HITACHI

HITACHI PREPARATIVE ULTRACENTRIFUGE

CP100WX／90WX／80WX
INSTRUCTION MANUAL

—Important—

Before using this CENTRIFUGE carefully read through this INSTRUCTION MANUAL to ensure efficient, safe operation.
Keep this INSTRUCTION MANUAL available as an important reference when using the CENTRIFUGE.

MFG.No.	CAT.No.	Manual code
		S99978101

●The appearance or specification of the products covered in this manual is subject to partial change for improvement.

Hitachi Koki

General description

The CP-WX Series is a series of products that pursue user-friendliness and reliability based on our many years of experience in developping centrifuges. This series offers many new features that we are confident of satisfying your requirements. These features include the following.

1. Maximum speed is 100,000 rpm(803,000 x g).(CP100WX)
2. When using RLM rotors, the rotor life time is automatically managed by the rotor life management (RLM) feature of the ultracentrifuge, so keeping log book is not necessary. the rotor life time can be extended by running the rotor at lower speeds.
3. Display panel with easy-to-see color liquid crystal screen and touch panel are incorporated.
4. The displayed language can be switched over between Japanese and English.
5. Control panel is simple with easy key operation.
6. The real time-time control feature enables setting a start time or finish time, thus letting you run your machine at desired date and time.
7. Centrifugal force (RCFmax and RCFavg) can be displayed and set(Note1).
8. Twenty varieties of nine stepped mode can be programmed for a wide range of applications such as step running.
9. Various alarm indication can notify users of the causes and necessary actions of the troubles.It can realize troubleshooting easier and quicker.
10. Space saving design. The installation area required is 0.81m^2(900X900mm). Lower top deck makes it easy to install and remove the rotor.
11. These products spin very quietly, and are thus well suited for personal use.
12. Samples can be easily balanced visually.
13. A CFC-free thermomodule cooling system is employed featuring a powerful cooling capacity.
14. In addition to door lock and an imbalance detector, two independent microproccessors are incorporated for overspeed detection (a dual CPU overspeed prevention mechanism) for even greater safety.
15. By installing the optional absorption (AB)scaner(special accessory ABS8), the ultracentrifuge can be used for analytical purposes.Automatic data recording and analysis can be done routinely.

Note1:RCF:Relative Centrifugal Force

⚠ SAFETY NOTICES

⚠ Safety reminders

Carefully read and fully understand the following safety instructions.

- Operate your instrument according to the instruction manual.
- Be sure to observe the all safety precautions in the instruction manual and safety instructions on your instrument. If neglected, personal injury and/or instrument damage can be caused.
- The safety reminders are indicated as shown below. The signal words "DANGER", "WARNING" and "CAUTION" are indicated together with the hazard alert symbols in this manual.

⚠ **DANGER :** This note indicates an imminently hazardous situation, which if not strictly observed, could result in personal severe injury or possible death.

⚠ **WARNING :** This note indicates a potentially hazardous situation, which if not strictly observed, could result in personal severe injury or possible death.

⚠ **CAUTION :** This note indicates a potentially hazardous situation, which if not strictly observed, could result in personal injury or severe damage to the instrument.

This hazard alert symbol indicated together with a signal word is a reminder to emphasize important safety instructions.

"NOTE" indicates a note which has no direct bearing on personal safety.

- Do not perform any operation not specified in the instruction manual. If any problem is found on your instrument, contact Hitachi Koki authorized sales/service representative.
- Although the safety precautions in the instruction manual and safety instructions on your instrument have been fully considered, an unexpected situation may arise. Observe the instructions in the instruction manual and always be careful yourself when operating this instrument.

⚠ SAFETY NOTICES

○Mechanical Safety

⚠ **WARNING**:

- Do not open the door while the rotor is spinning.
- Do not attempt to slow or stop the spinning rotor by hand.
- Do not incline or move the instrument while the rotor is spinning. Do not place any object on the instrument or lean on the instrument.
- Do not attempt to unlock the door forcefully while the rotor is spinning.
- For operator safety, maintain a 30-cm "clearance envelope" around the instrument while the rotor is spinning. Do not store dangerous substances capable of developing flammable or explosive vapors in the clearance envelope.
- Unauthorized repairs, disassembly, and other services to the centrifuge except by Hitachi Koki authorized sales/service representative are strictly prohibited.
- Do not use the other's manufacturer's rotor without Hitachi Koki's permission.
- Check the chemical resistance chart attached to the rotor, and do not use any sample inapplicable to the rotor (including buckets). Using such a sample could corrode the rotor (including buckets).
- Do not exceed the maximum rated speed of the rotor or buckets in use.
- Do not use corroded, scratched or cracked rotor, buckets and assemblies. Check that the rotor, buckets and assemblies are free of such abnormalities before operation.
- When using a swing rotor, check that the buckets are properly engaged with the rotor pins before operation. Wrong setting can cause severe damage to the instrument. Be sure to set all the buckets of the same type
- If abnormal sound or vibration occurs, stop the operation immediately and contact Hitachi Koki authorized sales/service representative.

⚠ **CAUTION**:

- Be sure to remove the rotor from the rotor chamber when centrifuge is not used for a long time or when the machine is moved. Otherwise the drive shaft(crown) may be damaged.
- Before using a rotor, be sure to read through the rotor instruction manual.
- Check the chemical resistance chart attached to the rotor, and do not use any sample inapplicable to the tubes, the bottles, or tube / bottle caps, etc. Using such a sample could corrode or deteriorate them.
- Use the rotor tubes and bottles within their actual capacities.
- Mount the rotor onto the drive shaft gently and properly.
- Do not drop the rotor or apply excessive force to the drive shaft to avoid damage to the drive shaft.
- Install the rotor carefully and securely on the drive shaft(crown) in the rotor chamber. Always place the rotor pin in the drive hole(crown hole) apart from the crown pin.
- Maximum rotor speed depends on the tubes or adapters to be used. Follow the instructions on the rotor instruction manual.
- Approximately even quantities of sample in the tubes are sufficient for balancing, and extremely different sample quantities must be avoided.(The levels of samples in the tubes should be approximately equal. Their difference should be within 5mm.)
- Clean the inside of the drive hole (crown hole) of the rotor and the surface of the drive shaft (crown) of the centrifuge once a month.
- Storing the rotor on the shelf is permitted if the shelf is taken necessary countermeasures against earthquakes not to drop the rotor.

⚠ SAFETY NOTICES

⚠ **CAUTION**:
- Do not pour any solution such as water, detergent and disinfectant directly into the rotor chamber. Otherwise, the bearings of the drive unit may be corroded or deteriorated.
- Use the log book to manage the life of the rotor with optical adapter.
- It is important to manage the life of the rotor. The life of each rotor is specific and dependent upon the frequency and the total running time.Do not use roors whose lives have expired. If used, the machine can be seriously damaged (Follow the rotor instruction manual.).
- Do not remove the RLM adapter or optical adapter/disk from rotor, or replace it with the adapter/disk for another rotor. The adapter/disk is a critical component that detects the over-speed of rotor : If an adapter/disk that is compatible with the rotor is attached, the rotor could break, resulting in damage to the ultracentrifuge.
- For details of the Zonal centrifugation, see the Zonal Rotor instruction manual.
- Do not operate the display panel and the operation keys using a ball-point pen.

