Low-Speed Centrifuge

406

User Manual

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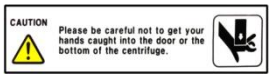
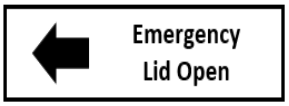
1. Meanings of Symbols & Safety Precautions

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.		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 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 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-Lock Release 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.

19. Before the tube is insterted in the rotor, make sure to load the sample in it.
    Avoid adding the sample to a tube which is already placed in the rotor

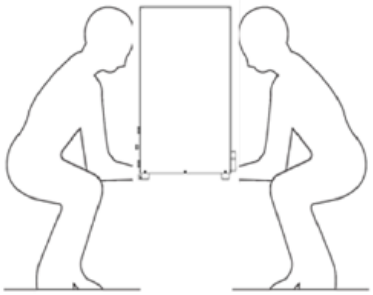
20. When handling a tube containing blood, use gloves to work.

21. This device must be operated by a professional who has received professional education, training and specialized skills for the using procedure.

- ✓ 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-Lock Release 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.
- ✓ 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.

1-3 lifting and carrying

When moving the product, two people should grab it from the front and back as shown in Figure



1-4 Transport, Storage, Use conditions

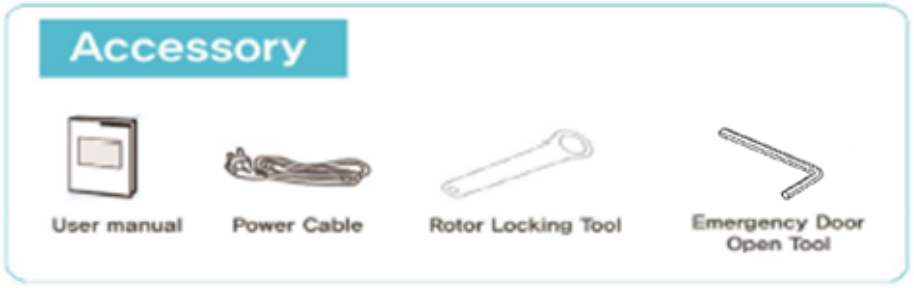
Use condition	Storage and transport condition
- Indoor use - Room Temperature : 5 ~ 40℃ - Relative humidity : 30 ~ 85% - Atmospheric pressure : 500 ~ 1060 hPa	- Ambient Temperature : -10 ~ 40℃ - Relative humidity : 10 ~ 90% - Atmospheric pressure : 500 ~ 1060 hPa

2. Product Description & Technical Specifications

2-1. Intended Use

The device is used mainly in the laboratory to separte the components through centrifugal force

2-2. Product Description



Cat no. GZ-0406 includes GRA-15-6A.

2-3. Technical Specifications

Max. RPM/RCF	4,000 rpm/ 2,075 xg
Max. capacity	6 x 15 ml
Time control	Timed, < 100 min or continuous
RPM/RCF conversion	Yes

Noise level	≤52 dB
Acc/Dec(sec)	≤20 sec / ≤20 sec
Program memory	30
Imbalance cutout	Yes
Safety door lock	Yes
Door drop protection	Yes
Automatic door release at completion	Yes
Power supply(V/Hz)	AC 230V/50Hz
Power requirement(VA)	140
Dimension(W x D x H, mm)	296 x 412 x 206
Weight without rotor (Kg)	17.5
CE mark	Yes
Cat. No.	GZ-0406

3. Installation

3-1. Power ON /OFF and Door Release

3-1-1. Power ON /OFF

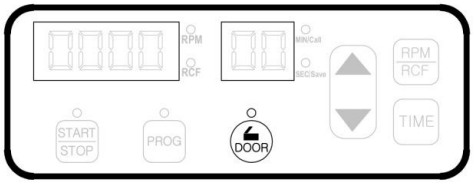
Action

1. Connect the AC Power cord(Disconnecting Device) to the power socket on the right back of the instrument.
2. Turn on the instrument by pressing a switch on the right side of the instrument.
3. Press the ‘Door’ button to open the door.

3-1-2. Door Release

Action

1. For opening the door, press the [DOOR] button.
   - ➢ The door is automatically opened after completion spinning with beeping sound.
   - ➢ Close the door until hearing clank shut.
   - ➢ When the door is opened, the door LED turns on.



☞
- ✓ 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.
- ✓ Power Failure: If there is any power failure during operation, door is not opened with 'Door' button. 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 '4-6. Emergency Door-Lock Release'.

