USER MANUAL

LOW-SPEED CENTRIFUGE
T05R

hanil

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M15R

Research Use Only

Contact Us

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

Original Instruction

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1. Safety Warnings and Conditions

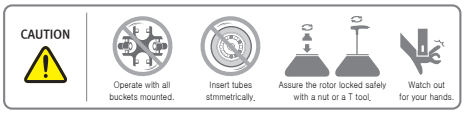
1-1. Safety label

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

Manual lid open hole position



Rotor / Tube insertion and Lid closing caution sign

1-2. Conditions of use, storage or transport

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

-Use Condition-
Indoor use
Ambient temperature 5℃~ 35℃
Maximum relative humidity 30%~85%
Air pressure 500~1060hpa

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

-Transport & Storage -
Ambient temperature -10℃~40℃
Maximum relative humidity 10%~90%
Air pressure 500~1060hpa

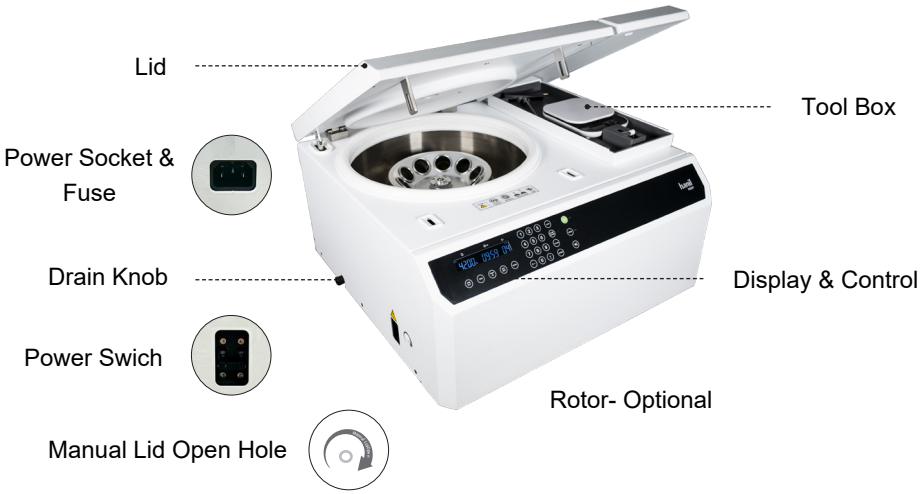
1.3. Precautions for safety

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, a large vibration may occur 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 taken.
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 drive the rotor above the permitted rotational speed. 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 and used. If the lid comes off during rotation, it may cause serious damage to the product and sample.
14. Do not block the air ventilation for proper air flow which keeps 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 washing the machine or when not in use for a long time.

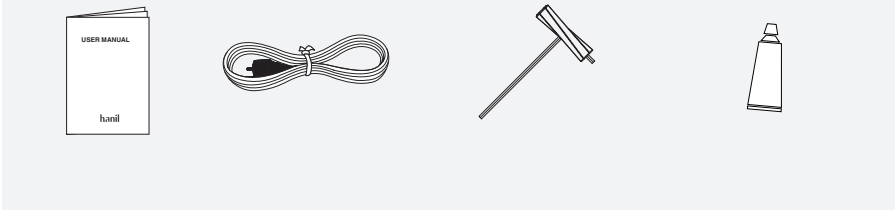
2. Product Composition and Information

2-1. Appearance



2-2. Components

Components			
User Manual	AC Power Cord	T-wrench	Grease(Lubricant)



2-3. Technical Specification

Max RPM / Fixed angle	5,000 rpm
Max RCF / Fixed angle	3,983 x g
Max RPM / Swing out	5,000 rpm
Max RCF / Swing out	4,218 x g
Max capacity / Fixed angle	10 x 50 ml
Max capacity / Swing out	4 x 100ml
Temp. range	-10 to +40℃
Time control	Pulse, timed ≤ 99 hr 59min or continuous
Time counting modes	Selectable, at set speed or from starting
Fast cool button	Yes
Noise level	≤60 dB
ACC/DEC	9/10 steps
Power supply	220V~, 60Hz
Power Requirement	900VA
Dimension (W x D x H)	584 x 554 x 313
Net weight	65.7 Kg
RCF/RPM conversion	Yes
Parameters on display window	RPM(RCF), Oper. Status, Lid Open/Close, Time(Hr:Min), Temp, ACC, DEC
Program memory	100
Display	Black LCD
Imbalance cutout	Yes
Safety lid lock	Yes
Lid drop protection	Yes
Motorized lid open & Close	Yes

2-4. Intended Use

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

3. Product installation

3-1. Unpacking

1. After purchasing the centrifuge, open the box and check the components.
   Centrifuge (T05R) / User Manual / AC power cord / T-wrench for rotor locking and emergency door opening.

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 [I / O] located on the right side of the main unit in the ON direction [I].

▶ The setting value used just before is displayed with a beep sound.
▶ When the device is shipped, the default value is Max.rpm per rotor, 10 minutes.

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

3-3. Lid Opening & Closure

▶When lid is opened, the lamp will be ON
▶When lid is closed, the lamp will be OFF

The lid lock system of this product is locked with only a light touch, so do not apply excessive force.