○Safety during installation and maintenance

⚠ **DANGER**:
- When servicing the centrifuge, be sure to turn off the POWER switch and the main circuit breaker. Before removing covers, tables, etc. from the centrifuge, wait for at least three minutes to avoid electrical shock hazards.

⚠ **WARNING**:
- When a power failure occurs during operation, it takes 3 hours or more for the running rotor to stop completely because the rotor chamber is depressurized and has less air to stop the rotor. Be sure to leave sufficient time before opening the door of the rotor chamber.
- For maintenance and repairing of the rotors, tubes, etc., see the rotor instruction manual and the rotor, tube, bottle, and cap instruction manual.
- After installation and before any test-run, this ultracentrifuge always needs the internal check by Hitachi Koki authorized sales/service representative..
- Unauthorized repairs, disassembly, and other services to the centrifuge except by Hitachi Koki authorized sales/service representative are strictly prohibited.

⚠ **CAUTION**:
- If the centrifuge is exposed to ultraviolet rays for a long time, the color of the covers may be changed or the coating may be peeled off. After use, cover the centrifuge with a cloth to protect it from direct exposure.

○Electrical Safety

⚠ **WARNING**:
- Your centrifuge must be grounded properly to avoid electrical shock hazards.

⚠ **CAUTION**:
- Do not place containers holding liquid in the rotor chamber or on or near the instrument.If they spill, liquid may get into the instrument and damage electrical components.
- If the machine will not be used for a long time, turn off the main circuit breaker.

⚠ SAFETY NOTICES

○Safety against Risk of Fire

⚠ **WARNING**: • This instrument is not designed for use with materials capable of developing flammable or explosive vapors. Do not centrifuge such materials in this instrument nor handle or store them near the instrument.

○Chemical and Biological Safety

⚠ **WARNING**: • Make sure to prepare necessary safety measures before using samples that are toxic or radioactive samples or pathogenic or infectious blood samples at your own responsibility.

• If the centrifuge, rotor or the accessory is contaminated by toxic or radioactive samples or pathogenic or infectious blood samples, be sure to decontaminate it according to good laboratory procedures and methods.

• If there is a fear that the centrifuge, rotor or the accessory is contaminated by toxic or radioactive samples or pathogenic or infectious blood samples that impair human health,it is your responsibility to sterilize or decontaminate the centrifuge, rotor or the accessory properly before requesting repairs to Hitachi Koki authorized sales/service representative.

• It is your responsibility to sterilize or decontaminate the centrifuge, rotor or the accessory properly before returning to Hitachi Koki authorized sales/service representative.

Notice for an Earthquake

An abnormality may be found on the centrifuge depending on the magnitude of an earthquake.
If any abnormality is found, stop using the centrifuge immediately and ask for inspection by the Hitachi Koki service representative.

⚠ SAFETY NOTICES

⚠ Precation Indications in This Manual

The followings informations indicate the precaution indications and the chapters/sections which mention them in this manual.

1.Indication of ⚠ DANGER

When servicing the centrifuge, be sure to turn off the POWER switch and the main circuit breaker. Before removing covers,tables, etc. from the centrifuge, wait for at least three minutes to avoid electrical shock hazards.(Section3-7, Chapter4, Chapter5, and Chapter6)

2.Indication of ⚠ WARNING

Do not remove the RLM adapter or optical adapter/disk from rotor, or replace it with the adapter/disk for another rotor. The adapter/disk is a critical component that detects the over-speed of rotor : If an adapter/disk that is compatible with the rotor is attached, the rotor could break, resulting in damage to the ultracentrifuge. .(Section2-2-4)

1. This instrument is not designed for use with materials capable of developing flammable or explosive vapors. Do not centrifuge such materials in this instrument nor handle or store them near the instrument.
2. Make sure to prepare necessary safety measures before using samples that are toxic or radioactive samples or pathogenic or infectious blood samples at your own responsibility.

(Section3-1)

Do not incline or move the instrument while the rotor is spinning. Do not place any object on the instrument or lean on the instrument. (Section3-2)

1. Do not open the door while the rotor is spinning.
2. Do not attempt to slow or stop the spinning rotor by hand. (Section3-7)

Make sure that the rotor has coasted to a complete stop. When the rotor is at rest, it make no sound. So listen carefully for any sound coming from the rotor chamber.
Do not attempt to unlock the door forcefully while the rotor is spinning.
It takes 3 hours or more for the running rotor to stop completely because the rotor chamber is depressurized and has less air to stop the rotor. Be sure to leave sufficient time before opening the door of the rotor chamber. (Section3-7)

If the machine will not be used for a long time, turn off the main circuit breaker. (Section3-7)

1. Make sure to prepare necessary safety measures before using samples that are toxic or radioactive samples or pathogenic or infectious blood samples at your own responsibility.
2. If the centrifuge, rotor or the accessory is contaminated by toxic or radioactive samples or pathogenic or infectious blood samples, be sure to decontaminate it according to good laboratory procedures and methods.
3. If there is a fear that the centrifuge, rotor or the accessory is contaminated by toxic or radioactive samples or pathogenic or infectious blood samples that impair human health,it is your responsibility to sterilize or decontaminate the centrifuge, rotor or the accessory properly before requesting repairs to Hitachi Koki authorized sales/service representative.
4. It is your responsibility to sterilize or decontaminate the centrifuge, rotor or the accessory properly before returning to Hitachi Koki authorized sales/service representative.

(Chapter4 and Chapter5)

For operator safety, maintain a 30-cm "clearance envelope" around the instrument while the rotor is spinning. Do not store dangerous substances capable of developing flammable or explosive vapors in the clearance envelope. (Chapter6)

⚠ SAFETY NOTICES

3.Indication of ⚠ CAUTION

As the RLM adapter has a magnetic memory, neither place the adapter near a magnet nor scratch it. If the adapter is placed near a magnet, the memory may be erased.
To protect the memory of the RLM adapter, be sure to store the RLM rotor on the rotor stand provided. (Section2-2-4 and Section3-6-1)

Do not place containers holding liquid in the rotor chamber or on or near the instrument.If they spill, liquid may get into the instrument and damage electrical components. (Section3-1)

1. Do not operate the display panel and the operation keys using a ball-point pen.
2. If abnormal sound or vibration occurs, stop the operation immediately and contact Hitachi Koki authorized sales/service representative. (Section3-2)

