Low-Speed Centrifuge

416

Operation Manual

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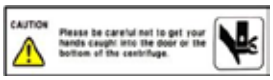
CONTENTS

1. Meanings of Symbols & Safety Precautions

1-1. Meanings of Symbols

1-1-1. Symbols on the device

Symbol	Meaning	Symbol	Meaning
	Attention and warning.		Attention and warning for electric shock
	Attention and warning for rotor coupling.		Attention and warning for door opening and closing
	Attention and warning for correct way of sample balancing in the rotor.		Attention and warning for correct way of buckets position.
	Indicate a hole for manual door opening in case of emergency		

1-1-2. Symbols in this document

Symbol	Meaning	Symbol	Meaning
	This symbol refers to safety relevant warnings and indicates possible dangerous outcomes.	☞	Note. This symbol refers to the important reminder.

1-2. Safety Precautions

Before using the instrument, please read this operation manual to ensure correct usage. Incorrect handling of the instrument may possibly result in personal injury or physical damage on the instrument or its accessories.

1. ALWAYS locate the instrument on a flat, rigid and stable table capable of withstanding the weight of the instrument and its spinning operation.

2. ALWAYS make a safety zone of 30 cm around the instrument to indicate that neither hazardous materials nor persons should be permitted within the area during operation.

   √ ALWAYS position the instrument with enough space on each side of instrument to ensure proper air circulation.

3. ALWAYS install the instrument within a temperature and humidity controlled environment (Permissible ambient temperature: 5 ~ 35 ℃, Relative humidity: ⩽ 85%).

4. Before connecting the main power, check the rated voltage.

5. Should not use incompatible rotors and accessories.

   √ Only use the rotors manufactured by Baygene Company Limited, appropriate centrifugal tubes and adaptors to hold sample containers tight in the rotors.

6. Before operating the instrument, check if the rotor and the lid are securely fastened.

   √ Should operate the instrument with a compatible rotor properly installed and secured to the motor shaft.

7. Mount the rotor on the motor shaft properly, check it by spinning manually.

8. Do not stop the rotor by hands while spinning.

9. Manual door release is available only when spinning of the rotor is completely stopped.

10. Should not exceed the rated rotational speed or specific gravity. If the loaded samples have densities of over 1.2 g/ml, the maximum rotational speed should be kept lower to prevent from rotor failure.

11. The sample content should not exceed 80% of total capacity of a tube. Otherwise, it may cause spillage of sample or even the tube breakage.

12. ALWAYS load the sample tubes symmetrically with evenly weighted samples not to cause rotor imbalance. If necessary, use the water blank to counterbalance the unpaired sample.

13. The rotation speed should not exceed the highest value of the individual guaranteed g-forces for centrifuge, rotor, bucket or adaptor. Especially, the guaranteed g-strength of the sample container should not be neglected.

14. The rotors should be cleaned and kept dry after use, for longer life span and safety.

15. ALWAYS disconnect the power supply prior to maintenance care and service to avoid electrical shock.

16. ALWAYS use proven disinfection procedures after centrifuging bio hazardous materials.

17. Should not centrifuge flammable, toxic, radioactive, explosive or corrosive materials.

18. When it is necessary to use toxic or radioactive materials or pathogenic microorganisms which belong to the Risk Group II of WHO: "Laboratory Biosafety Manual," should follow national regulations.

√ Do not place dangerous materials within 30 cm distance around the instrument, and that is also recommended by IEC 61010-2-020.

√ Use the Emergency Door Release function only when the door button on the control panel is dumb under the condition of complete stop of rotor running.

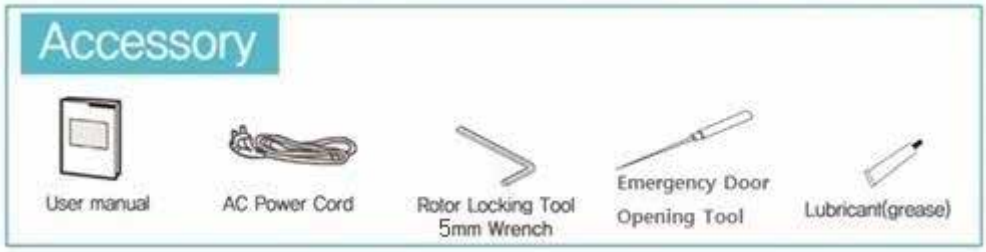
√ Never attempt to open or move the instrument until it is completely stopped.

√ Power input of 10% greater or less than the recommended voltage or fluctuates frequently may cause malfunction of the instrument and often serious damage.

√ Install the instrument at the place free from any kinds of corrosive gases.