3-4. Installing / Removing the Rotor

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

3-4-1. Swing Out Rotor

1. Insert the rotor into the motor shaft and tighten it completely using the locking tool.

▶ Rotor tightening: Rotating with a Rotor Locking Tool and rotating clockwise

▶ Rotor Separation: Rotating with a Rotor Locking Tool and rotating counterclockwise

▶ Hold the rotor with one hand and with the other hand, using the locking tool tighten or loosen the rotor.

2. Hang the appropriate bucket at each wing identically for safety.

▶Spin the rotor manually to check if bucket swinging is free enough.
If they do not swing freely, apply the Lubricant (grease) to the link area.

3-4-2. Fixed Angle Rotor.

1. Insert the rotor into the motor shaft and tighten it completely using the locking tool.

▶ Rotor tightening: Rotating with a Rotor Locking Tool and rotating clockwise

▶ Rotor Separation: Rotating with a Rotor Locking Tool and rotating counterclockwise

▶ Hold the rotor with one hand and with the other hand, using the locking tool tighten or loosen the rotor.

Before centrifugation, check if the rotor is firmly tightned.

3-5. Loading Tubes

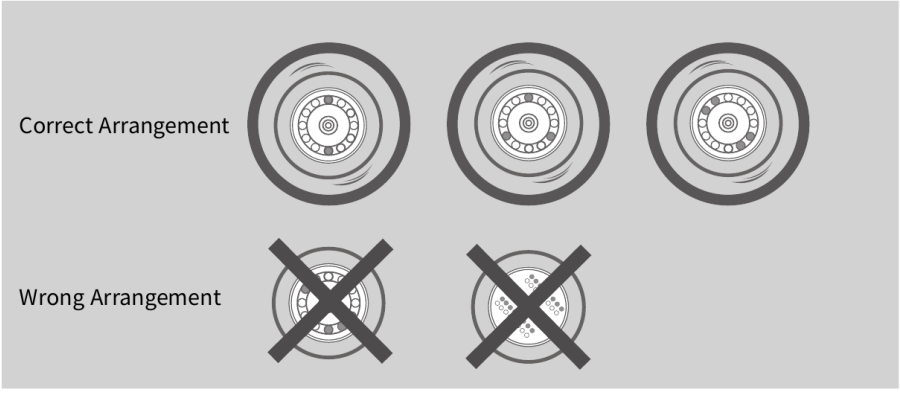
- Only use tubes provided or approved by Hanil Scientific Inc.
- Always use the same type of tube.
- Tubes should be loaded symmetrically.
- Do not exceed the maximum rated speed of the tube.
- Same volume of sample should be put on tubes.
- Check symmetric loading by balncing tubes with scales.

1. Before loading smaple tubes, check for any moisture or foreign substance in the rotor hole or bucket.

   ▶ If there is any, remove it with soft dry cloth.

2. Tubes must be placed in the rotor with same amount of samples symmetricaly.

   ▶ Only use appropriate centrifugal tubes and do not exceed the speed beyond the tube's max G-force.



4. Operation

4-1. Key Functions of Control Panel

□ RPM / RCF

For automatic conversion of RPM / RCF and to set the speed
Control interval : 1 RPM / 1 xg

□ AT SET SPEED

Use to count the run time once the actual run speed reaches to the set speed value

□ Time

Use to set time, available range up to 99 hour 59 min (00:00 : continuous)
Control interval : Hour / Minute

□ Temp

Use to set temperature (-10ºC~40ºC), FAST COOL function to reach set. temperature quickly
Control interval : 1℃

□ Open

Use to open instrument lid

□ Start / Stop

Use to start and stop operation

□ ACC / DCC

Use to set acceleration & deceleration level 1~9 steps ('0' : natural deceleration)
Control interval : 1

□ Pulse

The pulse button is for when press & hold, to accelerate up to maximum speed and decelerate when the button is not pressed.

□ PROG

Use to save a set of setting vlaues or recall the saved program number

□ Sound

Use to set the value of sound volume
Control interval : 1

□ KEY LOCK

Use for key lock mode

4-2. Setting the RPM Value

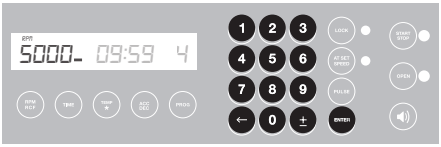
The speed setting value is displayed as RPM and RCF, and is automatically calculated correspondingly

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

▶Touching the button once / twice
→RPM / RCF setting

▶RPM, RCF will generate on display in setting mode

2. Input the value and touch [ENTER]



▶ Touching [ENTER] will save the value

▶ RPM / RCF value can set 1 rpm / 1xg

▶ If you do not touch the number button for 15 seconds, the setting mode will be cleared.

▶ If wrong number is entered, touch [←] button and change the value again.

4-3. Setting the Time Value

Time can be set by 'hour', and 'min' in maximum of 99h 59min or continuous run (00Min 00Sec) can be set. For accurate time control, 'AT SET SPEED' time mode (Time counting start after reaching set speed) is availible.

4-3-1. Setting the AT SET SPEED MODE

Touch the [AT SET SPEED] button once
▶Lamp on→(AT SET SPEED) mode activated

AT SET SPEED MODE

For exact time control, this instrument can be set with AT SET SPEED mode which counts the run time once the actual run speed reaches to the set speed value and stops when the deceleration begins.

