

# USER MANUAL

## LOW-SPEED CENTRIFUGE T04



# hanil

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## LOW SPEED CENTRIFUGE T04

### Research Use Only

- Product name :Centrifuge
- Model name : T04

### **Manufacturer : Hanil Scientific Inc.**

B2 & 1F & 5F, 16 Arayuk-ro, Gimpo-si, Gyeonggi-do, Republic of KOREA  
Tel) +82-2-3472-0727, FAX)+82-31-985-9158

info@ihanol.com

<https://www.ihanol.com>

### **European Authorized Representative : OBELIS S.A**

Boulevard GénéralWahis53,B-1030Brussels,BELGIUM

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### **Contact Us**

If you have and questions, contact Hanil Scientific Inc. or place of purchase.

+82-2-3472-0727

Inquiry: info@ihanol.com

Order: sales@ihanol.com

Tech. support: techsupport@ihanol.com

The contents in this user manual are subject to change for device improvement.

Original Instruction

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# 1. Safety warnings and cautions

## 1.1 Transport & Storage, Conditions of use



- The device and the accessories may only be stored in dry rooms



- Only lift and transport the device with sufficient number of helpers.

-Use Condition-

Indoor Use

Ambient temperature 5°C~35°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

## 1.2 Safety label



This manual describes the performance, usage, and handling precautions of the purchased product. Please read carefully before using the product.



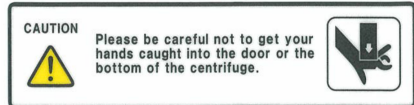
Caution sign indicating danger and warning



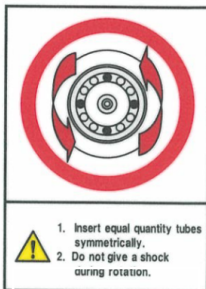
Electric shock hazard caution sign



Rotor insertion, tightening caution indication warning



Lid closure caution indication warning



Bucket mounting caution warning



In case of Emergency, the hole position to open the lid manually

### 1.3 Precautions for safety

Centrifugal separators are dangerous because they use a high-speed rotating body. Safety precautions are to prevent personal injury, product damage, and breakdown from possible dangers during use.

Please observe all safety measures described in this manual.

1. The centrifuge must be installed horizontally on a level surface. If the shaft is operated in an inclined state, vibration or damage to the device may occur.
2. Before connecting the centrifuge to power, check the voltage to be used. If it is connected with the wrong voltage, it may cause damage to the device and personal injury.
3. Use only the rotor and recommended parts and accessories provided by Hanil Scientific Inc. We are not responsible for any damage to the device or accidents resulting from the use of non-recommended parts and accessories.
4. The sample must be used in a centrifugal separator tube, and must be used within the maximum xg value of the tube.
5. In the case of centrifuging dangerous substances (pathogenic, toxic, radioactive substances, etc.), it is necessary to sufficiently grasp the physical properties of the substance and take necessary safety measures.
6. 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 considered.
7. Substances that can generate volatile or explosive vapors cannot be centrifuged.
8. When the rotor comes into contact with cleaning solutions such as strong acids or strong bases or cesium/silver/salt, it will cause a chemical reaction and corrosion will begin.
9. The rotor chamber must be kept dry at all times before using the centrifuge.
10. Do not exceed the maximum RPM / RCF. If the rotor is subjected to a centrifugal force that exceeds the allowable rotation limit, the rotor will be deformed and damaged.
11. Before centrifugation, the sample must be balanced.
12. It is forbidden to touch or move the rotating rotor.
13. The rotor must be accurately fixed to the rotating shaft, and the rotor used with the rotor lid must be securely fastened. If the lid comes off during rotation, it may cause serious damage to the Centrifuge, sample, and product.
14. Do not block the air ventilation for proper air flow which keep the centrifuge from overheating.
15. Do not put any objects into the openings of the centrifuge.
16. Never use a tool to remove the lid or guard.
17. When requesting repair, the user must remove contaminants in advance.
18. Maintenance must be performed by a technician authorized by Hanil Scientific Inc.
19. For product repair, contact the place of purchase.
20. When operating according to the IEC61010-2-020 standard, the safety distance (30 cm) around the centrifuge must be observed for smooth instrument operation and the safety of users and the surrounding environment.
21. Turn off the device switch after using the device.
22. Disconnect and store the power cord from the power outlet before cleaning the machine or when not in use for a long time.

