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# Operation Manual

***Combi 508***

Multi-purpose Centifuge

Product Model Name : \_\_\_\_\_

Date of Purchase : \_\_\_\_\_

**hanil**

**Combi 508**  
**Research Use Only**

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

[www.ihanyl.com](http://www.ihanyl.com)

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

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# 1. General Considerations

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## 1.1 Safety

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**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

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## 1.2 Transport & Storage

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- 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 2°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

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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

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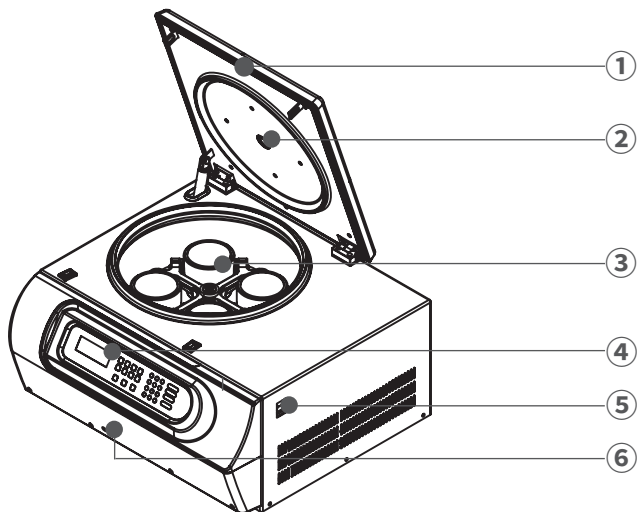
1. It is recommended that switchgear or circuit breakers and overcurrent protection devices be installed near the device.
2. Use a power cord only provided with the device.
3. Use sockets with a protective earth conductor and suitable power cord.
4. Do not use an extension cord.
5. Do not place anything 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

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### 2.1 Structure

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

### 2.2 Delivery package

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

## 2. Product Description

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### 2.3 Technical Specifications

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|  |   |
|--|---|
| Max. RPM<br>(Fixed angle rotor/Swing-out rotor)      | 8,000 rpm / 4,000 rpm                       |
| Max. RCF<br>(Fixed angle rotor/Swing-out rotor)      | 8,279 xg / 3,515 xg                         |
| Time   | < 2 hr, continuous                          |
| Max. Capacity<br>(Fixed angle rotor/Swing-out rotor) | 6 x 85 mL / 4 x 750 mL                      |
| 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)                            | 530 x 676 x 400                             |
| Weight without rotor                                 | 61 kg                                       |
| Power requirement                                    | 1.0 kVA                                     |
| Power input (V, Hz)                                  | 210~240V<br>50/60 Hz (110V, 50 Hz optional) |
| Cat. No.   | CB-508                                      |

# 3. Installation

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## 3.1 Packing Inspection

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- 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

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### **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

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## 3.3 Power Connection

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- 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

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- 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

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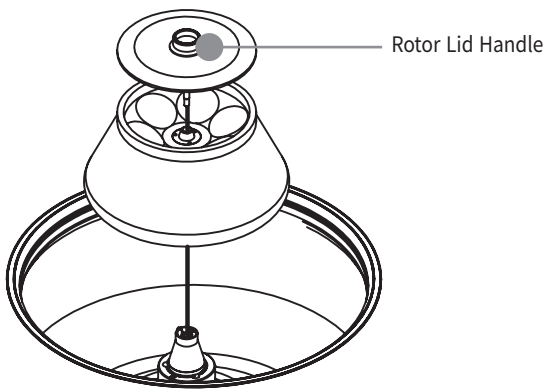
## 3.5 Installing/Removing the Angle Rotor

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- 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