*[AT SET SPEED] lamp turns on: From T1 to T2
*[AT SET SPEED] lamp turns off: From T0 to T2

4-3-2. Setting the 'Hour' / 'min' Value

1. Touch the [TIME] button once.

▶ 'min' value LED will flicker.

2. Touch the number buttons to change the minute value then touch [ENTER]

▶ If you do not touch the number button for 15 seconds, the setting mode is cleared.

▶ If wrong number is entered, touch [←] button and change the value again.

▶ Touching the [ENTER] button will change to 'HOUR' value setting.

3. Touch the number buttons to change the hour value then touch [ENTER]

▶ If you do not touch the number button for 15 seconds, the setting mode is cleared.

▶ If wrong number is entered, touch [←] button and change the value again.

▶ Touch the [ENTER] button to complete the setting.

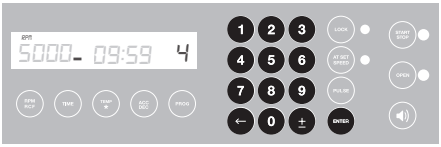
4-4. Setting Temperature and Fast Cool

The temperature setting range can be set from -10ºC to 40ºC

For temperature sensitive samples, fast cooling is supported, reaching room temperature or bellow in a short period of time.

1. Touch [TEMP] button
   ▶ The temperature set value will flash in the display.

2. Touch [ENTER] button after input set value to input temperature.



▶Set the temp value to number keys

▶Touch [ENTER] button to save set temperature

▶ Not touching the numbers within 15 seconds will clear settings.

▶Enter "+ / -" once and the - sign will appear before the temp set value. On two inputs- the sign will disapear.

▶To make correction, touch [←]button and re-input the values.

4-4-2. Fast Cool

1. Enter the set temperature according to normal temperature setting procedure.
2. Close the lid and press [TEMP] for 2 seconds.

▶Press [TEMP] for 2 seconds Fast Cool activated (1,000RPM)

▶Operation time flashes on the display screen when fast cool starts.

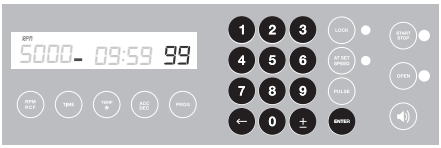
Fast Cool enables speed cooling by accelerating air circulation in the chamber through low speed rotation.

4-5. Acceleration / Deceleration

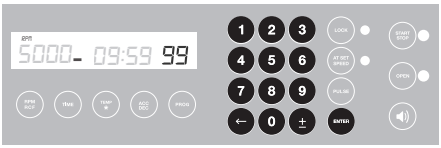
Set the acceleration rate to 9 steps and the deceleration rate to 10 steps (Natural Depreciation: 0) to protect sensitive samples and clean separation.

1. Touch [ACC/DCC] button

2. Touch [ENTER] button after inputting set value to input ACC
   - ▶ The ACC will flash on the display
   - ▶ ACC can be set from 1 to 9
   - ▶ If you do not touch the number button for 15 seconds, the setting mode is cleared.



3. Touch [ENTER] button after inputting set value to input DEC
   - ▶ The DEC will flash on the display.
   - ▶ DEC can be set from 0 to 9. (Natural Depreciation: 0)
   - ▶ To make correction, touch[←] button and re-input the values.



4-6. Start/Stop

This button is used to start or stop centrifugation. The Start/Stop button lamp illuminates during operation.

4-6-1. Start

1. Touch the [Start/Stop] button after completing the speed, time, and temperature settings.

- ▶ During operation, the lamp of the right of the [Start/Stop] button is illuminated.
- ▶ Operation only stars when the lid is closed.
- ▶ Touching [Enter] indicates the set value before entering the start button.

4-6-2. Stop

1. Touch the [Start/Stop] button to exit.

- ▶ Press the [Start/Stop] button during operation, to slow down immediately.
- ▶ Touch the [Start/Stop] button during slow down to decelerate the instrument rapidly to DEC 9 step regardless of the setup step.

4-6-3. Emergency stop.

1. Press the [Start/Stop] button twice to exit.

- ▶ Touch the [Start/Stop] button during slow down to decelerate the instrument rapidly to DEC. 9 step regardless of the setup step.

4-7. Pulse Mode

The [Pulse] button is for when press & hold, to accelerate up to maximum speed and decelerate when the button is not pressed.

1. Set the desired acceleration and deceleration steps.
2. Press the [pulse] button more than 2 sec.

▶While pressing [Pulse], the equipment will accelerate up to maximum RPM.
▶ By stop pressing the [Pulse], the equipment will decelerate to stop.

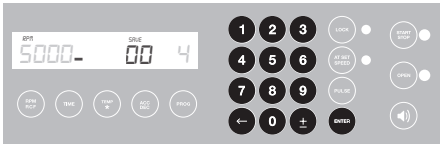
4-8. Program Saving & recalling

Program Saving

Save the set values, such as speed and time in advance and call them up as needed for immediate use, in case to operate the device under various conditions.

1. Touch the [PROG] button twice.
   ▶ 'SAVE' is turned on the display window.

2. Set the program number to indicate where you want to save it, then touch [ENTER].
   ▶ Touch [ENTER] The program you set with the saved phrase displays which is saved for the last time.
   ▶ Save up to 100 programs.
   ▶ Not touching the number button for 15 seconds will clear the setting.