## 2. Product composition and information

### 2.1. Appearance



T04 is provided with AO-15/10-12 Rotor

### 2.2 Components

#### Components

User manual

AC Power Cord

Rotor Locking  
Tool

Emergency Lid  
Open Tool

Grease  
(Lubricant)



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<b>2-3. Technical Specifications</b>	
Max RPM / RCF	4,000RPM / 2,075 xg
Max Capacity	6 x 15mL , 12 x 10mL
Time Control	Timed < 100 min or continuous
Time Counting	From Starting
Time display	Min : Sec
Program memory	30
Display parameters	RPM ( RCF ), Min ( Sec )
Chamber material and coating	Stainless Steel
Noise level ( dependent on rotor )	≤52 dB
ACC / DEC time	≤ 20 sec / ≤ 20 sec

RCF / RPM conversion	Yes
Imbalance cutout	Yes
Safety lid lock	Yes
Lid drop protection	Yes
Automatic lid release at completion	Yes
Power supply (V / Hz)	230V~ 50Hz (110V optional)
Power requirement	140 VA
Weight without rotor	15 kg
Dimension (W x D x H)	296 x 408 x 211

## 2.4 Intended Use

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



## 3. Product installation

### 3-1. Unpacking

1. After purchasing the centrifuge, open the box and check the components.  
Centrifuge (T04) / Rotor ( AO-15 / 10-12 ) / User Manual / AC power cord / Emergency lid opening tool / Rotor locking tool / Grease

### 3-2. Power connection

1. Connect the AC power cord to the power socket located on the back of the main body and connect the power plug to the outlet.
  - ▶ Please check the rated voltage to be used.
2. Press the power switch button [ I / O ] located on the right side of the main unit in the ON direction [ I ].
  - ▶ The set value used in previous operation will be displayed with a beep sound.
  - ▶ When the device is shipped, the default value is Max.rpm 4,000, 10 minutes.



When using the equipment, if the voltage changes by more than  $\pm 10\%$  from the standard voltage, precise reliability cannot be obtained. In addition, since it may damage various parts in the centrifuge, you must ensure that constant power is supplied.

### 3.3 Lid open

Used to open the lid. When the Lid is closed, the lamp is off, and when it is open, the lamp is turned on.

1. When the lid is closed (The lamp is off), press [Open].

► The Lid lamp lights up when the Lid is open.


### **DO NOT OPERATE THE CENTRIFUGE BEFORE REMOVING THE BUFFER INSTALLED INSIDE THE CHAMBER!**


There is a Buffer inside the chamber holding the rotor stable when released.  
The buffer must be removed before operating the Centrifuge.

### 3.4 Rotor mounting and removal

1. Before assembling the rotor, remove dirt or moisture from the motor shaft and rotor with a dry cloth.

2. After mounting the rotor to the central shaft in the chamber,

Insert provided 1) Washer (  ) and

2) Fixing Nut (  )

Then, Fix the rotor using the provided Rotor Locking Tool.



► Rotor mounting: clockwise rotation

► Rotor removal: counterclockwise rotation

► Hold the rotor with one hand and turn the rotor locking tool with the other to fix or remove.

3. Mount the 15ml stainless steel sleeve into all holes of the rotor.

- ▶ Before operation, make sure to mount all the sleeves on the rotor.



Before use, make sure that the rotor is firmly connected to the motor shaft.

### 3.5 Tube mounting



· Use the tube for centrifuge recommended by Hanil Scientific Inc, and do not use it above the allowable standard after checking the maximum RCF value for each tube.

