

Centrifugal Vacuum Concentrator

VC2124, VC2200

Operation Manual



GYROZEN Co., Ltd.
30-12 Gyeryong-ro 141-gil, Yuseong-gu, Daejeon 34187, Korea
Tel: +82-42-719-8200 Fax: +82-42-826-9848
www.gyrozen.com

DOC. No.: V01DC00204-1502




CONTENTS

	<u>Page #</u>
1. Meanings of Symbols & Safety Precautions	3
1-1. Meanings of Symbols	3
1-2. Safety Precautions	3
2. Product Description & Technical Specifications	5
2-1. Product Description	5
2-2. Technical Specifications	6
3. Unpacking	7
4. Connection with Supplying Equipment	7
5. Installation	8
5-1. Power ON/OFF and Lid Release	8
5-2. Rotor Coupling and Disassembling	9
5-3. Positioning of Sample Tubes.....	9
6. Operation	10
6-1. Key Functions of Control Panel	10
6-2. Setting the RPM	11
6-3. Setting the Time	11
6-4. Setting the Temperature	11
6-5. Program Saving & Recalling	11
6-6. Start / Stop.....	12
6-7. Operation Sequence.....	12
7. Maintenance	13
7-1. Outer Parts of Instrument	13
7-2. Chamber	13
7-3. Shaft	13
7-4. Rotor	13
7-5. Transportation of Instrument	13
8. Troubleshooting	14
8-1. Checklist	14
8-2. Error Codes.....	14
9. Rotors & Accessories	16



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 correct way of sample balancing in the rotor. Attention and warning for rotor coupling. Attention and warning for door opening and closing Attention and warning for burning.	

1-1-2. Symbols in this document

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


1-2. Safety Precautions

Before using the instrument, please read the operation manual to ensure correct usage. 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 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 °C, relative humidity: 30 ~ 85 %, atmospheric pressure: 500 ~ 1,060 hPa).
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 to embrace sample containers tightly enough inside rotors.
6. Before operating the instrument, check if the rotor is securely fastened.

- Should operate the instrument with a rotor properly installed and secured to the motor shaft.
- 7. Do not stop the rotor by hands during the instrument is running.
- 8. Emergency lid release should be performed only when rotor is completely stopped.
- 9. ALWAYS load the tubes symmetrically with evenly weighted samples to avoid rotor imbalance. If necessary, use the water blank to counterbalance the unpaired sample.
- 10. The operation speed should not exceed the highest value of the individual guaranteed g-forces of each centrifuge, rotor, sleeves and sample container, especially the guaranteed g-force of sample container should not be neglected.
- 11. ALWAYS disconnect the power supply prior to maintenance and service to avoid electrical shock.
- 12. ALWAYS use proven disinfection procedures after centrifuging biohazardous materials.
- 13. Should not centrifuge flammable, toxic, radioactive or explosive materials.
- 14. 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.