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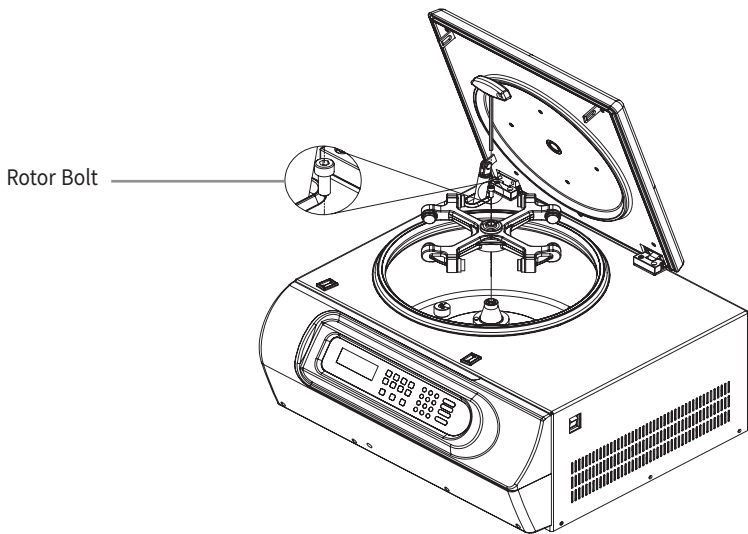
## 3.6 Installing/Removing the Swing-out Rotor

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- 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

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## 3.7 Loading Tube

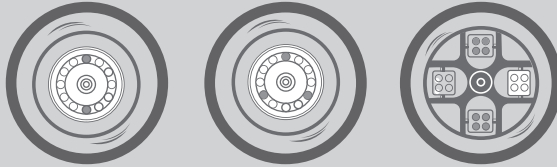
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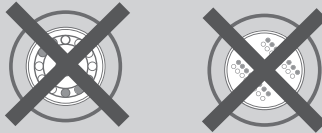
· Use recommended tubes by Hanil Scientific Inc.

- 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          | Adaptor   | Bore<br>(Ø x L, mm) | Tube<br>Capacity | Tube  | Tube<br>Material | Max. g-force(xg)                    | Tube dimension<br>O.D. x h, mm     |
|----------------|-----------|---------------------|------------------|---|------------------|-------------------------------------|------------------------------------|
| A10-12         | -         | 16.3 x 74.5         | 10 mL            | Nalgene 3119-0010   | PPCO             | 50,000 xg                           | 16.1 x 80.5                        |
| A15S-12        | -         | 17 x 96             | 15 mL            | Nalgene 3110-0160<br>(cap available separately DS3111-0018) | PPCO             | 50,000 xg                           | 15.8 x 112.8                       |
| A15c-12        | -         | 17 X 115            | 15 mL<br>conical | FALCON 352096<br>Eppendorf 0030122151                       | PP               | 12,000 xg<br>19,500 xg              | 17 x 120<br>17 x 121               |
| A50-6<br>A50-8 | -         | 29 x 100            | 50 mL            | Nalgene 3118-0050<br>Nalgene 3119-0050                      | PC<br>PPCO       | 50,000 xg<br>100,605 xg             | 28.8 x 106.4<br>28.8 x 105.9       |
|                | TR15(50)  | 17 x 94             | 50 mL            | Nalgene 3110-0150<br>(cap available separately DS3111-0016) | PPCO             | 50,000 xg                           | 15.8 x 112.8                       |
|                | TR15c(50) | 17 x 105            | 15 mL<br>conical | FALCON 352096<br>Eppendorf 0030122151<br>Corning 430052     | PP               | 12,000 xg<br>19,500 xg<br>12,000 xg | 17 x 120<br>17 x 121<br>17 x 118.5 |
| A50c-6         | -         | 30 x 108.6          | 50 mL<br>conical | FALCON 352070   | PP               | 16,000 xg                           | 30 x 115                           |
| A85-6          | -         | 38.3 x 95           | 85 mL            | Nalgene 3118-0085   | PC               | 50,000 xg                           | 38.2 x 105.2                       |
|                | TR50(85)  | 29 x 95             | 50 mL            | Nalgene 3118-0050<br>3119-0050                              | PC<br>PPCO       | 50,000 xg<br>100,605 xg             | 28.8 x 106.4<br>28.8 x 105.9       |
|                | TR50c(85) | 29.5 x 100          | 50 mL<br>conical | Orange 4440100N<br>FALCON 352070<br>SPL 50050               | PP<br>PP<br>PP   | 12,000 xg<br>16,000 xg<br>14,000 xg | 30 x 114<br>30 x 115<br>30 x 115   |
|                | TR15(85)  | 17 x 94             | 15 mL            | Nalgene 3110-0150<br>(cap available separately DS3111-0016) | PPCO             | 50,000 xg                           | 15.8 x 112.8                       |
|                | TR15c(85) | 17 x 100            | 15 mL<br>conical | FALCON 352096   | PP               | 12,000 xg                           | 17 x 120                           |