2. Product Description &Technical Specifications

2-1. Product Description



2-2. Technical Specifications

Max. RPM/RCF		4,000 rpm / 2,700 xg
Max. capacity	Fixed angle	16 x 15 ml
	Swing-out	4 x 100 ml
Time control		Timed < 100 min or continuous
RPM/RCF conversion		Yes
Noise level(dB)		⩽52
ACC/DEC (sec)		⩽20 / ⩽25
SOFT START /STOP		Yes

Program memory	10
Imbalance cutout	Yes
Safety lid lock	Yes
Door drop protection	Yes
Automatic door release at completion	Yes
Power supply(V/Hz)	220/50~60 (110V optional)
Power requirement(VA)	340
Dimension(W x D x H, mm)	375 x 480 x 260
Weight without rotor (kg)	19.5
CE mark	Yes
Cat. No.	GS-0416

☞The instrument has the following functions for safety.

1. SOFT spin key for gentle acceleration and deceleration.
2. Automatic detection and alarms for imbalance, excess speed and heating.

3. Unpacking

Motor Protecting Device: a motor fixing cushion (Polyethylene (PE) foam) is placed in the chamber of 416 centrifuge to prevent possible damages to the imbalance sensor caused by motor shaking during shipping or relocation.

Motor Fixing Cushion in 416

☞The cushion should be removed before the installation of the instrument.

4. Installation

4-1. Power ON /OFF and Door Release

Action

4-1-1. Power ON /OFF

1. Connect the AC Power cord to the power socket on the right back of the instrument.
2. Turn on the instrument by pressing the switch on the right side of the instrument.
3. Press the [DOOR] button to open the door.

4-1-2. Door Release

1. To open the door, press the [DOOR] button.
   - The door is automatically opened with end alarm upon completion of the rotation.
   - Close the door until you hear the door clank.
   - When the door is opened, the door LED turns on.

☞ √ The door is not opened while the instrument is running.
√ If the door is open, the instrument does not run by pressing the [START] button.
√Power Failure: If there is any power failure during operation, door is not opened with [DOOR]button. Door can be opened only when the rotation completely stops and the power is on again. If you want to open the door when power is gone off, please refer to ‘5Emergency Door Release’.

4-2. Rotor Coupling and Disassembling

Action

Before coupling a rotor, clean the motor shaft and chamber with soft dry towel.

4-2-1. Swing-Out Rotor

1. Mount a compatible rotor into the motor shaft.
2. Grasp the rotor with one hand, and place Rotor Locking Tool at the center hole of the rotor.
   - To assemble the rotor, rotate the Rotor Locking Tool clockwise until tightly assembled.
   - To disassemble the rotor, rotate the Rotor Locking Tool counterclockwise.

3. Hang the appropriate buckets into the rotor.
   - Load an identical bucket at each wing(Do not leave any vacant wing without bucket. All wings should hold identical bucket.).
   - Remove dirt or dust around hooks of rotor and hanging part of bucket.

4. Spin the rotor manually to check if bucket swinging is sufficiently smooth. If the rotation is resisted, apply the lubricant (grease) to the link area.

4-2-1. Fixed Angle Rotor

1. Mount a proper rotor into the motor shaft. Put the Washer () at the center hole of the rotor and assemble it with the Rotor Locking Nut ()
   - To assemble the rotor, rotate the Rotor Locking Nut clockwise until tightly assembled.
   - To disassemble the rotor, rotate the Rotor Locking Nut counterclockwise.
2. Load the 15-ml sleeves in every hole.

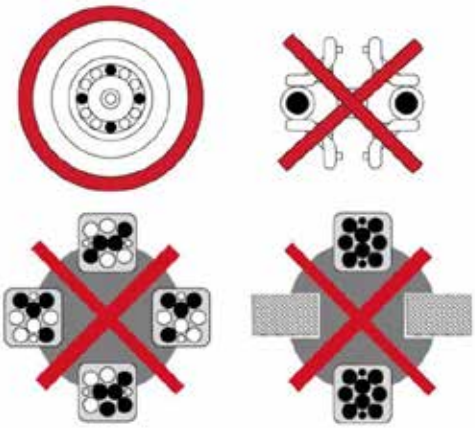
⚠	✓ When you couple the rotor at first installation, you turn off the instrument. ✓ After coupling the rotor, turn on the instrument.