3-2. Rotor Coupling and Disassembling

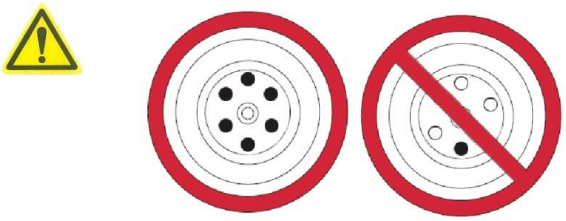
Action

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

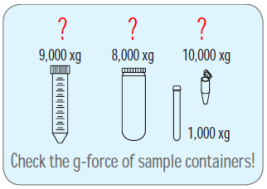
2. Mount a proper rotor into the motor shaft. Put the Washer () at the center hole of the rotor and assemble it with Rotor Locking Nut ().
   - ➢ To assemble the rotor: Rotate the Rotor Locking Nut clockwise until tightly assembled.
   - ➢ To disassemble the rotor: Rotate the Rotor Locking Nut counterclockwise.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

3-3. 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 Way of Sample Balancing & Tube Usage

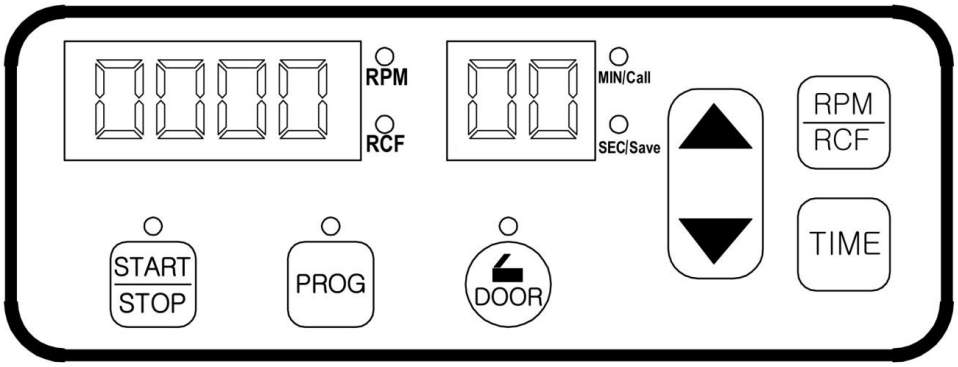


If the number of samples is not in pair, please load the control tubes at each symmetrical position. Otherwise, it results noise and vibration, which eventually damage the instrument.

☞ For safety, the 'Imbalance Cut Off' function will be occurred, if there is imbalance of loading tubes (Error 8, Imbalance error). Please refer to 6. Trouble Shooting.

4. Operation

4-1. Key Functions of Control Panel



□ START/STOP	Use to start or stop operation
□ PROG	Use to save a set of setting values or recall the saved program number
□ Door	Use to open the instrument door
□ RPM/RCF	For automatic conversion of RPM/RCF and to set the speed
□ TIME	Use to set time, available range up to 99 min 59 sec (00: continuous)

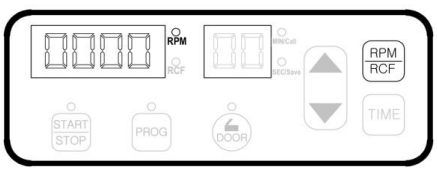
4-2. Setting the RPM/RCF Value

▶ Maximum RPM/RCF: 4,000 RPM/ 2,700 x g

Action

4-2-1. Setting the RPM Value

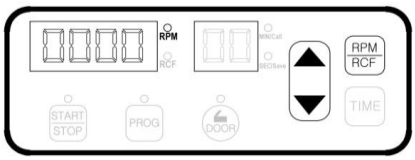
▶ Speed setting unit: 10rpm or 100rpm



1. Press the [RPM/RCF] button once.

- RPM MODE is generated by pressing a [RPM/RCF] button once.

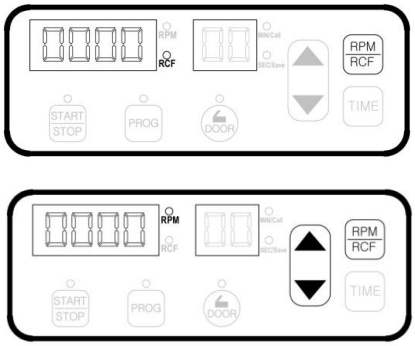
2. Press the [▲▼] buttons to change input value.
   - After keeping holding finger on the [▲▼] buttons for 5 seconds, the unit of setting value is changed to 100 rpm from 10rpm.
3. Press the [RPM/RCF] button again for saving.