### Tube Material

PPCO : Polypropylene copolymer

PP : Polypropylene

PC : Polycarbonate

# 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<br>Nalgene 3122-0250<br>Autofil 1801-RLS<br>Autofil1803-RLS<br>Autofil 1802-RLS<br>Autofil 1804-RLS | 250 mL conical | PPCO<br>PC<br>PP<br>PP<br>PC<br>PC | 13,200 xg<br>27,500xg<br>8,250xg<br>27,500xg<br>8,250xg<br>31,700xg | 61.8 x 125.2<br>61.8 x 125.2<br>61 x 127<br>61 x 127<br>61 x 127<br>61 x 127 |
| TR50-7      | 29.2 x 97                            | Nalgene 3118-0050<br>Nalgene 3119-0050  | 50 mL          | PC<br>PPCO                         | 50,000xg<br>100,605xg   | 28.8 x 106.4<br>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<br>Φ16mm x h 75~100mm  | 7.5 ~10 mL     | -                                  | -   | 16 x 75~100  |
|             |                                      | vacuette 7~9 mL tubes<br>Φ 16mm x h 100mm   | 7~ 9 mL        | -                                  | -   | 16 x 100   |
|             |                                      | Nalgene 3110-0150<br>(cap available separately<br>DS3111-0016)  | 15 mL          | PPCO                               | 50,000 xg   | 15.8 x 112.8   |
| T15c-14     | 17 x 89                              | SPL 50015<br>Eppendorf 0030122151   | 15 mL conical  | PP<br>PP                           | 9,000 xg<br>19,500 xg   | 17 x 120<br>17 x 121   |
| T10-21      | 16 x 87                              | BD vacutainer 7.5~10 mL<br>Φ16mm x h 75~100mm   | 7.5 ~10 mL     | -                                  | -   | 16 x 75~100  |
|             |                                      | vacuette 7~9 mL tubes<br>Φ 16mm x h 100mm   | 7~ 9 mL        | -                                  | -   | 16 x 100   |
| T5-24       | 13.2 x 60 (3 mL)<br>13.2 x 87 (5 mL) | BD 1.8ml~7 mL vacutainer<br>Φ13mm x h 75~100mm  | 1.8~7 mL       | -                                  | -   | 13 x 75~100  |
|             |                                      | vacuette 1~ 6 mL tubes<br>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<br>( $\varnothing$ x L, mm) | Tube  | Tube Capacity    | Tube Material                      | Max. g-force(xg)  | Tube dimension<br>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<br>Nalgene 3122-0250<br>Autofil 1801-RLS<br>Autofil1803-RLS<br>Autofil 1802-RLS<br>Autofil 1804-RLS | 250 mL           | PPCO<br>PC<br>PP<br>PP<br>PC<br>PC | 13,200 xg<br>27,500xg<br>8,250xg<br>27,500xg<br>8,250xg<br>31,700xg | 61.8 x 125.2<br>61.8 x 125.2<br>61 x 127<br>61 x 127<br>61 x 127<br>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<br>Nalgene 3119-0050  | 50 mL            | PC<br>PPCO                         | 50,000xg<br>100,605xg   | 28.8 x 106.4<br>28.8 x 105.9   |
| TR50c-3    | 30 x 90                          | Orange 4440100N<br>Falcon 352070<br>Eppendorf 0030122178  | 50 mL<br>conical | PP                                 | 12,000 xg<br>16,000 xg<br>19,500 xg                                 | 30 x 114<br>30 x 115<br>30 x 116.2   |
| TR15-19    | 16.5 x 85                        | BD vacutainer 7.5mL-10mL<br>$\Phi$ 16mm x h 75-100mm  | 7.5 ~10 mL       | -                                  | -   | 16 x 75~100  |
|            |                                  | vacuette 7~9 mL tubes<br>$\Phi$ 16mm x h 100mm  | 7~ 9 mL          | -                                  | -   | 16 x 100   |
| T15c-7     | 17 x 95.5                        | SPL 50015<br>Eppendorf 0030122151<br>Orange 4440300N  | 15 mL<br>conical | PP<br>PP<br>pp                     | 9,000 xg<br>19,500xg<br>10,000xg                                    | 17 x 120<br>17 x 121<br>16.8 x 118.8   |
| T10-9      | 17 x 64                          | BD vacutainer 7.5~10 mL<br>$\Phi$ 16mm x h 75-100mm   | 7.5 ~10 mL       | -                                  | -   | 16 x 75~100  |
|            |                                  | vacuette 7~9 mL tubes<br>$\Phi$ 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<br>$\Phi$ 13mm x h 75-100mm   | 1.8ml~7ml        | -                                  | -   | 13 x 75~100  |
|            |                                  | vacuette 1~ 6 mL tubes<br>$\Phi$ 13mm x h 75-100mm  | 1~ 6 ml tubes    | -                                  | -   | 13 x 75-100  |

