushless DC motor
Safety Devices	Dual door interlock, over-speed detector, over-temperature detector, automatic internal diagnosis
Power Requirements	Single-phase, 220V-240V, 50Hz/60Hz, 5A. 110V-120V, 50Hz/60Hz, 5A
Dimensions (mm)	280 × 364 × 266 (L x W x H)
Weight	12kg
Additional features	Speed/RCF switch, pulse operation, processing display, audible reminder

2. Declaration of Conformity

Construction in accordance with the following safety standards:

EN 61010-1
EN 61010-2-10

Construction in accordance with the following EMC standards:

EN 61326-1/ FCC Part 15 Subpart B/ IECS 001

Associated EU guidelines:

EMC guidelines: 2004/108/EC
Centrifuge guidelines:
This ISM device complies with Canadian ICES-001.
Cet appareil ISM est conforme à la norme NMB-001 du Canada.

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

NOTE: *This equipment 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 equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

3. Required Operating Conditions

3.1 Basic Operational Conditions

- Power: Single-phase, 220V-240V, 50Hz/60Hz, 5A; 110V-120V, 50Hz/60Hz, 5A
- Ambient temperature: 2°C~40°C
- Relative humidity: ≤80%, non-condensing
- No vibration and airflow around the centrifuge
- No static, explosive and corrosive gases around the centrifuge

3.2 Transport and Storage Conditions

- Storage temperature: -40°C-55°C
- Relative humidity: ≤93%

4. Installation

This section describes the instructions that you should adhere to when installing the centrifuge to ensure your safety and optimum performance of the unit. Before moving the centrifuge, the rotor must be removed.

> ⚠ **WARNING**
>
> - Improper power supply may damage centrifuge
> - Make sure the power source conforms to the required power supply before connecting

4.1 Location

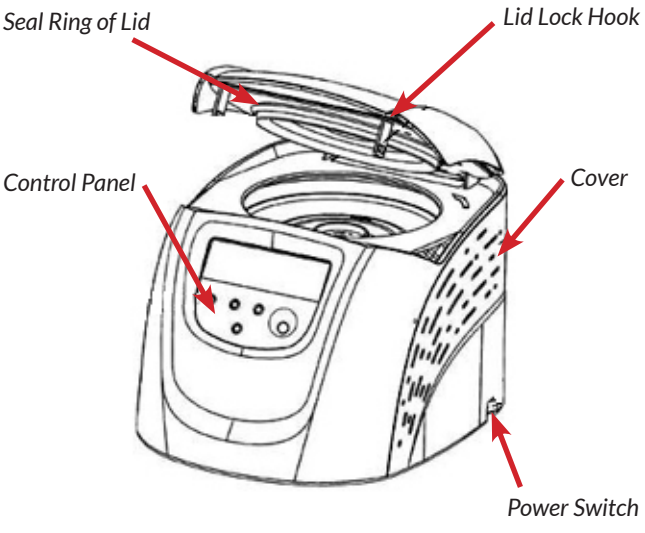
1. **Place this centrifuge on a firm, flat and level surface and ensure the four feet of this centrifuge stand on the counter firmly. Avoid installing on a slippery surface or a surface prone to vibration.**
2. **Ideal ambient temperature is 20°C ± 5°C, avoid placing the centrifuge in direct sunlight if the ambient temperature exceeds 30°C.**
3. **Keep obstructions clear of the centrifuge at least 10cm on both sides and at least 30cm behind it to ensure optimal cooling efficiency.**
4. **Keep away from heat or water to avoid sample temperature issues or centrifuge failures.**

