
User Manual

Combi R515

Multi-purpose Centrifuge

Date of purchase :

S e r i a l N o . :

Place of purchase :

hanil

Combi R515

Research Use Only

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The appearance or specifications of the device are subject to partial change for improvement. No part of this manual may be copied or distributed without the manufacturer's permission.

Do not repair or modify the product or its accessories without permission.

UM-Combi R515(E)(Rev.8)_2026.07.13

Original Instruction

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This user manual contains detailed instructions for using the centrifuge Combi R515.



Before using this product, be sure to read the user manual carefully and observe all safety precautions. This will help prevent malfunctions that may occur during use.

1. Safety warnings and precautions

1.1 Safety label information related to the user manual

All labels attached to the device must not be removed by the user.

Label	Instruction
	Danger and warning
	Electric shock
	Biological hazard
	Grounding
	Manual lid opening hole and rotation direction
	Rotor mounting, sample loading, and hand-stamping warning

1.2 Safety labels used in the manual

Label	Instruction
	Danger and warning
	Electric shock
	Biological hazard
	Explosion warning
	Risk of crushing
	Power disconnect
	Observe the user manual
	Wear protective gloves
	Wear safety shoes

1.3 Safety Rating

Labels and colors	Meaning
	DANGER! This is a dangerous situation that could result in death or serious injury.
	WARNING! Potentially dangerous situations that could result in serious injury.
	Caution! This is a potentially hazardous situation that could result in minor injury.
	Caution This contains important information regarding the use and damage of this equipment.

1.3.1 Safety Message

	DANGER!
	Risk of electric shock or fire due to unconfirmed product rating Ensure the product's rating matches the rating you ordered and that the power cable is suitable for the product's power outlet and operating environment. Improper connection can result in electric shock or fire. If the product specifications differ from your order, contact your place of purchase.
	Risk of electric shock due to incorrect power connection - Use only the power cable provided when purchasing the main unit. - Plug the power plug into a grounded outlet. If you are unsure whether your outlet is grounded, contact your facility's installation team or an electrician. - When using a power strip, check the grounding and rated capacity before connecting the product. - Install the device so that the power cable cannot be stepped on. - Do not place objects on top of power cables

  	Precautions for use, storage, and transportation of the product • Before storing this product, clean and store it according to the maintenance procedures. Failure to do so may result in performance and stability issues. • Before storing or transporting, unplug the product and close the lid. • Before transporting this product, if there is a rotor installed, remove the rotor from the product. • Wear personal protective equipment when transporting the product as there is a risk of injury. • Maintain balance when transporting the device to avoid damage to the device or its parts due to impact during transport.
	Risk of injury due to incomplete installation! • Ensure the fixed-angle rotor lid is fully locked before use. Operating the fixed-angle rotor without the lid locked can result in loud noise and serious damage. If you hear any strange noise or sound when the centrifuge is operating, the rotor or rotor lid may not be installed properly. Immediately press the Start/Stop key to stop the product.
	Do not install in environments with risk of explosion or fire • Do not install the product in an environment where explosion or fire may occur. • Do not place near any materials that may produce flammable or explosive vapors.
	Risk of product damage due to liquid penetration • Be careful not to let liquid seep into the product. Electrical, electronic, and driving components may be damaged. • Do not place containers containing liquids on top of the product's lid or near the product.
 	Risk of electric shock due to failure to disconnect power • Before cleaning the product, be sure to turn off all power after the product has stopped operating and disconnect the cables from the outlet.
	Risk of electric shock due to failure to dry • Before cleaning, washing, decontaminating, and connecting to power, make sure all parts of the product are completely dry.
	Before washing, what to do • The product must be placed on a flat surface before cleaning or washing. • When moving the product to another location, clean and disinfect the exterior and interior surfaces before moving. • Before cleaning or decontaminating, wear appropriate personal protective

	equipment. Perform cleaning, disinfection, and decontamination tasks in accordance with your organization's safety regulations.
	What to do before returning a product - When returning for service, repair, or disposal, disinfect or decontaminate the product and its parts. - Be sure to fill out the "Verification of Decontamination" and include it with your device. You can download the "Verification of Decontamination" from the Downloads section of the SUPPORT tab on the ihanol.com homepage.
	Risk of damage to components due to exceeding sterilization limits When sterilizing with high-pressure steam, do not exceed the specified temperature and time (121°C, 20 minutes). Exceeding the allowable temperature and time may result in component deformation or product malfunction.

	Warning!
	Risks from infectious, pathogenic, and radioactive substances - When handling pathogenic, infectious, toxic, or radioactive materials, follow laboratory biosafety guidelines, applicable national regulations, and Material Safety Data Sheets (MSDS). - If the substance belongs to Hazard Group II, refer to the "Laboratory Bio-safety Manual". - Wear personal protective equipment when handling or handling hazardous materials. - If the centrifuge is contaminated with pathogenic, toxic, or radioactive substances, the contaminants must be thoroughly removed, and necessary measures such as ventilation or isolation must be taken. - Failure to take necessary safety precautions may result in accidents such as infection, poisoning, or radiation exposure.
	Risk of damage to products and components due to mechanical or chemical damage - Do not use damaged, cracked, or corroded products or parts. - Do not use corrosive chemicals such as strong bases, weak bases, strong acids, cesium, silver, mercury, other heavy metals, phenol, or formaldehyde. - If contaminated, disconnect the power immediately and clean it immediately. - Organic solvents may cause damage to the rotor. - After using organic solvents, immediately wash the used accessories and devices.

	Risk of product damage and accidents when impacting or moving the product during operation • Do not move the product while it is in operation. • Do not lean on or place objects on top of the product while it is in operation. • During operation, the device may be damaged or cause an accident due to impact or movement.
	Risk of electric shock due to damage to the product and power cord • Use a complete product with no damage to the exterior or interior. • Do not use it if the power cord is damaged or worn.
	Risk of electric shock due to damaged housing • Before connecting the power, check the condition of the product housing. If the product housing is damaged or incomplete, contact the place of purchase or Hanil Scientific Inc. service team to avoid electric shock due to high voltage inside the product.
	Risk of fingers being caught when opening and closing the lid • Be careful not to pinch your fingers when opening and closing the lid. • After closing the lid, you must check that it is closed. • If the lid is not closed, the product will not start operating. • When opening the lid, open it completely so that it does not close to its original position.
	Risk of injury from spinning rotors • Do not touch the rotating rotor with your hands or tools. • Do not open the lid or disengage the lid lock system while the rotor is spinning.
	Rotor damage due to improper rotor handling • Do not lift the rotor by holding the angle rotor lid. The rotor may fall, causing damage to the rotor or injury to the user. • When handling the rotor, always use both hands. • Check the rotor weight and do not handle some heavy rotors alone. • The pivot connection between the rotor and bucket must be free of damage or foreign matter. After installation, check that the bucket rotates smoothly. If movement is not smooth, apply lubricant.
	Risk of product damage and injury due to loose rotors • If the rotor is not tightened or installed properly, severe vibration or noise may occur. • If severe vibration or noise occurs, stop using it immediately.

	Precautions when installing the rotor • Mount the bucket in any position on the swing-out rotor. • Be sure to install the appropriate tube type that matches the shape (diameter, height, bottom surface shape) of the rotor hole.
	Remove power after stopping operation • Before opening the lid in an emergency, be sure the device stops operating, turn off all power, and disconnect the cables from the outlet.
	Risk of sample damage and injury when manually opening the lid • Manual lid opening must be performed after the machine has completely stopped rotating. Failure to do so may result in damage to the sample and the user. • After emergency opening, do not close the lid immediately, but wait until the power supply is restored and then use it in the normal manner. • Manual lid opening should only be used in emergency situations.
	Risk of product damage due to insufficient or untimely maintenance • Follow the maintenance cycles and procedures recommended by the manufacturer. • Select a disinfection method according to the relevant laboratory regulations and legal requirements. • When performing maintenance, check for any damage or defects in the device or parts. • Conduct regular inspections of electrical safety, equipment, and parts at least every 12 months at an authorized service center of Hanil Scientific Inc. • Contact us for information on the spare parts and consumables. • If dust accumulates in the ventilation holes, it may cause product malfunction and fire.
	Caution!
	Risk of sample damage from heated accessories • Make sure the temperature control performance of the centrifuge meets the specifications of the sample you want to centrifuge. • For non-refrigerated centrifuges, the temperature of the motor, chamber, rotor, and sample may rise above the ambient temperature depending on the operating time, speed, and ambient temperature. • If the sample temperature is critical, conduct a test to check the sample temperature before use.