#### Tube Material

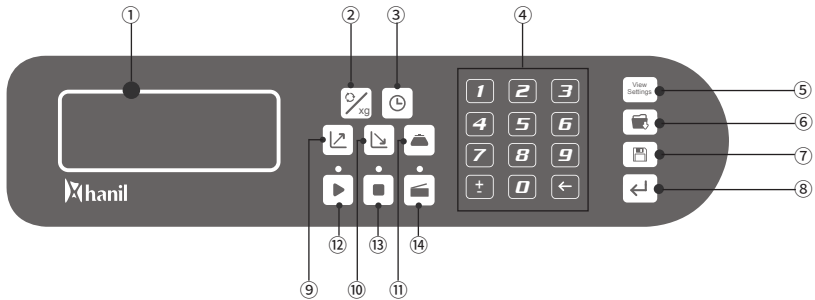
PPCO : Polypropylene copolymer

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      | Numeric buttons | - Enter a value using the numeric buttons                                     |
| ⑤      | View Setting    | - Verifying the setting parameters during centrifugation                      |
| ⑥      | Program call    | - Saving a program  |
| ⑦      | Program save    | - Calling up a program  |
| ⑧      | Enter           | - Press the enter after setting the parameters                                |
| ⑨      | Acceleration    | - Setting acceleration step   |
| ⑩      | Deceleration    | - Setting deceleration step   |
| ⑪      | Rotor ID.       | - When rotor id is not identified automatically, enter the rotor ID. manually |
| ⑫      | Start           | - Starting centrifugation   |
| ⑬      | Stop            | - Stopping centrifugation   |
| ⑭      | Lid             | - Openg the lid   |



# 4. Operation

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## 4.2 Setting Rotor ID. manually

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

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.

| 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        |

## 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

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## 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 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. Operation

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## 4.6 Saving/Calling up a Program

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### **[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

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## 4.7 Start/Stop a Run

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### **[Start a run]**

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

### **[Stop a run]**

1. Press the Stop button.

# 5. Maintenance

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## 5.1 Care Instructions

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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.