3. Touch the [ENTER] button to complete the saving.

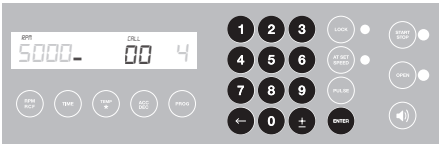
Program Recalling

Program recalling can call saved programs between 00 and 99

1. Touch [PROG] button once.

▶ 'Call' is shown in the display window.

2. Touch [ENTER] and enter the program number to be called.
   ▶ Touch [ENTER] → program recall
   ▶ The display shows the set values (speed, time, temperature, value / decrease, etc) of the called program.



▶Not touching the number button for 15 seconds will clear the setting.

3. To make correction, touch [←] button and re-input the values.

4-9. Set Key Lock/Unlock

During operation, the speed / time / temperature / acc / dec set value can be adjusted.
The Key Lock function is to prevent such adjustments while operation.

Key Unlock (Change the set value during operation)

1. To change the set value during operation, press the appropriate mode button and enter the desired set value.

▶ Speed / time / temperature / acc / dec setting can be adjusted during operation.

▶ The changed time set does not reflect the initial time set value.

Key Lock (Lockdown Mode)

1. Press the [KEY LOCK] button to prevent set value changes during operation.

▶Touch [KEY LOCK] Set lockdown mode.

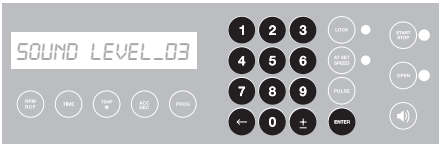
▶Touch [KEY LOCK] at lock mode to clear lock mode with the unlock statement shown on the display

4-10. Setting sound volume

Adjust the sound of the end of the action from 0 to 10 (0: mute).

1. Touch [Sound]
▶Touch [sound] → Display shows SOUND LEVEL

2. Touch [Enter], input set value to adjust volume
▶Touch [Enter] → save sound volume set
▶Sound Volume → 0 ~ 10 (0: mute)

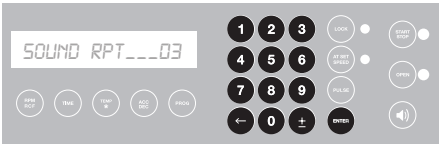


4-11. Setting the End Alarm Repeat Count

Adjust the number of end alarms up to 99 times (0~99, 0: no alarm)

1. Touch [AT SET SPEED] button for more than 2 seconds.
▶'Sound RPT' appears on the display window

2. To adjust the number of end alarms, enter the set value using the number plate and touch [Enter]
▶Touch [Enter] → Save number of end alarm.
▶ Number of end alarm → 0~99
(0: no alarm, 99: 99 times)



4-12. Emergency Lid-Lock Release

The following is the procedure to remove samples when the lid cannot be opened automatically due to no power to the main body

1. Make sure the inner rotor is completely stationary.
2. Remove the manual lid opening cap on the bottom left side and check the hole.
3. Insert the supplied Manual lid open tool(T-wrench) vertically, and turn it clockwise.

▶ Clockwise → Lid opens
▶ The lid opens manually with the sound of the gear motor.

Perform manual opening only when spinning completely stops to prevent harmful damage to the samples and operators.
After manually opening the lid, it is recommended to not close it until normal electricity is restored.

5. Maintenance

5-1. Outer part of Instrument

1. Clean the outside of the instrument with dry soft cloth. If necessary, dip the cloth in neutral detergent and clean contaminated area. Keep completely dry after cleaning.
2. Do not use any volatile chemicals such as alcohol and benzene, etc.
3. Be careful not to make scratches on the surface of the instrument.

✓ The scratches can cause corrosion on the surface of the instrument.

✓ If any rust appears, clean it with neutral detergents and keep dry.

5-2. Chamber

1. Keep dry inside the chamber after every use.
2. If the chamber is contaminated, dip the cloth in neutral detergent and clean contaminated area.

5-3. Shaft

1. Always make special attention to clean the motor shaft to avoid any imbalance problem due to the contaminants.
2. After using the instrument, take out the rotor from the shaft, and clean the shaft with dry soft cloth to keep dry.
3. Do not remove the rotor by force unless it is removed from the axis of rotation and contact service center

5-4. Rotor

1. If any parts are contaminated with samples, clean the rotor with soft wet cloth and keep the rotor dry.
2. Be careful not to make scratches inside or on the surface of rotors. Any small scratches can cause corrosion of the rotor and big damage to the instrument.
3. If you do not use the instrument, keep the rotor separately from the motor shaft and place it upside down.

6. Trouble Shooting

6-1. Check List

If there is something wrong with the centrifuge, check the following before referring it to the service center.

Symptom	Check List
Power failure	Connect the AC Power cord and make sure that the line is completely connected between the instrument and power outlet. Check if the power switch is turned on. (Refer to 3-2. Power On/Off and Lid Release)
Cannot start the instrument	If the lid is not closed completely, the instrument can't run. Check the Lid LED on the display window and close the lid completely.
Cannot open the lid	If the power is out, check the main fuse for the laboratory power supply. If it is not solved shortly, open the lid with emergency lid-lock release tool manually for safety of samples. (Refer to 4-12. Emergency Lid-Lock Release)
Cannot close the lid	Remove the dirt at the lid latch and then close the lid completely again. If the lid seems not closing by mechanical reason, please contact our service team.
Noise and vibration during running	Check that both the table and the instrument are balanced.
	Re-check the coupling status of the following to minimize noise 1. the rotor coupled into the motor shaft, well-balanced 2. the Rotor Locking Nut fixed completely 3. the Rotor Lid matched with the rotor correctly (Refer to 3-4. Rotor insert and removal)
	Check balances of samples in the rotor. (Refer to 3-5. Loading Sample Tubes) and load samples with identical weight and symmetry.