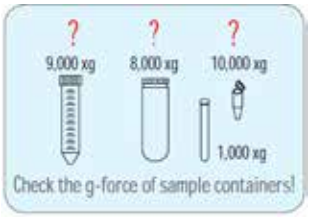
4-3. Positioning of Sample Tubes

Action

1. Before loading sample tubes, check if there are any water drops or dirt in the rotor hole or tube adaptors.
   - If you find any, remove it with soft dry cloth.
2. The sample tubes should be loaded symmetrically with the density and the weight considered to avoid imbalance.
   - **Only use appropriate centrifugal tubes and do not exceed the speed beyond the tube' s max** g-strength.

Correct Way of Sample Balancing and Tube Usage





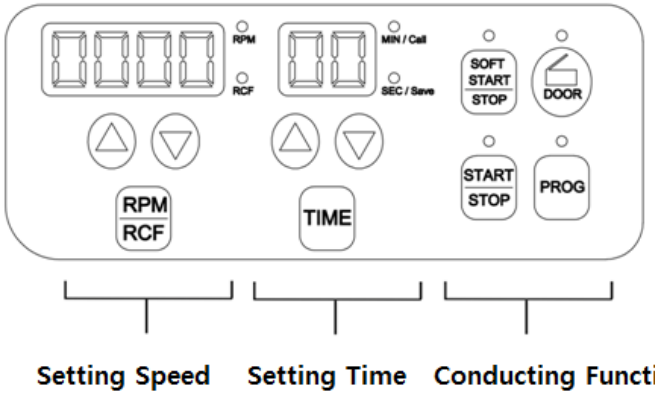
☒ In case the number of samples cannot make balance in weight, please use control tubes. Otherwise, it can cause noise or vibration, which may damage the instrument.

☞**For safety, the 'Imbalance Cutoff' function is** turned on, when there is weight imbalance of the loaded tubes

(Error 8, Imbalance error). Please refer to 7. Trouble shooting.

5. Operation

5-1. Key Functions of Control Panel



Setting Speed

☐ RPM/RCF — To set the speed and for automatic conversion between RPM and RCF

Setting Time

☐ TIME — To set time up to 99 min (0:00:00: continuous)

Setting Functions

☐ PROG — To save the set values and recall the saved programs

☐ START/STOP — To start or stop operation

☐ DOOR — To open the instrument lid

☐ SOFT START /STOP — To operate with slower and smoother acceleration / deceleration

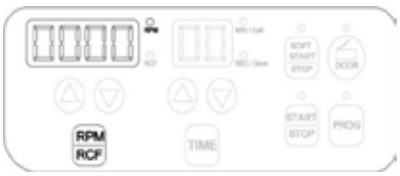
5-2. Setting the RPM/RCF Value

▶ Maximum RPM/RCF: 4,000 RPM/ 2,700 xg

☞In order to increase or decrease values rapidly, keep either of the [▲▼] **buttons pressed over 5**seconds.

Action

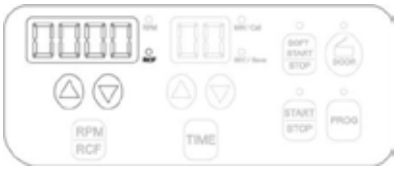
5-2-1. Setting the RPM Value



▶ Speed setting unit: 10 rpm

1. Press a [RPM/RCF] button once.
   - RPM MODE is on by pressing the [RPM/RCF]button once.
2. Press the [▲▼] buttons to change the set value.
3. Press the [RPM/RCF] button again to set the value.

5-2-2. Setting the RCF Value



▶ Speed setting unit: 1 xg

Press a [RPM/RCF] button twice.

- RCF MODE is on by pressing the [RPM/RCF] button twice.

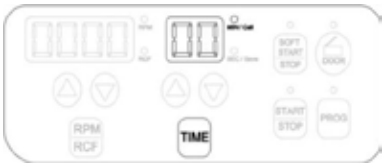
1. Press the [▲▼] buttons to change input value.
2. Press the [RPM/RCF] button again for saving.

5-3. Setting the Time Value

▶Speed setting unit: 1min / 1 sec

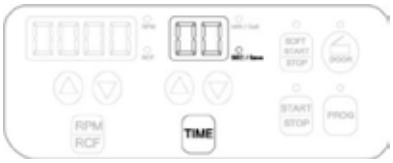
Action

5-3-1. Setting the MIN Value



1. Press the [TIME] button once.
   - The MIN mode is on by pressing the [TIME] button once.
2. Press the [▲▼] buttons to change the set value.
3. Press the [TIME] button again to set the value.

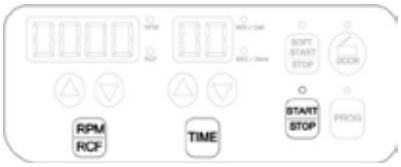
5-3-2. Setting the SEC Value



1. Press the [TIME] button twice.
   - The SEC mode is on by pressing the [TIME] button wice.
2. Press the [▲▼] buttons to change the set value.
3. Press the [TIME] button again to set the value.

