

Large Capacity, High Speed Centrifuge

2236R

User's Manual



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GYROZEN

Designed to suit your exact needs

Wide range of modern centrifuges for a wide variety of laboratory

THE BEST FUNCTIONAL QUALITY



- Manufactured and tested to IEC standards, stable spinning operation within +/-2% variation
- Steady and soft deceleration with dynamic brake technology
- Unique internal air flow design that protects heating of samples
- High capacity, strong compressor ensures fast cooling of chamber and samples
- Fast cool function to 4°C in 5 minutes for fast start up and fast cool down of sample
- Automatic rotor identification functions
- Very quiet operation with patented anti-vibration damper structure

SAFETY and ROBUSTNESS



- Triple laminated ABS/Steel door construction minimizes noise and heat transmissions
- Safety door lock mechanism ensures the door is locked whilst in operation mode
- Unique door-drop protection protects the operator and samples when loading and unloading
- Automatic rotor identification secures operational safety
- Automatic detection and alarms for imbalance, excess speed and heating
- Automatic door-open scheme with safety level of aperture depth not to damage operators
- Emergency door-lock release helps to open the instrument when power blackout or sudden stoppage occurs
- The compressor-off function during door-open minimizes frosting and rusting
- The Aerosol tight buckets and rotors prevent contamination and ensures safety
- Autoclavable and corrosion resistant rotors ensure safety and long life

EASY CUSTOMIZATION



- Any rotors, sample containers, and adaptors can be manufactured according to customer's specification
- Flexibility of including any additional functions or programs in need

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Large Capacity, High Speed Centrifuge 2236R

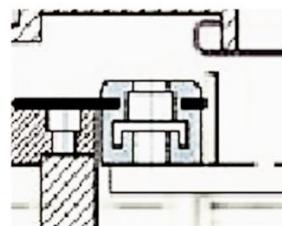


CONVENIENCE IN OPERATION



- Intuitive touch button/screen with easy to follow controls
- Time control of pulse, timed, and continuous
- Automatic RPM/RCF conversion for prompt detection of g-force
- Easy to check actual rpm through the top window of door
- Program memory for up to 100 programs
- Automatic rotor identification function
- Automatic door-opening function when rotor is static, for easy retrieval of samples
- A large assortment of rotors, fixed angle or swing-out with buckets and adaptors

PATENTED TECHNOLOGIES



Exceptional design of vibration absorbing dampers to minimize trembling and noise

ECO-FRIENDLY MANUFACTURING



- Dust free AC induction motor
- Eco-safe refrigerant, R404a
- Very quiet operation at lesser than 56

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Large Capacity, High Speed Centrifuge 2236R

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1. Meanings of Symbols & Safety Precautions

1-1. Meanings of Symbols

1-1-1. Symbols on the instrument

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.
	The door should be closed by gentle press-down touching motion.		

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 through understanding. Incorrect handling of the instrument could 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 floor capable of withstanding the weight of the instrument and its spinning operation.
2. ALWAYS make a safety zone of 30 cm around the centrifuge 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°C ~ +35 °C, Relative humidity: ≤ 85%)
4. Before connecting the power, check the rated voltage.
5. Should not use unapproved rotors and accessories.
 - ✓ Only use rotors from GYROZEN Co., Ltd. with appropriate centrifugal tubes and suitable adaptors to embrace sample containers tightly enough inside rotors.
6. Before operating the instrument, check if the rotor and the rotor lid are securely fastened.
 - ✓ Should operate the instrument with a rotor properly installed and secured to the motor shaft.
7. Mount the rotor on the motor shaft properly, check it with spinning manually.
8. Do not stop the rotor by touching with hand during the instrument is running.
9. Emergency door open should be performed only when spinning is completely stopped.
10. Should not exceed the rated speed or specific gravity. Samples whose density is greater than 1.2g/ml must have reduced maximum rotational speed to avoid rotor failure.
11. The sample content should not exceed 80% of total capacity of a tube. Otherwise, it would cause spillage of sample fluid and even the tube breakage.
12. ALWAYS load the tubes symmetrically with evenly weighted samples to avoid rotor imbalance. If necessary, use the water blank to counterbalance the unpaired sample.
13. The operation speed should not exceed the highest value of the individual guaranteed g-forces of each centrifuge, rotor, bucket or adaptors and sample container, especially the guaranteed g-force

of sample container should not be neglected.