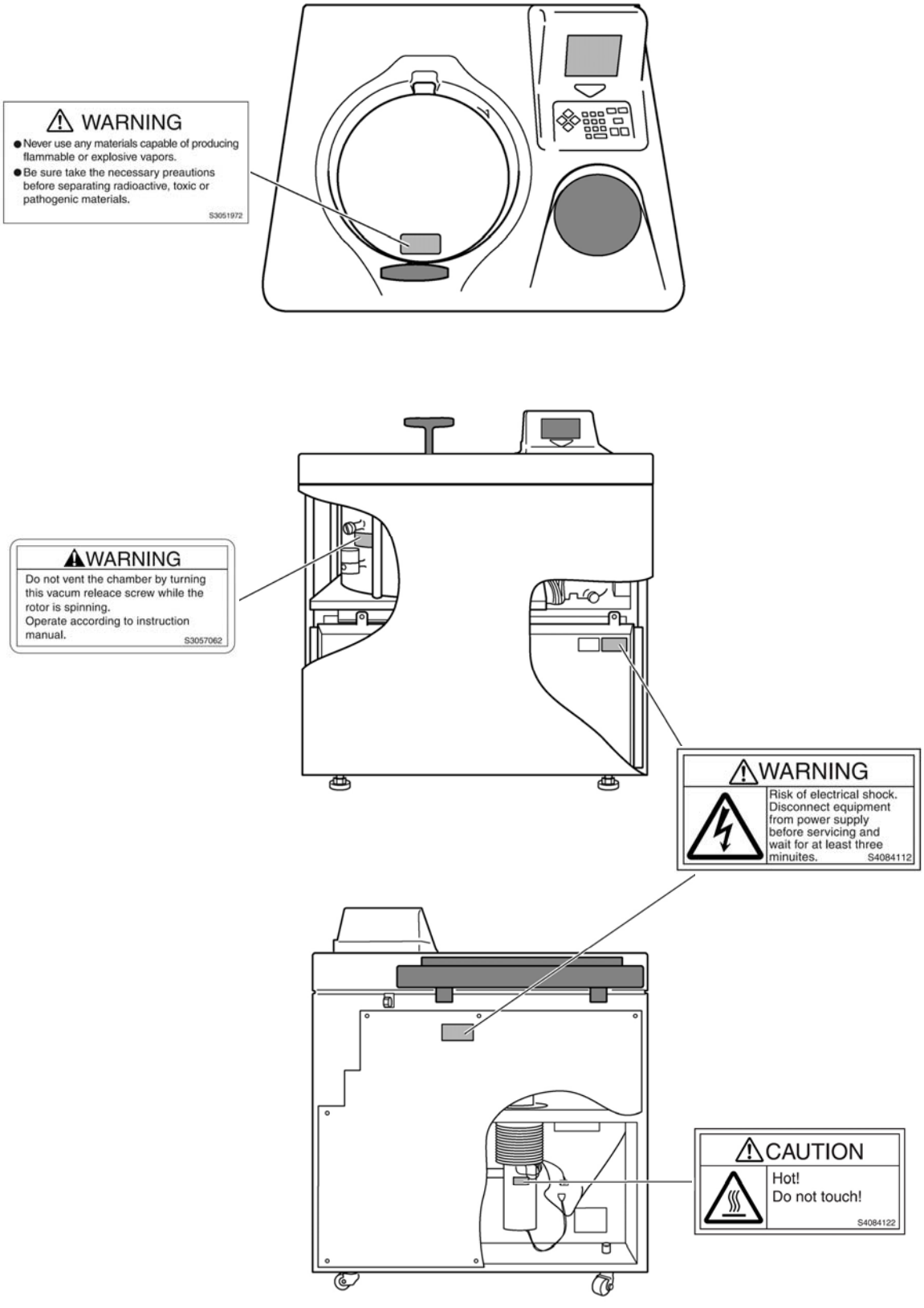
For details of the Zonal centrifugation, see the Zonal Rotor instruction manual. (Section3-3-2)

The life of rotors with optical adapters/disk is managed using a rotor log book. (Section3-6)

Do not perform any operation not specified in this manual. If any problem is found on your centrifuge, contact Hitachi Koki authorized sales/service representative.
(Section3-7, Chapter4 and Chapter5)

Be sure to remove the rotor from the rotor chamber when centrifuge is moved.
After installation and before any test-run, this ultracentrifuge always needs the internal check by Hitachi Koki authorized sales/service representative. (Chapter6)

⚠ SAFETY NOTICES



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1. Specifications

Model	CP100WX	CP90WX	CP80WX
Maximum speed	100,000rpm	90,000rpm	80,000rpm
Maximum RCF	803,000xg (P100AT2)	700,000xg (P90AT)	615,000xg (P80AT)
Speed control accuracy	±10rpm（1,000rpm to maximum speed）		
Acceleration/deceleration control	About 5 minutes from 0 to 100,000rpm or vice versa(P100AT2)		
Rotor temperature control/display accuracy	±0.5℃（set temprature is from 0℃ to 40℃）		
Set speed	1,000rpm to maximum speed in increments of 100rpm		
Vacuum system	Oil rotary vacuum pump and oil diffusion pump combined Ultimate vacuum:below 0.001Torr(0.13Pa) (This value reaches within 20 minutes after the rotor starts rotating.)		
Noise level	53dB(A scale) (measured 1m in front of the instrument at the set speed of the rotor)		
Maximum heat dissipation into room	1kW/hr		
Cooling method	Thermo-module cooling(CFC-free)		
User interaction means	Color liqiud crystal display(color-256), touch panel,and keyboard		
Interface	RS232C X 1CH		
Rotor life management	Automatic management(RLM rotor)		
Dimensions	Width:790 mm; depth:690 mm; height:1,000 mm Depth with safety cover mounted:890 mm Height to table:850 mm		
Weight	400kg		
Power requirement	Single phase 50/60 Hz 208,220 Vac+/-10 %, 20A maximum(normally 8A) 230,240 Vac+/-10 %, 16A maximum(normally 7A)		
Ambient temperature	Ambient temperature for operation : 2°C to 40°C Ambient Temperature for performance guarantee : 10°C to 30°C		

The CP100WX/90WX/80WX centrifuges are manufactured and tested according to the following regulations of EMC:

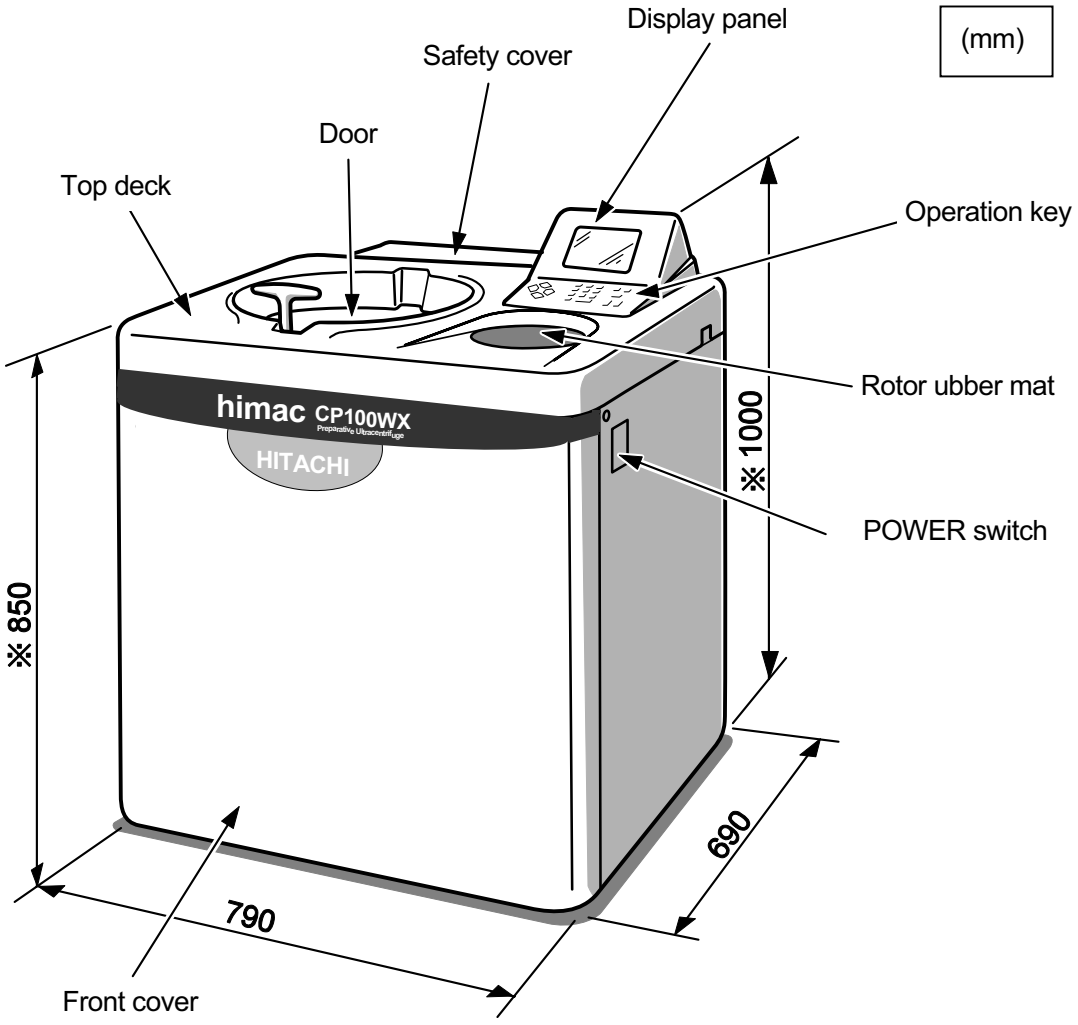
- EN61326
- EN61000-3-2
- EN61000-3-3

(*) EMC: Electromagnetic compatibility

2. Description

2-1 External view of ultracentrifuge

The CP-WX Series ultracentrifuge have the same external view, except for the model name printed on front cocer. The following is the external view of the CP100WX ultracentrifuge.



Note * This height is measured from level floor surface.

Fig.1-1 External view of CP-WX Series ultracentrifuge

2-2 Structure

2-2-1 Operation Panel

The operation panel for the CP-WX Series consists of a display panel and a keyboard
The display panel incorporates an easy-to-read color liquid display and touch panel. The display panel (field display) displays running conditions and running status(this screen is called the RunScreen), along with Programmed Run, Rotor List, and User Customizations Screens.
Fig. 2-2-1 shows the display panel, and Fig.2-2-2 represents the keyboard.

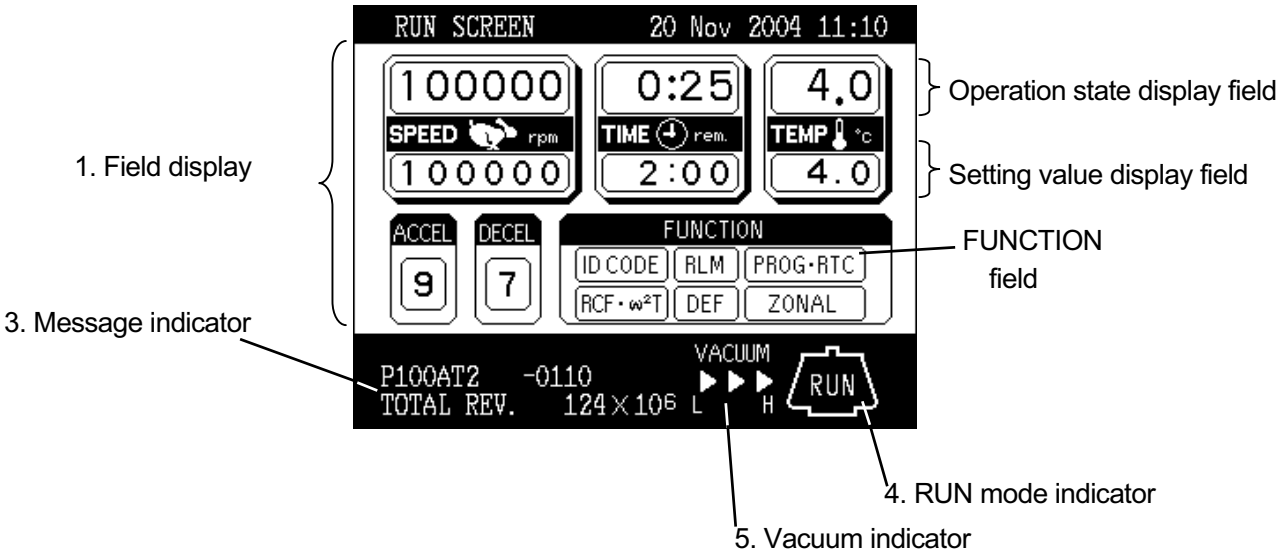


Fig. 2-2-1 Display panel

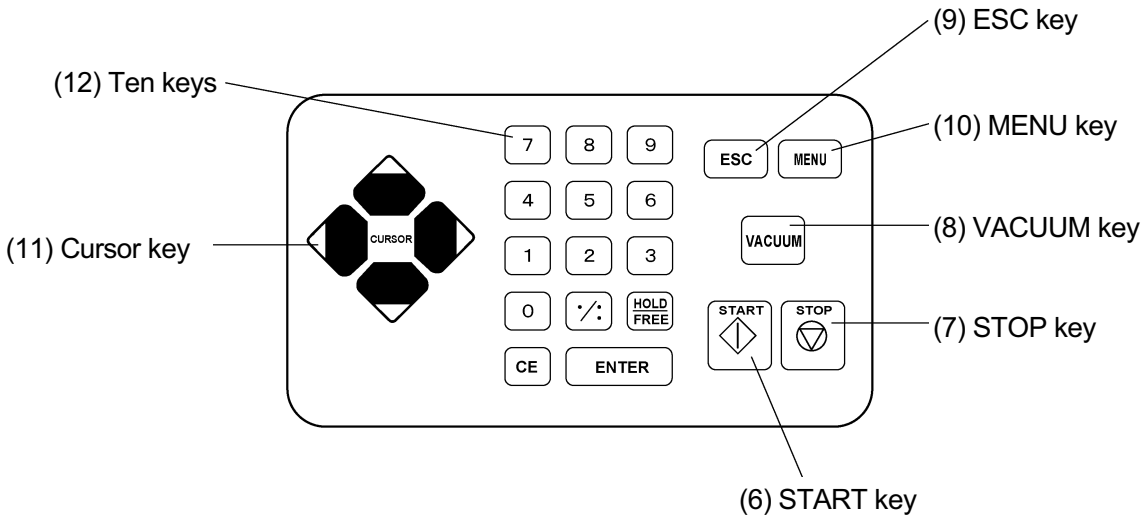
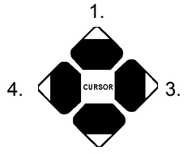
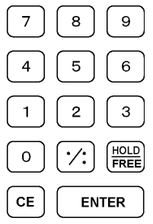