· Samples should be accurately measured in the same amount/density and placed in each tube, then the tubes must be mounted on the rotor so that they are symmetrical to each other. At this time, if the volume of the sample to be symmetrical is different, strong vibration may occur when the rotor rotates or serious damage to the rotor and motor may occur.

· Weight balance should be performed to minimize the difference in weight of the tubes containing the sample.

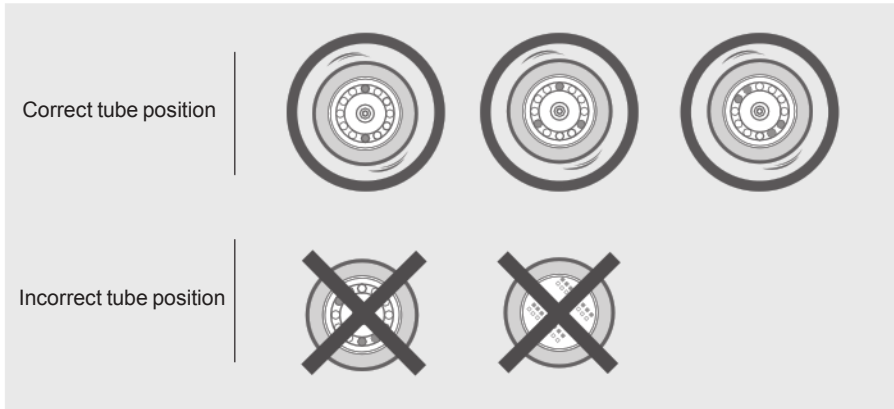
· Even if the number of tubes is the same, they will be asymmetrical according to their positions, so when inserting tubes into centrifugal tubes facing each other, you must also check the positions. If the number of tubes is not symmetrical, you must use an extra tube and insert it to balance the same weight as the other tubes.

1. Before inserting the sample tube, check that there is no foreign matter or moisture inside the rotor hole or bucket.

- ▶ If there is any foreign matter or moisture, be sure to remove it with a dry cloth.
- ▶ Load samples in the tubes before placing the tubes into the rotor holes.

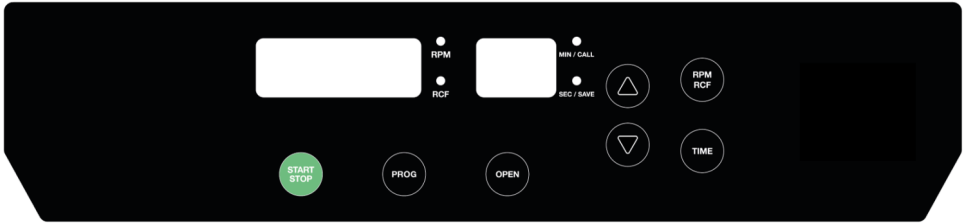
2. Sample tubes must be placed and mounted symmetrically.

- ▶ The tube filled with the sample should have no difference in weight and the density should be symmetrically and evenly arranged.
- ▶ Tubes for centrifuges must not exceed Max RCF value. It should be used after checking the RCF value of tubes.  
Do not use beyond acceptable standards.



## 4. How to use

### 4.1 Control Panel



#### □ RPM/RCF

The rotation speed is indicated in RPM/RCF, and mutual conversion is possible by pressing the RPM / RCF button.

Control interval : 1

#### □ Time

The time can be set in “minute” and “second”, and up to 99 minutes 59 seconds or continuous operation is possible.

Control interval : 1 Min / 1 Sec

#### □ START/STOP

It is used to start and stop centrifugation.

Control interval : 1

#### □ PROG

Up to 10 programs can be saved and can be called up every time they are used.

#### □ Open

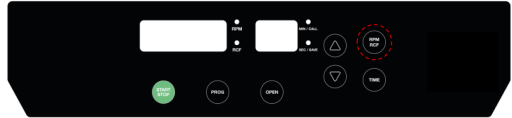
When the lid is closed, you can open the lid.

