
User Manual

Combi R515

Multi-purpose Centifuge

Product Model Name : _____

Date of Purchase : _____

hanil

Combi R515
Research Use Only

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If you have any questions, contact our Technical Support Center.
+82-2-3452-8966 / techsupport@ihanil.com

www.ihanil.com

The appearance or specifications of the device is subject to partial change for improvement.

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1. General Considerations

1.1 Safety

Follow precautions and all the safety requirements described on this user manual to prevent any damage and failure of device and loss of lives.

1. The device should be installed on flat surface to maintain level.
2. Check the voltage to be used, before connecting the device to the power source.
3. Only use rotors, parts, and accessories provided by Hanil Scientific Inc.
Hanil Scientific Inc. is not responsible for damages of the device and accidents caused by using parts and accessories not recommended.
4. Do not exceed the maximum rated speed of the rotor or buckets in use.
5. Make sure to prepare necessary safety measures before using samples that are toxic or radioactive samples or pathogenic or samples or infectious blood.
6. Substances that may generate volatile or explosive vapor can not be deviced.
7. The balancing work of samples should done in advance before operation.
8. To ensure safe use of the device, do not expose the device to strong acids, strong bases, cesium, salt, or alkaline detergents.
9. If the device is contaminated by toxic or radioactive samples or infectious blood samples, remove contaminants completely and take needful actions such as ventilation or isolation of device.
10. Before operation, rotor and chamber should be dry.
11. Do not attempt to slow or stop the spinning rotor by hand.
12. Only device with rotor and rotor door firmly tightened.
13. Do not block vents.
14. When serving the device, be sure to remove contaminants in advance.
15. Please contact the place of purchase or Hanil Scientific Inc. for product repairs.
16. According to IEC61010-2-020 maintain a 30cm “clearance envelope” around the device while the rotor is spinning.
17. Turn the power switch off after using the device.
18. Unplug the power plug before cleaning or left unused for a long period of time.
19. Don't lean against the device

1. General Considerations

1.2 Transport & Storage



- The device and the accessories must only be stored in dry rooms.
- Only lift and transport the device with sufficient number of helpers.

-Storage-

Ambient temperature 5°C~40°C
Maximum relative humidity 30%~85%
Air pressure 500~1060hpa

-Transport-

Ambient temperature -10°C~40°C
Maximum relative humidity 10%~90%
Air pressure 500~1060hpa

1.3 Safety label on the Device



- Insert tube symmetrically.
- Firmly tighten the rotor door.
- Watch your fingers when close the lid.



Mark indicating danger and warning.



Mark indicating a place in danger of electric shock.



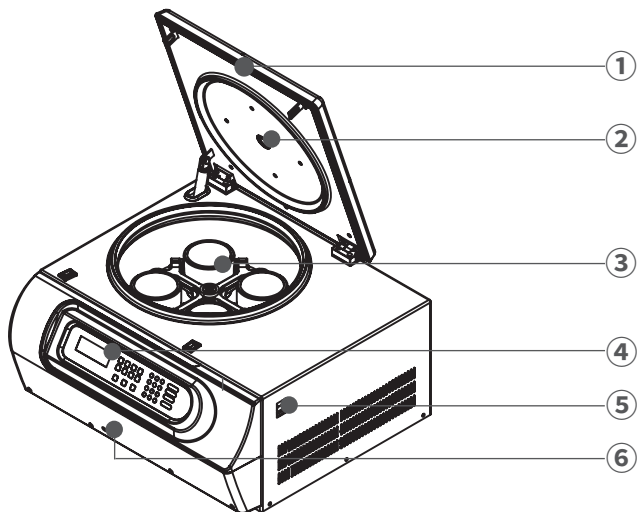
Mark indicating earth grounding

1.4 Electric safety

1. It is recommended that switchgear or circuit breakers and overcurrent protection devices be installed near the device.
2. Use a power cord only provided with the device.
3. Use sockets with a protective earth conductor and suitable power cord.
4. Do not use an extension cord.
5. Do not place anything on the powercable.
6. If you have the following emergencies, shut off the power supply and unplug the powercord from outlet and contact your place of purchase or Hanil Scientific Inc.
 - Unusual noises or smell from the equipment.
 - Damage or wear of a power cord.
 - Breakdown of circuit breaker, fuse or safety device.
 - If you spill liquid on the equipment.
 - If the equipment has been damaged.

2. Product Description

2.1 Structure



- ① Lid
- ② RPM measuring window
- ③ Rotor
- ④ Control Panel
- ⑤ Power Switch
- ⑥ Emergency Open Hole

2.2 Delivery package

- Combi R515 Main Body
- Operating manual
- T-wrench
- Rotors & Accessories on request

2. Product Description

2.3 Technical Specifications

Max. RPM (Fixed angle rotor/Swing-out rotor)	15,000 rpm / 4,500 rpm
Max. RCF (Fixed angle rotor/Swing-out rotor)	26,664 xg / 4,392 xg
Time	< 100 hr, continuous, pulse
Max. Capacity (Fixed angle rotor/Swing-out rotor)	6 x 250 mL / 4 x 750 mL
Temperature range	-10°C to 40°C
ACC/DEC steps	10/10 steps
Program memory	100
Rotor Identification	Automatic
Imbalance cutoff / tracking	Yes
Noise level	< 65 dB
Dimension (W x D x H, mm)	723 x 665 x 387
Weight without rotor	95 kg
Power requirement	2.5 kw
Power input (V, Hz)	210~240V 50/60 Hz (110V, 50 Hz optional)
Cat. No.	CB-R515

3. Installation

3.1 Packing Inspection



- Check packing conditions carefully, before unpacking.
- Contact Hanil Scientific Inc. immediately if damages found.
- Check the delivery for completeness.