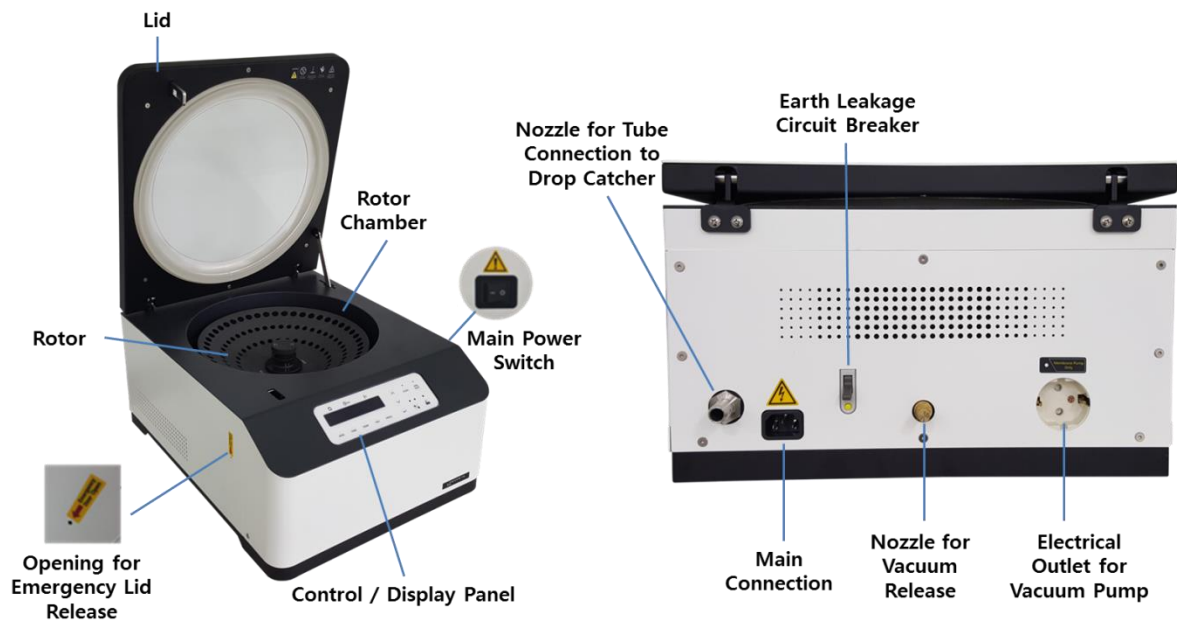


- Do not place dangerous materials within 30 cm distance around the instrument.
- Use the emergency lid release function only when the  button on the control panel is dumb under the condition of complete stop of rotor running.
- Never try to open or move the instrument if it is not completely stopped.
- If the power input is more than +/-10% of the recommended voltage or fluctuates frequently, it may cause malfunction of the instrument and often result serious damage.
- Install the instrument at the place without any kinds of corrosive gases.

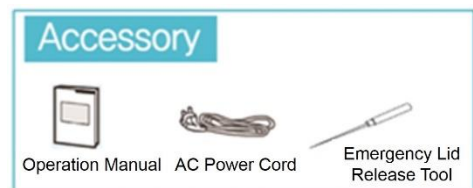
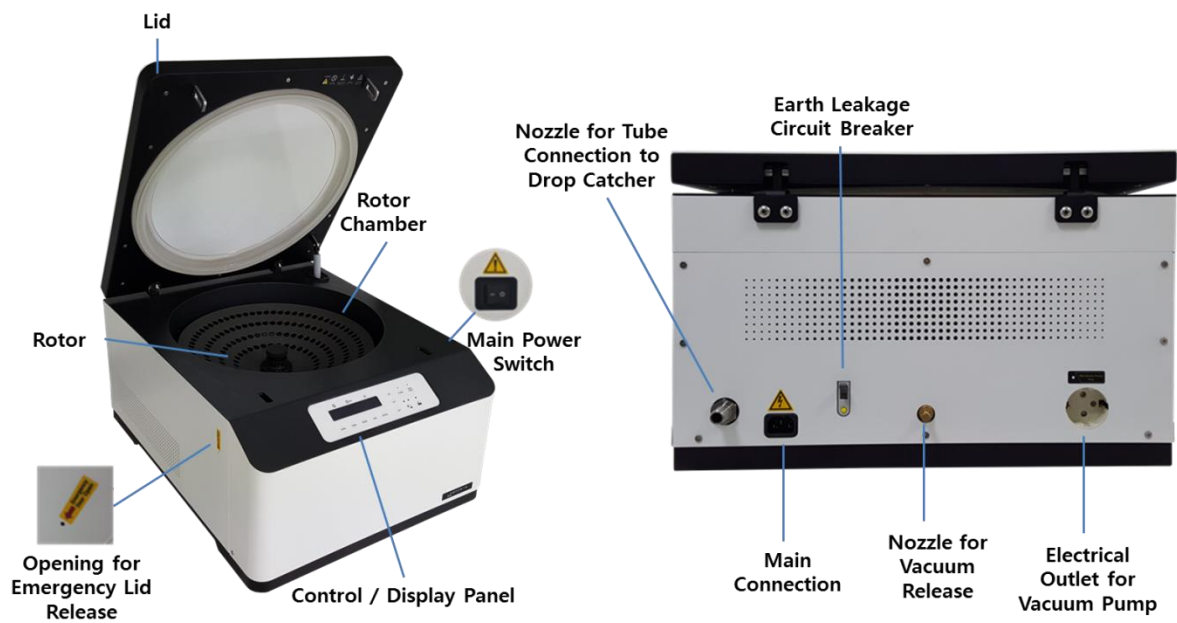
2. Product Description & Technical Specifications