4.2 Connection of the Power Cord and Grounding

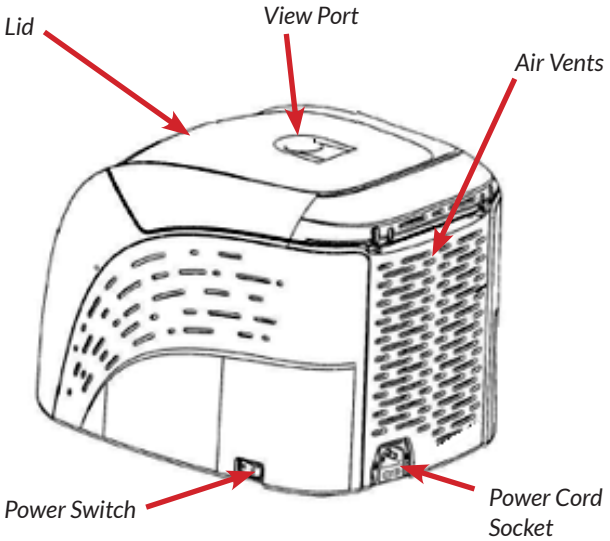
> ⚠ **WARNING**
>
> - To avoid electrical shocks, ensure your hands are dry when touching the power cord.
> - This centrifuge must be grounded properly.

A minimum 10A outlet providing a sufficient ground is required, and this must meet local safety requirements.

5. Unit Overview



FRONT VIEW



REAR / SIDE VIEW

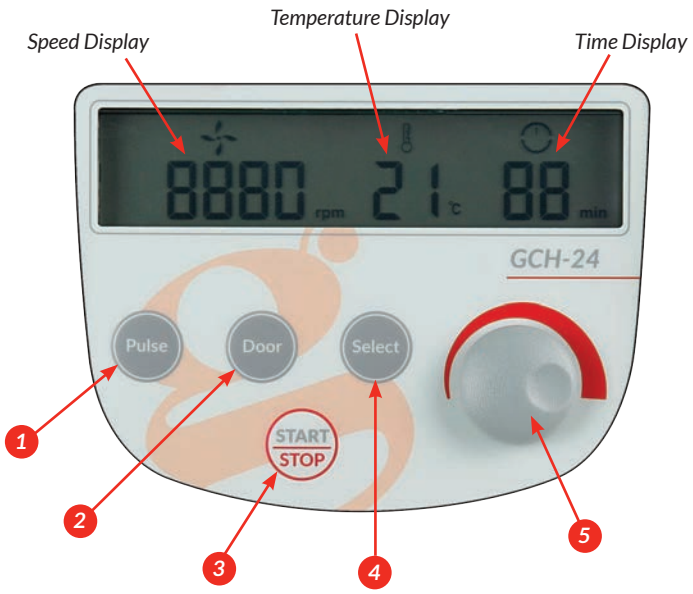
6. Control Panel

OPERATION

IMPORTANT: Plug unit into appropriate main supply based on the rated voltage.

1. **Pulse** ..... Press to accelerate and hold at the set speed. The centrifuge stops immediately once this button is released.
2. **Door**..... Press to open the lid. This button is not enabled while the centrifuge is running.
3. **Start / Stop** ..... Press to start the centrifuge. Press to stop if centrifuge is already running.
4. **Select**..... Press to choose the parameter you wish to modify.
5. **Adjustment Knob** Rotate clockwise to increase parameter values. Rotate counterclockwise to decrease parameter values. Press to switch between speed and RCF.

CONTROL PANEL



The main display is shown above. The speed is set to 8880rpm, the temperature of the centrifugal chamber is 21°C and the running time is 88 minutes. When the speed symbol is rotating, this indicates the centrifuge is running. The rotation of the speed symbol increases with the spin speed of the centrifuge. Temperature of chamber is displayed but cannot be controlled. The time symbol displays the ratio of working to time setting. The total time setting is divided into 10 sections.

7. Rotor Preparation

⚠ CAUTION

- Do not overload samples into the centrifuge as this will cause leaking.
- Do not exceed the actual capacity allowed in this user manual.

7.1 Inspect the Rotor

Check the rotor for corrosion or scratches before using.