► You can get contact details on the packing box or manual.

3.2 Installation

Installation on hard and flat ground.

- Centrifuge should be installed on hard and flat place.
- If the centrifuge is installed in an inclined place, the shaft may be bent due to the weight of the rotor.

Good ventilation.

- For air circulation and safety, maintain a 30cm “clearance envelope” around the centrifuge while the rotor is spinning.



Constant temperature/humidity

- Centrifuge equipped with the sensitive electronic software which is fragile with humidity and temperature.
- Must avoid direct ray or heater and be put in the ambience of controlled temp.and air.

Avoid the corrosive gas

- Install the centrifuge in a place where corrosive gas is not generated.
- Sulfur dioxide gas and chlorine gas may cause corrosion.

Leveling

- The device should be operated on a flat surface.
Use a leveler tool to check the device is level.

3. Installation

3.3 Power Connection



- Connect the device to voltage sources which correspond to the electrical requirements on the label attached to the device.
- Use sockets with a protective earth conductor and provided power cord.

1. Connect the power cord to the electrical outlet.
2. Switch the centrifuge on using the power switch on the right side of the device.

3.4 Opening/Closing the Lid



- If the lid is not closed, the device does not operate.

Opening the lid

1. Press the Lid button

Closing the lid

1. Put both hands on the lid and close it with light force.

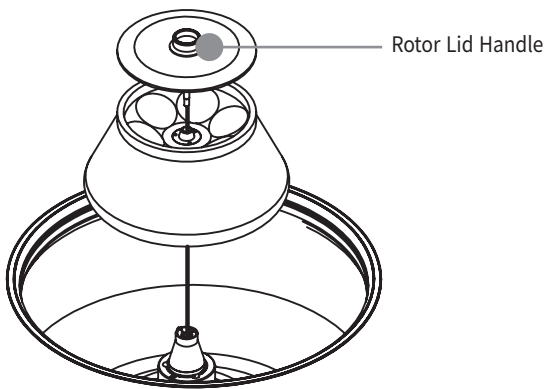
3. Installation

3.5 Installing/Removing the Angle Rotor



- Only use rotors , parts , and accessories provided by Hanil Science Inc.
- Do not use scatched or cracked rotor in use.

1. Before installing the rotor remove any foreign object or moisture from the chamber.
2. Load the rotor vertically onto the motor shaft.
3. Put the rotor lid on the rotor body.
4. Turn the rotor lid handle clockwise until it secured.
 - ▶ Installing : Turn the lid handle clockwise
 - ▶ Removing : Turn the lid handle counterclockwise



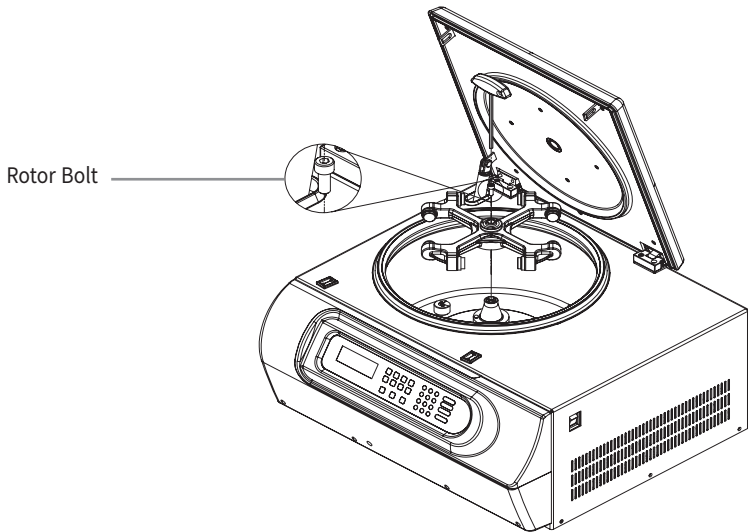
3. Installation

3.6 Installing/Removing the Swing-out Rotor



- Only use rotors , parts , and accessories provided by Hanil Science Inc.
- Do not use scatched or cracked rotor in use.

1. Before installing the rotor remove any foreign object or moisture from the chamber.
2. Load the rotor vertically onto the motor shaft.
3. Insert the rotor bolt into the rotor hole.
4. Using a T-wrench, tighten the rotor bolt clockwise until it secured.
 - ▶ Installing : Turn the bolt clockwise
 - ▶ Removing : Turn the bolt counterclockwise



3. Installation

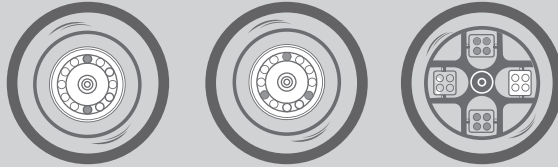
3.7 Loading Tube



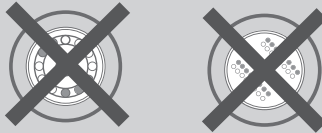
· Use recommended tubes by Hanil Scientific Inc.