2-1. Product Description

- VC2124



- VC2200



2-2. Technical Specifications

- VC2124

Max RPM	200 ~ 2,000 RPM
Max Capacity	124 x 1.5 / 2.0 ml microtubes or 48 x 1.5 / 2.0 ml + 76 x 0.5 ml microtubes
Auto Start / Stop	Yes
Chamber Heating Temperature Range	R.T ~ 80 °C
Vacuum Pressure	1 ~ 1,013 mbar
Operating Time	< 23 hr 59 min or continuous Default value: 0 h 0 m (continuous)
Centrifuge Dimension (W x D x H, mm)	375 x 445 x 252
Weight (kg)	22.5 (without Rotor)
Power Requirements	220V, 50/60Hz

- VC2200

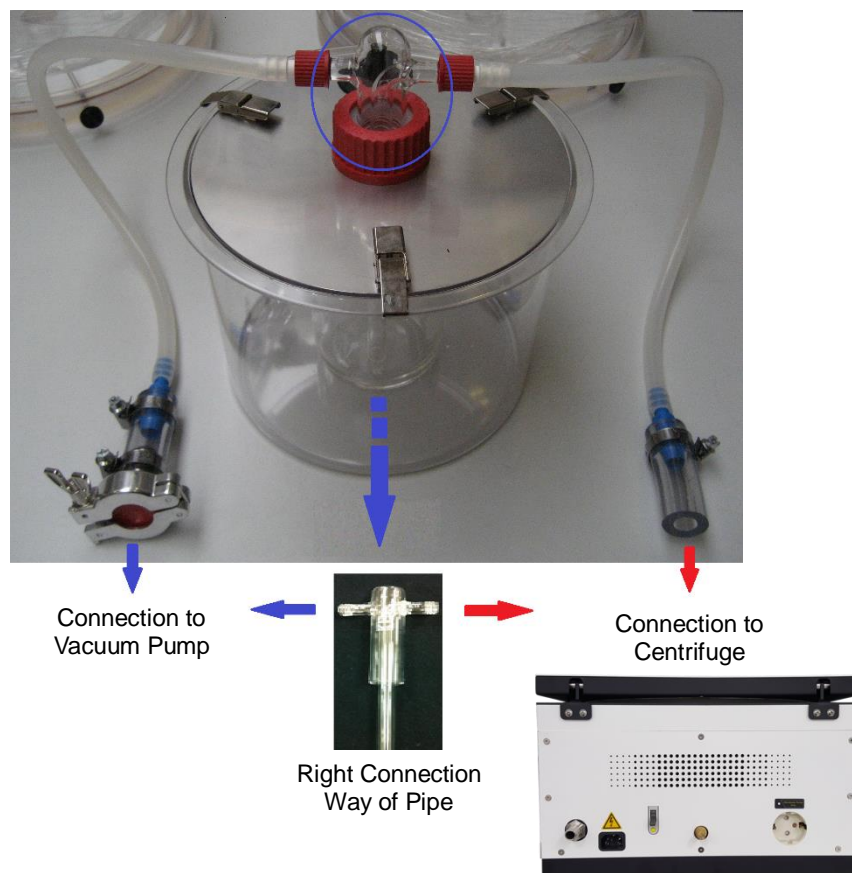
Max RPM	200 ~ 2,000 RPM
Max Capacity	200 x 1.5 / 2.0 ml microtubes
Auto Start / Stop	Yes
Chamber Heating Temperature Range	R.T ~ 80 °C
Vacuum Pressure	1 ~ 1,013 mbar
Operating Time	< 23 hr 59 min or continuous Default value: 0 h 0 m (continuous)
Centrifuge Dimension (W x D x H, mm)	475 x 560 x 350
Weight (kg)	37 (without Rotor)
Power Requirements	230V, 50/60Hz

3. Unpacking

1. Open the box and lift out the instrument carefully.
2. The system should be horizontally lifted up on the flat table.
3. Insert the Emergency Lid Release Tool into 'Opening for Emergency Lid Release' on the left side of the main body.
⚠ Remove the protection material inside the main body; Vacuum Concentrator series are delivered with the basic rotor mounted, and the protection material is inside the main body for rotor protection.
4. It is now ready for installation.