Fig. 2-2-2 Keyboard

[Functions of the display panel-keyed by item no. to fig. 2-2-1]

No.	Name and symbol	Functions and actions
(1)	Field display SPEED  TIME  TEMP	Displays various fields. The SPEED, TIME, and TEMP fields give the current status indicator in the top row and the setting indicator in the bottom row. (For setting, see Section 3-2-1.) ● SPEED (Speed indicator) (Top row) Displays speeds in increments of 10 rpm at lower than 5,000 rpm, and in steps of 100 rpm at 5,000 rpm or more. (Bottom row) Sets speeds from 1,000 to maximum speed in increments of 100 rpm. The lower two digits (one, ten positions) display zeros. ● TIME (running time indicator) (Top row) Displays the remaining operation time or the time elapsed during operation if settings are performed on the User Customization screen. If the running time is set to HOLD , this field displays time elapsed. (Bottom row) Specifies a setting in the range from 1 minute to 99 hours 59 minutes in steps of minutes and hours. ● TEMP ((temperature indicator) (Top row) Displays in steps of 0.1 °C. (Bottom row) Sets a setting in the range from 0 °C to 40 °C in increments of 0.1 °C ● ACCEL (acceleration mode indicator) Displays acceleration modes 1 through 9. ● DECEL (deceleration mode indicator) Displays deceleration modes 1 through 9, along with free coast (F).
(2)	Function Field	● ID CODE Sets an ID code. ● RLM Switches to the Rotor Management screen. ● PROG・RTC Sets, recalls programmed runs or sets the time and the end time for a programmed run. ● RCF・ω^2T Sets and displays the centrifugal force or sets an ω^2T. ● DEF Sets and resets the defrost function. ● ZONAL Sets the zonal operation mode.
(3)	Message indicator	Displays an alarm message and various suggestions for operation.
(4)	Run mode indicator	Displays run mode in the rotor graphic. The following terms are displayed: STOP, ACCEL, RUN (running at the set speed) DECEL, WAIT (waiting for vacuum during acceleration) ZONAL (for zonal operation) DELAY (until the start time in an RTC run)
(5)	Vacuum indicator	Displays the following four stages according to the vacuum of the rotor chamber. (1)  Atmospheric state. The vacuum pump is not activated. (2)  Low vacuum. The rotor waits at 4,000 rpm until the vacuum reaches an intermediate level (3)  Intermediate vacuum. (4)  High vacuum. Note If the sample is sensitive to a temperature rise, do not press the START key until the chamber is at high vacuum level.

No.	Name and symbol	Functions and actions
(6)	START key 	Starts rotor rotation. If VACUUM is off, this key activates the vacuum pump and starts temperature control.
(7)	STOP key 	Stops rotor rotation.
(8)	VACUUM key	Starts up the vacuum pump and activates air vent(to set the rotor chamber to atmospheric pressure). (As soon as vacuum pump is on, temperature control starts.) Air vent for vacuum chamber after a run cannot be opened as long as the rotor is spinning.
(9)	ESC key	Moves the display back to the screen at the preceding level (for example, to switch back from the Menu Screen to the Run Screen).
(10)	MENU key	Displays the Menu Screen. The Menu Screen offers the choice of Centrifuge Scheduler, User List, Alarm Information, Rotor Catalog, and User Customization Routines.
(11)	Cursor key 	a. Displays the cursor on the Run Screen, putting the display into input wait status. b. Move the cursor on the screen. 1. Moves the cursor up (↑). 2. Moves the cursor down (↓). 3. Moves the cursor to the right (→). 4. Moves the cursor to the left (←).
(12)	Numeric key 	Used to type numbers for setting run conditions. During time entry: Moves cursor from hours to minutes. During temperature entry: Acts as decimal point for data entry. a. During operation time entry: sets continuous run. b. When entering deceleration conditions: sets a free coast. Use this when you have entered the wrong value while entering an operating condition or entering a number or when the alarm device is activated. Functions of this key a. This key clears the cursor-carrying input field and returns you to the pre-input state. b. Use this key to clear an alarm signal. If more than one alarm signal is on, this key will clear them one by one. ENTER Registers the entered value.

2-2-2 Rotor chamber

The structure of the rotor chamber (vacuum chamber) is shown in Fig. 2-2-3.