⚠ CAUTION

- If any abnormality such as corrosion or scratches are found, stop using the rotor and contact Globe Scientific.
- Only Globe Scientific rotors may be used with the centrifuge.

7. Rotor Preparation (Cont.)

7.2 Symmetrically Load Tubes Into Rotor

IMPORTANT: The rotor should always be loaded in a balanced manner to avoid personal injury and to ensure centrifuge longevity.

- When any tube is loaded, a tube of the same type, volume and weight must be added in the opposite rotor location.
- Never intentionally run the centrifuge in an unbalanced condition even if operation is not affected.

> ⚠ **CAUTION**
>
> - Make sure the rotor and shaft are tightened. Otherwise, the rotor may come apart while operating and cause damage to the centrifuge and rotor.

8. Operation

> ⚠ **CAUTION**
>
> - Do not push or lean against the centrifuge while it is running.
> - Do not run the centrifuge when fragments or sample solutions are left in the centrifuge chamber. Always keep the centrifugal chamber clean.
> - If the centrifuge makes a strange noise during operation, stop it immediately and contact Globe Scientific. Please include any warning code(s), if displayed.

8.1 Normal Operation

Turn on the power switch and the centrifuge will start self-diagnostic checks, see figure 8-1 below:

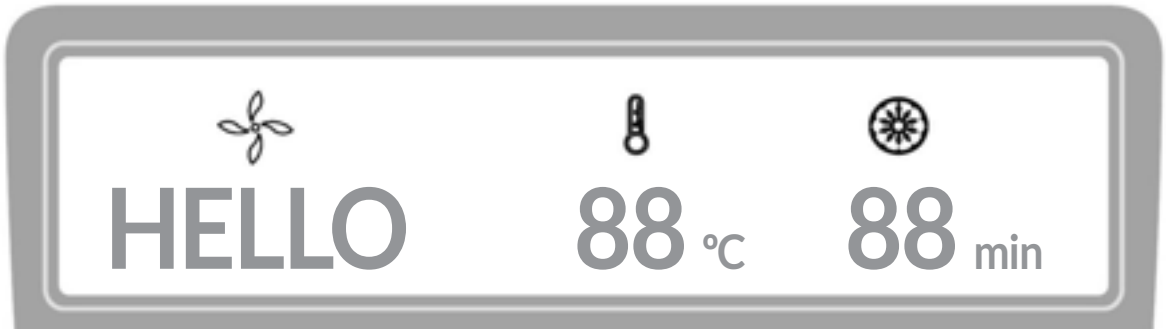


Figure 8-1 Self-check interface

8. Operation (Cont.)

After self-diagnostics, the centrifuge will display the cumulative running time, see figure 8-2 below:

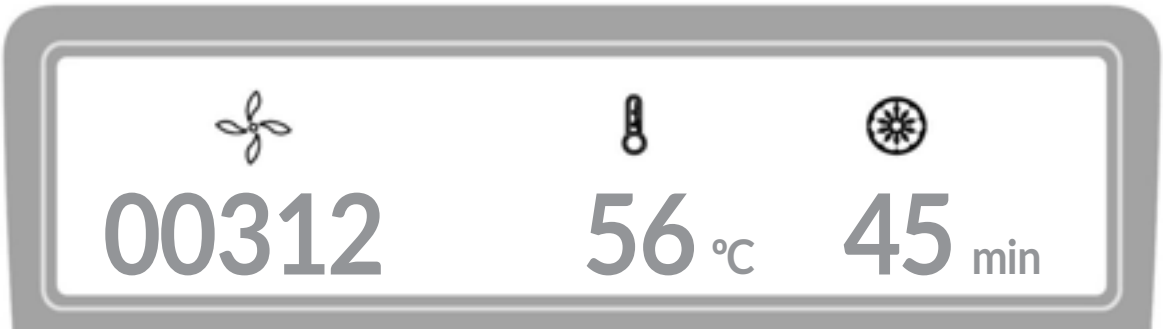


Figure 8-2 Cumulative running time interface

Figure 8-2 indicates the centrifuge has accumulated running time 312 hours 56 minutes and 45 seconds. Then the centrifuge displays the last running parameters, see figure 8-3 below