5-4. START /STOP

Action



1. After setting the RPM/RCF and the TIME, press [START/STOP] button.
   - While running, the START LED' is turned on.
   - To stop the operation, press the [START/STOP] button while running.

5-5. SOFT START /STOP

The [SOFT START/STOP] button is used for gentle acceleration and deceleration for sensitive samples.

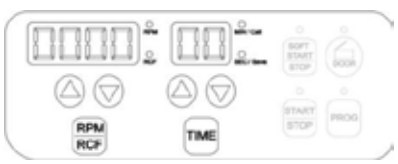
Action

1. After setting TIME and RPM, press the [SOFT START/STOP] button once.
   - The LED of [SOFTSTART/STOP] button is on while running.
   - The door is automatically opened when the operation is completed.
   - When operating in the [SOFT] mode, the operation cannot be stopped by pressing the[START/STOP] button.

5-6. Program Save / Recall

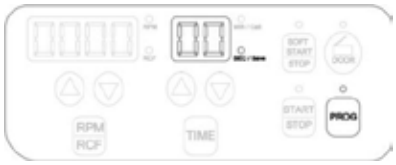
Action

5-6-1. Program Save

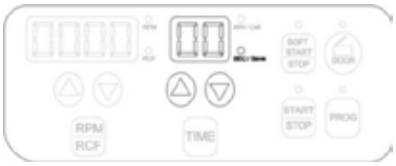


1. Set parameters (Refer to 5-2 ~ 5-3).

2. Keep the [PROG] button pressed over 3 seconds to save your set values.
   ▶ The LED of [PROG] button and SEC/Save are turned on.



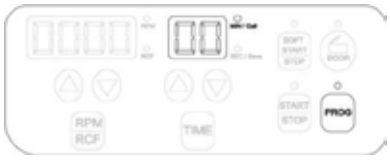
3. Input the program number by using the [▲▼] button.
   - Up to 10 programs can be stored.



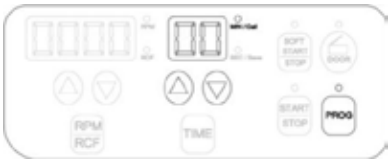
4. Press the [PROG] button again to complete saving.
   - The set value is saved.
   - In case of no input for 5 seconds, you will get out of the Save mode.

5-6-2. Program Recall

1. To recall a saved program, press the [PROG] button shortly.
   - The LED of [PROG] and MIN/Call are turned on.



2. Enter the program number you want to recall by pressing [▲▼] button.



3. Press [PROG] button once again.
   - The set values of the saved program are displayed.
   - In case of no input for 5 seconds, you will get out of the Recall mode.

5-7. Emergency Door Release

When the door of the instrument is not opened automatically or by pressing the [DOOR] button due to an accidental power shut-off or any unexpected causes, users can manually open the door by following the instruction.

The door can be unlocked manually with Emergency Door Opening Tool through the emergency opening hole.

1. Find the emergency hole on the left side of the instrument
2. Insert the Emergency Door Opening Tool into the hole and push it until the door is released.

Manual door release should be attempted only when the rotation completely stops. If not, it could bring about harmful damage to the operators or the samples.
After opening the door, it is recommended to wait until electricity gets back to normal.

5-8. Replacement of Fuse

When you turn on the instrument but it does not power on at all, please check the Power Switch, the connection

of the Power Outlet and the Power Socket. If the status keeps going, replace the fuse as the following instruction.

Action

1. Remove the AC Power Cord at the back of the instrument and push the Fuse Case by the flat-head screwdriver to take out the Fuse Case.

2. If you find the fuse broken or damaged, replace it by the new spare one stored in the fuse case and check out if the power can be turned on.

6. Maintenance

6-1. Outer part of instrument

1. Clean the outside of the instrument with dry soft cloth. If necessary, dip the cloth in neutral detergent and clean any contaminated area. Keep completely dry after cleaning.
2. Do not use any volatile chemicals such as alcohol, benzene, benzole and thinner, etc.
3. Be careful not to make scratches on the surface of the instrument.

- Scratches may cause corrosion on the surface of the instrument.
- Any parts with rust should be cleaned with neutral detergents and kept dry.

6-2. Chamber

1. Keep dry inside the chamber after every use.
2. If the chamber is contaminated, clean contaminated area with the cloth dipped in neutral detergent.