4-2-2. Setting the RCF Value

▶ Speed setting unit: 1 rcf or 10 rcf

1. Press the [RPM/RCF] button twice.
   - RCF MODE is generated by pressing a [RPM/RCF] button twice.
2. Press the [▲▼] buttons to change input value.
   - After keeping holding finger on the [▲▼] buttons for 5 seconds, the unit of setting value is changed to 10 rcf from 1 rcf.
3. Press the [RPM/RCF] button again for saving.



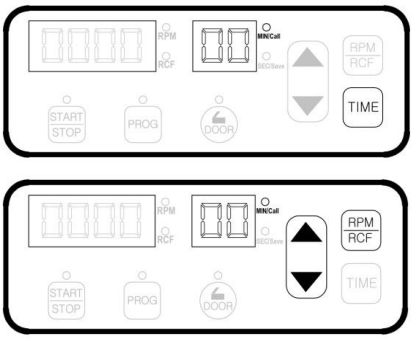
4-3. Setting the Time Value

▶ Speed setting unit: 1min. or 10min./ 1 sec. or 10 sec

Action

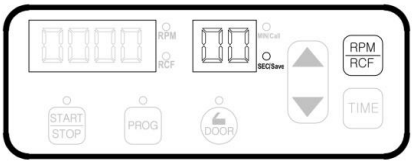
4-3-1. Setting the MIN. Value

1. Press the [TIME] button once.
   - Minutes MODE is generated with pressing a [TIME] button once.
2. Press the [▲▼] buttons to change input value.
   - After keeping holding finger on the [▲▼] buttons for 5 seconds, the unit of setting value is changed to 10min from 1 min.
3. Press the [TIME] button again for saving.



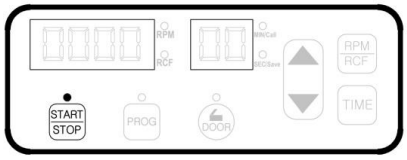
4-3-2. Setting the SEC. Value

1. Press the [TIME] button twice.
   - Seconds MODE is generated with pressing a [TIME] button twice.
2. Press the [▲▼] buttons to change input value.
   - After keeping holding finger on the [▲▼] buttons for 5 seconds, the unit of setting value is changed to 10 sec. from 1 sec.
3. Press the [TIME] button again for saving.



4-4. START / STOP

Action

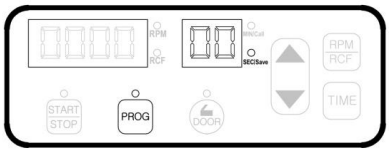


1. After setting RPM/RCF and Time, press [START/STOP] button.
   - ➢ During running, a 'Start LED' is turned on.
   - ➢ In case of pressing the [START/STOP] button during running, the running is stopped.

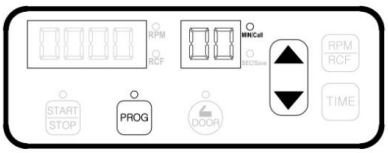
4-5. Program Save / Recall

Action

4-5-1. Program Save

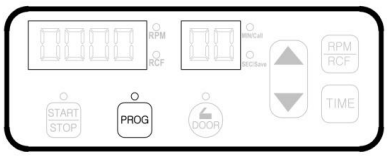


1. Set parameters. (Refer to 4-2 ~ 4-3)
2. Press the [PROG] button longer than 3 seconds to save your preferred set values.
   - ➢ The LED of [PROG] button and SEC/Save is turned on.

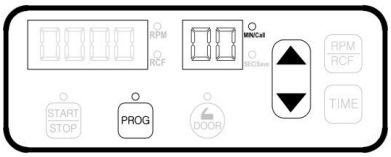


3. Input the program number by using [▲▼] button.
   - ➢ Save up to 30 programs
4. Press the [PROG] button again to complete the saving.
   - ➢ The setting value is saved
   - ➢ If you do not press the [PROG] buttons for 5 second, the setting mode is cleared.

4-5-2. Program Recall



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



2. Check the program number to call and enter the program number you want to recall by pressing [▲▼] button.
3. Press [PROG] button once again.
   - ➢ The setting values are displayed according to your saved number.
   - ➢ If you do not press the [PROG] buttons for 5 second, the setting mode is cleared.

4-6. Emergency Door-Lock Release

For Emergency Door-Lock Releasing, you can use the Emergency Door-Lock Release Tool as long as the instrument is completely stopped.
The door can be unlocked manually with Emergency Door-Lock Release Tool through the emergency opening hole.

1. Find the emergency hole at the left side of the instrument
2. Insert the Emergency Door-Lock Release Tool into the hole and push it 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.

4-7. Replacement of Fuse

When the power is not turned on, please check the Power Switch, the connection of Power Outlet and Power Socket. If the power is still not turned on, replace the fuse as following instruction.