	Risk of product damage due to imbalance - The product must be placed on a flat, solid surface and leveled. - If the product is not installed horizontally, it may cause vibration, noise, or malfunction.
	Be careful not to pinch your fingers when installing the rotor. - Be careful not to pinch your fingers when installing or removing the rotor. - Be sure to use the provided Rotor Locking Tool to lock or remove the rotor.
	Precautions when installing sample tubes If the density of the entire sample is greater than 1.2 g/mL, the maximum rotation speed must be reduced to avoid device failure and rotor damage due to rotor overload.
	Risk of product damage due to tube overload - Be sure to use a centrifuge-specific tube. - Check the maximum RCF (g-force) value for each tube specified by the tube manufacturer and do not use it above the allowable standard. - Be sure to fill to the capacity specified by the tube manufacturer. - If the allowable volume is not provided, fill in the installed tube to the extent that the centrifuged material does not flow out of the container.
	Risk of injury from deformed or open tubes - High pressure sterilization, organic solvents, etc. may cause tube deformation or damage. - Before using the tube, check its condition. - Do not use the tube if it is deformed or damaged. - Before centrifugation, tightly seal all tube covers.
	When using glass tubes, there is a risk of product damage and injury due to breakage - During centrifugation, the tube may break, causing glass fragments to fly out or become contaminated. - When cleaning broken tubes, wear appropriate personal protective equipment and remove them completely.
	Risk of shaft damage due to non-horizontal condition If the product is not level, it may cause imbalance or damage to the motor shaft.
	Do not use iron cleaning tools Do not use steel wool or wire mesh cleaning brushes. The product's coating will peel off and cause corrosion.

	Risk of injury or product damage due to use of non-recommended accessories and spare parts Use only rotors and recommended parts and accessories provided by Hanil Scientific Inc. We are not responsible for any damage or accident to the product caused by using non-recommended parts and accessories.
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	Note!
	Risk of product damage due to condensation When moving the device from a cold environment to a warm environment, condensation can occur and damage electronic components. Ensure the device is fully dry at room temperature for a minimum of 4 hours before referring to [3.3 Power Connection] for connection instructions.
	- When you receive the product, carefully check the appearance of the packaging to ensure that the product is not damaged during transportation on a flat, non-slip surface. - If the product packaging is damaged, contact the place of purchase immediately. - Contact information is listed at the bottom of the user manual and on the label attached to the outside of the product.
	Install the product's power switch, plug, and outlet so that they are easily accessible to users.
	Electrical requirements - The power supply is 220V, and if the voltage varies more than $\pm 10\%$ from the standard voltage, precise reliability cannot be achieved during use. - Also, it is necessary to ensure that a constant power supply is provided to avoid damaging various parts inside the centrifuge. - This device is designed for use with 220V voltage at the factory.
	Check rotor installation before operation - Before use, make sure the rotor is securely fastened to the motor shaft. Check rotor lid installation - If you operate a fixed angle rotor, make sure that the rotor lid is properly locked. If not, it may cause very loud noise and serious damage.
	Manual lid opening This method is used to remove the sample mounted on the rotor when the lid cannot be opened automatically due to a lack of power supplied to the main unit.

**Do not store bleach**

- Use freshly made 10% bleach for disinfection each time.
- Bleach loses its effectiveness after 24 hours when diluted in water, so do not store it and use it immediately.

1.4 Safety Precautions



Before using this product, be sure to read the user manual carefully and observe all safety precautions. This will help prevent malfunctions that may occur during use.

Centrifuges involve inherent risks due to the use of high-speed rotating components.

Safety precautions are provided to prevent personal injury, product damage, and malfunctions during use. Please follow all safety measures provided in this manual.

Please keep this user manual in a place where it is easily accessible as part of the device. If you transfer the device to a third party, please also pass on the user manual.

1) Always make sure that the device is fixed on a safe level surface that can withstand shaking and the weight of the device during operation.

- If the device operates with a tilted shaft, it may cause great vibration and product damage.

2) Do not move the device during operation and leave a safe space within 30cm around the centrifuge for user safety and surroundings.

- Ensure there is always enough space around the device for proper air circulation

3) Always install the device in a place where temperature and humidity can be controlled.

4) Before connecting the power, the rated voltage should be checked.

Using the device with an incorrect voltage connection can cause damage to the equipment and pose a risk of personal injury.

5) Use only rotors and recommended parts and accessories provided by Hanil Scientific Inc.

Hanil Scientific Inc. is not responsible for damage to the product or accidents caused by using parts and accessories not recommended.

6) The chamber must always be kept dry before using the centrifuge.

7) Before using the device, make sure that the rotor and rotor lid are securely locked.

- The rotor must be properly installed and securely locked onto the shaft before use.

- If the rotor lid detaches during rotation, it can cause significant damage to the product or the sample.

8) Ensure the rotor is securely locked on the motor shaft manually

9) Do not use your hand to stop the rotor while the device is running.

10) Manual lid opening is only used when rotation is completely stopped.

11) If the density of the entire sample exceeds 1.2 g/mL, the maximum rotation speed should be reduced to prevent rotor overload and rotor damage.

12) sample should be filled up to the recommended volume by tube manufacturer. Otherwise, the tube may break, or the sample solution may leak.

13) To prevent unbalanced rotors, tubes should always be symmetrically loaded with well-balanced (weight, material, density and volume) samples. If necessary, you can use water to achieve symmetry and balance. (Please refer to 4.3 Sample Tube Loading)

14) The operating speed should not be higher than the individual maximum g-values of the centrifuge, rotor, bucket or adapter and sample tube. In particular, the maximum g-value of the sample tube should not be neglected.

15) The rotor should be cleaned and dried after each use for long life and safety.

16) The rotor must be handled with care as it can corrode when exposed to cleaning agents like strong acids, strong bases, cesium, silver, or salts.

17) Turn off the power switch after using the device.

18) Always disconnect the power supply during long periods of non-use, cleaning, regular maintenance, or servicing to avoid electric shock.

19) After centrifugation of biological materials, follow validated disinfection procedures.

20) Do not centrifugation flammable, toxic, radioactive, explosive, or corrosive substances.

21) Do not use the product in environments where there is a risk of explosion or fire.

22) If it is necessary to use toxic or radioactive substances or pathogenic microorganisms belonging to WHO Risk Group II, the national regulations of the "Laboratory Bio-safety Manual" must be observed.

23) Ensure that the ventilation hole is not obstructed.

24) Do not insert any objects into the device openings.

25) Do not detach the lid or protective cover using tools.

26) When requesting repairs, users must remove any contaminants beforehand.

27) Repairs and maintenance must be performed by a technician certified by Hanil Scientific Inc.

28) Please contact the supplier for product repairs.

29) Equipment damage can occur in the following scenarios, and the user is liable for any damage or injuries that arise.:

- not using the device in accordance with the user manual's instructions. - Using the product for purposes other than its intended use.
- Using unauthorized accessories and tools.
- Unauthorized personal maintenance, repair, and modification.

1.5 Electrical Safety Information

	Danger!
	Risk of electric shock or fire due to failure to check product ratings • Ensure that the device rating matches the rating you ordered, and the power cable is suitable for the device's power socket and the service environment. Incorrect connection may cause electric shock or fire. If the product is different from the ordered specifications, contact your place of purchase.
	Risk of electric shock due to incorrect power connection • Use only the power cable provided with the device. • Plug the power plug into a grounded outlet. Contact your facility's maintenance team or an electrical professional to ensure that the outlet is grounded. • If using a power strip, connect the product after checking the grounding and rated capacity. • Install the device so that the power cable cannot be stepped on. • Do not place anything on the power cable.
	Warning!
	Risk of electric shock due to damage to the product and power cord • Use a complete product with no external or internal damage. • Do not use a damaged or worn-down power cord.
	Note!
	Risk of product damage due to condensation • When moving the device from a cold environment to a warm environment, condensation can occur and damage electronic components. Ensure the device is fully dry at room temperature for a minimum of 4 hours before referring to [3.3

	Power Connection] for connection instructions.
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- 1) Use only the power cable provided with the device.
- 2) Plug the power cable into a grounded outlet.
 - If you need to check whether the outlet is grounded, contact a qualified electrician or the Lavex technical support team.
- 3) Do not use extension cords (multi-outlets).
- 4) Install the device so that the power cable is not exposed.
- 5) Do not place objects on the power cable.
- 6) If you have the following emergencies, shut off the power supply and unplug the power cord from outlet and contact your place of purchase or Hanil Scientific Inc.
 - Unusual noises or smell from the device.
 - Damage or wear on a power cord.
 - Breakdown of circuit breaker, fuse or safety device.
 - If you spill liquid on the device.
 - If the device is damaged.

1.6 Use Conditions, Storage, Transportation

	Danger!
  	Precautions when using, storing, and transporting the product • Before storing the device, clean and store the device and accessories according to the management procedures. Otherwise, problems with the performance and stability of the product and accessories may occur. • Before storing or transporting, turn off the power to the product and close the lid. • Before transporting this product, remove the rotor if there is an installed one. Otherwise, the motor shaft may be damaged by the vibration generated when transporting the product. • When carrying the product, there is a risk of injury, so wear personal protective equipment. • Keep the device balanced when transporting it as the device or parts may be damaged due to impact during transport.

Use Conditions

Usage Environment	Indoor (A place without direct sunlight is recommended)
Indoor Temperature	5 to 35°C
Relative Humidity	30 ~ 85%
Pressure	500 ~ 1,060 hPa

Storage & Transportation Conditions

Ambient Temperature	-10 to 40°C
Relative Humidity	10 ~ 90%

2. Product Description**2.1 Intended Use**

This device is a centrifugal device capable of cooling the temperature inside the chamber.