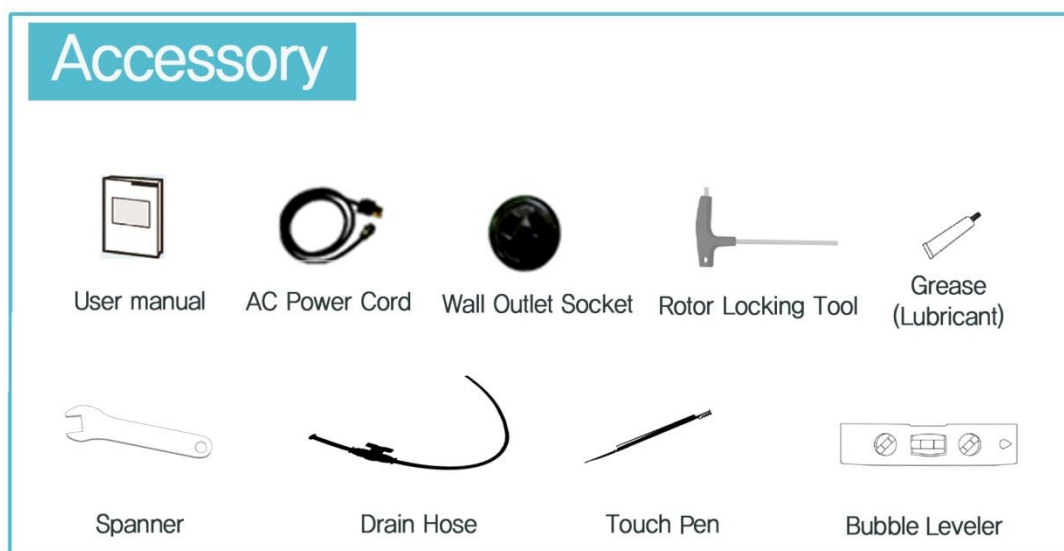
14. The rotors should be cleaned and kept dry after every use for longer life and safety.
15. ALWAYS disconnect the power supply prior to maintenance care and service to avoid electrical shock.
16. ALWAYS use proven disinfection procedures after centrifuging biohazardous materials.
17. Should not centrifuge flammable, toxic, radioactive, explosive, or corrosive materials.
18. When it is necessary to use toxic or radioactive materials or pathogenic micro-organisms which belong to the Risk Group II of WHO: "Laboratory Bio- safety 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 open function only when the door button on the control panel is dumb under the condition of complete stop of rotor running.
- ✓ Never try to open or move the instrument if it is not completely stopped.


2. Product Description & Technical Specifications

2-1. Product Description



2-2. Technical Specifications

Max.RPM/RCF	Fixed angle	22,000 rpm / 54,111 xg
	Swing out	4,000 rpm / 3,134 xg
Max. capacity	Fixed angle	6 x 1,000 ml
	Swing out	4 x 250 ml
Temp. range(°C)		-20 ~ +40
FAST COOL button		Yes
OS / Control Display		Windows CE / 7" Touch Screen
Time control		Pulse, timed < 100 hr. or continuous
RPM/RCF conversion		Yes
Noise level (dB)		≤56
Acc/Dec		9/10 steps
Program memory		100
Rotor Identification		Automation
Imbalance cutout		Yes
Safety lid lock		Yes
Lid drop protection		Yes
Power supply(V/Hz)		220/50~60 (110V optional)
Power requirement(KVA)		4.0
Dimension(W x D x H, mm)		824 x 634 x 1,049
Weight without rotor (Kg)		240
CE mark		Yes
Cat. No.		GZ-2236R

 This instrument has following functions for safety.

1. Automatic rotor identification function.
2. Automatic detection and alarms for imbalance, excess speed and heating.
3. User ID and protocol management with historical tracking
4. Holding or changing of time and temperature possible while running

3. Preinstallation Requirements

3-1. Environmental Requirement

1. Install the instrument on the flat and rigid floor. If you place the centrifuge on the slopping area, the motor shaft might be distorted by the rotor weight and centrifugal force.
2. Install the instrument about 30 cm away from the wall for the air circulation. It is also recommended to install the instrument at the dustless place as much as possible.
3. Install the instrument at the place with appropriate temperature and humidity. It has to be maintained at the proper temperature & humidity. (Permissible ambient temperature: +5°C ~ +35 °C, Relative humidity: 30% ~ 85%)
4. Install the instrument at the place without any kinds of corrosive gases.

3-2. Electricity Requirement

1. The 2236R requires 4K VA for optimal operation. Therefore, should secure sufficient power inflow in single phase current. The supplied Power Cord and Plug should make proper current connection with the supplied Wall Outlet Socket.



Wall Outlet Socket, 220V / Single Phase
(should be installed to proper voltage line and earth grounded)



Power Cord and Plug




A Socket on the Back of Device

2. Check the proper voltage of your instrument and connect to adequate power outlet.
3. If the power input is more than +/- 10% of the recommended voltage or fluctuates frequently, it may affect some functions of the instrument and often result serious damage.

3-3. Unpacking

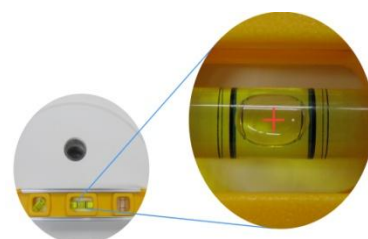
1. Untie the plastic banding over the paper box and get rid of box from the instrument main body.
2. Unwrap the vinyl coat surrounding the main body.
3. Place the instrument on a proper place by moving instrument's wheel.
4. Removal of Safety Padding

 2236R is delivered with its chamber filled with safety padding. As the 2236R has the rotor auto-recognition function, the system unnecessarily tries to identify a rotor if you turn on the power before coupling a rotor. In this case, an error signal is appeared because of absence of the rotor. When this error appears, press 'OK' button on the control screen and then press 'DOOR' button to open the door. Mount the rotor and press 'START' button to recognize the rotor.

4. Installation

4-1. Balance Adjustment

Imbalancing of the instrument itself causes vibration, noise and error during operation. Check the level of the floor surface with a Bubble Leveler before installation.



Action

After locating the instrument on the solid and flat floor, check the horizontality with a Bubble Leveler.

1. Place the Bubble Leveler on top of the instrument.
 - Try to locate all bubbles in the center of the Bubble Leveler with rotating the red gear which is in caster of the instrument.
2. Adjust the height of four-wheel, which is at the bottom of the instrument, with rotating the red gear (which is in caster of the instrument) for the first balance adjustment. (For the final balance adjustment, please refer to 4-5. Balance Adjustment – Final)
 - For fixing a wheel: rotate the red gear counterclockwise with a spanner
 - For loosening a wheel: rotate the red gear clockwise with a spanner



4-2. Connection of the Drain Hose

To discharge liquid outwards, the Drain Hose should be connected properly.