## 4.2 Speed setting

The speed setting value is displayed as RPM and RCF, and is automatically calculated through interlocking.

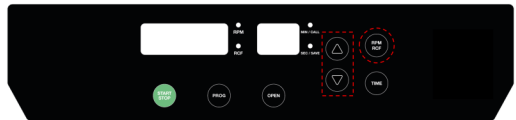
### 1. Press [RPM/RCF]

- ▶ Press Once/Twice  
→ RPM/RCF setting mode
- ▶ Entering the setting mode, RPM / RCF lamp will turn on.



### 2. Enter the setting value using the [▲/▼] key and press [RPM/RCF].

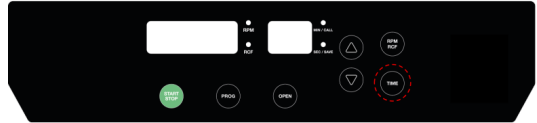
- ▶ Press [RPM/RCF] to save the set speed value.
- ▶ RPM/RCF value is changed in units of 10 rpm/ 1xg.
- ▶ Pressing the [▲/▼] button for more than 5 seconds will change in units of 100rpm/10xg.
- ▶ If you do not enter the setting value for 15 seconds, the setting mode is canceled.



### 4.3 Time setting

The time can be set in "minute" and "second", up to 99 minutes 59 seconds or continuous operation (00 minutes 00 seconds setting) is possible.

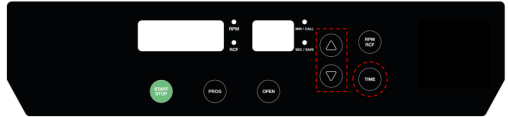
1. Press [Time].



- ▶ pressing [Time] Once/ Twice  
→ "Minute"/"Second" input mode
- ▶ Entering the setting mode, Min / Sec lamp will turn on.

2. Enter the setting value using the [▲/▼] key and press [Time].

- ▶ Min/Sec can be changed 1min/1sec
- ▶ Pressing the [▲/▼] button for more than 5 seconds will change in units of 10min / 10sec.
- ▶ If you do not enter the setting value for 15 seconds, the setting mode is canceled.

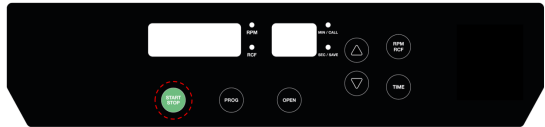


### 4.4 Start / Stop

Can be used to start or stop operation.  
During operation, the Start/Stop lamp is indicated by lighting up.

#### 1. Start

1. After setting the speed and time, etc., press the [Start/Stop] button.

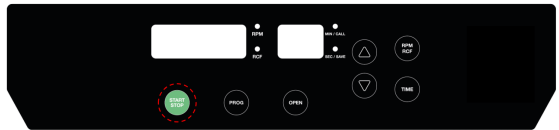


- ▶ Operation starts only when the lid is closed.
- ▶ During operation  
→ [Start/Stop] lamp is turned on.

#### 2. Stop

1. If you want to end the operation, press the [Start/Stop] button.

- ▶ During deceleration  
→ [Start/Stop] lamp is turned off.
- ▶ End of operation  
→ [Start/Stop] lamp is turned off.



- ▶ Final stop  
→ When operation is stopped, the equipment will beep 10 times for 20 seconds and the lid will open.



## 4.5 program storage

Program storage: When operating the device under various conditions, setting values such as speed and time can be saved in advance and then recalled and used immediately as needed.

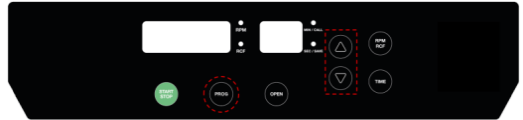
1. After setting the program that needs to be saved, press the [PROG] button for more than 3 seconds.

► Display → Save flashing



2. Using the [▲/▼] key, select the program number and press [PROG] again.

- Up to 30 programs can be stored.
- If you do not enter the setting value for 15 seconds, the setting mode is canceled



### 4.6 Program call

Program call: It is designed to call the program stored between 00 and 30.