2.2 User Profile

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

2.3 Safety Features

- Error alarm

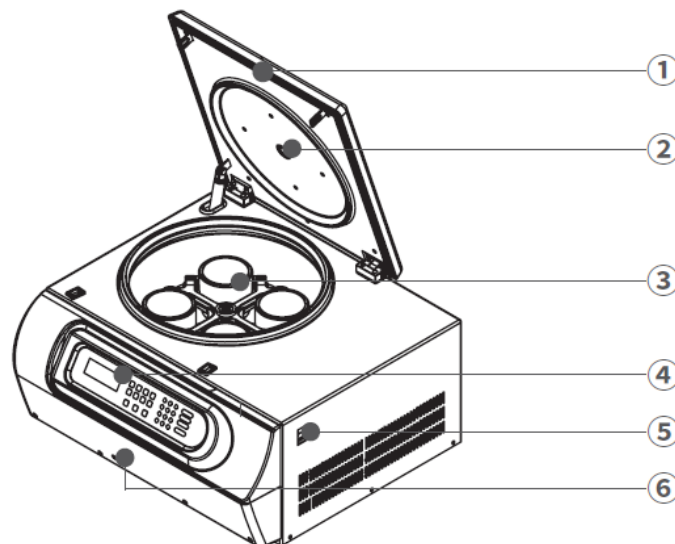
If a problem occurs with the device, an error code displays with a sound. Detailed error codes are in [6.2. Error codes].

- Steel frame

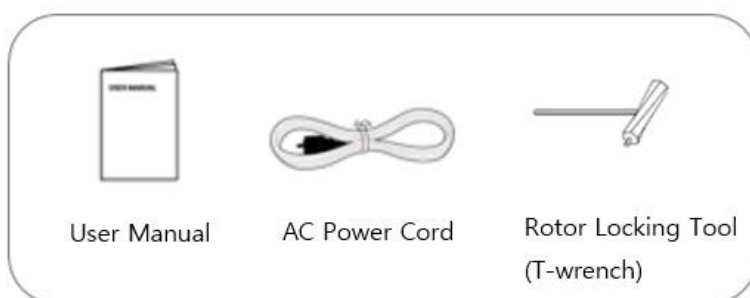
The chamber is installed inside a steel frame, and the inside of the lid is also made of steel plate to prevent damage that occurs inside the chamber from leaking outside.

2.4 Product Overview

- ① Lid : It protects the inner chamber and prevents the rotor from being ejected in case of danger.
- ② RPM measuring window : This is the part where you can measure the rotor speed with a digital speedometer, etc.
- ③ Rotor : It is connected to the motor shaft and rotates by hanging a tube rack, etc., to hold the sample.
- ④ Control Panel : You can set time, temperature, speed, etc.
- ⑤ Power Switch : This is a switch to turn the device ON/OFF after connecting the power.
- ⑥ Manual Lid Open Hole : The lid can be opened in case of emergency.



2.5 Components



※ Rotor purchased separately. (Refer to 7. Rotor & Accessories)

2.6 Technical Specifications

Max. RPM/RCF	Fixed angle	15,000 rpm / 25,353 xg
	Swing out	4,500 rpm / 4,392 xg
Max. Capacity	Fixed angle	6 x 250 mL
	Swing out	4 x 750 mL
Time control		Timed < 100hr, continuous
Temperature setting range		-10°C to 40°C*
Program memory		100
ACC/DEC ramps		10 / 10
Noise level		≤65 dB
Imbalance cutout		Yes
Power Supply (V/Hz)		210~240V 50/60 Hz (110V, 50 Hz optional)
Power Requirement (VA)		1,940 VA
Weight without rotor		95 kg
Dimension (W x D x H)		723 x 665 x 387 mm
Cat. No.		CB-R515

*The A50c-8 rotor may not reach the set target temperature depending on the sample, ambient conditions, and operating conditions.

3. Installation

3.1 Unpacking the centrifuge

	Note!
	• When you receive the device, carefully check the appearance of the packaging to ensure that it has not been damaged during transportation on a flat surface where the product will not slip. • If the product packaging is damaged, get in touch with the supplier immediately. • Contact information can be found at the bottom of the user manual and on the label affixed to the product.

1) After purchasing the centrifuge, open the packaging and verify the contents of the components.

► Refer to [2.5. Components] to check the list of it.

3.2 Installing the centrifuge

3.2.1 Selecting the location

	Note!
	• The device should be installed so that the power switch, plug, and outlet are easily accessible to the user.

	Danger!
	Do not install in environments with explosion or fire hazard • Do not install the device in environments where explosions or fires could occur. • Do not place the device near any materials that may generate a flammable or explosive atmosphere.

1) Installation on hard and flat ground : Centrifuge should be installed in a hard and flat place. If installed on an inclined location, the rotating shaft may be damaged by the heavy weight of the rotor.

2) Smooth air circulation : To ensure smooth air circulation, the device must be installed with a 30cm clearance from the air intake and exhaust ports. In particular, if the main unit's air intake is covered with cloth or blocked by other devices, air circulation may be impaired, leading to overheating. Also,

avoid installing the device in locations with high levels of dust.

3) Constant temperature/humidity : Appropriate temperature and humidity must be maintained. Centrifuges operate under highly sophisticated electronic control devices and are therefore subject to external environmental factors such as temperature and humidity. Avoid installing them in direct sunlight or near heating appliances. Appropriate temperature and humidity must be maintained.

4) Avoid the corrosive gas : Install the device in a location free from corrosive gases. Contact with sulfur dioxide, chlorine gas, or other gases may cause corrosion of the rotor and motor shaft, and damage to various metal parts.

5) Avoid installing the device in areas with electromagnetic radiation : Do not expose the device or accessories to an environment or near equipment that generates electromagnetic radiation. This may reduce the performance and stability of the device and accessories.

3.2.2 Leveling the device

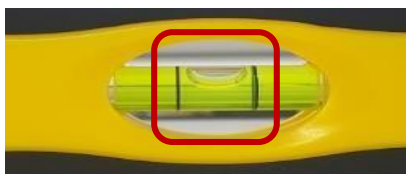
	Caution!
	Risk of product damage due to imbalance • After placing the device on a flat and firm surface, balance adjustment must be performed. • If the product is installed imbalanced, it may cause vibration, noise, and failure.

1) The device must be installed horizontally so that the motor shaft is perpendicular to the ground.

2) When installing, please use a level to ensure leveling.



3) Ensure that all the bubbles in the level must be in center of the line.



3.3 Power Connection

	Warning!
	Risk of electric shock due to damaged housing • Check the condition of the device housing before connecting to power. If the device housing is damaged or incomplete, there is a risk of electric shock due to high voltage inside. Contact your supplier or the service team of Hanil Scientific Inc.

	Note!
	Electrical requirements • Check the rated voltage indicated on the product label before connecting the power. • If you are checking whether the power you are using matches the rated voltage of the product, contact your local power company or Hanil Scientific Inc. service team.

1) Connect the power cable connected to the rear of the device to an electrical outlet.

2) Turn on the device by pressing the power switch on the right side of the device.

3.4 Opening/Closing the Lid

	Warning!
	Risk of crushing when opening and closing the lid • When opening and closing the lid, be careful of your fingers. • After closing the lid, you must double-check the closed state. • The device will not start working unless the lid is closed. • When opening the lid, ensure it is fully opened so that it does not close back to its original position.
	Risk of injury from spinning rotors • Do not touch the rotating rotor with your hands or tools. • Do not open the lid or disengage the lid lock system while the rotor is spinning.

1) Opening the lid

- ▶ Press the lid button while the power is connected.

2) Closing the lid

- ▶ After lowering the lid, please firmly close it with both hands.

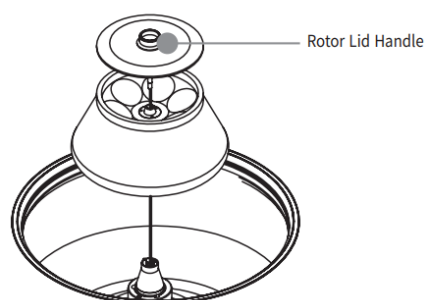
3.5 Installing/Removing the rotor

	Warning!
	Rotor damage due to improper rotor handling • Use only rotors manufactured by Hanil Scientific Inc. • Do not use rotors, buckets, or adapters with visible corrosion or mechanical defects.

[Installing/Removing the fixed angle rotor]

When removing or replacing the rotor, please follow the steps below.

- 1) Before installing the rotor, use a dry cloth to remove any foreign material or moisture from the motor shaft and rotor.
- 2) Insert the rotor into the motor shaft.
- 3) Place the rotor lid on the rotor body.
- 4) Tighten the rotor lid handle clockwise.



(Tighten the rotor lid handle all the way until it cannot be returned.)

- ▶ Installing the rotor : Rotate the rotor lid handle clockwise.
- ▶ Removing the rotor : Rotate the rotor lid handle counterclockwise.

5) Double check that the rotor is fully locked.

- ▶ If the rotor lid is not completely fastened, it can lead to an accident.
- Be sure to ensure it is completely fastened.