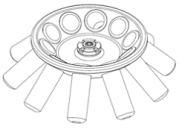
6-2. Error Code

If the instrument shows the error code with beeping sound, press [START/STOP] button to stop the beeping sound and press [ENTER] button to release of the error status and make the instrument go to the default setting again. If the problem persists after taking the following measures, please contact the service center.

Error Code	Reason of Error	Recommended Action
E1	Motor error	Look into the lid window and check the rotor.
E2	Lid open	Make sure the lid is cloased.
E3	Motor overheating	1) Check if the ventilation hole is blocked by any objects. 2) remove all the device that projects heat nearby. 3) Turn Off the device, open the lid and let it cool down (1Hr).
E4	Low Voltage	1) Check power input 2) If the power input is below 10%, AVR is needed to provide correct input of voltage.
E5	High Voltage	1) Check power input 2) If the power input is over 10%, AVR is needed to provide correct input of voltage.
E6	Overspeed	Stop and turn off the device and replug the power cord.
E7	Firmware program	Stop and turn off the device and replug the power cord, restart.
E8	Imbalance	1) Check if samples in the rotor is symmetrical. 2) Make sure the table is leveled out. 3) Remove the rotor from the device and check for foreign substances of bending of motor spindle. 4) : Check for tube or bottle deformation for a spill.
E9	RPM Sensing	1) Look into the lid window and check if the rotor is spinning. 2) Rotate the rotor with and and check display RPM.
E11	Chamber Temperature	Stop and turn off the device and clean the temp sensor.
E12	Chamber Temperature	Stop and turn off the device and clean the temp sensor. And restart
E15	Motor Temp. sensor	Restart the device
E16	Compressor Temp. sensor error	Restart the device
E17	Main-Display-I/O board connection error	Restart the device
E20~27	Lid error	Restart the device

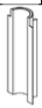
7. Rotors and accesories

Angle Rotor, **A-50-10**

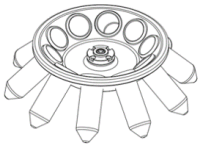


Capacity : 10 x 50 mL or 50 mL Conical
Max. RPM / RCF : 5,000 / 3,983
Hole angle rotation : ∠ 45°
Hole dimension (Ø x L,mm) : 32.2 x 13.5
Rotor material : Aluminum alloy, anodized, autoclavable

50 mL Sleeve, **B50(A50)**
Capacity : 50 mL
Max. RMP / RCF : 5,000 / 3,983
Hole dimension (Ø x L,mm) : 30 x 99
Hole bottom type : Flat bottom with rubber pad
Max. height for tube fit (mm) : 130
Supplied with 3.5 mm thick NBR pad

Tube					
Tube capacity (mL)	14 mL	15	15 mL conical	25mL conical	
Tube Dimension (Φ x L,mm)	15.7 x 96	16 x 120	17 x 120	28.8 x 83	28.8 x 78.5
Adapter					
Cat No.	TR14(50)	TR15(50)		TR25c(50)	
Adaptor hole dimension (Φ x L,mm)	17.2 x 75	17.2 x 87		27.1 x 14.1	
Adaptor hole bottom type	Round	Open		Conical	
Max. radius (mm)*	141.9			115	
Max. RCF (g-force)*	3,966			3,214	
Tube					
Tube capacity (mL)	30	50	50 mL conical	50 mL conical(Skirt)	50
Tube Dimension (Φ x L,mm)	25.7 x 101.4	29 x 108	29.5 x 118	29.5 x 118	29 x 108
Adapter				None	None
Cat No.	TR30(50)	TR50(50)	TR50c(50)	-	-
Adaptor hole dimension (Φ x L,mm)	26 x 86.5	29.5 x 14	29.5 x 17.5	-	-
Adaptor hole bottom type	Round	Round	Conical	-	-
Max. radius (mm)*	135	135.5	142.5		
Max. RCF (g-force)*	3,773	3,787	3,983		

Angle Rotor, **A-50c-10**



Capacity : 10 x 50 mL or 50 mL Conical
Max. RPM / RCF : 5,000 / 3,913
Hole angle rotation : ∠ 45°
Hole dimension (Ø x L,mm) : 32.2 x 13.5
Rotor material : Aluminum alloy, anodized, autoclavable

50 mL Sleeve, **B50(A50c)**
Capacity : 50 mL
Max. RPM / RCF : 5,000 / 3,913
Hole dimension (Ø x L,mm) : 31 x 99
Hole bottom type : Conical
Max. height for tube fit (mm) : 130

Tube						
Tube capacity (mL)	15 mL conical	25mL conical		30	50	50 mL conical
Tube Dimension (Φ x L,mm)	17 x 120	28.8x83	28.8x78.5	25.7 x 101.4	29 x 108	29.5 x 118
Adapter						None
Cat No.	TR15c(50c)	TR25c(50c)		TR30(50c)	TR50(50c)	-
Adaptor hole dimension (Φ x L,mm)	17 x 105	27.1x14.1		26x83.8	27.9 x 11	-
Adaptor hole bottom type	Conical	Conical		Round	Round	-
Max. radius (mm)*	139.6	115		135.5	136.1	140
Max. RCF (g-force)*	3,902	3,214		3,787	3,804	3,913