4. Connection with supplying equipment

The following pictures guide a way for connecting a Drip catcher kit with Centrifuge and Vacuum Pump.



5. Installation

5-1. Power ON/OFF and Lid Release



Action




5-1-1. Power ON/OFF

1. After connecting the AC Power cord to the mains power on the right back of the instrument, turn on the Earth Leakage Circuit Breaker.
 - Check the power on.
2. Turn on the main power on the right side of the instrument.



5-1-2. Lid Opening

1. For opening lid, press the  button.
 - Should press the  button when the lid is closed (Lid LED turns off).
 - Close the lid until hearing clank shut.
 - When the lid is open, the lid LED turns on.

-  ● The lid is not released while the instrument is running. (With the vacuum pump connected, the lid is released only when the vacuum is released.)
- If the lid is open, the instrument cannot be operated even with pressing the  button.
- Power Failure: if there is any power failure during operation, lid is not open with  button. Lid can be released only when the operation is completely stopped and the power is on. If you want to release the lid at the power failure, refer to '5-1-3. Emergency Lid Release'.

5-1-3. Emergency Lid Release

For emergency lid release, you can use the Emergency Lid Release Tool only when the instrument is completely stopped.

The lid can be unlocked manually with the Emergency Lid Release Tool through the Opening for Emergency Lid Release.

- Find the Opening for Emergency Lid Release on left side of the instrument.
- Insert Emergency Lid Release Tool into the opening and push it until the lid is released.



Manual lid opening should be performed only when spinning is completely stopped. Otherwise, harmful damage can be accompanied.
After opening the lid manually, it is recommended to wait until the main power turns back on.

5-2. Rotor Coupling and Disassembling

Action

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




2. Mount a rotor into the motor shaft. Assemble it with the Locking Nut.
 - To assemble the rotor: Rotate the Locking Nut clockwise until tightly assembled.
 - To disassemble the rotor: Rotate the Locking Nut counterclockwise.




5-3. Positioning of Sample Tubes

1. Before loading sample tubes, check the water drop or dirt in the rotor hole or inner sleeve.
 - If you find water drops or dirt in the rotor or inner sleeve, remove it with soft dry cloth.
2. Tubes should be placed in the rotor with equal amount of samples at symmetrical positions.
 - Only use appropriate centrifugal tubes and do not exceed the speed beyond the max g-force allowed for the tubes.


Correct Way of Sample Balancing & Tube Usage






?

9,000 xg




?

8,000 xg



?

10,000 xg



1,000 xg

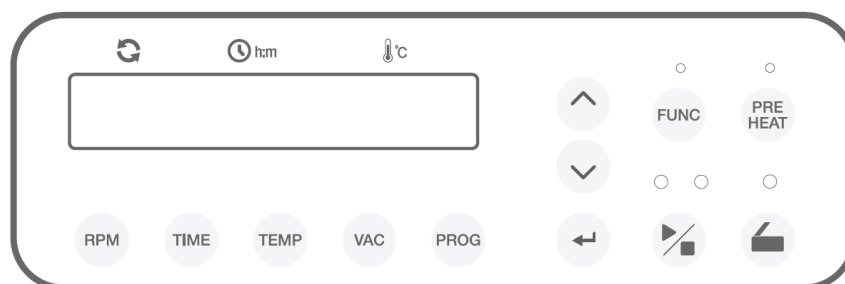
Check the g-force of sample containers!

If it is hard to make balance with the samples, please employ control tubes. Otherwise, it may bring about noise or vibration, which may lead to damaging the instrument.