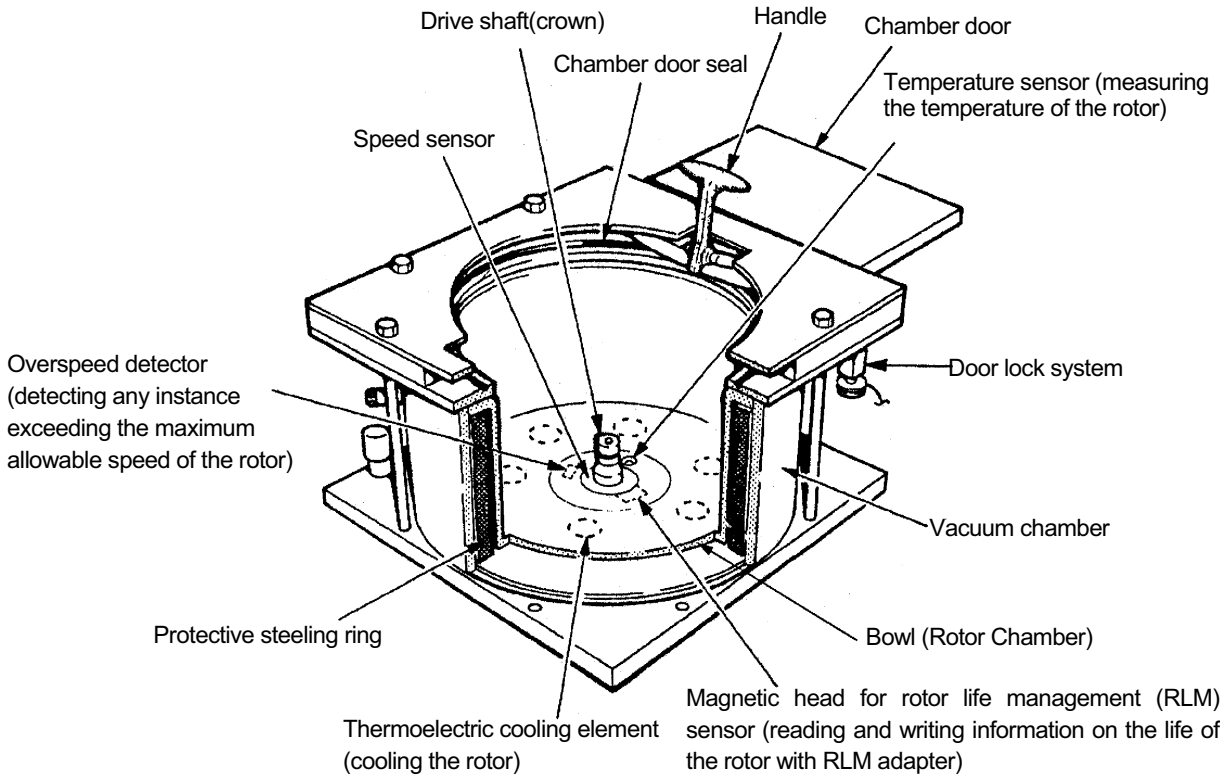


Fig. 2-2-3 Rotor chamber

Note : If sample or water drops to the window of the temperature sensor or the RLM sensor, it may cause an incorrect detection. Whenever the sensor is wet, wipe it with a clean, dry cloth. Take care not to scratch the surface of the sensor.

2-2-3 Safety devices

(1) Protection of rotor chamber

Should the rotor spining at high speed fails (or comes off the drive shaft), the safety of the operator is ensured by the thick protective steel ring enclosing the bowl. (Fig. 2-2-3).

(2) Imbalance detector

If during operation the vibration of the rotor becomes excessive due to serious imbalance or improper bucket setting, the imbalance detector detects the situation and decelerates the rotor immediately.

However, the ultracentrifuge is designed to tolerate imbalance associated with visual balancing-it is equipped with an imbalance tolerant drive. (For more information on the balancing of rotors, see Section 3-1-2, "Preparing tubes/bottles and rotor".)

(3) Door lock system

The chamber door automatically locks for safety while the rotor is spinning. When the power supply is off, the door remains locked. The door can only be opened and closed when the rotor is at rest and the rotor chamber is vented. Unless the door is closed, the rotor will not start rotating except in zonal mode. To open the door in the event of a power failure, see Section 3-7, "Happenings when power failure occurs".

(4) Speed sensor and overspeed detector

For protection in the event of entry errors the ultracentrifuge is provided with an automatic system to stop the rotor when its speed exceeds the maximum allowable speed. If a speed higher than the maximum permitted speed is set, the ultracentrifuge will detect the mistake before the speed reaches 3000 rpm, and then will display an alert message and decelerate the rotor to a stop.

2-2-4 Rotor adapters

There are two types of adapters for rotors :RLM adapter and optical adapter.

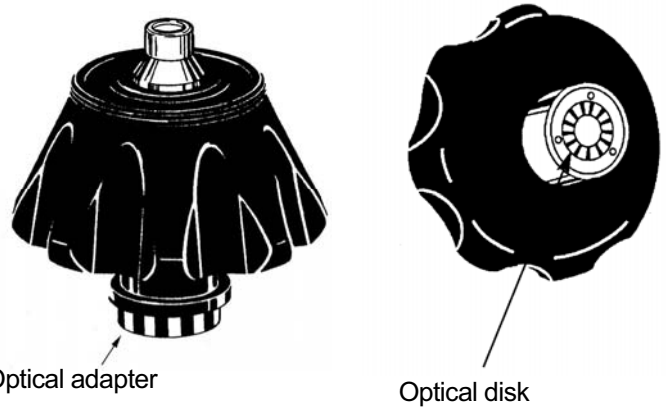
(1) RLM adapter

This type of adapter has a memory to manage the rotor life.The rotor type, serial number, total number of runs,and accumulated run time are recorded in this memory.Rotors with RLM adapters are termed RLM rotors (automatically managed rotors.) (See Fig. 2-2-4).

(2) Optical adapter

This type of adapter has alternating black and white bands around its circumference. The umber of bands corresponds to the maximum permitted speed of the rotor. Rotors with optical adapters are termed rotors with optical adapters. A variation of the optical adapter has alternating black and white sectors on its disk instead of such bands around its circumference, and the disk is called the optical desk (See Fig.2-2-5).

Fig.2-2-4 RLM rotor

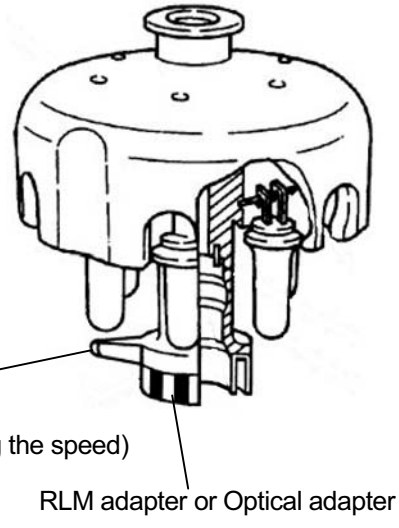


(a) Rotor with optical adapter (b) Rotor with optical disk

Fig.2-2-5 Rotor with optical adapter or disk

The rotor with an RLM adapter or an optical adapter is available to this centrifuge.

⚠ **CAUTION:** R28SA,RPS27-2,RPS27-3,RPS25,RPS25-2, RPS25-3rotor,etc. are not available to this centrifuge. As shown in the right figure, each of these rotors includes the pin portion(the detector to exceeding the speed).
Never use these rotors,otherwise the pin portion may touch the bottom of the rotor chamber when the rotor is rotating,and it may cause the rotor chamber damage.



You should note that there are two versions of the CP-WX Series ultracentrifuges: One is designed for rotors having optical adapters and the other, for rotors having optical dsiks. The RLM rotors can be used on both types, but rotors having optical adapters cannot be used on the ultracentrifuge vesion designed for rotors having optical disks and vice versa. Before running rotors having optical adapters or disks, check whether the rotor and ultracentrifuge are compatible.

⚠ **WARNING:** Do not remove the RLM adapter or optical adapter/disk from rotor, or replace it with the adapter/disk for another rotor. The adapter/disk is a critical component that detects the over-speed of rotor : If an adapter/disk that is compatible with the rotor is attached, the rotor could break, resulting in damage to the ultracentrifuge.

⚠ **CAUTION:** Do not bring the RLM adapter near a magnet, or scratch it: Doing so will erase the memory stored in adapter, and make the rotor unusable. To prevent the adapter from being scratched, store the rotor with RLM adapter, using the stand provided with the rotor (rotor stand for protecting adapter) (See Fig.2-2-6).