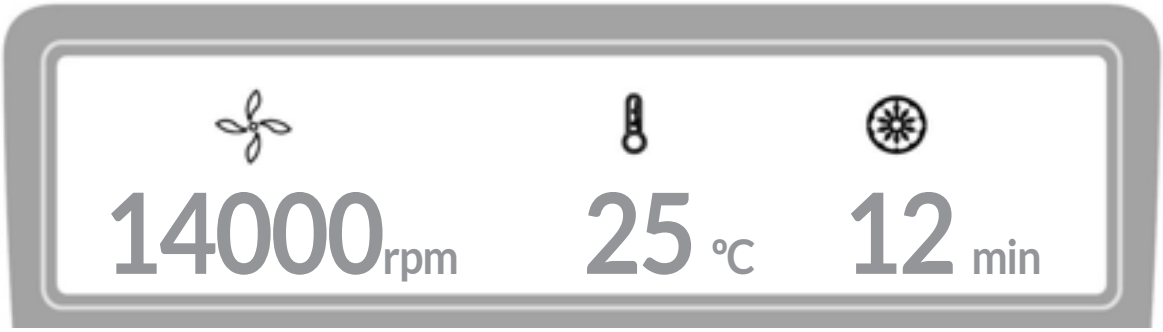


Figure 8-3 Last running interface

- Speed: 14000rpm; running time: 12minutes; centrifugal chamber temperature: 25℃
- Release the door.

LOADING AND REPLACING THE ROTOR

Load the rotor onto the shaft

Tighten the locking nut

Attach the rotor lid

⚠CAUTION

- Attach the rotor to the rotor shaft. Ensure the rotor is properly positioned and connected with the shaft, tightening the locking nut to secure the rotor with shaft, to prevent the rotor damaging the centrifuge.
- Ensure the rotor lid is firmly secured to the rotor.

8. Operation (Cont.)

LOADING AND REPLACING THE ROTOR (Cont.)

- Load the rotor onto the shaft and ensure the rotor is correctly positioned.
- You should feel a “click” when the rotor is properly connected to the shaft. If not, there may be something stuck between the rotor and the shaft. Double check and clean if necessary.
- Rotate the rotor slightly with your fingers to check if the rotor vibrates, if it does you should reattach the rotor.
- Rotate the nut clockwise using the wrench to firmly tighten the rotor to the shaft.
- Close the rotor lid, firmly tighten the lid clockwise to the rotor and ensure it is positioned properly. Close the door and then start running.
- The method of removing the rotor is the same as the above in reverse (turning the locking nut counterclockwise)

START THE OPERATION

Press the **Select** button to select the desired parameters. The parameters can be modified when the value is flashing. Rotate the **Adjustment Knob** clockwise to increase parameter value. Rotate the **Adjustment Knob** counter clockwise to decrease parameter value. Rotate the **Adjustment Knob** faster and the parameter value will increase faster. The minimum speed increment is 10 rpm, the minimum time increment is 1 second.

1. Set the speed

- Press the **Select** button until the speed rpm is displayed.
- When the **Speed** button is selected, the speed symbol will flash the speed value.
- The minimum speed value you can set is 200rpm; the minimum increment is 10 rpm.
- Rotate the **Adjustment Knob** clockwise to increase speed value. Rotate the **Adjustment Knob** counter clockwise to decrease speed value.
- There is a circulating function to increase/decrease the speed values. Rotate the **Adjustment Knob** clockwise to change settings from small » large » maximum » minimum. Rotate the **Adjustment Knob** counter clockwise to change settings from large » small » minimum » maximum.