# 6. Troubleshooting

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## 6.1 Possible Problems

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

# 6. Troubleshooting

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## 6.2 Error Codes

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| Error | Message           | Cause   | Recommended Action   |
|-------|-------------------|---|--|
| E1    | Motor start error | <ul style="list-style-type: none"><li>· Occurs when 200rpm is not reached within 2 seconds after motor operation.</li></ul>                     | <ul style="list-style-type: none"><li>· Check the connector connection.</li><li>· Check the rotor is installed tightly.</li></ul>  |
| E2    | Lid open error    | <ul style="list-style-type: none"><li>· Occurs when the lid is opened during operation.</li></ul>   | <ul style="list-style-type: none"><li>· Check the lid latch for foreign objects.</li><li>· Restart the device</li></ul>  |
| E3    | Motor over-heat   | <ul style="list-style-type: none"><li>· Temp. rises inside of the motor.</li></ul>  | <ul style="list-style-type: none"><li>· Check the stator of motor.</li><li>· Restart the device after 1 hour.</li></ul>  |
| E4    | Low Speed error   | <ul style="list-style-type: none"><li>· Can not reach 100rpm within 2sec. after start the run.</li></ul>  | <ul style="list-style-type: none"><li>· Restart the device</li></ul>   |
| E5    | Overspeed         | <ul style="list-style-type: none"><li>· 10% over the set RPM.</li><li>· Incorrect tuning of motor and controller.</li></ul>                     | <ul style="list-style-type: none"><li>· Check controller and motor.</li><li>· Restart the device</li></ul>   |
| E6    | System error      | <ul style="list-style-type: none"><li>· Error in control system</li></ul>   | <ul style="list-style-type: none"><li>· Restart the device</li></ul>   |
| E7    | Imbalance error   | <ul style="list-style-type: none"><li>· Imbalance is detected.</li></ul>  | <ul style="list-style-type: none"><li>· Check the rotor is installed tightly.</li><li>· Check the proper loading of tubes.</li><li>· Check the stable ground or worktable.</li></ul> |
| E8    | Lift Lid          | <ul style="list-style-type: none"><li>· Deceleration Motor failure or cable missing.</li><li>· Lid can not be opened after operation.</li></ul> | <ul style="list-style-type: none"><li>· Check the cable is connected.</li><li>· Perform the emergency open.</li></ul>  |
| E9    | Lid lock error    | <ul style="list-style-type: none"><li>· Lid sensor failure.</li><li>· Lid sensor cable is not connected.</li></ul>                              | <ul style="list-style-type: none"><li>· Check the lid sensor.</li><li>· Connect the lid sensor cable.</li></ul>  |
| E10   | Unknow Rotor ID   | <ul style="list-style-type: none"><li>· No Rotor</li><li>· Rotor is not recognized.</li><li>· Foreign matter in the rotor and sensor.</li></ul> | <ul style="list-style-type: none"><li>· Install the rotor</li><li>· Check the rotor drive or rotor id disk for foreign objects.</li></ul>  |
| E11   | Lmb Not, Connect  | <ul style="list-style-type: none"><li>· Imbalance sensor failure or cable is disconnected.</li></ul>  | <ul style="list-style-type: none"><li>· Check the cable connection.</li></ul>  |

# 6. Troubleshooting

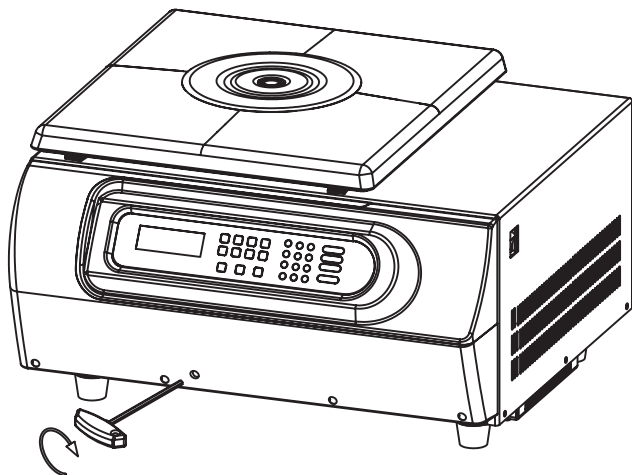
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## 6.3 Emergency Lid Open

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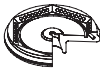






If the device lid cannot be opened, you can activate the emergency open manually.