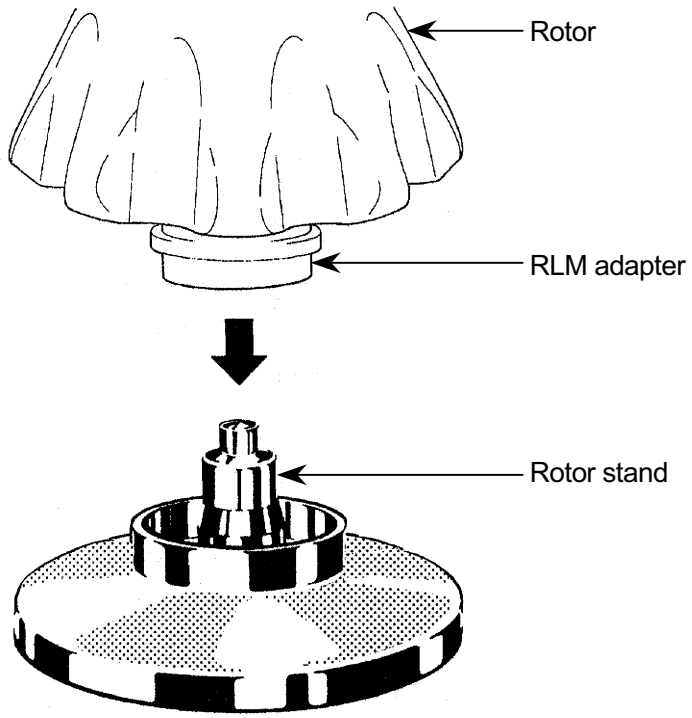
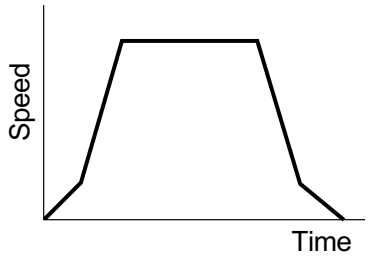
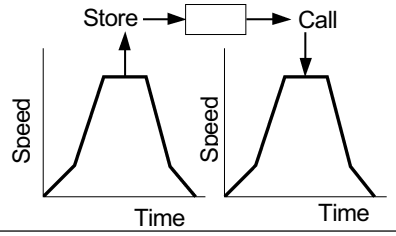
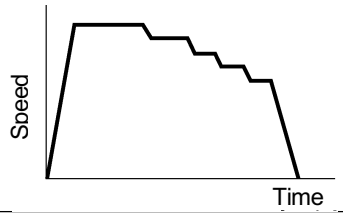
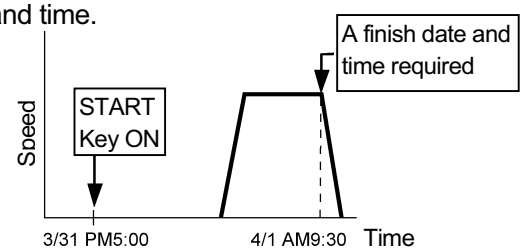
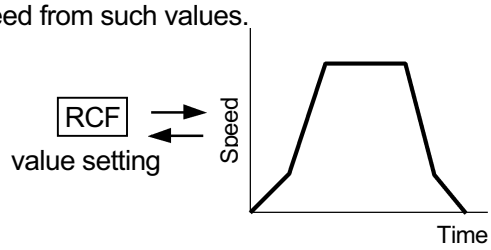
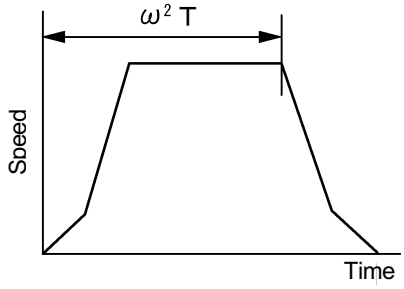
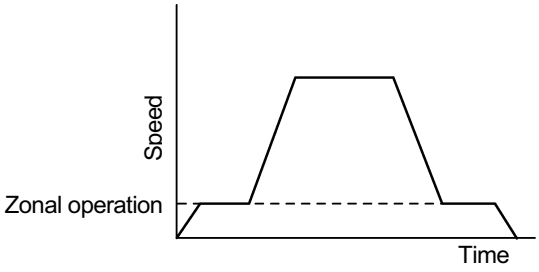


Fig.2-2-6 Rotor stand

3. Operation

The CP-WX Series Ultacentrifuges are capable of operation in more than one mode to meet a wide range of applications. The outline of each available mode is given below:

		Brief description	Reference
	Normal operation		☞ Section3-3-1 “Normal Operation”
Optional features	Programmed operation	You can store set run conditions in memory for later use in repeated operation. 	☞ Section3-5 “How to use the FUNCTION field” Section3-5-1 “Programmed operation”
	Step-mode operation	More than one normal operation can be combined into a sequence of operations or step for successive centrifugation. 	☞ Section3-5-2 “Step-mode operation”
	RTC(real-time control) operation	Run starts or completes at a required date and time. 	☞ Section3-5-3 “RTC feature”
	RCF(centrifugal force) value display setting	This feature calculates centrifugal force (RCF) values from set speed. It can also calculate reversely, i.e., finding speed from such values. 	☞ Section3-5-4 “Displayed and setting RCF”

		Brief description	Reference
Optional features	ω^2T setting	Calculates and displays the running time from the set values of speed and ω^2T. 	☞ Section3-5-5 "ω^2T setting"
	Zonal operation	Zonal operation is a mode of operation using a zonal rotor. 	☞ Section3-3-2 "Zonal operation"

3-1 Run preparation

⚠ **WARNING** : 1.This centrifuge is not designed for use with materials capable of developing flammable or explosive vapors. Do not centrifuge such materials in this instrument nor handle or store them near the instrument.

2. Make sure to prepare necessary safety measures before using samples that are toxic or radioactive samples or pathogenic or infectious blood samples at your own responsibility.

⚠ **CAUTION** : Do not place containers holding liquid in the rotor chamber,on the top deck, or near the centrifuge. If spilt, liquid may get into the instrument and damage electrical and mechanical components

3-1-1 Starting up this machine

Before setting run conditions, display the Run Screen(Screen for Setting Run Conditions)

(1)Displaying the Run Screen(Screen for Setting Run Conditions)

1.Turn on the POWER switch.

↓

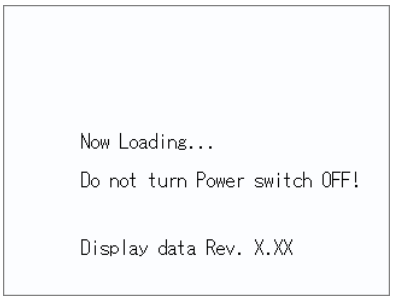
2.The starting screen appears.
(X.XX is the number of the revision.)

↓

3.The initial screen appears.

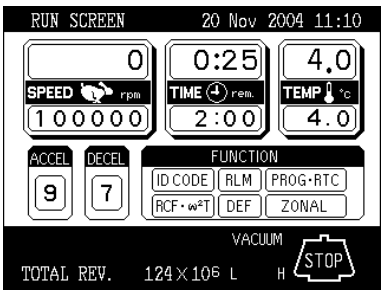
↓

4.The Run Screen appears.