[Installing/Removing the swing-out rotor]

When removing or replacing the rotor, please follow the steps below.

1) Before installing the rotor, use a dry cloth to remove any foreign material or moisture from the motor shaft and rotor.

2) Insert the rotor into the motor shaft.

3) Insert the rotor bolt into the rotor center hole.

4) Turn the bolt clockwise using the Rotor Locking Tool.

- ▶ Installing the rotor : Tighten the rotor bolt by turning it clockwise.

- ▶ Removing the rotor : Loosen the rotor bolt by turning it counterclockwise.

5) Double check that the rotor is fully locked.

- ▶ Be sure to ensure it is completely fastened.

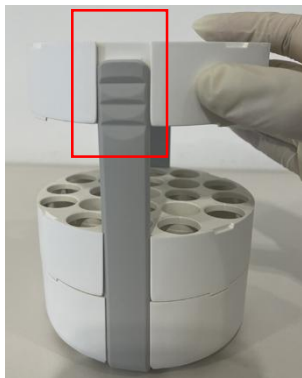


	Note!
	Check rotor installation before operation • Before using it, make sure that the rotor is securely fastened to the motor shaft. Check rotor lid installation • For the fixed angle rotor, make sure the rotor lid is completely locked.

6) Check the maximum load and height per bucket (adapter, container, or plate and contents).

7) Make sure the adapter fits the sample tube correctly.

	Precautions!
	Risk of incorrect installation of the adapter - For 2-stage or 3-stage adapters, ensure that the adapter handles are properly seated in the grooves on both sides of the last top adapter. - Incomplete installation of the 2-stage or 3-stage adapter may result in loss of sample during centrifugation, as well as damage to the adapter and significant damage to the product.



► Ensure that the adapter handles fit properly into the grooves on both sides of the adapter.



Correct



Incorrect

3.6 Loading Tubes

	Warning!
	Precaution when installing the rotor - You must use the tubes recommended by Hanil Scientific Inc., and do not use them above the permissible standard after checking the maximum RCF value for each tube. - Samples must be accurately measured in identical quantities and densities and placed in separate tubes. The tubes must then be mounted on the rotor so that they are symmetrical. If the symmetrical sample volumes differ, the rotor will vibrate violently or suffer serious damage to the rotor and motor shaft. - To minimize the weight difference between the tubes containing the samples, balancing using a scale must be performed first.

- Even with the same number of tubes, asymmetrical shapes can occur depending on their position. Therefore, when inserting tubes into opposing centrifuge tubes, their positions must be carefully considered. If the number of tubes is not symmetrical, use an extra tube to balance the weight of the other tubes.

1) Before loading sample tubes, check the water drop or any dirt in the rotor hole.

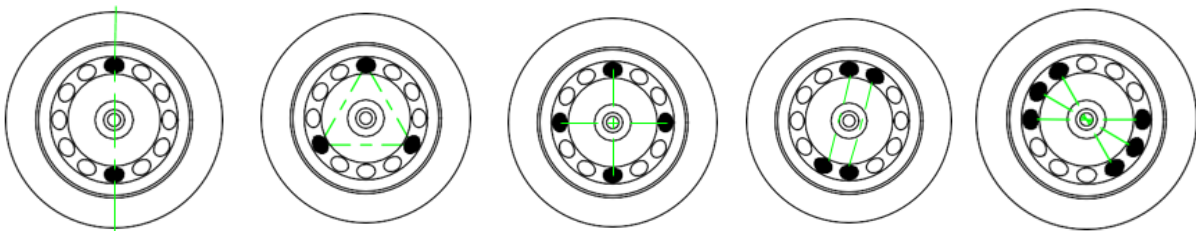
- ▶ If there is any foreign matter or moisture, remove it with soft dry cloth.

2) Tubes should be symmetrically inserted with well-balanced.

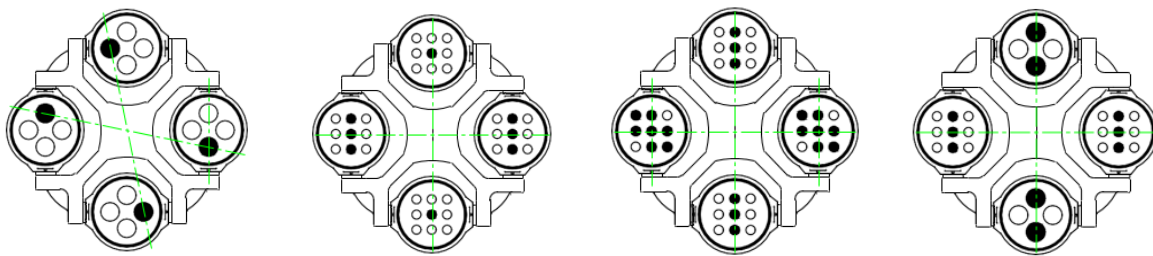
▶ There should be no difference in the weight of the tubes filled with the sample, and the density should be symmetrically distributed evenly.

▶ Be sure to use centrifuge-specific tubes and check the Max. RCF value for each tube. Do not use tubes exceeding the allowable limit.

Correct loading examples for fixed angle rotors



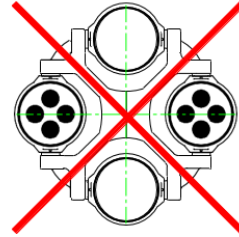
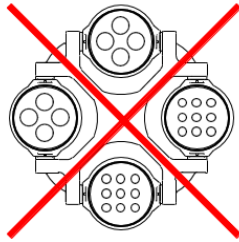
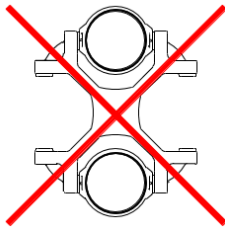
Correct loading examples for swing out rotors



Incorrect loading examples for fixed angle rotors



Incorrect loading examples for swing out rotors



4. Operation

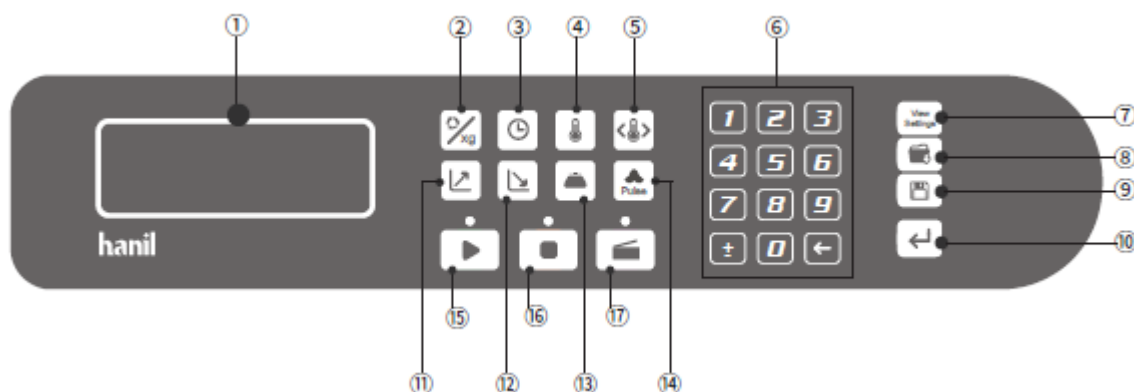
	Danger!
	Risk of product damage due to liquid penetration • Be careful not to let liquids seep into the product. Electrical, electronic, and drive components may be damaged. • Do not place containers containing liquids on top of the product's lid or near the product.

	Warning!
	Risks from infectious, pathogenic, and radioactive substances • When handling pathogenic, infectious, toxic, or radioactive materials, follow laboratory biosafety guidelines, applicable national regulations, and Material Safety Data Sheets (MSDS). • If the substance belongs to risk group II, refer to the "Laboratory Bio-safety Manual". • Wear personal protective equipment when handling hazardous materials. • If the centrifuge is contaminated with pathogenic, toxic, or radioactive substances, the contaminants must be thoroughly removed, and necessary measures such as ventilation or isolation must be taken. • Failure to take necessary safety precautions may result in accidents such as infection, poisoning, or radiation exposure.

	Risk of damage to products and components due to mechanical or chemical damage • Do not use damaged, cracked, or corroded products or parts. • Do not use corrosive chemicals such as strong bases, weak bases, strong acids, cesium, silver, mercury, other heavy metals, phenol, or formaldehyde. • If contaminated, disconnect the power immediately and clean it immediately. • Organic solvents may cause damage to the rotor. • After using organic solvents, immediately wash the used accessories and devices.
	Risk of product damage and accidents when impacting or moving the product during operation • Do not move the product while it is in operation. • Do not lean on or place objects on top of the product while it is in operation. • During operation, the device may be damaged or cause an accident due to impact or movement.

	Caution!
	Risk of sample damage from heated accessories • Make sure the centrifuge's temperature control performance meets the specifications of the sample you want to centrifuge. • For non-refrigerated centrifuges, the temperature of the motor, chamber, rotor, and sample may rise above the ambient temperature depending on the operating time, speed, and ambient temperature. • If the sample temperature is important, conduct a test to check the sample temperature before use.