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

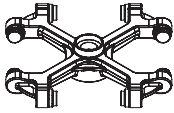
| Rotor  |  | Tube Capacity /Bottom Type      | Required Adaptor | Bore Ø x L Radius (mm) | Max. RPM(rpm) Max. RCF (xg) |
|--|--|---------------------------------|------------------|------------------------|-----------------------------|
| <br>A0.2-48   | Hole angle : $\angle 45^\circ$<br>Max. Capacity : 48 x 0.2 mL<br>Size (Ø x H) : $\varnothing 200 \times 56$ mm   | 0.2 mL<br>0.2mLpcr strip<br>-   | -                | 6.5 x 17<br>88.9       | 12,500<br>15,530            |
| <br>A2.0-24   | Hole angle : $\angle 40^\circ$<br>Max. Capacity : 24 x 1.5/2.0 mL<br>Size (Ø x H) : $\varnothing 202 \times 79$ mm<br>Max. height for tube fit : 46 mm     | 1.5/2.0 mL<br>-                 | -                | 11.5 x 38<br>80.8      | 15,000<br>20,325            |
|  |  | 0.5 mL<br>-                     | TR0.5            | 8 x 37<br>76.5         | 15,000<br>19,244            |
|  |  | 0.2 mL<br>-                     | TR0.2            | 6 x 21<br>67           | 15,000<br>16,854            |
| <br>A2.0-36   | Hole angle : $\angle 30^\circ$<br>Max. Capacity : 36 x 1.5/2.0 mL<br>Size (Ø x H) : $\varnothing 240 \times 64$<br>Max. height for tube fit : 49 mm        | 1.5/2.0 mL<br>Micro-filter tube | -                | 11 x 37.5<br>115.7     | 14,000<br>25,353            |
|  |  | 0.5 mL                          | TR0.5            | 8 x 37<br>111          | 14,000<br>24,323            |
|  |  | 0.2 mL                          | TR0.2            | 6 x 21<br>100          | 14,000<br>21,913            |
| <br>A10-12    | Hole angle : $\angle 36^\circ$<br>Max. Capacity : 12 x 10 mL<br>Size (Ø x H) : $\varnothing 179.9 \times 82$<br>Max. height for tube fit : 87.1 mm         | 10 mL<br>Round                  | -                | 16.3 x 74.5<br>85.1    | 15,000<br>21,407            |
| <br>A15-12  | Hole angle : $\angle 30^\circ$<br>Max. Capacity : 12 x 15 mL<br>Size (Ø x H) : $\varnothing 222.7 \times 106$ mm<br>Max. height for tube fit : 121 mm      | 15 mL<br>Round                  | -                | 17 x 96<br>106         | 15,000<br>26,664            |
| <br>A15c-12 | Hole angle : $\angle 36^\circ$<br>Max. Capacity : 12 x 15 mL conical<br>Size (Ø x H) : $\varnothing 215 \times 121$<br>Max. height for tube fit : 123.2 mm | 15 mL<br>Conical                | -                | 17 X 115<br>99.4       | 15,000<br>25,004            |
| <br>A50-6   | Hole angle : $\angle 30^\circ$<br>Max. Capacity : 6 x 50 mL<br>Size (Ø x H) : $\varnothing 200 \times 109$ mm<br>Max. height for tube fit : 122.7 mm       | 50 mL<br>Round                  | -                | 29 x 100<br>96.1       | 15,000<br>24,174            |
|  |  | 15 mL<br>Round                  | TR15(50)         | 17 x 94<br>89.9        | 15,000<br>22,614            |
|  |  | 15 mL<br>Conical                | TR15c(50)        | 17 x 105<br>91         | 15,000<br>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) |
|---|---|----------------------------|------------------|------------------------|-----------------------------|
| <br>A50c-6 | Hole angle : $\angle 23^\circ$<br>Max. Capacity : 6 x 50 mL conical<br>Size (Ø x H) : $\phi 205.7 \times 119$ mm<br>Max. height for tube fit : 118.1 mm | 50 mL Conical              | -                | 30 x 108.6<br>91       | 15,000<br>22,891            |
| <br>A50-8  | Hole angle : $\angle 30^\circ$<br>Max. Capacity : 8 x 50 mL<br>Size (Ø x H) : $\phi 213 \times 110.7$ mm<br>Max. height for tube fit : 110.7 mm         | 50 mL Round                | -                | 29 x 100<br>98.9       | 15,000<br>24,878            |
|   |   | 15 mL Round                | TR15(50)         | 17 x 94<br>92.8        | 15,000<br>23,344            |
|   |   | 15 mL Conical              | TR15c(50)        | 17 x 105<br>93.9       | 15,000<br>23,621            |
| <br>A85-6  | Hole angle : $\angle 25^\circ$<br>Max. Capacity : 6 x 85 mL<br>Size (Ø x H) : $\phi 209.1 \times 112$ mm<br>Max. height for tube fit : 115.4 mm         | 85 mL Round                | -                | 38.3 x 95<br>97.6      | 15,000<br>24,551            |
|   |   | 50 mL Round                | TR50(85)         | 29 x 95<br>92.9        | 15,000<br>23,369            |
|   |   | 50 mL Conical              | TR50c(85)        | 29.5 x 100<br>93       | 15,000<br>23,394            |
|   |   | 15 mL Round                | TR15(85)         | 17 x 94<br>89          | 15,000<br>22,388            |
|   |   | 15 mL Conical              | TR15c(85)        | 17 x 100<br>89.2       | 15,000<br>22,438            |