1. Connect the two supplied Drain V/V, and then close the valve.
2. Connect the hose to the joint hole at the left bottom of the instrument.
 - At usual time, rotate the drain lever counterclockwise to close, and so the refrigeration is not influenced by air inflow.
 - From time to time, turn the lever in a straight line (—) for draining the liquid inside.



During running process, some water is condensed inside the device. It should be discharged for it can degrade the cooling capacity. So for this the device has a drain channel in a chamber. The drain channel is elongated to outside drain hose & valve and closed for most of time. The 2236R has a valve type drain channel as shown in below figure for easy drainage.



4-3. Power On/Off and Door Open

4-3-1. Power On/Off



To connect the AC power cord, the power socket should be installed which is supplied by manufacture.

1. Connect the AC Power cord at the power socket on the right back of the instrument.



Power connection



Main body power socket



Power Connection wall

2. Turn on the instrument by pressing a switch on the right side of the instrument.
3. Press OK.

- After pressing OK, the display window changes to main window with automatic rotor recognition.
- If the rotor is coupled, the follow message shows up with automatic rotor recognition.
"Searching Rotor" >> "Recognition OK"



☞ This instrument has automatic rotor identification function for safety. If the rotor is not coupled, "Error 9" message shows up. This message will be disappeared when the rotor is coupled.

4-3-2. Door Open

Easy recognition with the change of [Door] color (Open-red, Close-white) in the main screen.

1. For opening the door, touch [Door] when the door is closed (Door -white).
 - When the door is opened, the [Door] on the screen turns red.



- ✓ The door is not opened while the instrument is running.
- ✓ If the door is opened, the instrument could not be operated even with pressing the 'Start' button.
- ✓ For operational safety, this instrument has the automatic rotor recognition function.
- ✓ When you supply the power, "Searching Rotor" / "Change to Rotor ID" will be appeared. If the rotor is absent, the "Error 9" will be appeared. This message will be cleared after rotor coupling and running.
- ✓ The door is not automatically opened after finishing operation to keep the sample at proper temperature.
- ✓ Power Failure: If there is any power failure during operation, door is not opened with touching [Door]. Door can be opened only when the operation is completely stopped and the power is on again. If you want to open the door at the power failure, please refer to '5-9. Emergency Door Open'.

4-3-3. Door Lock

The door should be closed only by gentle press-down motion.



As soon as the door latch touches the sensor inside, it is automatically closed by a geared motor of door locking system


4-4. Rotor Coupling and Disassembling

Action

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



4-4-1. Swing-Out Rotor

2. Mount a proper rotor into the motor shaft.
3. 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.
4. Hang the appropriate buckets into the rotor.
 - Load the identical bucket at each wing for safety. (Do not leave a vacant wing without bucket. All wings should hold identical bucket.)
 - Remove dirt and dust around hooks of rotor and hanging part of bucket.
4. Spin the rotor manually to check if buckets swinging free enough and ever. If they do not swing freely,, apply the Lubricant (grease) to the linking area.




4-4-1. Fixed Angle Rotor

2. Mount the proper rotor into the motor shaft.
Grasp the rotor with one hand, and place Rotor Locking Tool at the center hole of 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. To close of the rotor lid, rotate the rotor lid nut clockwise.
 - For closing lid: rotate the rotor lid nut clockwise.
 - For opening lid: rotate the rotor lid nut counterclockwise.



When you run a fixed angle rotor, make sure that the rotor lid is tightly closed. If you don't close the rotor lid completely, it will be crushed.

 For operational safety, this instrument has the automatic rotor recognition function.

4-5. Balance Adjustment – Final

1. Mount the rotor and place the Bubble Leveler on the middle of the top of a rotor.
 - Confirm that air bubbles of all three windows of the Bubble Leveler are within the black lines.




2. To adjust the balance status, rotate the red colored ring at the wheel caster clockwise or counterclockwise until the device is well balanced.

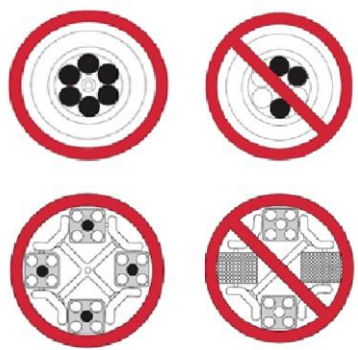


4-6. Positioning of Sample Tubes

1. Before loading sample tubes, check the water drop or dirt in the rotor hole or inner adaptor.
 - If there is a water drop or dirt in the rotor hole or inner adaptor, remove it with soft dry cloth.
2. Tubes should be placed in the rotor with same amount of samples at symmetrical positions.
 - Only use appropriate centrifugal tubes and do not exceed the speed beyond the tube's max g-force.
 - For safety, fill the sample for 70~80% in the tubes.



Correct Ways of Sample Balancing & Tube usage



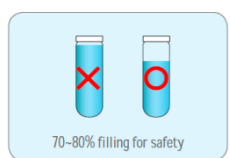
9,000 xg ?

8,000 xg ?

10,000 xg ?

1,000 xg

Check the g-force of sample containers!



70~80% filling for safety

✓ If the number of samples is not in pair, please load the control tubes at each symmetrical position. Otherwise, it results noise and vibration, which eventually damage the instrument.

☞ For safety, the 'Imbalance Cut Off' function will be occurred, if there is imbalance of loading tubes (Error 8, Imbalance error). Please refer to 7. Trouble Shooting.