4.1 Control Panel



Button		Description
①	Display	Checking the setting values such as speed/time/temperature/acceleration/deceleration steps
②	Speed	Press once : Setting the RPM / Press twice: Setting the RCF
③	Time	Setting run time
④	Temp	Setting temperature
⑤	Temp Limit	Setting temperature limit range
⑥	Numeric buttons	Enter a value using the numeric buttons
⑦	View Setting	Verifying the setting parameters during centrifugation
⑧	Program call	Calling up a program
⑨	Program save	Saving a program
⑩	Enter	Confirming the input value
⑪	Acceleration	Setting acceleration step
⑫	Deceleration	Setting deceleration step
⑬	Rotor ID	Entering Rotor ID manually when Rotor ID is not identified automatically
⑭	Pulse	Using for quick runs
⑮	Start	Starting centrifugation
⑯	Stop	Stopping centrifugation
⑰	Lid	Openg the lid

4.2 Setting Rotor ID. manually

	Note!
	This device automatically recognizes the rotor ID, but if a recognition error occurs, manually enter the ID and use it.

1) Install the rotor.

► Refer to [3.5 Installing/Removing the rotor]

2) Press the Rotor ID button after closing the lid.

3) Set the Rotor ID using the numeric buttons.

4) Press the Enter button.

Rotor	A0.2-48	A2.0-24	A2.0-36	A10-12	A15c-12	A15s-12	A50-6
Rotor ID	18	1	14	2	4	8	5

Rotor	A50c-6	A50c-8	A50-8	A85-6	A250-6	S500-4	S750-4
Rotor ID	6	15	7	9	10	12	13

4.3 Setting Speed

[Setting RPM]

1) When the speed indicator is in rpm setting mode, press the Speed button once.

(If it is in xg setting mode, press and hold the Speed button for more than 3 seconds to change to RPM setting mode, then press the Speed button once.)

► RPM setting mode : The rpm indicator on the display blinks.

2) Please use the numeric buttons to enter the desired speed value.

3) Please press the Enter button to confirm the value.

[Setting RCF]

1) When the speed indicator is in xg setting mode, press the Speed button once.

(If it is in rpm setting mode, press and hold the Speed button for more than 3 seconds to change to RCF setting mode, then press the Speed button once.)

► RCF setting mode : The xg indicator on the display blinks.

- 2) Please enter the desired RCF value using the numeric buttons.
- 3) Please press the Enter button to confirm the value.

4.4 Setting Run Time

- 1) Press the Time button.
 - ▶ Time setting mode : The time indicator (0:00:00) blinks on the display.
- 2) Please enter the desired time value using the numeric buttons.
 - ▶ You can set it up to 99 hours, 59 minutes, and 59 seconds.
 - ▶ Setting the time to 0 enables continuous run.
- 3) Please press the Enter button to confirm the value.

4.5 Setting Temperature

- 1) Press the Temp button.
 - ▶ Temperature setting mode : The temperature indicator (00°C) blinks on the display.
- 2) Please enter the desired temperature value using the numeric buttons.
 - ▶ It can be set from -10°C to 40°C.*
- 3) Please press the Enter button to confirm the value.

*The A50c-8 rotor may not reach the set target temperature depending on the sample, ambient conditions, and operating conditions.

4.6 Setting Temperature Limit

You can set the range in which operation will stop when the set temperature is exceeded.

- 1) Press the Temp limit button.
- 2) Press the numeric buttons to set the desired temperature limit range.
 - ▶ Default value : ± 30 °C
- 3) Please press the Enter button to confirm the value.

4.7 Setting Acceleration/Deceleration

1) Press the ACC or DEC button.

- ▶ Acceleration setting mode : ACC indicator(↗) blinks on the display.
- ▶ Deceleration setting mode : DEC indicator(↘) blinks on the display.

2) Please use the numeric buttons to enter the desired acceleration or deceleration value.

- ▶ Acceleration levels : 0~9
- ▶ Deceleration levels : 0~9
- ▶ The larger the acceleration setting step number, the faster the acceleration speed, and the smaller the number, the slower the acceleration speed.
- ▶ The larger the deceleration setting step number, the faster the deceleration speed, and the smaller the number, the slower the deceleration speed.
- ▶ Deceleration setting level 0 is natural deceleration.

3) Please press the Enter button to confirm the value.

4.8 Saving/Calling up a Program



Program saving

- When operating the device under various conditions, you can save the setting values such as speed and time in advance and then call them up and use them immediately when needed.

1) Please enter the settings you want to save, such as speed, temperature, time, acceleration, and deceleration.

2) Press the Program save button.

- ▶ Program Saving Mode: The program indicator (P:0) blinks on the display.

3) Please use the numeric buttons to enter the desired program storage number.

- ▶ Program storage can be set to 100 from 0 to 99.

4) Please press the Enter button to confirm the value.



Program call

- Program calls are designed to call programs stored between 0 and 99.

1) Please press the Program call button.

- ▶ Program call mode: The program indicator (P:0) blinks on the display.

2) Please use the numeric buttons to enter the program number you wish to call.

3) Please press the Enter button to confirm the value.

4.9 Start/Stop/Pulse Run

[Start centrifugation]

1) After entering the settings, press the Start button.

- ▶ If the lid is not completely closed, pressing the Start button will not work.

[Stop centrifugation]

1) If you want to stop the operation, press the Stop button.

[Pulse Run]

This function slows down and stops after reaching the set speed.

1) Please set your desired speed.

- ▶ Refer to [4.3 Setting Speed]

2) Please press the Pulse button.

4.10 Checking cycle count

1) In the stopped state, press the View setting button for 3 seconds.

- ▶ You can check the accumulated cycle number when the Cycle pop-up appears.

2) Press the Enter button to remove the pop-up..

5. Maintenance

5.1 User Checklist

	Warning!
	Risk of product damage due to insufficient or untimely maintenance • Follow the maintenance cycles and procedures recommended by the manufacturer. • Select a disinfection method according to the relevant laboratory regulations and legal requirements. • When performing maintenance, check for any damage or defects in the device or parts. • Conduct regular inspections of electrical safety, equipment, and parts at least every 12 months at an official Hanil Scientific Inc. service center. • Contact us for information on body parts and consumables. • If dust accumulates in the ventilation holes, it may cause product malfunction and fire.

- 1) Visually check if the connecting part of the rotor hub is separated or bent.
- 2) When you manually turn the shaft, check if there is noise from the shaft or if it rotates smoothly.
- 3) Visually inspect the rotor for any cracks, clean the connection points, and check for any signs of wear.
- 4) Set the time to 10 minutes and use a stopwatch to make sure the time is accurate.
- 5) Prepare four sheets of paper of the same size (approximately 2 cm wide x 15 cm long), place them evenly spaced on the chamber gasket at the top of the chamber with the lid open, and then close the lid. If the lid is completely sealed, friction will occur when you pull the paper, preventing it from being pulled naturally.
- 6) Centrifuges that have been installed for more than a year are recommended to undergo regular maintenance inspection at least once a year.
- 7) For rotors manufactured more than 5 years ago, we recommend checking the surface condition and balance.
- 8) It is recommended to inspect rubber consumables such as motor anti-vibration dampers and rotor O- ring every 2-3 years.

5.2 Check the device level

	Note!
	• If the device is not level, it may cause imbalance or damage to the motor shaft.

- 1) After installing or moving the device, be sure to use a level to ensure that it is level.
- 2) After installing the rotor, place a level on the rotor lid handle to ensure that it is level.

5.3 Refrigerated device maintenance

This centrifuge is a refrigerated device, so please check and keep in mind the following:

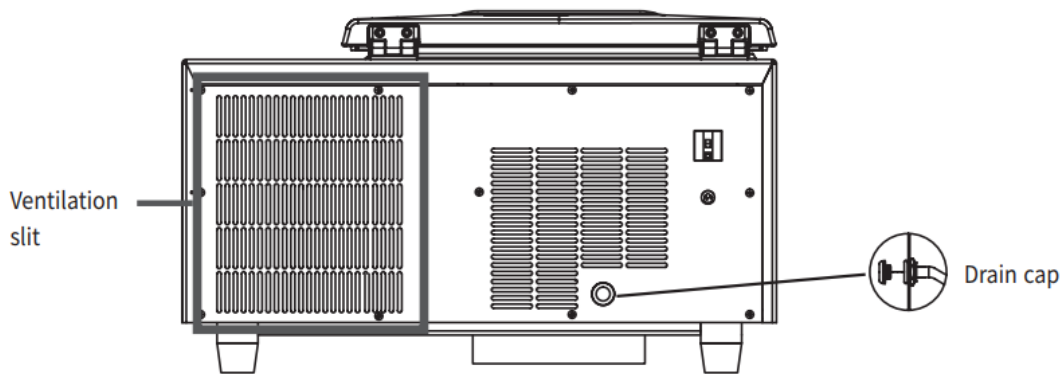
[Open the lid after use]

- 1) After use, wipe away any moisture generated inside the chamber with a soft, dry cloth.
- 2) After use, keep the device with the lid open.