1. Press [PROG] once.

▶ Display→ CALL flashing



2. Using the [▲/▼] key, select the program number and press [PROG] again.

▶ Selected program number will

show the saved settings

▶ If you do not press [PROG] for 5 seconds, the setting mode is canceled



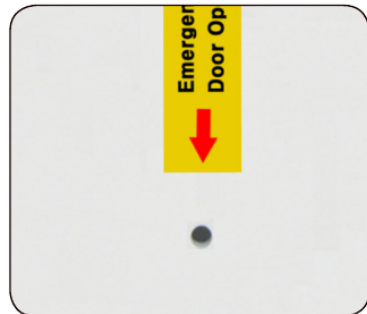
### 4.7 Manual lid opening in case of emergency

This method is used to remove the sample mounted on the rotor when the lid cannot be opened automatically because the main body is not supplied with power.

1. After confirming that the inner rotor has completely stopped rotating, check the hole at the end of the arrow direction of the “Emergency Door Open” label on the left side of the equipment.

2. Push the provided Emergency Door Open Tool vertically.

▶ Lid opens manually with a “click” sound.



Manual lid opening must be performed after the machine has completely stopped rotating. If this is not followed, it may damage the sample and the user, so be careful.  
Do not close the lid immediately after emergency opening, wait until the power supply is restored, and then use it in a normal way.

## 5. Maintenance

### Main body

1. If the exterior is contaminated, wash it with soapy water on a soft cloth and wipe it with a dry cloth to prevent moisture from remaining.
2. Do not use chemicals such as alcohol, benzene, benzol as they may damage it.
3. Be careful not to scratch the surface while cleaning or moving the external surface.
  - ▶ If the surface is scratched, the unit may be exposed to rust.
  - ▶ If rust is formed by leaving it wet for a long time, remove it with a neutral detergent and wipe it with a dry cloth.

### Chamber

1. After use, always dry the inside of the chamber.
2. If the chamber is contaminated, wipe with a mild detergent and wipe with a soft cloth to prevent moisture.

### Shaft

1. If rotation is unstable due to foreign substances on the shaft, it may cause imbalance due to high-speed rotation, so it must be kept clean at all times.
2. After completing the experiment, remove the rotor from the rotating shaft, dry it with a dry cloth, and keep it dry.
3. If the rotor does not separate from the rotating shaft, do not remove the rotor with excessive force, contact a service center.

### Rotor

1. If an acid, basic solution, or solution spills from the tube, immediately wipe it off with a soft cloth dampened with warm water and store in a dry place.
2. The tube hole of the Fixed Angle rotor or the bucket of the rotor should be checked for contamination of the solution from time to time and kept dry. It is recommended to store it upside down when not in use for a long time.

## 6. Problem solving

### 6.1 Checklist before reporting a malfunction

If there is a problem with the centrifuge, check the following before reaching to a service center.


Symptom	Check list
No power	Refer to [3.2 Power Connection] and check if the power plug is removed.
Does not work	If Lid is not closed, it will not work. Refer to [3.3 Lid Open] and check the Lid status of the lamp and close the Lid well.
Lid does not open.	When the power supply is interrupted, check the power plug connection in [3.2 Power Connection]. If it is not resolved in a short time, open the lid manually by referring to [4.7 Manual Lid Release in Emergency] for sample protection.
Lid does not close.	Check if there is any foreign substance on the lid clasp, if there is, remove the foreign substance and close the lid.
Vibration and noise appear during operation.	If the installation position of the main body is unstable, check the level of the main body and whether it is fixed, and re-install it horizontally on a flat surface.
	If the rotor installation is poor, check the exterior of the rotor after removing the rotor and stop using the rotor immediately if there is any damage. Also, if the mounting method is wrong, refer to [3.4 Rotor Mounting and Removal] to install the rotor correctly.
	If the tube insertion is asymmetrical or the weight is not correct, refer to [3.5 Mounting the sample tube] to check the tube weight and insert it symmetrically.