5. Operation

5-1. Key Functions of Control Panel

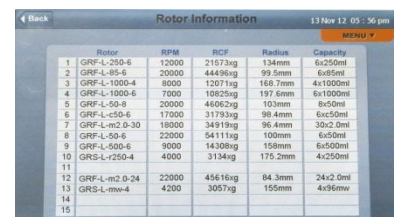
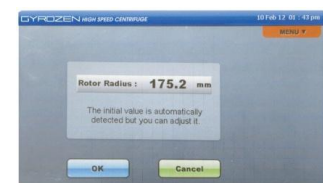
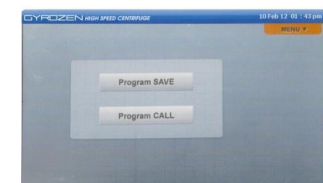
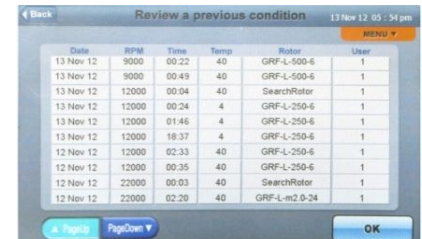


- ☐ RPM/RCF For automatic conversion of RPM/RCF and to set the speed
- ☐ TIME Use to set time up to 99 hours 59 min 59 sec (0:00:00: continuous)
- ☐ TEMP Use to set temperature (-20°C ~ 40°C)
- ☐ Accel Use to set the acceleration level from 1 to 9 steps. Larger number means faster acceleration
- ☐ Decel Use to set the deceleration level from 0 to 9 steps. '0' step means natural deceleration. Larger number means faster deceleration.
- ☐ Rotor Show the Cat. No. of coupled rotor
- ☐ START Use to start operation
- ☐ STOP Use to stop operation
- ☐ FAST COOL Use to reach rapid refrigeration up to the setting temperature.
- ☐ HOLD Change time and temperature after reaching the setting speed.
- ☐ DOOR Use to open the instrument lid

5-1-1. Menu

Action

1. Touch [MENU].
 - ▶ Menu is appeared on the screen.
- History
 - ✓ Log file is showed up (Date, RPM, Time, Rotor and User).
- Program (Please refer to 5-6. Program Saving & Recalling)
 - ✓ Save up to 100 programs.
 - ✓ Can call at every using
- Radius
 - ✓ Can check the rcf (g-force) value for using adaptors.
- Options
 - COLOR (For background)
 - VOLUME (For touch sound)
 - Touch Calibration (For sensitivity of touch)
 - Keypad Type (Input mode: LCD touch or USB Keyboard)
- Rotor
 - ✓ List of the available rotors with RPM/RCF, RADIUS information.
- Information
 - ✓ Check the serial no. and firmware



5-2. Setting RPM/RCF

Automatic RPM/RCF conversion for prompt detection of g-force.

Action

5-2-1. Setting RPM

- ▶ Speed setting unit: 1 rpm

1. Touch [RPM display]
 - The [RPM display] will blink.
 - The numerical keypad will be appeared.
2. Touch the number buttons to input value and then touch OK.
 - After touching [OK], the saved RPM value is showed on the [RPM display] as a setting value.
 - [CE] can be used for correction of input value.
 - The Set RPM shows the maximum RPM value of coupled rotor.



5-2-2. Setting RPM/RCF

- ▶ Speed setting unit: 1 rcf

1. Touch [RCF display]
 - The [RCF display] will blink.
 - The numerical keypad will be appeared.
2. Touch the number buttons to input value and then touch [OK].
 - After touching [OK], the saved RCF value is showed on the [RCF display] as a setting value.
 - [CE] can be use for correction of input value.
 - The Set RCF shows the maximum RCF value of coupled rotor.



If you input over the maximum value or less the minimum value of rotor speed, "The range of RPM/RCF is from <minimum value> rpm/rcf to <maximum value> rpm/rcf" is appeared.

- To go to the main page, touch [OK] or [Cancel]



5-3. Setting Time

- ▶ Time setting to 99hour 59min 59sec or continuous.
- ▶ **Normal** (Time display begins to count the run time when the acceleration begins and stops when the deceleration begins)
- ▶ **Section** (Time display begins to count the run time once the actual run speed reaches to the set speed value and stops when the deceleration begins)



- Normal Time Control : From t0 to t2

- Section Time Control : From t1 to t2

Action

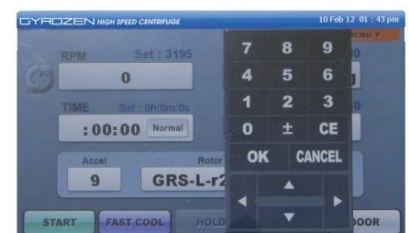
1. Choose [Time display] (Normal/Section)



2. Touch the "hour", "minute" and "second" individually on [Time display]
 - 00:00:00 is ordered by "hour", "minute" and "second"
 - The numerical keypad will be appeared.



3. Touch the number buttons to input value and then touch [OK].
 - After touching [OK], the saved Time value is showed on the [Time display] as a setting value.
 - [CE] can be used for correction of input value.
 - The time display shows the type of Normal or Section after starting running.



5-4. Setting Temperature and Fast Cool

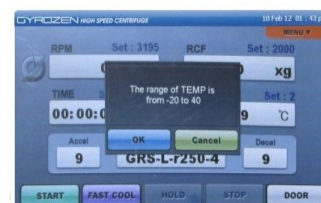
Action

5-4-1. Setting Temperature

- ▶ Temperature can be set from -20°C to 40°C
- ▶ Temp. setting unit: 1 °C
- 1. Touch [TEMP display]
 - The number blinks on the [TEMP display].
 - The numerical keypad will be appeared.
- 2. Touch the number buttons to input value and then touch [OK].
 - After touching [OK], the saved Temp value is showed on [Temp display] as a setting value.
 - [CE] can be used for correction of input value.