[Condensate removal]

- 1) There is a 'drain cap' on the rear of the device to remove condensation.

Open this drain cap to periodically remove condensation.



[Cleaning the vents]

If you look at the rear of the device, you will see a ventilation hole installed in the area where the compressor is built in.

If dust accumulates in the ventilation holes, it may cause malfunction and fire.

Check your ventilation vents periodically to remove any accumulated dust.

5.4 Cleaning and decontamination

	Danger!
 	Risk of electric shock if the power is not disconnected. Before cleaning the device, ensure it has completely stopped, then turn off all power sources, and unplug the product from the electrical outlet.
	Risk of electric shock due to skipped drying. After cleaning, washing, and removing any contamination, ensure all parts of the device are completely dry before connecting the power source.
 	Before washing, guidance. - The product should be placed on a flat surface before cleaning or washing. - When moving the device to another location, clean and disinfect both the exterior and interior before relocation. - Put on appropriate personal protective equipment before cleaning or decontaminating. - When performing tasks such as cleaning, disinfecting, or decontamination, follow the safety regulations of your institution.
	Before return the device, guidance. - When returning products or parts for service, repair, or disposal, disinfect or remove any contaminants. - Be sure to fill out a "Decontamination Confirmation Form" and send it together with the device. The "Decontamination Confirmation Form" can be downloaded from the Documents section of the Support tab on the www.ihanil.com website.
	Risk of product damage due to liquid permeation. - Be careful to prevent liquids from entering the device, as this can damage electrical, electronic, and mechanical components. - Do not place containers filled with liquids on top of or near the product.
	Risk of component damage due to exceeding sterilization tolerances. When sterilizing by high-pressure steam, do not exceed the specified temperature and time limits (121°C, 20 minutes). Exceeding the tolerances may result in component deformation or device malfunction.

	Warning!
	Risk of damage to products and parts due to mechanical or chemical damage. • Do not use damaged, cracked, or corroded products or parts. • Do not use corrosive chemicals such as strong bases, weak bases, strong acids, cesium, silver, mercury, other heavy metals, phenol, formaldehyde, etc. • If the device or accessories are contaminated, turn off the power immediately and clean it. • Organic solvents may cause damage to the rotor. • After using organic solvents, immediately clean the accessories and the device used.

	Caution!
	Do not use metal-based cleaning tools. • Do not use the metal scrubbing or wire brush. This will peel off the product coating and cause corrosion.

	Note!
	Do not store bleach • Use freshly made 10% bleach for disinfection each time. • Bleach loses its effectiveness after 24 hours when diluted with water, so use it immediately without storing it.

5.4.1 Cleaning

In the event of a spill or contamination, promptly clean all internal and external parts of the centrifuge, including the chamber, motor shaft, and rotor, using a suitable decontamination agent.

Check the chemical resistance before applying to any decontamination agent.

[Unit]

- 1) If the device is contaminated due to sample leakage, clean it with a soft cloth soaked in neutral detergent. Then, dry completely with a dry soft cloth.
- 2) Do not use chemicals such as alcohol, benzene, toluene, etc., as they can damage the device.
- 3) Be careful not to create scratches on the surface of the device during movement or cleaning.

Do not use cleaning tools with rough surfaces that can cause damage.

- 4) In case of rust due to prolonged dampness after use, clean the rust with a neutral detergent and dry it with cloth.

[Chamber]

- 1) Keep dry inside the chamber after every use.
- 2) In case of chamber contamination, immediately dampen a soft sponge with lukewarm water and neutral detergent, clean the area, and then wipe it dry with a soft cloth.

[Motor shaft]

- 1) An imbalance issue may occur due to contaminants staining the shaft. Always keep the motor shaft clean.
- 2) After using the instrument, take out the rotor from the shaft, and wipe the shaft with dry soft cloth to keep it dry.
- 3) If the rotor cannot be removed from the shaft, do not remove the rotor with excessive force. Contact a service center.

[Rotor]

- 1) If liquid spills from the tube and gets on the rotor, immediately wipe it with a soft cloth dampened with warm water. Be careful not to damage the specially treated surface of the rotor during cleaning.
- 2) Wipe the tube holes of the fixed angle rotor with a soft non-ferrous test tube cleaning brush, and dry with an absorbent cloth or paper.
- 3) Check the tube holes of the fixed angle rotor for contamination of the solution and keep it dry. Fixed angle rotors during a long time of non-use, separate the rotor lid and store the main body upside down.
- 4) After cleaning the rubber ring on the lid fastening part of the fixed angle rotor, lightly apply lubricant before use.

5.4.2 Disinfection

- 1) Disinfect using 10% bleach (1 part undiluted bleach, 9 parts water).
- 2) Weekly disinfect the exterior of the centrifuge.
- 3) disinfect the interior of the centrifuge (chamber, lid inner, motor cover, shaft, rotor, buckets, adapters, and tube rack) at least once a month.

5.4.3 Decontamination of hazardous materials

1) Radioactive materials

- ▶ Radioisotope contamination can be removed by first cleaning with 50% ethanol, followed by cleaning with 10% SDS. Gloves or all materials used to clean radioactive materials should be collected and disposed of properly according to laboratory regulations.

2) Biologically hazardous materials

- ▶ If the dirt or spill is in a sealed container (rotor or bucket), only the sealed container should go through the decontamination process.
- ▶ check that no damaged areas and small holes have occurred in the rotor or bucket that could allow hazardous materials to escape.

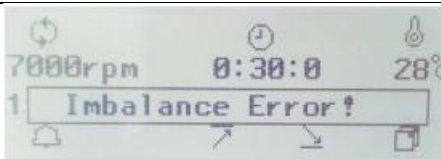
5.5 Disposal

This product cannot be disposed of for household use. Please dispose of it in accordance with the relevant waste disposal laws and regulations in your country.

6. Troubleshooting

6.1 Frequently Asked Questions

If there is a problem with your centrifuge, please check the following before contacting Hanil Scientific Inc. service team.

Symptom	Check List
Power failure	Please refer to [3.3 Power Connection] to check if the power plug is disconnected.
Can't be operated	If the lid does not close, it will not operate. Please refer to [3.4 Opening/Closing the Lid] to check the lid status and ensure it is closed properly.
Lid cannot be opened	- Press the 'Lid open button'. - Check the power connection.
Lid cannot be closed	- Remove the dirt from the door latch and close the lid. - Check if the lid latch is not damaged.
Noise and vibration during running	If the installation location of the main unit is unstable, please check the horizontal alignment and stability of the main unit. Reinstall it on a flat surface, ensuring it is level.
	If the rotor attachment state is not good, after removing the rotor, check the outside of the rotor, and if there are any damaged areas, immediately stop using the rotor. Also, if the attachment method is incorrect, please refer to [3.5 Installing/Removing the Rotor] to correctly attach the rotor.
	If the tube insertion is asymmetric or the weights do not match, please refer to [3.6 Loading Tubes] to verify the tube weights and insert them symmetrically.
Imbalance error	 - If there is a problem with the imbalance sensor, an

	imbalance error message is displayed. - In this case, pressing the start button does not work. - Contact Hanil techsupport.
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6.2 Error Codes

If an error occurs during equipment operation or standby, an error number will appear on the display, and a sound will be emitted. If the problem persists after taking the following actions, please contact the service team.

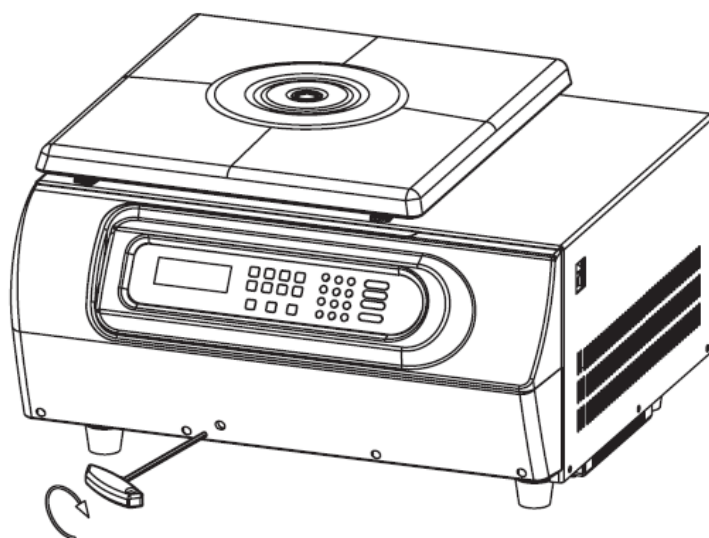
Error	Message/Cause	Recommended Action
Error 1	Imbalance error : This occurs when the imbalance sensor is defective or detects an imbalance.	- After stopping, open the lid and check that the rotor is properly seated. - Check the rotor, bucket, and tube for damage. - Check the balance of the sample.
Error 2	Over speed error : This occurs when the speed exceeds the set RPM by more than 1,000 RPM.	- After stopping, remove the sample, turn off the power, and contact the service team.
Error 3	Motor start error : This occurs when the device cannot reach 10rpm within 10 seconds.	- Restart your device.
Error 4	Door Open! Fast stop! : This occurs when the lid is opened during operation.	- If the same error message appears after restarting the device, stop it, remove the sample, and contact the service team.
Error 5	Low Speed error : This occurs when the device cannot reach 100rpm within 2sec. after starting the run.	- If the same error message appears after restarting the device, stop it, remove the sample, and contact the service team.
Error 6	System error : This occurs when there is an error in the control system.	- Contact Hanil Scientific Inc. service team.
Error 7	Over current error : This occurs when the current applied to the device is 10A or more.	- Contact Hanil Scientific Inc. service team.
Error 8	Power Failure! : This occurs when the rated voltage is not supplied to the device.	- Contact Hanil Scientific Inc. service team.
Error 9	HI voltage error : This occurs when the voltage applied to the motor during operation increases abnormally.	- Contact Hanil Scientific Inc. service team.