# 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

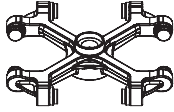


Adaptor  
TR5-24

| 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<br>3,515               |
|   | TR500(750)       | 500 mL Flat               | 1 / 4                    | 75.5 x 98.7                        | 138.2                                  | 150.6                                   | 4,000<br>3,458               |
|   | TR500c(750)      | 500mL conical Conical     | 1 / 4                    | 99 x 58                            | 140.2                                  | 152.5                                   | 4,000<br>3,515               |
|   | TR250(750)       | 250 mL Flat               | 1 / 4                    | 62.3 x 87                          | 137.5                                  | 146.7                                   | 4,000<br>3,443               |
|   | TR50-7           | 50 mL Round               | 7 / 28                   | 29.2 x 97                          | 129.1                                  | 135.3                                   | 4,000<br>3,443               |
|   | TR50c-5          | 50 mL conical Conical     | 5 / 20                   | 29 x 91                            | 125.1                                  | 131.2                                   | 4,000<br>3,515               |
|   | TR15-19          | 15 mL Round               | 19 / 76                  | 17.2 x 87                          | 123.7                                  | 129.8                                   | 4,000<br>3,443               |
|   | TR15c-14         | 15 mL conical Conical     | 14 / 56                  | 17 x 89                            | 125.5                                  | 131.6                                   | 4,000<br>3,479               |
|   | TR10-21          | 10 mL Round               | 21 / 84                  | 21 / 84                            | 123.9                                  | 130                                     | 4,000<br>3,443               |
|   | TR5-24           | 3 mL / 5 mL Round         | 24 / 96                  | 13.2 x 60(3 mL)<br>13.2 x 87(5 mL) | 123.2                                  | 129.3                                   | 4,000<br>3,443               |
| TM96(750-4)<br>Radius : 163.5 mm<br>size (WxDxL, mm) :<br>88 x 128.5 x 42 | MTP              |                           | 1 / 4                    | 88 x 128.5 x 42                    |  |   | 4,000<br>2,925               |

# 7. Rotors and Accessories

## S500-4



∠90°  
 Max. RPM : 4,000  
 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)<br>Max. RCF (xg) |
|---|------------------|---------------------------|--------------------------|------------------|--|---|---------------------------------|
| B500  | TR500(500)       | 500 mL Flat               | 1 / 4                    | 99 x 103         | 142                                    | 158.5                                   | 4,000<br>3,434                  |
|   | TR250(500)       | 500 mL Flat               | 1 / 4                    | 75.5 x 98.7      | 138.2                                  | 150.6                                   | 4,000<br>3,390                  |
|   | TR100(500)       | 100 mL(85mL) Round        | 1 / 4                    | 99 x 58          | 140.2                                  | 152.5                                   | 4,000<br>3,390                  |
|   | TR50-4           | 50 mL Round               | 1 / 4                    | 62.3 x 87        | 137.5                                  | 146.7                                   | 4,000<br>3,390                  |
|   | TR50c-3          | 50 mL Conical             | 3 / 12                   | 30 x 90          | 128.3                                  | 140                                     | 4,000<br>3,399                  |
|   | TR15-9           | 50 mL Round               | 7 / 28                   | 29.2 x 97        | 129.1                                  | 135.3                                   | 4,000<br>3,390                  |
|   | TR15c-7          | 50 mL conical Conical     | 5 / 20                   | 29 x 91          | 125.1                                  | 131.2                                   | 4,000<br>3,408                  |
|   | TR10-9           | 15 mL Round               | 19 / 76                  | 17.2 x 87        | 123.7                                  | 129.8                                   | 4,000<br>3,381                  |
|   | TR5-9            | 15 mL conical Conical     | 14 / 56                  | 17 x 89          | 125.5                                  | 131.6                                   | 4,000<br>3,363                  |
| TM96(500-4)<br>Radius : 154 mm<br>size (WxDxL, mm) :<br>87 x 128.5 x 53 |                  | MTP                       | 1 / 4                    | 87 x 128.5 x 53  |  |   | 4,000<br>2,755                  |









RECYCLABLE

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