- Always use the same type of tube.
- Weight, Density and volume of opposing tubes must be same.
- Check symmetric loading by balancing the tubes with scales.

Correct Arrangement










Wrong Arrangement







3. Installation

3.8 Recommended Tubes for Angle Rotors

Rotor		Tube Capacity /Bottom Type	Required Adaptor	Bore Ø x L Radius (mm)	Max. RPM(rpm) Max. RCF (xg)
 A0.2-48	Hole angle : $\angle 45^\circ$ Max. Capacity : 48 x 0.2 mL Size (Ø x H) : Ø200 x 56 mm	0.2 mL 0.2mLpcr strip -	-	6.5 x 17 88.9	12,500 15,530
 A2.0-24	Hole angle : $\angle 40^\circ$ Max. Capacity : 24 x 1.5/2.0 mL Size (Ø x H) : Ø202 x 79 mm Max. height for tube fit : 46 mm	1.5/2.0 mL -	-	11.5 x 38 80.8	15,000 20,325
		0.5 mL -	TR0.5	8 x 37 76.5	15,000 19,244
		0.2 mL -	TR0.2	6 x 21 67	15,000 16,854
 A2.0-36	Hole angle : $\angle 30^\circ$ Max. Capacity : 36 x 1.5/2.0 mL Size (Ø x H) : Ø240 x 64 Max. height for tube fit : 49 mm	1.5/2.0 mL Micro-filter tube	-	11 x 37.5 115.7	14,000 25,353
		0.5 mL	TR0.5	8 x 37 111	14,000 24,323
		0.2 mL	TR0.2	6 x 21 100	14,000 21,913
 A10-12	Hole angle : $\angle 36^\circ$ Max. Capacity : 12 x 10 mL Size (Ø x H) : Ø179.9 x 82 Max. height for tube fit : 87.1 mm	10 mL Round	-	16.3 x 74.5 85.1	15,000 21,407
 A15-12	Hole angle : $\angle 30^\circ$ Max. Capacity : 12 x 15 mL Size (Ø x H) : Ø222.7 x 106 mm Max. height for tube fit : 121 mm	15 mL Round	-	17 x 96 106	15,000 26,664
 A15c-12	Hole angle : $\angle 36^\circ$ Max. Capacity : 12 x 15 mL conical Size (Ø x H) : Ø215 x 121 Max. height for tube fit : 123.2 mm	15 mL Conical	-	17 X 115 99.4	15,000 25,004
 A50-6	Hole angle : $\angle 30^\circ$ Max. Capacity : 6 x 50 mL Size (Ø x H) : Ø200 x 109 mm Max. height for tube fit : 122.7 mm	50 mL Round	-	29 x 100 96.1	15,000 24,174
		15 mL Round	TR15(50)	17 x 94 89.9	15,000 22,614
		15 mL Conical	TR15c(50)	17 x 105 91	15,000 22,891

3. Installation

3.8 Recommended Tubes for Angle Rotors

Rotor		Tube Capacity /Bottom Type	Required Adaptor	Bore Ø x L Radius (mm)	Max. RPM(rpm) Max. RCF (xg)
 A50c-6	Hole angle : $\angle 23^\circ$ Max. Capacity : 6 x 50 mL conical Size (Ø x H) : $\phi 205.7 \times 119$ mm Max. height for tube fit : 118.1 mm	50 mL Conical	-	30 x 108.6 91	15,000 22,891
 A50-8	Hole angle : $\angle 30^\circ$ Max. Capacity : 8 x 50 mL Size (Ø x H) : $\phi 213 \times 110.7$ mm Max. height for tube fit : 110.7 mm	50 mL Round	-	29 x 100 98.9	15,000 24,878
		15 mL Round	TR15(50)	17 x 94 92.8	15,000 23,344
		15 mL Conical	TR15c(50)	17 x 105 93.9	15,000 23,621
 A85-6	Hole angle : $\angle 25^\circ$ Max. Capacity : 6 x 85 mL Size (Ø x H) : $\phi 209.1 \times 112$ mm Max. height for tube fit : 115.4 mm	85 mL Round	-	38.3 x 95 97.6	15,000 24,551
		50 mL Round	TR50(85)	29 x 95 92.9	15,000 23,369
		50 mL Conical	TR50c(85)	29.5 x 100 93	15,000 23,394
		15 mL Round	TR15(85)	17 x 94 89	15,000 22,388
		15 mL Conical	TR15c(85)	17 x 100 89.2	15,000 22,438
 A250-6	Hole angle : $\angle 25^\circ$ Max. Capacity : 6 x 250 mL Size (Ø x H) : $\phi 295.6 \times 147.8$ mm Max. height for tube fit : 132 mm	250 mL Flat	-	62 x 103 138.3	8,000 9,896