2. Set the time

- Press the **Select** button, the time value flashes in the time setting mode.
- Rotate the **Adjustment Knob** to set the running time from 30 seconds up to 99 minutes.
- When the time displays HD, the centrifuge is in continuous running mode.

3. Warning display

- If an error occurs during operation, the centrifuge will brake to stop automatically and display the error code in the time/display area. The error code can be checked in table 10-1, and corrective actions can be applied accordingly.

END THE OPERATION

1. The centrifuge will brake when it reaches the set time or when the Start / Stop button is pressed

- When the rotor stops rotating, the centrifuge will start beeping to alert the operation has finished.

2. Open the lid

- The lid will be released automatically when the operation has stopped.
- With the lid closed, you can press the **Door** button to open it.
- After ending centrifuge operation, the program will store the setting parameters of this operation and will recall these parameters when restarting the program.

3. Remove the rotor and samples

8. Operation (Cont.)

8.2 RCF Operation

1. Turn on the Power Switch

2. Set an RCF (Relative Centrifugal Force) value

> ⚠ **CAUTION**
>
> - Do not exceed the allowable maximum RCF value of the rotor and adapters (section 11.2).

- Press the **Select** button and choose speed unit ×g, the speed symbol will then flash into RCF value input status.
- If no button is pressed after the speed value has flashed after 5 seconds, the input mode will be shut down.
- Rotate the **Adjustment Knob** to input an RCF value; the RCF increment is 10×g.

3. Set time and start operation as described in Section 8.1

8.3 Pulse Operation

This function is used to remove residual sample material that may have adhered to the interior of tubes or for quick spins.

> ⚠ **NOTE:** The **Pulse** button works only when the rotor is stopped and the lid is locked.

1. Turn on the power switch and load the rotor onto the shaft, tighten the rotor lid and make sure it is in a secured position, and then close the lid.

2. The centrifuge goes into preparation mode and displays the values of the last run.

3. Press the Pulse button and hold; the centrifuge will then speed up to the set speed. When releasing the Pulse button during acceleration, the centrifuge will start to decelerate and stop.

9. Maintenance

9.1 Cleaning

> ⚠ **CAUTION**
>
> - Failure to follow the recommended instructions for cleaning and disinfecting may result in damage to the centrifuge.

9. Maintenance (Cont.)

1. Centrifuge

- If the centrifuge is exposed to ultraviolet rays for a long period of time, the lid may discolor or the label may be peel off. It is recommended to cover the centrifuge with a piece of cloth to protect it from direct exposure or to move it from direct exposure.
- If the centrifuge needs cleaning, clean it with a cloth or sponge moistened with a neutral detergent solution.
- Sterilize the centrifuge by wiping with a cloth moistened with a 70% ethanol solution.

2. Rotor Chamber

> ⚠ **CAUTION**
>
> - Do not directly pour water, neutral detergent or disinfectant solution into the rotor chamber, otherwise fluids may leak into the drive units and cause corrosion or deterioration to the bearings.

- If the rotor chamber needs cleaning, clean with cloth or sponge moistened with a neutral detergent solution. Sterilize the centrifuge by wiping with a cloth moistened with a 70% ethanol solution.

3. Drive Shaft

- We recommend regular maintenance for the drive shaft. You can wipe the drive shaft with a soft cloth, and then apply a thin coat of silicon grease.

4. Lid

- Clean and sterilize the lid using the same method as in step one above.

5. Rotor

- To prevent corrosion, remove the rotor from the rotor chamber. If not in use for a long period of time, turn the rotor upside down to dry the tube cavities and keep clean.
- For sample leaks in the rotor, rinse the rotor with water. Apply a thin coat of silicon grease to the rotor when it is completely dry.
- The rotor should be checked every 3 months to ensure the tube and rotor cavities are clean and to apply a thin coat of silicon grease.

9.2 Consumables

Replaceable wearing parts are listed below. It is recommended to replace these according this table.