☞ If you input out-of setting value, "The range of Temp is from -20°C to 40°C" is appeared.

- To go to the main page, touch [OK] or [Cancel]



5-4-2. Fast cool

1. Set the temperature. (Please refer to 5-4-1. Setting Temperature)
2. Touch the [Fast Cool] buttons for fast cooling.
 - The window shows a message: "Searching Rotor" >> "recognition OK!"
 - By touching the [Fast Cool] button, the instrument is refrigerated down to the set temperature in a short time. During the fast cooling, the rotor runs at low speed (1,000 rpm).
 - The passed time is showed on [Time display]



- ✓ If you'd like to load your sample tubes before pressing the [Fast Cool] button, please check if the sample is safe during spinning at 1,000 rpm.
- ✓ Before starting Fast Cooling, please check the rotor coupling and symmetrical arrangement of sample tubes.

5-5. Acceleration / Deceleration

- ▶ Use the adjustment function of acceleration & deceleration levels to protect sensitive samples and separate the layer clearly.
- ▶ 9 acceleration and 10 deceleration ramps (Level 0: Natural deceleration)

Action

1. Touch [ACC display] or [DEC display] that indicates with red rectangle.
 - [ACC/ DEC display] will blink.
 - The numerical keypad will be appeared.
2. Touch the number buttons to input value and then touch [OK].
 - After touching [OK], the saved ACC/DEC value is showed on the [ACC/DEC display] as a setting value.
 - ACC(DEC) can be set 1(0)~9 level. (ACC/DEC 9: The fastest Acceleration and Deceleration level, DEC 0: Natural deceleration)



☞ If you input out-of setting value "The range of Accel (Decel) is from 1(0) to 9" is appeared.

- To go to the main page, touch [OK] or [Cancel]



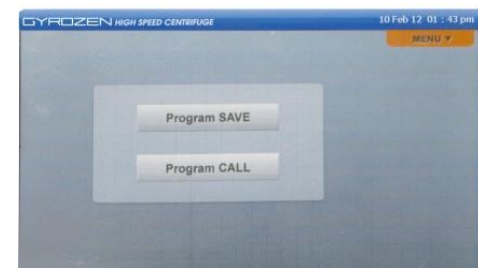
5-6. Program Saving & Recalling

- ▶ Program memory up to 100 programs.

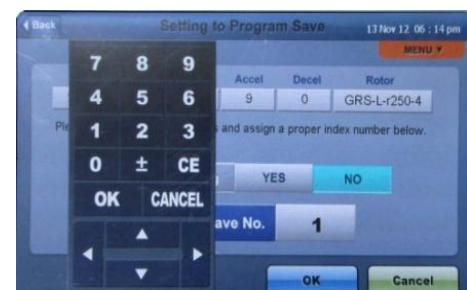
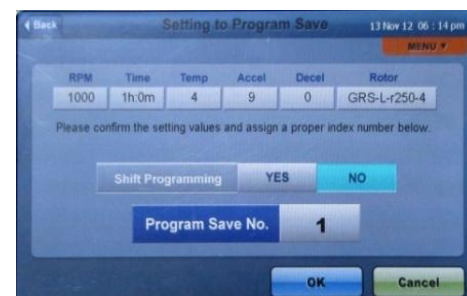
Action

5-6-1. Program Saving

1. Set parameters. (Refer to 5-2 ~ 5-4: RPM/RCF, Time, Temp)
2. Touch the [MENU] and then select program.
 - Window shows the program display.
3. Touch [PROGRAM SAVE]
 - The setting value is appeared on the display window.

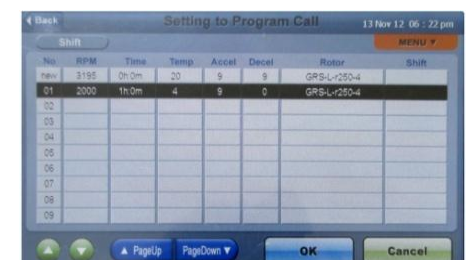
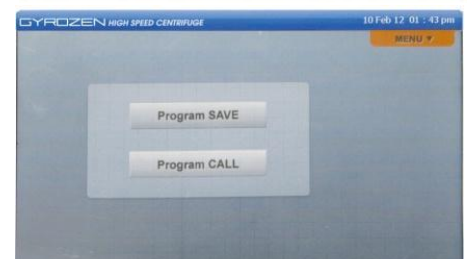


4. Touch the [Program Save No. display].
 - Check the setting value.
 - The numerical keypad will be appeared.
5. Touch the number buttons to input program number and then touch [OK].
 - After touching [OK], "Setting to Program Save: Do you want to save your changes?" is showed.
 - If you input the program number that already used, the setting value is overwritten.
 - [CE] can be used for correction of input value.
 - To go to the previous page, touch [Cancel].
6. Touch [OK] when the confirm message for saving is showed up.
 - To go to the previous page, touch [Cancel].



5-6-2. Program Recalling

1. To recall the saved program, touch the [MENU] and then touch [program].
 - Window shows the program display.
2. Touch [Program CALL]
3. Select the call program and then touch [OK].
 - When touch [OK], the setting values are showed up on the main window.
 - Number 00 is the program numbers that were already saved.
 - To go to the main page, touch [Cancel].
 - The new value is previous setting value.