6. Operation

6-1. Key Functions of Control Panel

6-1-1. Main Display



	Use to set the of RPM (200 ~ 2,000 rpm)
	Use to set time, available range up to 23 hr 59 min or continuous
	Use to set temperature (R.T ~ 80 °C). Display the set temperature while idle, and actual temperature during operation.
	Use to display the vacuum pressure for checking the vacuum level
	Use to save the set values or recall the saved parameters (Saving capacity max. 100 memories).
	Use for (1) manual on/off of vacuum pump. It is only activated while the instrument is idle. And use to (2) move to Sub Display from Main Display. Refer to 6-1-2. Sub Display for more detailed information.
	Use to start operation at the set chamber temperature. PRE-HEAT LED blinks during the setting and is kept on when the setting is completed.
	Use to confirm the parameter setting / Check the preset values during operation
	Use to start or stop operation
	Use to open the instrument lid. Only activated when the vacuum is released.

6-1-2. Sub Display





Sub Display appears upon the button after setting the operating conditions.

- Sub Display function is for manual ON/OFF of vacuum pump. But it can be used only when the machine is not operating.
- Normally, adjustment of the Sub Display is not used for operation but for Emergency Lid Release in any emergency conditions. The detailed method & sequence for the Emergency Lid Release are stated in section 6-7-3.
- If you press the button after setting the Sub Display function, you can go to the Main Display again.
- Function LED blinks during the Sub Display setting and is kept on when the setting is completed.

6-2. Setting the RPM

- ▶ Speed setting unit (display unit): 10 rpm (1 rpm)
- ▶ Speed setting range: (200 ~ 2,000 rpm)





Action

1. Press the  button once.
 - RPM mode
 - RPM LED flickers on the display window.
2. Press the   buttons to change input value and then press the  button to complete the setting.

6-3. Setting the Time

- ▶ Time setting range: 23 hr 59 min or continuous





Action

1. Press the  button once.
 - The set time LED flickers with beeping sound.
2. Press the   buttons to change input value and then press the  button to complete the setting.
 - Time is counted down after starting centrifugation.

6-4. Setting the Temperature





- ▶ Temp setting unit & display unit: 1 °C
- ▶ Temp setting range: 4 ~ 80 °C

Action





1. Press the  button.
2. Press the   buttons to change input value and then press the  button to complete the setting.

6-5. Program Saving & Recalling

6-5-1. Program Saving


1. Set parameters. (Refer to 6-2 ~ 6-4.)
2. Press the  button longer than 3 seconds.
 - Check the message of "PROGRAM SAVE: ##" on the display window.
3. Press the   buttons to change input Program number.
 - Save up to 100 programs. (Program numbers from 0 to 99)
4. Press the  button to complete the saving.

6-5-2. Program Recalling

1. To recall the saved program, press the  button shortly (less than 1 sec.).
 - Check the message of "PROGRAM CALL: ##", on the display window.
2. Press the   buttons to select program number you want to recall and then press the  button.

6-6. Start/Stop

6-6-1. Start












1. After setting RPM, Time and Temp., press the  button.
 - During running, a 'Start LED' is turned on.
 - The instrument runs only when the lid is closed.

6-6-2. Stop


1. You can stop the operation by pressing the  button.

6-7. Operation Sequence

6-7-1. Detailed Sequences for Operation







1. Fill the chamber of Drip Catcher kit with ice.
2. Turn on the centrifuge and the vacuum pump.
3. Set the parameters according to your preferences. (RPM / TIME / TEMP)
4. Press the  button then   buttons to switch the status of the vacuum pump. Press the  button upon setting each function. Normally, you don't need to adjust the values for these functions.
5. Press the  button to start operation with your set values.
 - ☞ If you set your speed above 1,000 rpm, the vacuum pump starts to operate at 1,000 rpm. If you set it below 1,000 rpm, the vacuum pump starts to operate at your set RPM.
 - ☞ Operation starts before the chamber reaches to the set temperature. If you want to start the operation at your set temperature, you can use the PRE-HEAT function. Press the  button before pressing the  button. Then the operation starts after reaching your set temperature.  LED blinks while setting and is kept on upon the completion of the setting. Press the  button to start operation.
6. If you want to stop the operation, press the  button.
 - Vacuum pump stops.
 - Vacuum Release function is activated and the releasing is completed. Function LED blinks during the release and is kept on upon the completion of the release.
 - With the vacuum released, alarm beeps and Lid LED blinks for 5 seconds when the rotor completely stops.
7. To open the lid, press the  button after the vacuum release. Then lid lock is released for 5 seconds with the Lid LED on, and you may open it within the time.