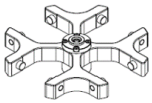
Angle Rotor, **A-15-24**

Capacity : 24 x 15 mL (12 outer, 12 inner)
Max. RPM / RCF : 4,500 / 3,509
Hole angle rotation : ∠ 45°
Hole dimension (Ø x L,mm) : 20.4 x 10

15 mL Sleeve, **B15/10**
Capacity : 15 mL
Max. RPM / RCF : 4,500 / 3,509
Hole dimension (Ø x L,mm) : 18 x 87
Hole bottom type : Flat bottom with rubber pad
Max. height for tube fit (mm) : 125(120 for conical / wider cap)
Supplied with 4.0 mm thick NBR pad

	Inner							
Tube								
Tube capacity (mL)	2.0~4 mL VT	4~7 mL VT	5 mL conical		14 mL	8~10 mL VT	15	15 mL conical
Tube Dimension (Φ x L,mm)	13 x 75	13 x 100	16 x 59	16 x 67	15.7 x 96	16 x 100	16 x 120	17 x 120
Adapter						None	None	None
Cat No.	TR3(15)	TR5(15)	TR5c(15)		TR14(15)	-	-	-
Adaptor hole dimension (Φ x L,mm)	13.5 x 61	13.5x85	14 x 20		16.5 x 7	-	-	-
Adaptor hole bottom type	Round	Open	Conical		Round	-	-	-
Max. radius (mm)*	116.3	136.8	105.3		126.5	138		
Max. RCF (g-force)*	2,633	3,097	2,384		2,864	3,124		
	Outer							
Tube								
Tube capacity (mL)	2.0~4 mL VT	4~7 mL VT	5 mL conical		14 mL	8~10 mL VT	15	15 mL conical
Tube Dimension (Φ x L,mm)	13 x 75	13 x 100	16 x 59	16 x 67	15.7 x 96	16 x 100	16 x 120	17 x 120
Adapter						None	None	None
Cat No.	TR3(15)	TR5(15)	TR5c(15)		TR14(15)	-	-	-
Adaptor hole dimension (Φ x L,mm)	13.5 x 61	13.5x85	14 x 20		16.5 x 7	-	-	-
Adaptor hole bottom type	Round	Open	Conical		Round	-	-	-
Max. radius (mm)*	132.3	152.8	121.3		142.5	155		
Max. RCF (g-force)*	2,995	3,459	2,746		3,226	3,509		

Swing Rotor, **S-100-4**

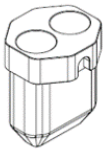


4 loadings
Max. RPM : 4,500
Angle from axis during rotation: ∠ 90°
Rotor dimension / weight (Ø x L,mm / g) : 206.3 x 46 / 810

100 mL Bucket with a Cap, BB100bs
Max. RPM / RCF with S-100-4 : 4,500 / 3,511
Max. Radius (mm) with S-100-4 : 155.1
Hole dimension (Ø x L,mm) : 47 x 99
Max. height for tube fit (mm) : 120(w/ cap) / 130(w/o cap)
Hole bottom type : Flat
Supplied with a cap and an O-ring

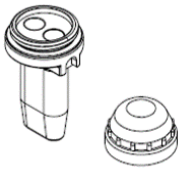
Tube									
Tube capacity (mL)	1.5~2.0	2.0mL (cap)	5 mL conical		2.6~7	4~10	15	15 mL conical	15 mL conical
Tube Dimension (Φ x L,mm)	11 x 38	10.1x46	16 x 59	16 x 67	13 x 75	16 x 100	16 x 120	17 x 120	17 x 120
Adapter									
Cat No.	TR2-6(100)		TR5c-3(100)		TR7-5(100)	TR10-5(100)	TR15-3(100)	TR15c-3(100)	TR15c(100)
Adaptor hole dimension (Φ x L,mm)	11 x 39		17.2 x 52		13.5 x 60	16 x 60	17.5 x 105	17.2 x 106.5	17.2 x 106.5
Adaptor hole bottom type	Round		Conical		Flat			Conical	
Max. height tube fit (mm)	115		75		115		120		
Max. radius (mm)*	150.1		110.1		150.1		152.1	155.1	
Max. RCF (g-force)*	3,398		2,493		3,398		3,443	3,511	

Tube								
Tube capacity (mL)	25mL conical		30	50	50 mL conical	50 mL conical(Skirt)	85	100
Tube Dimension (Φ x L,mm)	28.8 x 83	28.8 x 78.5	25.7 x 101.4	29 x 108	29.5 x 118	29.5 x 118	38 x 106	44 x 115
Adapter								
Cat No.	TR25c(100)		TR30(100)	TR50(100)	TR50c(100)	TR50sc(100)	TR85(100)	TR100(100)
Adaptor hole dimension (Φ x L,mm)	17.2x52		26x86	29.5 x 95.9	30 x 100	29.8x100	38.5 x 96.4	44.2 x 93
Adaptor hole bottom type	Conical		Round		Conical	Flat	Round	
Max. height tube fit (mm)	118				120		118	
Max. radius (mm)*	153.5		153				153.5	150.1
Max. RCF (g-force)*	3,475		3,464				3,475	3,398