Replaceable Wearing Parts	Replacement Conditions
Lid Sealing Ring	Cracked
Temperature Sensor Rubber Housing	

9.3 Routine Inspection

1. Check that the centrifuge is on a sturdy, flat and level surface with all four feet seated firmly on the surface.

2. Check that the centrifuge is grounded properly. Use a multimeter to check if there is a short circuit between the power cord grounding pin and the motor shaft. If an open circuit is found, contact Globe Scientific before use.

10. Troubleshooting Tips

This centrifuge has a self-diagnostic function. If a problem occurs, an error/warning code will be displayed on the time display screen and the operator can determine the malfunction with the alarm code below.

Problem		Cause	Solution
Nothing displays on the screen when the **Power Switch** is turned on		Building circuit breaker or GFI recepticle has tripped	Reset the circuit breaker or GFI recepticle and turn on **Power Switch**
Alarm Code Displayed	E-02 Lid Fault	The lid opened during operation	Close the lid immediately
	E-03	Centrifuge cannot identify the rotor	Use the correct rotor
			Replace the rotor identification connection
	E-04 Temperature Fault	Air vents are blocked	Clean air vents
		Radiator fan is damaged	Replace radiator fan
	E-06 Incorrect Parameter	The set parameter exceeds the allowable range	Modify the set parameter value
	E-10~86	Refer to service manual	Contact Globe Scientific

- Alarm codes E-1~E-9 are related to incorrect operation/programming. You can continue running the centrifuge after implementing corrective procedures.

10.1 How to Open the Lid

WHEN POWERED ON

> ⚠ **CAUTION**
>
> - The lid should only be opened when the rotor has come to a complete stop.

1. Turn on the power switch; the lid is then released automatically.

2. The lid lock will be released automatically once the operation is finished.

3. It is possible to release the lid by pressing the Door button when the rotor has stopped.

IN THE CASE OF POWER OUTAGE

The lid will not open automatically if there is a power outage. It is possible to open manually as follows:

1. Ensure the rotor has stopped rotating.

- Listen carefully to ensure no rotation can be heard.

2. Insert a screw driver into each lid release hole to open the lid.

- Holes are located on the left and right sides of the unit.
- Carefully insert a screw driver into the lid release holes and push forward to release the lid.

10. Troubleshooting Tips (Cont.)

10.2 Replacing Fuses

There are two fuses in the GCH-24 Hematocrit Centrifuge, 250V, 10A time-delay type, size: Φ5×20.

The fuse holder is located inside the power inlet.

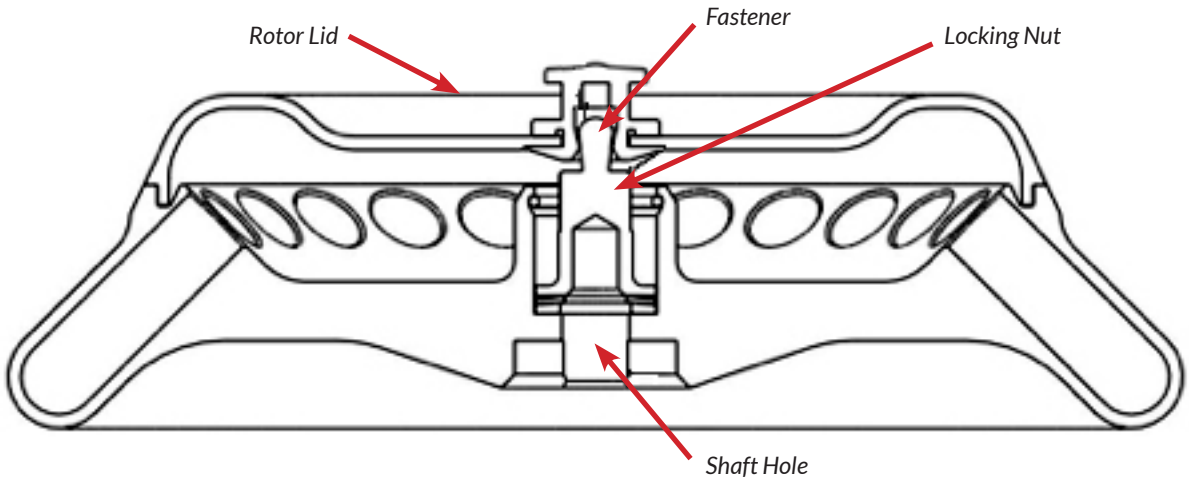
- Pull out the fuse holder tray from the power inlet and replace the fuses if necessary.