6.3 Emergency Lid Open

	Note!
	Manual lid open This is used to remove the sample loaded on the rotor when the lid cannot be opened automatically due to a lack of power supplied to the main unit.

	Warning!
	Disconnect the power after stopping operation Before opening the lid in an emergency, be sure to turn off all power and unplug the cable from the outlet after the device has stopped working.
	Risk of sample damage and injury when manually opening the lid - Manual lid opening must be performed after the machine has completely stopped rotating. Failure to follow this may result in damage to the sample or the user. - Do not close the lid immediately after the emergency opening. Wait for the power to be restored before using the device normally. - Only use the manual lid open in an emergency.

- 1) Turn off the main power switch. Wait until the rotor stops.
- 2) Check the emergency lid hole on the front of the device.
- 3) Insert the T-wrench provided with the device into the emergency lid hole and turn it clockwise.



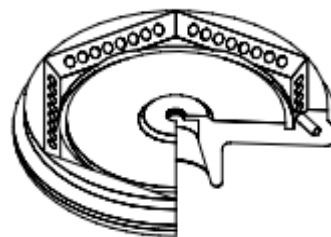
7. Rotor & Accessories

	Caution!
	Precautions when loading sample tubes If the density of the entire sample is greater than 1.2 g/mL, the maximum rotation speed must be reduced to avoid device failure and rotor damage due to rotor overload.
	Risk of injury and product damage due to the use of unauthorized accessories and spare parts - Use only provided the rotors, parts, and accessories by Hanil Scientific Inc. - Hanil Scientific Inc. is not responsible for any damage or accident to the product caused by using non-recommended parts and accessories.

	Mean of Max. Radius Max. Radius of each rotor means the distance from the rotor hole or bucket to the inside edge of the adapter bore based on the rotor axis.	
	 Max. Radius of Fixed angle rotor	 Max. Radius of Swing-out rotor

Angle Rotor, A0.2-48

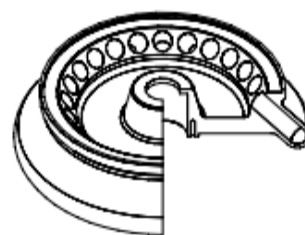
- Capacity : 48 x 0.2 mL
- Max. RPM / RCF : 12,500 / 15,530
- Hole angle from axis during rotation : $\angle 45^\circ$



Tube		
Tube capacity(mL)	0.2	0.2(PCR strip)
Tube Dimension ($\Phi \times L$, mm)	6 x 8	6 x 8
Radius(mm)	88.9	88.9
Max. RCF (xg)	15,530	15,530

Angle Rotor, A2.0-24

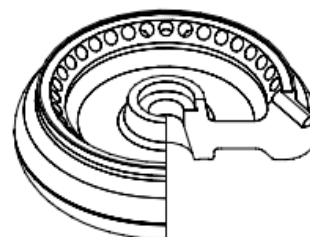
- Capacity : 24 x 1.5 / 2.0 mL
- Max. RPM / RCF : 15,000 / 20,325
- Hole angle from axis during rotation : $\angle 40^\circ$



Tube			
Tube capacity(mL)	0.2	0.5	1.5 / 2.0
Tube Dimension (Φ x L, mm)	6 x 8	8 x 30	11 x 38
Adapter			None
Cat No.	TR0.2(2)	TR0.5(2)	None
radius (mm)	67	76.5	80.8
Max. RCF (xg)	16,854	19,244	20,325

Angle Rotor, A2.0-36

- Capacity : 36 x 1.5 / 2.0 mL
- Max. RPM / RCF : 14,000 / 25,353
- Hole angle from axis during rotation : $\angle 30^\circ$

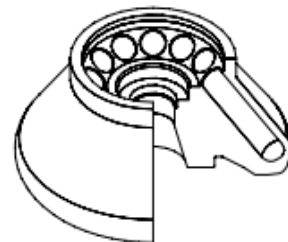


Tube			
Tube capacity(mL)	0.2	0.5	1.5 / 2.0
Tube Dimension (Φ x L, mm)	6 x 8	8 x 30	11 x 38
Adapter			None
Cat No.	TR0.2(2)	TR0.5(2)	None
radius (mm)	100	111	115.7
Max. RCF (xg)	21,913	24,323	25,353

Angle Rotor, A10-12

- Capacity : 12 x 10 mL
- Max. RPM / RCF : 15,000 / 21,407
- Hole angle from axis during rotation : $\angle 36^\circ$

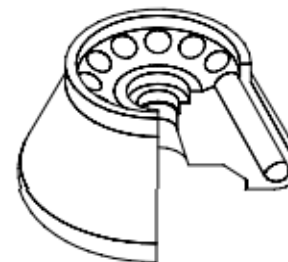
Tube	
Tube capacity(mL)	10
Tube Dimension (Φ x L, mm)	16 x 82
radius (mm)	85.1
Max. RCF (xg)	21,407



Angle Rotor, A15S-12

- Capacity : 12 x 15 mL
- Max. RPM / RCF : 15,000 / 24,174
- Hole angle from axis during rotation : $\angle 25^\circ$

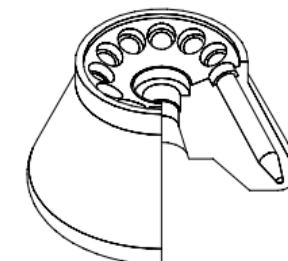
Tube	
Tube capacity(mL)	16
Tube Dimension (Φ x L, mm)	18 x 108.5
radius (mm)	96.1
Max. RCF (xg)	24,174



Angle Rotor, A15c-12

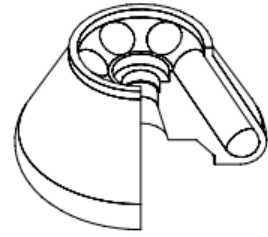
- Capacity : 12 x 15 mL conical
- Max. RPM / RCF : 15,000 / 25,004
- Hole angle from axis during rotation : $\angle 25^\circ$

Tube	
Tube capacity(mL)	15(conical)
Tube Dimension (Φ x L, mm)	17 x 120
radius (mm)	99.4
Max. RCF (xg)	25,004



Angle Rotor, A50-6

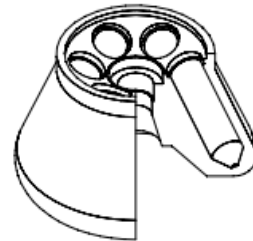
- Capacity : 6 x 50 mL
- Max. RPM / RCF : 15,000 / 24,174
- Hole angle from axis during rotation : $\angle 30^\circ$



Tube						
Tube capacity(mL)	15	15 conical	25 mL conical	25 mL conical	30	50
Tube Dimension (Φ x L, mm)	16 x 120	17 x 120	28.8 x 83	28.8 x 78.5	25.7 x 101.4	29 x 108
Adapter						None
Cat No.	TR15(50)	TR15c(50)	TR25c(50)	TR25c(50)	TR30(50)	None
radius (mm)	89.9	91	76	76	90.4	96.1
Max. RCF (xg)	22,614	22,891	19,118	19,118	22,740	24,174

Angle Rotor, A50c-6

- Capacity : 6 x 50 mL conical
- Max. RPM / RCF : 15,000 / 22,891
- Hole angle from axis during rotation : $\angle 23^\circ$



Tube						
Tube capacity(mL)	15 conical	25 mL conical	25 mL conical	30	50	50 mL conical
Tube Dimension (Φ x L, mm)	17 x 120	28.8 x 83	28.8 x 78.5	25.7 x 101.4	29 x 108	29.5 x 118
Adapter						None
Cat No.	TR15c(50c)	TR25c(50c)	TR25c(50c)	TR30(50c)	TR50(50c)	None
radius (mm)	86.2	75.5	75.5	87.5	88.5	91
Max. RCF (xg)	21,684	18,992	18,992	22,011	22,262	22,891

Angle Rotor, A50c-8

- Capacity : 8 x 50 mL conical
- Max. RPM / RCF : 13,000 / 20,878
- Hole angle from axis during rotation : $\angle 25^\circ$

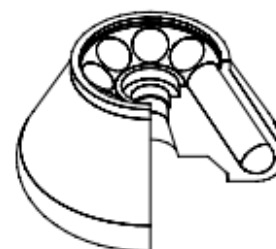


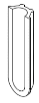
Tube						
Tube capacity(mL)	15 conical	25 mL conical	25 mL conical	30	50	50 mL conical
Tube Dimension (Φ x L, mm)	17 x 120	28.8 x 83	28.8 x 78.5	25.7 x 101.4	29 x 108	29.5 x 118
Adapter						None
Cat No.	TR15c(50c)	TR25c(50c)	TR25c(50c)	TR30(50c)	TR50(50c)	None
radius (mm)	105.7	95	95	107	108	110.5
Max. RCF (xg)	19,971	17,949	17,949	20,217	20,406	20,878

*The A50c-8 rotor may not reach the set target temperature depending on the sample, ambient conditions, and operating conditions.