6-7-2. Operating Status for Each Part (VacPump / Release / Heater)

Power ON (Start status: default setting)	VacPump	Release	Heater
	OFF	OFF	OFF
Setting Temperature and Running Instrument (~20 min.)	VacPump	Release	Heater
	OFF	OFF	OFF
Until reaching the set RPM (Refer to 6-7-1-4.)	VacPump	Release	Heater
	OFF	OFF	ON
After reaching the set RPM or 1,000 rpm (Refer to 6-7-1-4.)	VacPump	Release	Heater
	ON	OFF	ON
Press the STOP () button.	VacPump	Release	Heater
	OFF	ON	OFF
After completing the Stop – Return to the Start Status (default setting)	VacPump	Release	Heater
	OFF	OFF	OFF

6-7-3. Manual Operation

If you need to adjust the function of vacuum pump, to release it or execute emergency open, you can use manual operation.

1. Turn on the main power.
2. Press the  button.
3. Check the display. (Default: Vacuum pump: OFF / Release: OFF)
4. Press the  button and then press the   buttons to set the status of the vacuum pump. You can switch on or off vacuum pump and release the vacuum on your need. You need to press the  button after setting each function.
5. If you want to execute the emergency lid open, the release has to be set as 'ON'.
6. When the vacuum release is completed, alarm beeps and Lid LED blinks for 5 seconds.
7. Press the  button and open the lid within 5 seconds while the Lid LED blinks.

7. Maintenance

7-1. 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 the instrument 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 is found on the vacuum pump, clean it with neutral detergents and keep it dry.

7-2. Chamber

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

7-3. Shaft

1. Always keep the motor shaft clean to prevent from any imbalance problem caused by contaminants.
2. After using the instrument, take out the rotor from the shaft and clean the shaft with dry soft cloth to keep dry.

7-4. Rotor

1. If any parts become contaminated with samples, clean the rotor with soft wet cloth and keep them 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, keep the rotor separated from the motor shaft.

7-5. Transportation of Instrument



1. If you need to move or ship the instrument, pay special attention to protecting the motor shaft from any physical impact or turbulence.
2. Fill inside the chamber with proper materials to keep the motor shaft in place and not to be influenced by physical pressure.

8. Troubleshooting

8-1. Checklist

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 on (Refer to 5-1-1. Power ON/OFF and Lid Release.).
Can't be started	If the lid is not closed completely, the instrument can't run. Check the Lid LED on the display window and close the lid completely.
Can't open the lid	If the power is out, check the main fuse for the laboratory to supply the power. If it is not solved shortly, open the lid with emergency lid tool manually for safety of sample (Refer to 5-1-3. Emergency Lid Open.).
Can't close the lid	Remove the dirt at the lid latch and then close the lid completely again. If the lid is not closed by any reason, please contact our service team.
Noise and vibration during running	Please, check if the table and the instrument keep level.
	Please, re-check the coupling status of the following. <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 (Refer to 5-2. Rotor Coupling and Disassembling.)
	Check the balanced positioning of samples in the rotor (Refer to 5-3. Positioning of Sample Tubes.) and load the same weight of samples symmetrically.

8-2. Error Codes

If an error code comes up with beeping sound, press 'STOP ()' button to stop the beep and press the  button to release the error status and make the instrument restore the default setting again.