☞ If you input program number that has not been saved, "Loaded Failed: Can't read selected data!" is appeared.

- To go to the main page, touch [OK] or [Cancel]



5-7. Start/Stop and Hold

Action

5-7-1. Start

1. Touch [Start] when the door is closed.
 - The setting value is showed up for confirmation.
2. After checking the setting value, touch [OK].
 - When touch [OK], the window shows the message as follows with running: "Searching Rotor" (rotor recognition with spinning under 200 rpm)>> "recognition OK!"
 - If the setting values are not correct, touch [cancel] to go to main display window.
 - When the instrument is running, [START] and [DOOR] is not activated.



5-7-2. Hold

- ▶ After reaching the set RPM, Time and Temp are changeable.

1. Press [Hold] for 5 seconds.
 - After pressing [Hold], TIME and TEMP in the main window are activated.
 - Please refer to 5-3 & 5-4 to set the TIME and TEMP.



5-7-3. Stop

1. In case of touching [Stop], the instrument stops running.



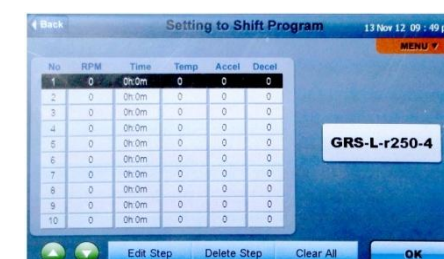
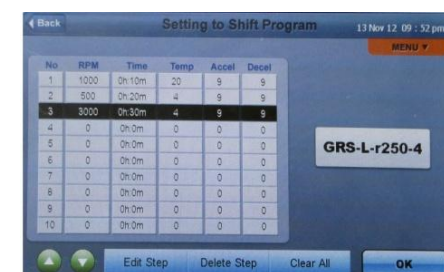
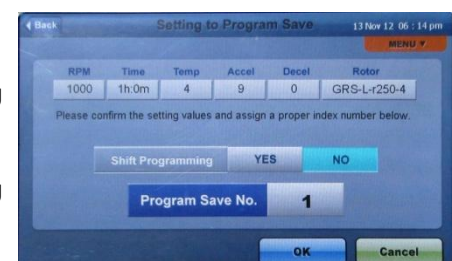
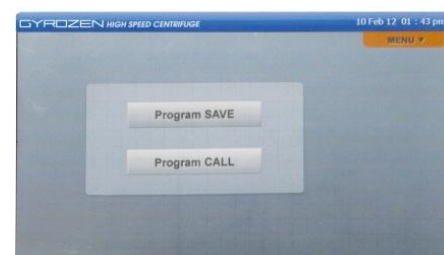
5-8. Shift Programming

With the shift programming function, up to 10 steps of operating conditions can be linked together in a program memory and operate sequentially as a single run. This function is useful in density gradient centrifugation or complex cell separation.

The shift programming function can be used with saved program number.

Action

- To use the shift programming, save the program (please refer to 5-6-1. Program Saving)
 - Select the Normal time count method.
 - Check the setting value on the program call window.
- On the program save display window, select the Shift Programming with Yes.
 - After Selecting Yes, the window moves to the Shift programming window.
- On the Shift Programming display window, touch the [step no.] that you want to use.
- Input the RPM/RCF, Time, Temp, and ACC/DEC in the setting display, and then touch [OK] to save the input value.
 - The numerical key pad is appeared when touching the each setting value.
- After finishing the edit of step, touch [OK].
 - Edit Step: To correct the setting value.
 - Delete Step: To delete for each step.
 - Clear All: To delete for every step at once.



✧ Cancellation of the Shift Programming

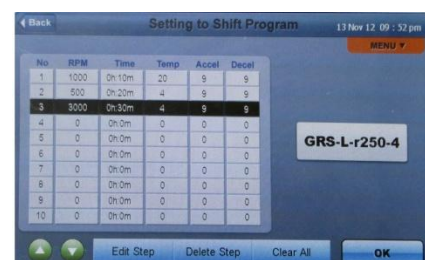
1. Move to Setting to Program Call display and then touch [Shift].

- Refer to 5-6-2. Program Recalling.
- The setting value of Shift Programming is on the display window.



2. Touch [Clear All] and then touch [OK].

- When you touch [Clear All], the setting values of every step cleared.
- When you touch [OK], the Shift Programming is canceled.
- The display window moves to Setting to Program Save.



5-9. Emergency Door Open

For emergency door opening, you can use the Emergency Open Tool only when the instrument is completely stopped.

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

1. Find the emergency door open hole at the center of the front case.
2. Pick out the silicon closure. (After finishing Emergency Door Open, fit it again.)
3. Insert the Emergency Open Tool into the hole and revolve it counterclockwise until the door is released.



- ✓ Manual opening should be performed only when spinning is completely stopped. Otherwise, harmful damage will be accompanied to not only operators but samples.
- ✓ After opening the door manually, it is recommended to wait until normal electricity comes back.

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 contaminated area. Keep completely dry after cleaning.
 2. Do not use any volatile chemicals such as alcohol and benzene, etc.
 3. Be careful not to make scratches on the surface of the instrument. The scratches can cause corrosion on the surface of the instrument.
- ✓ If any rust appears, clean it with neutral detergents and keep dry.

6-2. Chamber

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

6-3. Shaft

1. Always make special attention to clean the motor shaft to avoid any imbalance problem due to 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.

6-4. Rotor

1. If any parts are contaminated with samples, clean the rotor 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. If you do not use the instrument, keep the rotor separately from the motor shaft and stand it upside down.