11. Rotor Instructions

⚠ CAUTION

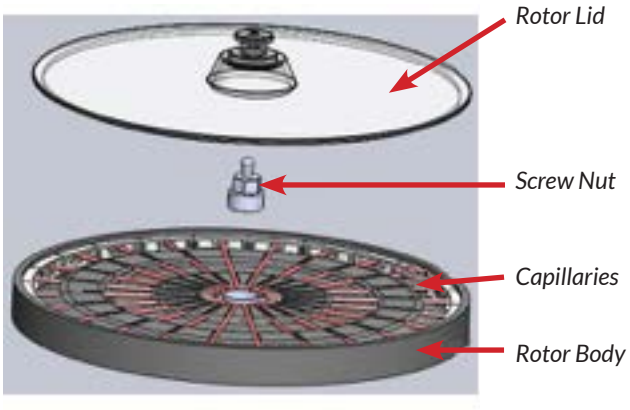
- Read the instructions thoroughly to properly load and use the rotor.
- Do not exceed the allowable maximum speed of the rotor, tube and adapters etc. Ensure the allowable maximum speed of the adapters is lower than the rotor's maximum speed.

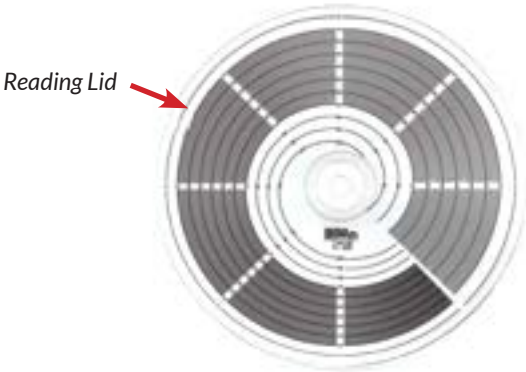
11.1 Rotor Structure



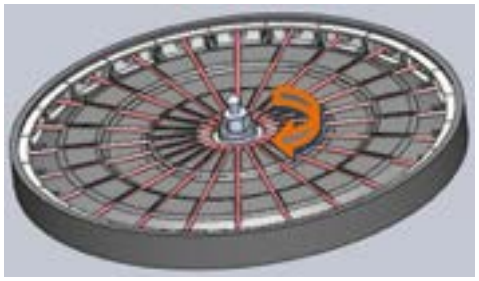
11. Rotor Instructions (Cont.)

11.2 Rotor Overview

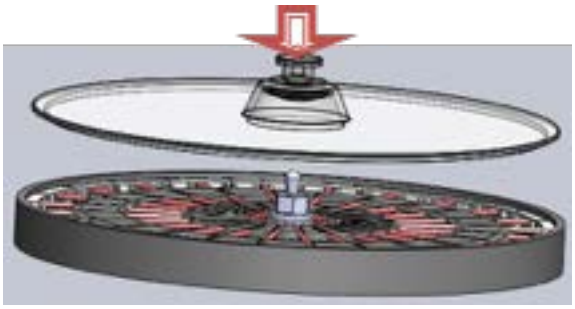




11.3 Rotor Installation



Tighten the screw nut



Snap rotor lid onto rotor body

11.4 Available Rotors and Adapters

Rotor Type	Tube Quantity	Tube Size/ Type	Adapters Required	Maximum Speed (rpm)	Maximum Centrifugal Radius (cm)	Maximum RCF (×g)
GCH-24-ROT-H	24	ø1.75 x 75	—	12000	8.5	13680
GCH-24-ROT-1.5-2 (optional)	24	2/1.5mL	—	14000	8.5	18620
	24	0.2mL PCR	GCM-24-AD2	14000	6.9	15110
	24	0.5mL Micro	GCM-24-AD5	14000	7.6	16638