Action

1. Separate the AC Power Cord at the back of the instrument and push Fuse Case by the flat-head screwdriver for bringing out the Fuse Case.

2. Replace the damaged fuse with new one from the fuse case and then connect in the power.

5. Maintenance

5-1. 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.

5-2. 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.

5-3. 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.

5-4. 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.

5-5. 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.

6. Trouble Shooting

6-1. 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 3-1. Power on/off and Door Release)
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-Lock Release Tool manually for safety of sample. (Please refer to 4-6. Emergency Door-Lock Release)
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 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 3-2. Rotor Coupling and Disassembling)
	Check balances of samples in the rotor. (Please refer to 3-3. Positioning of Sample Tubes) and load the same weight of samples symmetrically.

6-2. Error Code

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 200 rpm 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 GYROZEN's 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 GYROZEN's 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 GYROZEN's 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 GYROZEN's partner.
Error 7	Software	- If the installed software has any bugs, this message may come up. - Contact a Service Engineer of your local GYROZEN's partner and get the firmware upgrade. Wire disconnection or tuning of the instrument must be performed only by a Service Engineer authorized by GYROZEN Co., Ltd.
Error 8	Imbalance	- Check the balance status of the samples in the rotor (Please refer to 3-3. 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 GYROZEN's partner.
Error 9	RPM Sensor	- If the rpm sensor recognition fails, this message comes up. - The message will be cleared by coupling an appropriate rotor (Please refer to 3-2. 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 GYROZEN's partner.

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

7. Rotors and Accessories

Angle Rotor, GRA-15/10-12, GRA-15-6A

- Capacity : 6 x 15 mL or 12 x 10 mL / 6 X 15 mL
- Max. RPM / RCF : 4,000 / 2,075
- Hole angle rotation : ∠ 45°
- Hole dimension (Ø x L, mm) : 20.4 x 10.1
- Supplied with 12 sleeves, No ID ring

15 mL Sleeve
GLB-15/10A

Max. Capacity : 15 mL
Max RPM / RCF : 4,000 / 2,075
Hole dimension (Ø x L, mm) : 18 x 87
Hole bottom type : Flat bottom with rubber pad
Supplied with 4.0 mm thick NBR pad inserted

Tube								
Tube capacity (mL)	2.0 ~ 4 mL VT	4 ~ 7 mL VT	5 mL conical	5 mL conical	14 mL	8 ~ 10 mL VT	15	15 mL conical
Tube Dimension (Φ x L, mm)	13 x 75	13 x 100	16 x 59	16 x 67	15.7 x 96	16 x 100	16 x 120	17 x 120
Adapter						None	None	None
Cat No.	GAS-3(f15)	GAS-5(f15)	GAS-c5(f15)	GAS-c5(f15)	GAS-14(f15)	-	-	-
Adaptor hole dimension (ΦxL,mm)	13.5 x 61	13.5 x 85	14 x 20	14 x 20	16.5 x 7	-	-	-
Adaptor hole bottom type	Round	Open	Conical	Conical	Round	-	-	-
Max. radius (mm)*	95.5	111	81.5	81.5	104.5	116	116	116
Max. RCF (g-force)*	1,708	1,986	1,458	1,458	1,869	2,075	2,075	2,075

8. CE Declaration of Conformity

GYROZEN® www.gyrozen.com

DECLARATION OF CONFORMITY

We, GYROZEN Co.,Ltd, hereby declare under our sole responsibility that the product(s) listed below conform to the European Union directives and standards identified in this declaration.

Nous, GYROZEN Co.,Ltd, déclarons sous notre seule responsabilité que le produit (s) indiqués ci-dessous sont conformes aux directives de l'Union européenne et les normes définies dans la présente déclaration.

Nosotros, GYROZEN Co.,Ltd, por la presente declaro bajo nuestra responsabilidad exclusiva que el producto (es) en la lista por debajo de ajustarse a las normas y las directivas de la Unión Europea, identificadas en esta declaración.

Wir, GYROZEN Co.,Ltd, hiermit unter eigener Verantwortung, dass das Produkt (s), die unter die Richtlinien der Europäischen Union und Normen, die in dieser Erklärung.

Description of Product	Centrifuge
Model Name	406

Relevant Directives/ Harmonised Standards

Machinery	2006/42/EC	as last amended	EN ISO 12100:2010
Low Voltage	2014/35/EU	as last amended	IEC 61010-1:2010/A1:2016 IEC 61010-2-020:2016
EMC	2014/30/EU	as last amended	EN 61326-1:2013 EN 55011:2016/A1:2017 EN 61000-3-2:2014 EN 61000-3-3:2013
RoHS	2011/65/EU	as last amended	EN IEC 63000:2018

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May 10, 2022

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