6-5. Transportation of 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. Trouble Shooting

7-1. Check List

Symptom	Check list
Power failure	Connect the AC Power cord and make sure that the line is completely connected between the instrument and power outlet. Check the power switch is turned on. (Please refer to 4-3-1. Power On/Off)
Can't be started	If the door is not closed completely, the instrument can't 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 in shortly, open the door with the Emergency Door Open Tool manually for safety of sample. (Please refer to 5-9. Emergency Door Open.)
Can't close the door	Remove the dirt at the door latch and then close the door completely again. If the door seems not being closed by mechanical reason, please contact our service team.
Noise and vibration during running	Please check the balanced status of both the table and the instrument.
	Please re-check the coupling status of the following three matches to minimize the noise <ol style="list-style-type: none"> 1. the balanced way of coupling of the rotor into the motor shaft 2. the completeness of fixing of the Rotor Locking Nut on the rotor 3. the matching status of Rotor Lid with the rotor (Please refer to 4-4. Rotor Coupling and Disassembling.)
	Check balances of samples in the rotor. (Please refer to 4-6. Positioning of Sample Tubes.) and load the same weight of samples symmetrically.

7-2. Error Code

If the instrument shows the error code with beeping sound, press 'STOP' button to stop the beeping sound and press 'Enter' button to release of the error status and make the instrument go to the default setting again.

Error	Possible Causes	Actions
Error 1	RPM Sensor	<ul style="list-style-type: none">- Shut off the power supply, and then, turn on the power switch again to check the instrument.- If the error code shows continuously although you try to operate again, please call Gyrozen Field Service Engineer.
Error 2	Door	<ul style="list-style-type: none">- If the door is not closed completely, this message is appeared.- Remove the dirt at the door latch and then close the door completely again. Check the Door LED on the display window. If it is not solved in shortly, open the door with emergency door tool manually for safety of sample. (Please refer to 5-9. Emergency Door Open.)
Error 3	Motor Overheating	<ul style="list-style-type: none">- If the motor is overheated, this message is appeared.- Shut off the power supply for an hour, and then turn on the power switch for checking the instrument.- If the error code shows continuously, please call Gyrozen Field Service Engineer.
Error 4	Low Voltage	<ul style="list-style-type: none">- If the power input of Power supply (V/Hz) is 10% less than required power, this message is appeared.- Shut off the power supply and then check the voltage of the Power supply (V/Hz).- Use AVR to provide proper power.
Error 5	High Voltage	<ul style="list-style-type: none">- If the power input of Power supply (V/Hz) is 10% more than required power, this message is appeared.- Shut off the power supply and then check the voltage of the Power supply (V/Hz).- Use AVR to provide proper power.
Error 6	Over Speed	<ul style="list-style-type: none">- If the instrument is spun with over speed, there will be some problems in the overload of motor and the output of motor.- Shut off the power supply, and then, turn on the power switch again to check the instrument.
Error 7	Software	<ul style="list-style-type: none">- If the installed software has bugs, this message is appeared.- Tuning the firmware. (Download)*
Error 8	Imbalance	<ul style="list-style-type: none">- Check weight-balances of samples (Please refer to 4-6. Positioning of


Sample Tubes) and then turn off and on the instrument for checking.		
Error 9	Rotor ID or RPM Sensor	<ul style="list-style-type: none"> - If the function of rotor recognition is failed, this message is appeared. - This message will be cleared by coupling an appropriate rotor (Please refer to 4-4. Rotor coupling and disassembling.) - If the error code shows continuously, please call Gyrozen Field Service Engineer.
Error 11	Chamber Temp. Error	<ul style="list-style-type: none"> - If the instrument is not reached to setting temperature within an hour, this message is appeared. - No user action. Please call Gyrozen Field Service Engineer.
Error 12	Temp. Sensor Error	<ul style="list-style-type: none"> - If there is a faulty in the temperature sensing of chamber or over heated, this message is appeared. - No user action. Please call Gyrozen Field Service Engineer.
Error 15	Motor Temp. Sensor	<ul style="list-style-type: none"> - If the motor temperature sensor can't recognize, this message is appeared. - No user action. Please call Gyrozen Field Service Engineer.
Error 16	Comp. Temp. Sensor	<ul style="list-style-type: none"> - If the temperature of compressor is over heated up, this message is appeared. - No user action. Please call Gyrozen Field Service Engineer.

* Any wire disconnection or tuning of the instrument must be performed only by a service engineer who is authorized by GYROZEN Co., Ltd.

8. Rotors & Accessories

Fixed Angle Rotor, GRF-L-1000-6


6 x 1,000 ml
25°
Hole diameter (mm) : 97
Max height for tube fit (mm) : 175

Tube	
Tube capacity(ml)	1,000
Radius(mm)	197.6
Max. RPM	7,000
Max. RCF(g-force)	10,825



Fixed Angle Rotor, GRF-L-1000-4


4 x 1,000 ml
25°
Hole diameter (mm) : 97
Max height for tube fit (mm) : 172

Tube	
Tube capacity(ml)	1,000
Radius(mm)	168.7
Max. RPM	8,000
Max. RCF(g-force)	12,071



Fixed Angle Rotor, GRF-L-500-6



6 x 500 ml
 $\angle 25^\circ$
 Hole diameter (mm) : 70
 Max height for tube fit (mm) : 167

Tube	
Tube capacity(ml)	500
Radius(mm)	158
Max. RPM	9,000
Max. RCF(g-force)	14,308



Fixed Angle Rotor, GRF-L-250-6

6 x (250/15 ml)
 $\angle 25^\circ$
 Hole diameter (250/15)(mm) : 62/17
 Max height for tube fit (250/15)(mm) : 125/110