3. Installation

3.9 Recommended Tubes for Swing-out Rotors

Swing-out Rotor: S750-4

Adaptor	Bore (Ø x L, mm)	Tube	Tube Capacity	Tube Material	Max. g-force(xg)	Tube dimension O.D. x h, mm
-	99 x 103 (B750)	Thermo 75003699	750 mL	Polypropylene	-	98 x 133
TR500(750)	75.5 x 98.7	Hanil HI_TB-W500	500 mL	PP		73.7 x 143
TR500c(750)	99 x 58	Corning 431123	500 mL	PP	6,000 xg	95.5 x 148.6
TR250(750)	62.3 x 87	Nalgene 3120-0250 Nalgene 3122-0250 Autofil 1801-RLS Autofil1803-RLS Autofil 1802-RLS Autofil 1804-RLS	250 mL conical	PPCO PC PP PP PC PC	13,200 xg 27,500xg 8,250xg 27,500xg 8,250xg 31,700xg	61.8 x 125.2 61.8 x 125.2 61 x 127 61 x 127 61 x 127 61 x 127
TR50-7	29.2 x 97	Nalgene 3118-0050 Nalgene 3119-0050	50 mL	PC PPCO	50,000xg 100,605xg	28.8 x 106.4 28.8 x 105.9
TR50c-5	29 x 91	FALCON 352070	50 mL conical	PP	16,000xg	30 x 115
TR15-19	17.2 x 87	BD vacutainer 7.5mL~10mL Φ16mm x h 75~100mm	7.5 ~10 mL	-	-	16 x 75~100
		vacuette 7~9 mL tubes Φ 16mm x h 100mm	7~ 9 mL	-	-	16 x 100
		Nalgene 3110-0150 (cap available separately DS3111-0016)	15 mL	PPCO	50,000 xg	15.8 x 112.8
T15c-14	17 x 89	SPL 50015 Eppendorf 0030122151	15 mL conical	PP PP	9,000 xg 19,500 xg	17 x 120 17 x 121
T10-21	16 x 87	BD vacutainer 7.5~10 mL Φ16mm x h 75~100mm	7.5 ~10 mL	-	-	16 x 75~100
		vacuette 7~9 mL tubes Φ 16mm x h 100mm	7~ 9 mL	-	-	16 x 100
T5-24	13.2 x 60 (3 mL) 13.2 x 87 (5 mL)	BD 1.8ml~7 mL vacutainer Φ13mm x h 75~100mm	1.8~7 mL	-	-	13 x 75~100
		vacuette 1~ 6 mL tubes Φ13mm x h 75~100mm	1~ 6 mL	-	-	13 x 75~100

Tube Material

PPCO : Polypropylene copolymer

PP : Polypropylene

PC : Polycarbonate

3. Installation

3.9 Recommended Tubes for Swing-out Rotors

Swing-out Rotor: S500-4

Adaptor	Bore (Ø x L, mm)	Tube	Tube Capacity	Tube Material	Max. g-force(xg)	Tube dimension O.D. x h, mm
TR500(500)	73 x 125	Hanil HL_TB-w500	500 mL	PP		73.7 x 143
TR250(500)	62 x 100	Nalgene 3120-0250 Nalgene 3122-0250 Autofil 1801-RLS Autofil1803-RLS Autofil 1802-RLS Autofil 1804-RLS	250 mL	PPCO PC PP PP PC PC	13,200 xg 27,500xg 8,250xg 27,500xg 8,250xg 31,700xg	61.8 x 125.2 61.8 x 125.2 61 x 127 61 x 127 61 x 127 61 x 127
TR100(500)	38.5 x 84.5	Beckman 345775	94 mL	PP	40,000 xg	32 x 102
TR50-4	29.5 x 85.5	Nalgene 3118-0050 Nalgene 3119-0050	50 mL	PC PPCO	50,000xg 100,605xg	28.8 x 106.4 28.8 x 105.9
TR50c-3	30 x 90	Orange 4440100N Falcon 352070 Eppendorf 0030122178	50 mL conical	PP	12,000 xg 16,000 xg 19,500 xg	30 x 114 30 x 115 30 x 116.2
TR15-19	16.5 x 85	BD vacutainer 7.5mL-10mL Φ16mm x h 75-100mm	7.5 ~10 mL	-	-	16 x 75~100
		vacuette 7~9 mL tubes Φ 16mm x h 100mm	7~ 9 mL	-	-	16 x 100
T15c-7	17 x 95.5	SPL 50015 Eppendorf 0030122151 Orange 4440300N	15 mL conical	PP PP pp	9,000 xg 19,500xg 10,000xg	17 x 120 17 x 121 16.8 x 118.8
T10-9	17 x 64	BD vacutainer 7.5~10 mL Φ16mm x h 75-100mm	7.5 ~10 mL	-	-	16 x 75~100
		vacuette 7~9 mL tubes Φ 16mm x h 100mm	7~ 9 mL	-	-	16 x 100
		Nalgene 3119-0010	10 mL	PP	50,000xg	16.1 x 80.5
TR5-9	13 x 64	BD 1.8mL~7mL vacutainer Φ13mm x h 75-100mm	1.8ml~7ml	-	-	13 x 75~100
		vacuette 1~ 6 mL tubes Φ13mm x h 75-100mm	1~ 6 ml tubes	-	-	13 x 75-100