## 6.2 Error message information

If the problem persists after taking the following measures, please contact the service center.

Error code	Description	Action
Error 1	Motor start error: Occurs when the motor does not reach 200 rpm within 2 seconds after starting the operation.	Check the rotor rotation through the lid's center window.
Error 2	Lid Open : Occurs when Lid is opened during operation.	1) Check if the lid closed. 2) Check the Lid lamp status.
Error 3	Motor Overheating : Occurs when the motor overheats.	1) Remove any heat-generating devices around the centrifuge, check if the centrifuge vent is blocked or clogged with foreign substances, and take measures so that the heat generated from the centrifuge can be dissipated smoothly. 2) Turn off the power, stop using the product for about an hour (open the lid at this time), and turn the power on again to check.
Error 4	Low Voltage : Occurs when the supply voltage is below -10%.	1) Check the supply voltage. 2) If it is less than +10% of the rated voltage, install an AVR to supply the rated voltage.
Error 5	High Voltage : Occurs when the supply voltage is above +10%.	1) Check the supply voltage. 2) If it is more than +10% of the rated voltage, install an AVR to supply the rated voltage.
Error 6	Overspeed : Occurs when 1,000 RPM or more is higher than the set speed.	Turn off the power and turn it on again to check the operation status again.
Error 7	Firmware Program : Occurs due to a system error in the control unit.	Turn off the power and turn it on again to check the operation status again.
Error 8	Imbalance : Occurs when the sample balance is not correct.	1) Check if the weight of the sample inserted in the rotor is the same and that it is inserted symmetrically. 2) Check if there is any imbalance in the device due to the level of the floor, and if there are any factors that cause the device to move, remove and reinstall to balance. 3) Remove the rotor and wipe off any foreign matter on the shaft and the connection part, and make sure that there is no bending of the motor shaft. If there is no problem, align the threads of the rotor and the motor shaft and tighten them completely. 4) Check if the tube or bottle is crushed or spilled.
Error 9	RPM Sensing : Occurs when the sensor is defective or the motor cannot rotate.	1) Through the lid center window, check if the rotor is rotating . 2) Spin the rotor by hand and check on the display screen for any change in RPM.

## 7. Rotor & Accessories

Rotor	Tube Capacity	Required Adaptor	Bore Ø x L (mm) Radius (mm)	Max. RPM(rpm) Max. RCF (xg)
 <p>AO-15/10-12</p>	<p>10/15mL</p>	<p>-</p>	<p>20.4 x10.1 116</p>	<p>4,000 2,075</p>

## 8. Declaration of Conformity

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### DECLARATION OF CONFORMITY

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

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

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

Wir, Hanil Scientific Inc., hiermit unter eigener Verantwortung, dass das Produkt (s), die unter die Richtlinien der Europäischen Union und Normen, die in dieser Erklärung.

Description of Product Model Name	Centrifuge T04		
<b>Relevant Directives/ Harmonised Standards</b>			
Machinery	2006/42/EC	as last amended	EN ISO 12100:2010
Low Voltage	2014/35/EU	as last amended	IEC 61010-1:2010/A1:2016 IEC 61010-2-020:2016
EMC	2014/30/EU	as last amended	EN 61326-1:2013 EN 55011:2016/A1:2017 EN 61000-3-2:2014 EN 61000-3-3:2013
RoHS	2011/65/EU	as last amended	EN IEC 63000:2018

#### Test Report. Ref.

ACTS-2019-SC-118  
E19WD-307  
RT22R-S0948

#### Authorized Representative & Person authorized to compile the technical file

OBELIS S.A  
Address : Boulevard Général Wahis 53,  
B-1030 Brussels, BELGIUM  
Tel: +32.2.732.59.54  
Fax: +32.2.732.60.03  
E-mail : mail@obelis.net

May 26, 2022

  
Yongjoo Kim / CEO

Doc No.: DDC-T04(Rev.1)

MEMO



**hanil**