Note: The centrifuge rotor can separate samples with a density lower than 2.0g/ml. If the sample density is over 2.0g/ml, calculate allowable speed using the following formula:

$$\text{allow speed}(rpm) = \text{max } speed \times \sqrt{\frac{2.0(g/ml)}{\text{sample density}(g/ml)}}$$

12. Calculating RCF

The RCF can be determined with the following formula:

$RCF = 1.118 \times r \times n^2 \times 10^{-5}$
r = rotating radius, unit: cm; **n** = rotating speed, unit: rpm

13. Returning and Disposal

13.1 Returning the Unit

⚠ Before returning the unit, a transport securing device must be installed.

Before the unit or its accessories are returned to Globe Scientific, they must be decontaminated and cleaned to protect people, the environment and property.

13.2 Disposal

Before disposal, the device must be decontaminated and cleaned to protect people, the environment and property. When you are disposing of the device, the respective statutory rules must be observed.

Pursuant to guideline 2002/96/EC (WEEE), all devices supplied after August 13, 2005 may not be disposed of as part of domestic waste. The device belongs to group 8 (medical devices) and is categorized in the business-to-business field. The icon of the crossed-out trash can shows that the device may not be disposed of as part of domestic waste. The waste disposal guidelines of the individual EC countries may vary. If necessary, contact your supplier.

14. Ordering Information

Item #	Descriptions	Unit
GCH-24	Hematocrit Centrifuge, 24-Place, 120v, 60Hz, US Plug, (includes: 24 place hematocrit rotor kit with lid and reading disk)	Each
GCH-24-UK	Hematocrit Centrifuge, 24-Place, 230v, 50Hz, UK Plug, (includes: 24 place hematocrit rotor kit with lid and reading disk)	Each
GCH-24-EU	Hematocrit Centrifuge, 24-Place, 230v, 50Hz, EU Plug, (includes: 24 place hematocrit rotor kit with lid and reading disk)	Each
Accessories		
GCH-24-ROT-1.5-2	Rotor for use with GCH-24 Hematocrit Centrifuge with Lid, Fixing Clips and O-Ring, 14000rpm max, 24-Place for 1.5mL and 2.0mL Microcentrifuge Tubes	Each
GCM-24-AD2	Rotor Adapters for use with GCH-24-ROT-1.5-2, for 0.2mL Tubes	24
GCM-24-AD5	Rotor Adapters for use with GCH-24-ROT-1.5-2, for 0.5mL Tubes	24

15. Warranty

This centrifuge is guaranteed for two years from the date of delivery provided that it has been operated and maintained properly.

Instances that would void the warranty include:

1. Failures caused by incorrect installation.
2. Failures caused by rough or improper handling.
3. Failures caused by transportation or relocation after installation.
4. Failures caused by unauthorized disassembly or modification.
5. Failures caused by using non-standard spare parts or accessories and/or unauthorized modification of the rotor or centrifuge.
6. Failures caused by natural disasters including fire, earthquakes, etc. (force majeure).

16. Service

To ensure safe and efficient operation of your GCH-24 centrifuge, it is necessary to keep the centrifuge clean and to use as recommended in this manual. If centrifuge has problems, do not attempt to repair it by yourself. In the unlikely event you require service or assistance, please contact Globe Scientific.

globe® SCIENTIFIC INC.

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1 201-599-1406 fax

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