Tube Material

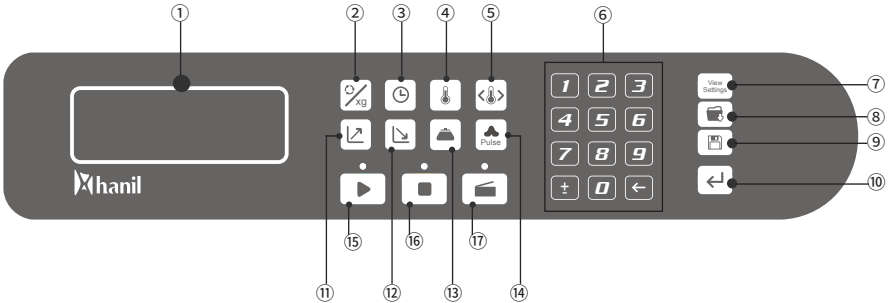
PPCO : Polypropylene copolymer

PP : Polypropylene

PC : Polycarbonate

4. Operation

4.1 Control Panel



Button		Description
①	Display	- Indicate Speed/Time/Temperature/Acc.Dec.
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 save	- Calling up a program
⑨	Program call	- Saving a program
⑩	Enter	- Press the enter after setting the parameters
⑪	Acceleration	- Setting acceleration step
⑫	Deceleration	- Setting deceleration step
⑬	Rotor ID.	- When rotor id is not identified automatically, enter the rotor ID. manually
⑭	Pulse	- Use for quick runs
⑮	Start	- Starting centrifugation
⑯	Stop	- Stopping centrifugation
⑰	Lid	- Openg the lid

4. Operation

4.2 Setting Rotor ID. manually

When rotor id is not identified automatically, enter the rotor ID. manually.

Rotor	Rotor ID
A0.2-48	18
A2.0-24	1
A2.0-36	14
A10-12	2
A15-12	4
A15c-12	8
A50-6	5
A50c-6	6
A50-8	7
A85-6	9
A250-6	10
S500-4	12
S750-4	13

1. Loading the rotor
2. Close the lid.
3. Press the Rotor ID. button.
4. Set the Rotor ID. using the numeric buttons.
5. Press the Enter button.

4.3 Setting Speed

[Setting RPM]

1. Press the Speed button once.
 - ▶ RPM setting mode: RPM(rpm) display flashes.
2. Press the numeric buttons to set the desired RPM value.
 - ▶ Refer to [7. Rotors and accessories] to check the Max. RPM of each rotor.
3. Press the Enter button.

[Setting RPM]

1. Press the Speed button twice.
 - ▶ RCF setting mode: RCF(xg) display flashes.
2. Press the numeric buttons to set the desired RCF value.
 - ▶ Refer to [7. Rotors and accessories] to check the Max. RCF of each rotor.
3. Press the Enter button.

4. Operation

4.4 Setting Run Time

1. Press the Time button.
 - ▶ Time setting mode: Time 00:00:00 display flashes.
2. Press the numeric buttons to set the desired run time.
 - ▶ Up to 99hr 99min 99sec
3. Press the Setup/Enter button.

4.5 Setting Temperature

1. Press the Temp button.
2. Press the numeric buttons to set the desired temperature.
 - ▶ -10°C ~ 40 °C
3. Press the Setup/Enter button.

4.6 Setting Temperature Limit

Temperature range that stops operation when the temperature is lower or higher than the set temperature.

1. Press the Temp limit button.
2. Press the numeric buttons to set the desired temperature limit range.
 - ▶ Default value: $\pm 30^{\circ}\text{C}$
3. Press the Setup/Enter button.

4. Operation

4.7 Setting Acceleration/Deceleration

1. Press the ACC or DEC button.
 - ▶ Acceleration setting mode: ACC (↗) display flashes.
 - ▶ Deceleration setting mode: DEC (↘) display flashes.
2. Press the numeric buttons to set the desired ACC or DEC rate.
 - ▶ ACC rate: 0~9 / DEC rate: 0~9
3. Press the Enter button.

4.8 Saving/Calling up a Program

[Saving]

1. Set the RPM(or RCF) / Run time / Accel, Decel rate / Temperature
2. Press the Program Save button.
3. Press the numeric buttons to set the desired program number.
 - ▶ Up to 0~99 :100
4. Press the Enter button.

[Calling up]

1. Press the Program Call button.
2. Press the numeric buttons to set the desired program number.
3. Press the Enter button.

4. Operation

4.9 Start/Stop/Pulse Run

[Start a run]

1. Check all parameters are correct.
2. Press the Start button.

[Stop a run]

1. Press the Stop button.

[Pulse]

It is for quick and short spin down.

After reaching the set speed, the centrifugation is decelerated and stopped

1. Set the desired speed.
 - ▶ Refer to [4.3 Setting Speed]
2. Press the Short button.

5. Maintenance

5.1 Care Instructions

1. Regularly inspect the rotor chamber for check the motor shaft is normal.
2. Regularly check the rotor and accessories to be sure there is no damage.
3. Rotate the motor shaft with your hand to make sure it turns smoothly.
4. To prevent the rotor from sticking, lubricate the rotor drive hole which contacts motor shaft regularly.