Error	Possible Causes	Actions
Error 1	RPM Sensor	- Turn off and on the main power to check the instrument. - If the error code keeps coming up, please contact us.
Error 2	Lid Open	- If lid opens while the instrument running or the instrument has any trouble in lid sensor, this message may come up. - Remove the dirt at the lid latch and then close the lid completely. Check the Lid LED on the display window. If the error code keeps coming up, please contact us.
Error 3	Motor Overheating	- If the motor is overheated, this message may appear. - Keep the main power off for an hour, and then turn on to check the instrument. - If the error code keeps coming up, please contact us.
Error 4	Low Voltage	- If the input power (V/Hz) is at least 10% less than the recommended, this

		<p>message may appear.</p> <ul style="list-style-type: none"> - Turn off the main power and 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 input power (V/Hz) is at least 10% more than the recommended, this message may appear. - Turn off the main power and check the voltage of the Power supply (V/Hz). - Use AVR to provide proper power.
Error 6	Overspeed	<ul style="list-style-type: none"> - If the rotor spins faster than allowed, it may cause overload to motor capacity or trouble in the output of motor. - Turn off and on the main power to check the instrument. - If the error code keeps coming up, please contact us.
Error 7	Low Temperature	<ul style="list-style-type: none"> - If the actual temperature is lower than the set temperature, this message may come up. - If the error code keeps coming up, please contact us.
Error 8	High Temperature	<ul style="list-style-type: none"> - If the actual temperature is higher than the set temperature, this message may come up. - If the error code keeps coming up, please contact us.
Error 9	Vacuum	<ul style="list-style-type: none"> - It cannot detect the vacuum level.
Error 10	Motor	<ul style="list-style-type: none"> - It cannot recognize the motor. - Please contact us.



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


9. Rotors & Accessories

- VC2124





Angle rotor, GRV-m0.5/2.0-124
 48 x 1.5/2.0 mL + 76 x 0.5 mL
 ∠ 30.4°
 Hole diameter (mm): 11.1 / 8

Tube		
Tube capacity (mL)	1.5/2.0	0.5






Angle rotor, GRV-m2.0-120
 120 x 1.5/2.0 mL
 ∠ 30.4°
 Hole diameter (mm): 11.1

Tube	
Tube capacity (mL)	1.5/2.0




Angle rotor, GRV-50-6
 6 x 50 mL/50 mL conical
 ∠ 45°
 Hole diameter (mm): 30.4


Tube		
Tube capacity (mL)	50	50 mL conical





Sleeves, GLV-50
 Sleeve bore (Φ x h): 30.4 x 130




Sleeves, GLV-c50
 Sleeve bore (Φ x h): 30.4 x 130




Angle rotor, GRV-15-12
 12 x 15 mL/15 mL conical
 ∠ 45°
 Hole diameter (mm): 18.4


Tube		
Tube capacity (mL)	15	15 mL conical



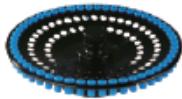
Sleeves, GLV-15
 Sleeve bore (Φ x h): 17.5 x 130




Swing rotor GRV-mw-2
 2 loadings of microplate
 ∠ 45°
 Area dimension (mm): 86.3 x 130.3


Tube	
Tube capacity (mL)	MTP

- VC2200






Angle rotor, GRV-m2.0-200
 200 x 1.5/2.0
 ∟ 25°
 Hole diameter (mm) : 11.1

Tube	
Tube capacity(ml)	1.5/2.0






Swing rotor, GRV-mw-4
 4 loadings
 ∟ 45°
 Hole diameter (mm) : 86.3 x 130.3

Tube		
Tube capacity(ml)	MTP	DWP




Angle rotor, GRV-50-12
 12 x 50 /50 conical
 ∟ 45°
 Hole diameter (mm) : 30.4


Tube		
Tube capacity(ml)	50	50 conical





Sleeves, GLV-50
 Sleeve bore(xh): 30.4 x 130




Sleeves, GLV-c50
 Sleeve bore(xh): 30.4 x 130



Angle rotor, GRV-15-48
 48 x 15 /15 conical
 ∟ 45°
 Hole diameter (mm) : 18.4

Tube		
Tube capacity(ml)	15	15 conical



Sleeves, GLV-15
 Sleeve bore(xh): 17.5 x 130