Angle Rotor, A50-8

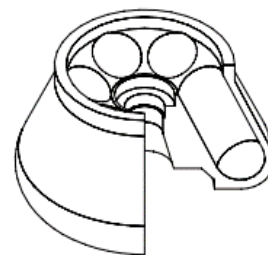
- Capacity : 8 x 50 mL
- Max. RPM / RCF : 15,000 / 24,878
- Hole angle from axis during rotation : $\angle 30^\circ$



Tube						
Tube capacity(mL)	15	15 conical	25 mL conical	25 mL conical	30	50
Tube Dimension (Φ x L, mm)	16 x 120	17 x 120	28.8 x 83	28.8 x 78.5	25.7 x 101.4	29 x 108
Adapter						None
Cat No.	TR15(50)	TR15c(50)	TR25c(50)	TR25c(50)	TR30(50)	None
radius (mm)	92.8	93.9	78.8	78.8	93.2	98.9
Max. RCF (xg)	23,344	23,621	19,822	19,822	23,444	24,878

Angle Rotor, A85-6

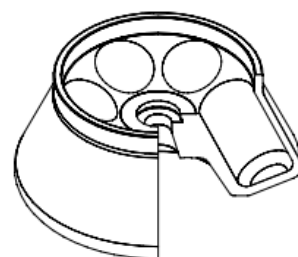
- Capacity : 6 x 85 mL
- Max. RPM / RCF : 15,000 / 24,551
- Hole angle from axis during rotation : $\angle 25^\circ$



Tube								
Tube capacity(mL)	15	15 mL conical	25 mL conical	25 mL conical	30	50	50 mL conical	85
Tube Dimension (Φ x L, mm)	16 x 120	17 x 120	28.8 x 83	28.8 x 78.5	25.7x101.4	29 x 108	29.5 x 118	38 x 106
Adapter								None
Cat No.	TR15(85)	TR15c(85)	TR25c(85)	TR25c(85)	TR30(85)	TR50(85)	TR50c(85)	
radius (mm)	89	89.2	80.3	80.3	91.6	92.9	93	97.6
Max. RCF (xg)	22,388	22,438	20,199	20,199	23,042	23,369	23,394	24,551

Angle Rotor, A250-6

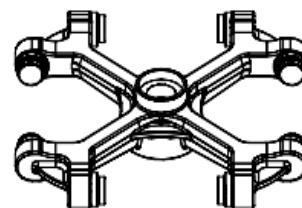
- Capacity : 6 x 250 mL
- Max. RPM / RCF : 8,000 / 9,896
- Hole angle from axis during rotation : $\angle 25^\circ$



Tube						
Tube capacity(mL)	1.5~2.0	2.0 mL with screw cap	5 mL conical	5 mL conical	4~7 mL VT	8~10 mL VT
Tube Dimension (Φ x L, mm)	11 x 38	10.1 x 46	16 x 59	16 x 67	13 x 75	16 x 100
Adapter						
Cat No.	TR2.0-9(250)	TR2.0-9(250)	TR5c-4(250)	TR5c-4(250)	TR7-8(250)	TR10-7(250)
radius (mm)	135	135	131	131	135.5	133.5
Max. RCF (xg)	9,660	9,660	9,373	9,373	9,695	9,552
Tube						
Tube capacity(mL)	15	15 mL conical	25mL conical	25mL conical	30	50
Tube Dimension (Φ x L, mm)	16 x 120	17 x 120	28.8 x 83	28.8 x 78.5	25.7 x 101.4	29 x 108
Adapter						
Cat No.	TR15-4(250)	TR15c-4 (250)	TR25c(250)	TR25c(250)	TR30-3(250)	TR50-2(250)
radius (mm)	133.5	131	120	120	132.5	120
Max. RCF (xg)	9,552	9,373	8,586	8,586	9,481	8,586
Tube						
Tube capacity(mL)	50 mL conical	50 mL conical (Skirted)	85	100	250	
Tube Dimension (Φ x L, mm)	29.5 x 118	29.5 x 118	38 x 106	44 x 115	61.5 x 128	
Adapter					None	
Cat No.	TR50c(250)	TR50sc(250)	TR85(250)	TR100(250)		
radius (mm)	119	125	122.5	124.5	138.3	
Max. RCF (xg)	8,515	8,944	8,765	8,908	9,896	

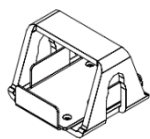
Swing Rotor, S750-4

- 4 loadings
- Max. RPM : 4,000
- Hole angle from axis during rotation : $\angle 90^\circ$



 750mL Bucket with a cap, B750S	 750mL Bucket. B750	Max. RPM / RCF : 4,000 / 3,515 Max. Radius (mL) : 196.5 Hole dimension (Ø x L, mm) : 99 x 103 Hole bottom type : Flat
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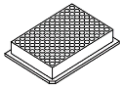
Tube						
Tube capacity(mL)	2.0~4 mL VT	4~7 mL VT	8~10 mL VT	15	15 conical	50
Tube Dimension (Φ x L, mm)	12.5 x 75	13 x 100	16 x 100	16 x 120	17 x 120	29 x 108
Adapter						
Cat No.	TR5-24(750)	TR5-24(750)	TR10-21(750)	TR15-19(750)	TR15c-14(750)	TR50-7N(750)
radius (mm)	193.5	193.5	193.5	193.5	195.5	193.5
Max. RCF (xg)	3,461	3,461	3,461	3,461	3,497	3,497
Tube						
Tube capacity(mL)	50 conical	250	250 conical	500	500 conical	750
Tube Dimension (Φ x L, mm)	29.5 x 118	61.5 x 128	60 x 163	73.5 x 142	96.2 x 147	97 x 152
Adapter						None
Cat No.	TR50c-5N(750)	TR250(750)	TR250c(750)	TR500(750)	TR500c(750)	
radius (mm)	194	194.6	194	194.3	195.5	
Max. RCF (xg)	3,470	3,481	3,470	3,476	3,497	3,515

MTP holder, [TM96\(750-4\)](#)

Max. RPM / RCF : 4,000 / 2,925

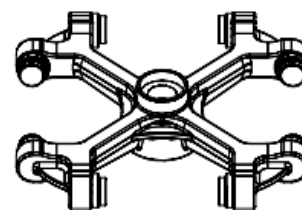
Max. Radius (mL) : 163.5

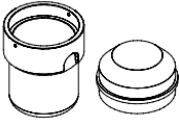
Holder inner dimension (W x D, mm) : 88 x 128.5

Tube	
Plate capacity	MTP
Rotor capacity	1 / 4
radius(mm)	163.5
Max. RCF(xg)	2,925

Swing Rotor, S500-4

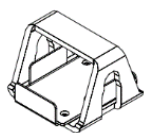
- 4 loadings
- Max. RPM : 4,500
- Hole angle from axis during rotation : $\angle 90^\circ$



 500mL Bucket with a cap, B500	Max. RPM / RCF : 4,500 / 4,392 Max. Radius (mL) : 194 Hole dimension ($\varnothing$ x L, mm) : 80 x 111 Hole bottom type : Flat
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Tube					
Tube capacity(mL)	4~7 mL VT	8~10 mL VT	15	15 Conical	50
Tube Dimension (Φ x L, mm)	13 x 100	16 x 100	16 x 120	17 x 120	29 x 108
Adapter					
Cat No.	TR5-9(500)	TR10-9(500)	TR15-9(500)	TR15c-7(500)	TR50-4(500)
radius (mm)	188	188	189.5	190.5	189.5
Max. RCF (xg)	4,256	4,256	4,290	4,313	4,290

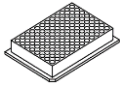
Tube				
Tube capacity(mL)	50 Conical	85	250	500
Tube Dimension (Φ x L, mm)	29.5 x 118	38 x 106	61.5 x 128	73.5 x 142
Adapter				
Cat No.	TR50c-3(500)	TR100(500)	TR250(500)	TR500(500)
radius (mm)	190	189.5	189.5	192
Max. RCF (xg)	4,302	4,290	4,290	4,392

MTP holder, [TM96\(500-4\)](#)

Max. RPM / RCF : 4,000 / 2,755

Max. Radius (mL) : 154

Holder inner dimension (W x D, mm) : 87 x 128.5

Tube	
Plate capacity	MTP
Rotor capacity	1 / 4
radius(mm)	154
Max. RCF(xg)	2,755



RECYCLABLE