5.2 Cleaning



- Before cleaning the centrifuge, be sure to switch off the device and disconnect the power cord.

[Outside of the device]

1. Clean the outside of device with a soft and dry cloth.
 - ▶ If the device is contaminated, use a mild cleaning fluid to clean.
2. Do not use aggressive chemicals on the device such as alcohol, benzene, acetone or phenol.
3. Make sure do not scratch the surface of device when cleaning it.
 - ▶ Do not use a metal sponge.
 - ▶ If the device is rusted, remove it with a mild detergent and wipe it with a dry cloth.

[Chamber]

1. If the rotor chamber is not dry, wipe moisture from the chamber with a dry cloth.
2. If the rotor chamber is dirty, clean it with a mild fluid to clean.

[Rotor]

1. After centrifugation, remove the rotor from the chamber and keep it upside down.
2. If any sample is spilt inside the rotor, clean it and dry well.

[Disposal]

1. In case of product is to be disposed of, the local wastes laws and regulations are to be observed.

5. Maintenance

5.3 Care Instructions for Refrigerated device

[Open the lid after centrifugation]

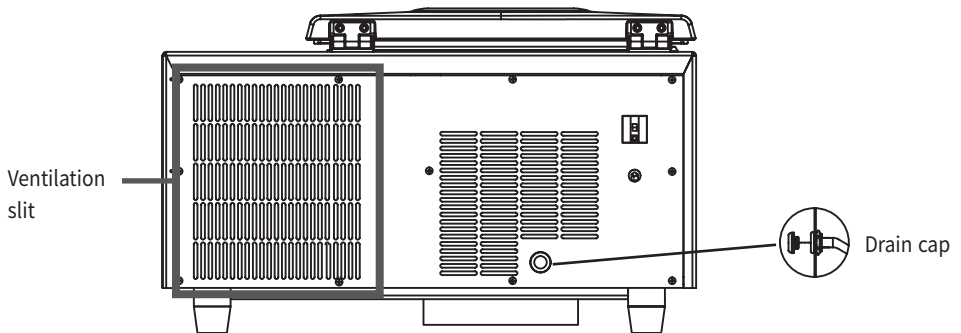
1. Wipe up the moisture in the chamber with a soft cloth.
2. Leave the centrifuge lid open after centrifugation.

[Remove the condensation water]

1. Remove the drain cap and empty the condensation water regularly.

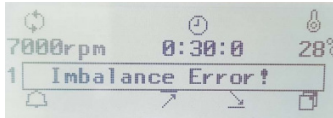
[Remove dust]

1. Remove any dust from the ventilation slits regularly.



6. Troubleshooting

6.1 Possible Problems

Problems	Recommended Action
Power failure	<ul style="list-style-type: none">- Check the power cord connection.- Check the power fuse of the device.
Centrifugation cannot be started	<ul style="list-style-type: none">- Check the lid is closed completely.
Lid cannot be opened	<ul style="list-style-type: none">- Press the 'Lid open button'.- Check the power connection.
Lid cannot be closed	<ul style="list-style-type: none">- Remove the dirt at the door latch and close the lid.- Check the lid latch is not damaged.
Unusual noise and vibration	<ul style="list-style-type: none">- Check the device is installed on the hard and flat place
	<ul style="list-style-type: none">- Reinstall the rotor symmetrically.- Reinstall the tubes symmetrically.- Tighten the rotor lid firmly by turning the rotor lid handle clockwise.
Imbalance error message is displayed	 <ul style="list-style-type: none">- 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.

6. Troubleshooting

6.2 Error Codes

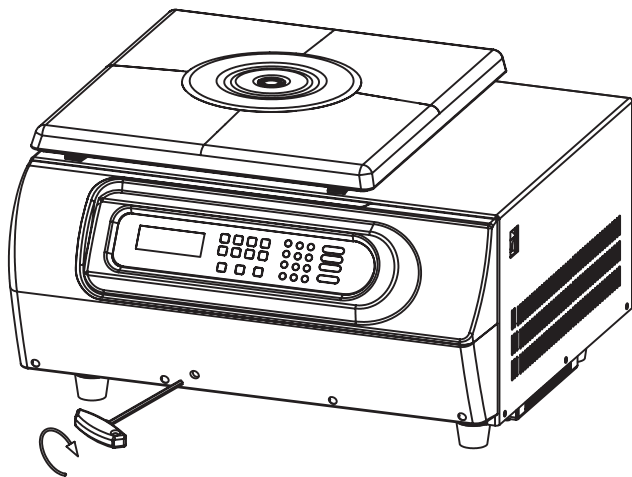
Error	Message	Cause	Recommended Action
E1	Imbalance error	• Imbalance is detected.	<ul style="list-style-type: none">• Check the tightness of rotor loading.• Check the proper loading of tubes.• Check the stable ground or worktable.
E2	Over speed error	<ul style="list-style-type: none">• 10% over the set RPM.• Incorrect tuning of motor and controller.	<ul style="list-style-type: none">• Check controller and motor.• Restart the device
E3	Motor start error	• Can not reach 10rpm within 10 sec.	<ul style="list-style-type: none">• Restart the device.
E4	Door Open! Fast stop!	- When the lid is opened during operation.	<ul style="list-style-type: none">• Restart the device
E5	Low Speed error	• Can not reach 100rpm within 2sec. after start the run.	<ul style="list-style-type: none">• Restart the device
E6	System error	• Error in control system	<ul style="list-style-type: none">• Restart the device
E7	Over current Error	- Current over more than 10A	<ul style="list-style-type: none">• Contact Hanil Scientific Inc. technical service team.
E8	Power Failure!	- No voltage supplied to the device	<ul style="list-style-type: none">• Contact Hanil Scientific Inc. technical service team.
E9	HI voltage Error	- Abnormal voltage rise in motor	<ul style="list-style-type: none">• Contact Hanil Scientific Inc. technical service team.