6-3. Shaft

1. Always keep the motor shaft clean to avoid any imbalance problem caused by the contaminants.
2. After using the instrument, take out the rotor from the shaft and clean the shaft with dry soft cloth to keep dry.
3. If the rotor cannot be easily removed from the shaft, do not pull the rotor by force and call a service engineer authorized by Baygene Company Limited

6-4. Rotor

1. If any parts become contaminated, clean them with soft wet cloth and keep the rotor dry.
2. Be careful not to make scratches inside or on the surface of rotors. Any small scratches can cause corrosion of the rotor and big damage to the instrument.
3. While the instrument is not used, remove the rotor from the motor shaft and stand it upside down.

6-5. Transportation of the instrument

1. If you need to move or ship the instrument, be cautious to protect the motor shaft from any physical impact or turbulence.
2. Do not mount a rotor in any cases of movement. Fill inside the chamber with proper materials to keep the motor shaft on place and not to be influenced by physical pressure.

7. Troubleshooting

7-1. Checklist

Symptom	Check list
Power failure	Make sure the AC Power cord completely connects the instrument to the power outlet. Check the power switch is on (Please refer to 4-1. Power ON / OFF and Door Release).
Can't be started	If the door is not closed completely, the instrument does not run.Check the Door LED on the display window and close the door completely.
Can't open the door	If the power is out, check the main fuse for the laboratory to supply the power. If it is not solved shortly, open the door with the manual door release tool (Please refer to 5-7. Emergency Door Release).
Can't close the door	Remove the dirt at the door latch and keep the door completely closed.If the door is closed by any reasons, please contact GENESPEED® service team.
Noise and vibration during running	Please check if the table and the instrument keep level.
	Please recheck the three coupling status on the following. 1. Balanced coupling of the rotor to the motor shaft 2. Complete fixing of the rotor by the Rotor Locking Nut 3. Fastening of the Rotor Lid and the rotor. (Please refer to 4-2. Rotor Coupling and Disassembling)
	Check the balanced positioning of the samples in the rotor (Please refer to 4-3. Positioning of Sample Tubes).

7-2.Error Codes

Note!

If any of the following **error messages comes up with beeping sound, press 'PROG' button to clear the error** status and make the instrument restore its default setting. If the error message does not disappear, check into the current status by referring to the following information.

Error	Possible Causes	Actions
Error 1	RPM	- If the speed does not reach 200rpm within 2 seconds after motor starts to operate, this message may appear. - Check whether the motor is normally working or not. - If the error message does not disappear, please contact a Service Engineer of your local GENESPEED® partner.
Error 2	Door Open	- If the door opens while spinning or has any trouble in the door sensor, this message may come up.

		- Remove the dirt at the door latch and close the door completely. Check the door closing status on the display window. - If the error message does not disappear, please contact a Service Engineer of your local GENESPEED® partner.
Error 3	Motor Overheating	- If the motor is overheated, this message may come up. - Keep off the power supply for an hour, and turn on the power to check up the instrument. - If the error message does not disappear, please contact a Service Engineer of your local GENESPEED® partner.
Error 4	Low Voltage	- If the power input (V/Hz) is at least 10% lower than the recommended power, this message may come up. - Turn off the power supply and check the voltage of the Power supply (V/Hz). - Use AVR to provide proper power.
Error5	High Voltage	- If the power input (V/Hz) is at least 10% higher than the recommended, this message may come up. - Turn off the power supply and check the voltage of the Power supply (V/Hz). - Use AVR to provide proper power.
Error 6	Overspeed	- If the instrument spins faster than allowed (1,000 rpm higher than the set speed), it may cause overload to motor capacity or any trouble in the output of motor. - Turn off and on the power supply to check up the instrument. - If the error message does not disappear, please contact a Service Engineer of your local partner.
Error 7	Software	- If the installed software has any bugs, this message may come up. - Contact a Service Engineer of your local partner and get the firmware upgrade. Wire disconnection or tuning of the instrument must be performed only by a Service Engineer authorized by Baygene Company Limited
Error 8	Imbalance	- Check the balance status of the samples in the rotor (Please refer to 4-3. Positioning of Sample Tubes) and turn off and on the instrument to check the status. - If the error message does not disappear, please contact a Service Engineer of your local GENESPEED® partner.
Error 9	RPM Sensor	- If the rotor recognition fails, this message comes up. - The message will be cleared by coupling an appropriate rotor (Please refer to 4.2 Rotor Coupling and Disassembling.). - Disassemble and couple a compatible rotor and turn off and on the instrument to check out the status. - If the error message does not disappear, please contact a Service Engineer of your local GENESPEED® partner.

* Any wire disconnection or tuning of the instrument must be performed only by a service engineer who is authorized by Baygene Company Limited.

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