50 mL Conical Bucket, Bd50c
Max. RPM / RCF with S-100-4 : 4,500 / 3,511
Max. Radius (mm) with S-100-4 : 155.1
Hole dimension (Ø x L, mm) : 30 x 89
Max. height for tube fit (mm) : 125
Hole bottom type : Conical

Tube						
Tube capacity (mL)	15 mL conical	25mL conical		30	50	50 mL conical
Tube Dimension (Φ x L,mm)	17 x 120	28.8 x 83	28.8 x 78.5	25.7 x 101.4	29 x 108	29.5 x 118
Adapter						None
Cat No.	TR15c(50c)	TR25c(50c)		TR30(50c)	TR50(50c)	-
Adaptor hole dimension (Φ x L,mm)	17 x 105	27.1 x 14.1		26 x 83.8	27.9 x 11	-
Adaptor hole bottom type	Conical	Conical		Round		-
Max. radius (mm)*	152.5	118.5		143.9	144.1	155.1
Max. RCF (g-force)*	3,453	2,683		3,258	3,262	3,511



15 mL Dual Conical Bucket with a Cap, BBd15cd
Max. RPM / RCF with SO-100-4 : 4,500 / 3,511
Max. Radius (mm) with SO-100-4 : 155.1
Hole dimension (Ø x L,mm) : 17 x 97.5
Max. height for tube fit (mm) : 120 (w/ cap) / 125 (w/o cap)
Hole bottom type : Conical
Supplied with a cap and O-ring

Tube				
Tube capacity (mL)	5 mL conical		14 mL	15 mL conical
Tube Dimension (Φ x L,mm)	16 x 59	16 x 67	15.7 x 96	17 x 120
Adapter				None
Cat No.	TR5c(15c)		TR14(15c)	-
Adaptor hole dimension (Φ x L,mm)	14.8 x 20		16 x 7.8	-
Adaptor hole bottom type	Conical		Round	-
Max. radius (mm)*	102		115.1	155.1
Max. RCF (g-force)*	2,309		2,606	3,511

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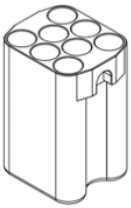
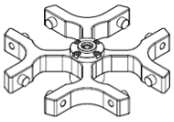


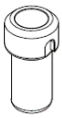
15 mL Bucket, B15-8
Max. RPM / RCF with SO-100-4 : 4,500 / 3,441
Max. Radius (mm) with SO-100-4 : 152
Hole dimension (Ø x L,mm) : 17 x 86
Hole bottom type : Flat
Max. height for tube fit (mm) : 115
Supplied with 3.0 mm thick NBR rubber pad

Tube					
Tube capacity (mL)	2.0~4 mL VT	4~7 mL VT	5 mL conical	5 mL conical	14 mL
Tube Dimension (Φ x L,mm)	13 x 75	13 x 100	16 x 59	16 x 67	15.7 x 96
Adapter					
Cat No.	TR3(15)	TR5(15)	TR5c(15)		TR14(15)
Adaptor hole dimension (Φ x L,mm)	13.5 x 61	13.5 x 85	14 x 20		16.5 x 7
Adaptor hole bottom type	Round	Open	Conical		Round
Max. height tube fit (mm)	88	115	75		103.5
Max. radius (mm)*	125	156.6	112		140.5
Max. RCF (g-force)*	2,830	3,545	2,536		3,181
Tube					
Tube capacity (mL)	8~10 mL VT	15 mL glass	15 mL open top	15	
Tube Dimension (Φ x L,mm)	16 x 100	16 x 100	16 x 114	16 x 120	
Adapter	None	None	None	None	
Cat No.	-	-	-	-	
Adaptor hole dimension (Φ x L,mm)	-	-	-	-	
Adaptor hole bottom type	-	-	-	-	
Max. height tube fit (mm)	115			125 (center)	
Max. radius (mm)*	152				
Max. RCF (g-force)*	3,441				

Swing Rotor, **S-50-4**



4 loadings
Max. ROM : 5,000
Angle from axis during rotation: ∠ 90°
Rotor dimension / weight (Ø x L, mm / g) : 206.3 x 46 / 800



50 mL Bucket, B50
Max. RPM / RCF with S-50-4 : 5,000 / 4,218
Max. Radius (mm) with S-50-4 : 150.9
Hole dimension (Ø x L,mm) : 30.5 x 91
Max. height for tube fit (mm) : 125
Hole bottom type : Flat
Supplied with 4.0 mm thick NBR pad

Tube					
Tube capacity (mL)	14 mL	15	15 mL conical	25mL conical	
Tube Dimension (Φ x L,mm)	15.7 x 96	16 x 120	17 x 120	28.8 x 83	28.8 x 78.5
Adapter					
Cat No.	TR14(50)	TR15(50)		TR25c(50)	
Adaptor hole dimension (Φ x L,mm)	17.2 x 75	17.2 x 87		27.1 x 14.1	
Adaptor hole bottom type	Open	Open		Conical	
Max. radius (mm)*	150.9			118.6	
Max. RCF (g-force)*	4,218			3,315	
Tube					
Tube Dimension (Φ x L,mm)	25.7 x 101.4	29 x 108	29.5 x 118	29.5 x 118	29 x 108
Adapter				None	None
Cat No.	TR30(50)	TR50(50)	TR50c(50)	-	-
Adaptor hole dimension (Φ x L,mm)	26 x 86.5	29.5 x 14	29.5 x 17.5	-	-
Adaptor hole bottom type	Round	Round	Conical	-	-
Max. radius (mm)*	143.6		150.9		
Max. RCF (g-force)*	4,014		2,700		