6. Troubleshooting

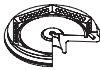






6.3 Emergency Lid Open

If the device lid cannot be opened, you can activate the emergency open manually.





1. Wait for rotor to stop before activating the emergency open.
2. Insert the T-wrench into the emergency open hole and turn it clockwise until the lid is opened.



7. Rotors and Accessories

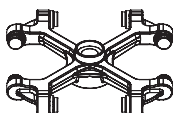
Rotor		Tube Capacity /Bottom Type	Required Adaptor	Bore Ø x L Radius (mm)	Max. RPM(rpm) Max. RCF (xg)
	Hole angle : $\angle 45^\circ$ Max. Capacity : 48 x 0.2 mL Size (Ø x H) : $\varnothing 200 \times 56$ mm	0.2 mL 0.2mLpcr strip -	-	6.5 x 17 88.9	12,500 15,530
	Hole angle : $\angle 40^\circ$ Max. Capacity : 24 x 1.5/2.0 mL Size (Ø x H) : $\varnothing 202 \times 79$ mm Max. height for tube fit : 46 mm	1.5/2.0 mL -	-	11.5 x 38 80.8	15,000 20,325
		0.5 mL -	TR0.5	8 x 37 76.5	15,000 19,244
		0.2 mL -	TR0.2	6 x 21 67	15,000 16,854
	Hole angle : $\angle 30^\circ$ Max. Capacity : 36 x 1.5/2.0 mL Size (Ø x H) : $\varnothing 240 \times 64$ Max. height for tube fit : 49 mm	1.5/2.0 mL Micro-filter tube	-	11 x 37.5 115.7	14,000 25,353
		0.5 mL	TR0.5	8 x 37 111	14,000 24,323
		0.2 mL	TR0.2	6 x 21 100	14,000 21,913
	Hole angle : $\angle 36^\circ$ Max. Capacity : 12 x 10 mL Size (Ø x H) : $\varnothing 179.9 \times 82$ Max. height for tube fit : 87.1 mm	10 mL Round	-	16.3 x 74.5 85.1	15,000 21,407
	Hole angle : $\angle 30^\circ$ Max. Capacity : 12 x 15 mL Size (Ø x H) : $\varnothing 222.7 \times 106$ mm Max. height for tube fit : 121 mm	15 mL Round	-	17 x 96 106	15,000 26,664
	Hole angle : $\angle 36^\circ$ Max. Capacity : 12 x 15 mL conical Size (Ø x H) : $\varnothing 215 \times 121$ Max. height for tube fit : 123.2 mm	15 mL Conical	-	17 X 115 99.4	15,000 25,004
	Hole angle : $\angle 30^\circ$ Max. Capacity : 6 x 50 mL Size (Ø x H) : $\varnothing 200 \times 109$ mm Max. height for tube fit : 122.7 mm	50 mL Round	-	29 x 100 96.1	15,000 24,174
		15 mL Round	TR15(50)	17 x 94 89.9	15,000 22,614
		15 mL Conical	TR15c(50)	17 x 105 91	15,000 22,891

7. Rotors and Accessories

Rotor		Tube Capacity /Bottom Type	Required Adaptor	Bore Ø x L Radius (mm)	Max. RPM(rpm) Max. RCF (xg)
 A50c-6	Hole angle : $\angle 23^\circ$ Max. Capacity : 6 x 50 mL conical Size (Ø x H) : $\phi 205.7 \times 119$ mm Max. height for tube fit : 118.1 mm	50 mL Conical	-	30 x 108.6 91	15,000 22,891
 A50-8	Hole angle : $\angle 30^\circ$ Max. Capacity : 8 x 50 mL Size (Ø x H) : $\phi 213 \times 110.7$ mm Max. height for tube fit : 110.7 mm	50 mL Round	-	29 x 100 98.9	15,000 24,878
		15 mL Round	TR15(50)	17 x 94 92.8	15,000 23,344
		15 mL Conical	TR15c(50)	17 x 105 93.9	15,000 23,621
 A85-6	Hole angle : $\angle 25^\circ$ Max. Capacity : 6 x 85 mL Size (Ø x H) : $\phi 209.1 \times 112$ mm Max. height for tube fit : 115.4 mm	85 mL Round	-	38.3 x 95 97.6	15,000 24,551
		50 mL Round	TR50(85)	29 x 95 92.9	15,000 23,369
		50 mL Conical	TR50c(85)	29.5 x 100 93	15,000 23,394
		15 mL Round	TR15(85)	17 x 94 89	15,000 22,388
		15 mL Conical	TR15c(85)	17 x 100 89.2	15,000 22,438
 A250-6	Hole angle : $\angle 25^\circ$ Max. Capacity : 6 x 250 mL Size (Ø x H) : $\phi 295.6 \times 147.8$ mm Max. height for tube fit : 132 mm	250 mL Flat	-	62 x 103 138.3	8,000 9,896