Tube		
Tube capacity(ml)	15	250
Radius(mm)	131.3	134
Max. RPM	12,000	
Max. RCF(g-force)	21,138	22,442



Fixed Angle Rotor, GRF-L-85-6











6 x 85 ml

25°

Hole diameter (mm) : 38.3

Max height for tube fit (mm) : 125

Supplied with aerosol tight O-ring

Tube						
Tube capacity(ml)	10	15	15 ml conical	50	50 ml conical	85
Adaptor						None
Cat. No.	GA5-15(85)		GA5-c15(85)	GA5-50(85)	GA5-c50(85)	-
Adaptor bore (Φ x L, mm)	17 x 94		17 x 98	29 x 95	29.9 x 98	-
Radius(mm)	91.5	92.5	90.5	93.5	91.5	99.5
Max. RPM	20,000					
Max. RCF(g-force)	40,919	41,366	40,472	41,813	40,919	44,496



Fixed Angle Rotor, GRF-L-50-6

6 x 50 ml

30°

Hole diameter (mm) : 29.5

Max height for tube fit (mm) : 107

Supplied with aerosol tight O-ring

Fixed Angle Rotor, GRF-L-50-8







8 x 50 ml

30°

Hole diameter (mm) : 29.5


Max height for tube fit (mm) : 122


Supplied with aerosol tight O-ring

Tube				
Tube capacity(ml)	10	15	15 ml conical	50
Adaptor				None
Cat. No.	GA5-15(50)		GA5-c15(50)	-
Adaptor bore (Φ x L, mm)	17 x 94		17 x 105	-
Radius(mm) [6/8]	89.5/92.5	90.5/93.5	93/96	100/103
Max. RPM [6/8]	22,000/20,000			
Max. RCF(g-force) [6/8]	- / 41,366	- / 41,813	- / 42,931	54,111 / 46,062




Fixed Angle Rotor, GRF-L-c50-6

6 x 50 ml conical
 25°
Hole diameter (mm) : 29.5
Max height for tube fit (mm) : 142
Supplied with aerosol tight O-ring


Tube	
Tube capacity(ml)	50 ml conical
Radius(mm)	98.4
Max. RPM	17,000
Max. RCF(g-force)	31,793








Fixed Angle Rotor, GRF-L-m2.0-24

24 x 1.5/2.0 ml
 45°
Hole diameter (mm) : 11.1
Max height for tube fit (mm) : 56
Supplied with aerosol tight O-ring

Fixed Angle Rotor, GRF-L-m2.0-30

30 x 1.5/2.0 ml
 45°
Hole diameter (mm) : 11.1
Max height for tube fit (mm) : 56
Supplied with aerosol tight O-ring

Tube			
Tube capacity(ml)	0.2	0.5	1.5/2.0
Adaptor			None
Cat. No.	GA5-m0.2[2]	GA5-m0.5[2]	-
Adaptor bore (Φ x L, mm)	6.5 x 23	8 x 31	-
Radius(mm) [24/30]	67/79	73/86	84.3/96.4
Max. RPM [24/30]	22,000/18,000		
Max. RCF(g-force) [24/30]	36,255/28,616	39,501/31,152	45,616/34,919



Swing Rotor, **GR5-L-r250-4**

4 loadings
90°



Rectangular 250 mL Bucket GLB-r250-r250
Bucket bore (wxdxh, mm) : 86 x 70.3 x 90.5
Radius(mm) : 175.2
Max. RPM : 4,000
Max. RCF(g-force) : 3,134

Tube										
Tube capacity(mL)	3	5	10	15	15 mL conical	50	50 mL conical	15	85	250
Tube rack										
Cat. No.	GAM-5-12(r250)		GAM-15-12(r250)		GAM-c15-9 (r250)	GAM-50-4 (r250)	GAM-c50-3 (r250)	GAM-85-2(r250)		GAS- 250(r250)
Rack capacity(ea/4)	12/48		12/48		9/36	4/16	3/12	2/8		1/4
Hole dimension (Φx L, mm)	13.5 x 58	13.5 x 80	17.5 x 90		17.5 x 90	30.2 x 90	30.5 x 90	17 x 90	38.5 x 90	62.5 x 87



Microplate Holder GLP-mw-r250
Holder dimension (wxdxh, mm) : 88 x 128.5 x 80
Radius(mm) : 153
Max. RPM : 4,000
Max. RCF(g-force) : 2,737

Plate		
Plate capacity(mL)	MTP	DWP
Holder capacity(ea/4)	4/16	1/4

9. Product Range

Product Range



10. CE

Doc No. : STC-A11-047 / KEL11-C03103

EC Declaration of Conformity

We, **Gyrozen Co., Ltd.**
B-Station, 544-1, Bongmyeong-dong, Yuseong-gu, Daejeon 305-301, Korea
declare under our sole responsibility that the product ;

Description of Equipment : **Centrifuge**
Model Name : **2236R**


to which this declaration relates is in conformity with the following standards or other normative documents ;

EN 61010-1(2001) Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1 : General requirements
EN 61010-2-020(2006) Safety requirements for electrical equipment for measurement, control, and laboratory use
- Part 2 : Particular requirements for laboratory centrifuges
EN 61326-1(2006) Electrical equipment for measurement, control and laboratory use
- EMC requirements
EN 55011(2007) Industrial, scientific and medical (ISM) radio-frequency equipment
Radio disturbance characteristics Limits and methods of measurement

following the provisions of Directives ;

2004/108/EC Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC
2006/95/EC Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits

Issued date : June 23, 2011

Confirmed by: 
Sun-Ki Kim President