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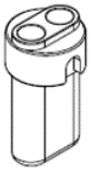
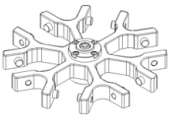
Tube						
Tube capacity (mL)	15 mL conical	25mL conical		30	50	50 mL conical
Tube Dimension (Φ x L,mm)	17 x 120	28.8 x 83	28.8 x 78.5	25.7 x 101.4	29 x 108	29.5 x 118
Adapter						None
Cat No.	TR15c(50c)	TR25c(50c)		TR30(50c)	TR50(50c)	-
Adaptor hole dimension (Φ x L,mm)	17 x 105	27.1 x 14.1		26 x 83.8	27.9 x 11	-
Adaptor hole bottom type	Conical	Conical		Round		-
Max. radius (mm)*	150.9	119.9		145.3	145.5	150.9
Max. RCF (g-force)*	4,218	3,351		4,061	4,067	4,218



15 mL Dual Conical Bucket, Bd15c
Max. RPM / RCF with S-50-4 : 5,000 / 4,218
Max. Radius (mm) with -S-50-4 : 150.9
Hole dimension (Ø x L,mm) : 17 x 91.5
Max. height for tube fit (mm) : 120
Hole bottom type : Conical

Tube				
Tube capacity (mL)	5 mL conical		14 mL	15 mL conical
Tube Dimension (Φ x L,mm)	16 x 59	16 x 67	15.7 x 96	17 x 120
Adapter				None
Cat No.	TR5c(15c)		TR14(15c)	-
Adaptor hole dimension (Φ x L,mm)	14.8 x 20		16 x 7.8	-
Adaptor hole bottom type	Conical		Round	-
Max. radius (mm)*	98.6		131.6	150.9
Max. RCF (g-force)*	2,756		3,678	4,218

Swing Rotor, **S-15-6**

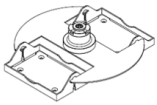


6 loadings
Max. RPM : 4,400
Angle from axis during rotation: ∠ 90°
Rotor dimension / weight (Ø x L,mm / g) : 198.2 x 44 / 573

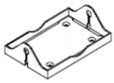
15 mL Dual Round Bucket, Bd15
Max. RPM / RCF with S-15-6 : 4,400 / 3,312
Max. Radius (mm) with S-15-6 : 153
Hole dimension (Ø x L,mm) : 17 x 88
Max. height for tube fit (mm) : 122
Hole bottom type : Flat with rubber pad
Supplied with 3.0 mm thick NBR rubber pad

Tube					
Tube capacity (mL)	2.0~4 mL VT	4~7 mL VT	8~10 mL VT	15 mL glass	15 mL open top
Tube Dimension (Φx L,mm)	13 x 75	13 x 100	16 x 100	16 x 100	16 x 114
Adapter			None	None	None
Cat No.	TR3(15)	TR5(15)	-	-	
Adaptor hole dimension (Φx L,mm)	13.5 x 61	13.5 x 85	-	-	
Adaptor hole bottom type	Round	Open	-	-	
Max. height tube fit (mm)	95	123			
Max. radius (mm)*	126	153			
Max. RCF (g-force)*	2,727	3,312			

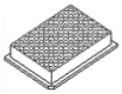
Swing Rotor, **S-mw-2**



2 loadings
Max. RPM : 4,000
Angle from axis during rotation: ∠ 90°
Rotor dimension / weight (Ø x L, mm / g) : 240 x 46 / 546



Microplate Bucket, P-mw
Max. RPM / RCF with S-mw-2 : 4,000 / 2,000
Max. Radius (mm) with S-mw-2 : 111.8
Hole dimension (w x d ,mm) : 86.5 x 128.5
Max. height for tube fit (mm) : 35
Hole bottom type : Flat bottom with ABS pad
Supplied with 3.0 mm thick ABS pad

Tube	
Tube capacity (mL)	MTP
Tube Dimension (Φx L,mm)	86 x 128 x15
Bucket capacity(ea / 2)	2/4

8. Declaration of Conformity

hanil

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	**Centrifuge**
Model Name	T05R

Relevant Directives/ Harmonised Standards

Machinery	2006/42/EC	as last amended	EN ISO 12100:2010
Low Voltage	2014/35/EU	as last amended	EN 61010-1:2010/A1:2019 EN 61010-2-020:2017
EMC	2014/30/EU	as last amended	EN 61326-1:2013 EN 55011:2016
RoHS	2011/65/EU	as last amended	EN IEC 63000:2018

Additional applied standards IEC 61010-1:2010/A1:2016, IEC 61010-2-020:2016
IEC 61326-1:2012, CISPR 11:2015/A1:2016/A2:2019

Test Report. Ref.

ACTS-2020-SC-256
KES-EM-21T0114
RT22R-S0951

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May 26, 2022

Yongjoo Kim / CEO

Doc No.: DOC-T05R(Rev.0)

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MEMO

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