7. Rotors and Accessories

S750-4



∠90°
 Max. RPM : 4,000 rpm
 Size (W x D x H)
 : 277 x 277 x 55 mm



Round Bucket
B750S
(Cap available)



Round Bucket
B750



Bucket Lid
BL750



MicroTiter Plate
Rack
TM96(750-4)



Adaptor
TR500(750)



Adaptor
TR500c(750)



Adaptor
TR250(750)



Adaptor
TR50-7



Adaptor
TR50c-5



Adaptor
TR15-19



Adaptor
TR15c-14



Adaptor
TR10-21

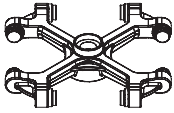


Adaptor
TR5-24

Bucket	Required Adaptor	Tube Capacity Bottom Type	Tube per Adaptor / Rotor	Bore (Ø x L, mm)	Max.height for tube fit (mm) (w/ cap)	Max.height for tube fit (mm) (w/o cap)	Max. RPM (rpm) Max. RCF (xg)
B750S / B750	-	750 mL Flat	1 / 4	99 x 103	142	158.5	4,000 3,515
	TR500(750)	500 mL Flat	1 / 4	75.5 x 98.7	138.2	150.6	4,000 3,458
	TR500c(750)	500 mL conical Conical	1 / 4	99 x 58	140.2	152.5	4,000 3,515
	TR250(750)	250 mL Flat	1 / 4	62.3 x 87	137.5	146.7	4,000 3,443
	TR50-7	50 mL Round	7 / 28	29.2 x 97	129.1	135.3	4,000 3,443
	TR50c-5	50 mL conical Conical	5 / 20	29 x 91	125.1	131.2	4,000 3,515
	TR15-19	15 mL Round	19 / 76	17.2 x 87	123.7	129.8	4,000 3,443
	TR15c-14	15 mL conical Conical	14 / 56	17 x 89	125.5	131.6	4,000 3,479
	TR10-21	10 mL Round	21 / 84	21 / 84	123.9	130	4,000 3,443
	TR5-24	3 mL / 5 mL Round	24 / 96	13.2 x 60(3mL) 13.2 x 87(5 mL)	123.2	129.3	4,000 3,443
TM96(750-4) Radius : 163.5 mm size (WxDxL, mm) : 88 x 128.5 x 42		MTP	1 / 4	88 x 128.5 x 42			4,000 2,925

7. Rotors and Accessories

S500-4



∠90°
 Max. RPM : 4,500
 Size (W x D x H)
 : 262 x 262 x 55 mm



Round Bucket
B500
(Cap available)



Bucket Lid
BL750



MicroTiter Plate
Rack
TM96(50-4)



Adaptor
500(500)



Adaptor
250(500)



Adaptor
100(500)



Adaptor
TR50-4



Adaptor
TR50c-3



Adaptor
TR15-9



Adaptor
TR15c-7



Adaptor
TR10-9



Adaptor
TR5-9

Bucket	Required Adaptor	Tube Capacity Bottom Type	Tube per Adaptor / Rotor	Bore (Ø x L, mm)	Max. height for tube fit (mm) w/ cap)	Max. height for tube fit (mm) w/o cap)	Max. RPM (rpm) Max. RCF (xg)
B500	TR500(500)	500 mL Flat	1 / 4	73 x 125	141.5	143.6	4,500 4,347
	TR250(500)	250 mL Flat	1 / 4	62 x 100	135	146.6	4,500 4,290
	TR100(500)	100 mL(85 mL) Round	1 / 4	38.5 x 84.5	139	150.9	4,500 4,290
	TR50-4	50 mL Round	4 / 16	29.5 x 85.5	129	140.6	4,500 4,290
	TR50c-3	50 mL Conical	3 / 12	30 x 90	128.3	140	4,500 4,302
	TR15-9	15 mL Round	9 / 36	16.5 x 85	132.1	146.8	4,500 4,290
	TR15c-7	15 mL Conical	7 / 28	17 x 95.5	128.4	140.1	4,500 4,313
	TR10-9	10 mL Round	9 / 36	17 x 64	132.9	144.6	4,500 4,279
	TR5-9	5 mL Round	9 / 36	13 x 64	133.8	145.5	4,500 4,256

TM96(500-4) Radius : 154 mm size (WxDxL, mm) : 87 x 128.5 x 53	MTP	1 / 4	87 x 128.5 x 53	4,000 2,755
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RECYCLABLE

hanil

16, Arayuk-ro, Gimpo, REP of Korea
+82-2-3452-8966
technicalsupport@ihanyl.com
www.ihanyl.com