Staring screen

Initial screen



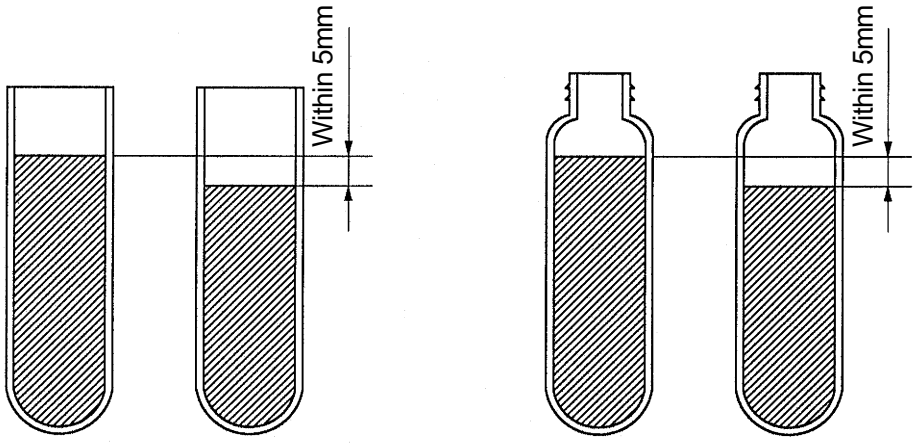
Run Screen

Fig.3-1-1 Staring screen, initial screen,and Run Screen

3-1-2 Preparing tubes/bottles and rotor

The CP-WX Series allow you to balance, by eye, tubes or bottles containing a sample solution and then centrifuge them. Make sure that the difference between meniscus levels of sample solution in tubes or bottles in within 5 mm (See fig. 3-1-2).

Although the tubes/bottles are balanced within the allowable range, imbalance alarm may occur depending on the combination of the tubes/ bottles and the rotor when using the tubes/bottles whose capacity is more than 100ml. Balance them more accurately.



(1) Tubes (2) Bottles

Fig. 3-1-2 Balancing tubes/bottles containing a sample solution

To prevent tube or bottle failure, some tube/bottle and rotor combinations cannot be run to the maximum speed of the rotor when partially filled. The tube or bottle must be full in the following cases:

1. When a thin tube or seal tube is used.
2. When a thick tube is used for swinging rotor.
3. When a bottle is used 100,000 x g or more.

For the detail about handling tubes/ bottles and rotors, refer to “ROTORS, TUBES, BOTTLES AND CAPS(Part No.S999204) ”and the rotor instruction manual.

NOTE If you now have any one of the following rotors, which are not painted black, we strongly advise you to have the rotor painted black. The rotor, if painted black, will enable you to control rotor temperature more accurately during operation.

RPS65T	**RPS40T**	**RP80T**
RPS56T	**RPS40T2**	
RPS55T	**RPS55T2**	

If you want to have your rotor(s) painted black, call your authorized Hitachi Koki representative.

3-2 Basic operation

⚠ **WARNING:** Do not incline or move the instrument while the rotor is spinning.
Do not place any object on the instrument or lean on the instrument.

⚠ **CAUTION:** 1. Do not press the display panel and the function keys with a sharp-pointed object such as a ball-point pen.
2. If abnormal sound is heard during the operation, stop the operation immediately and contact Hitachi koki authorized sales/service representative.

3-2-1 Setting run conditions

This section will first describe the screen for basic operation (the Run Screen), the touch panel, and the cursor keys.

[Run Screen]

The screen for displaying run conditions and operational status is called the Run Screen.
Speed, time, and temperature are displayed in two rows: the top row displays the current actual run conditions, while the bottom row displays the set run conditions.
The acceleration (ACCEL) and the deceleration (DECEL) fields display set conditions.

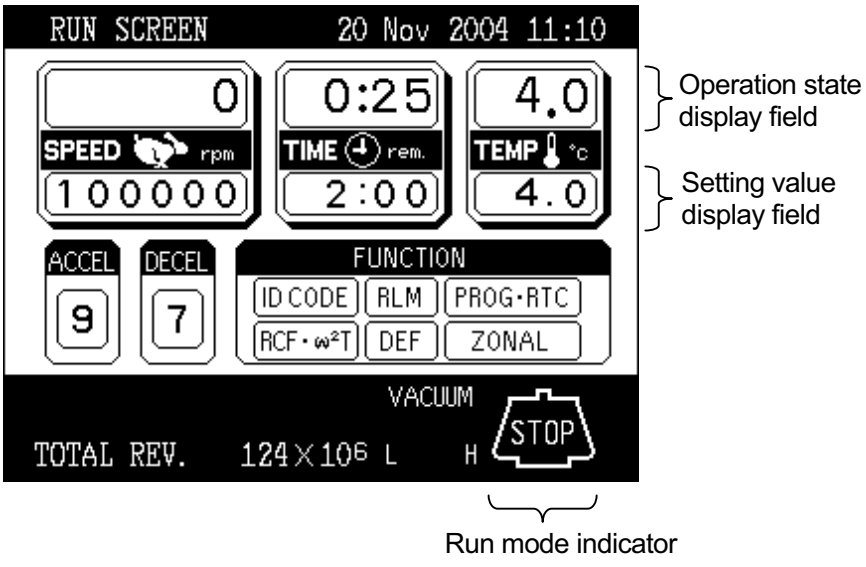


Fig. 3-2-1 Run Screen

[Touch panel]

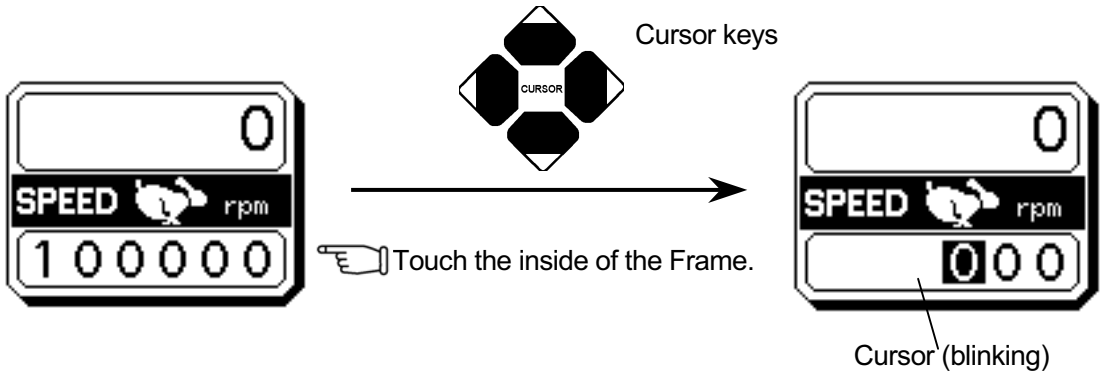
The setting field on the screen will blink by touching the inside of the frame of the item you want to set (See Fig.3-3-2(2)).
The touch panel and the cursor key can be used together.

[Cursor key]

Pressing the cursor key will highlight the field where changes can be made. (This blinking/highlighted object is referred to as the cursor in this manual.)
The screen setting field is in either of the following states depending on whether the cursor is there.
(1) Determined input state: This is a normal state and the cursor does not appear.
(2) Input wait state: Press a cursor key (either the top, bottom, right, or left) while in the determined input state, and the numerical part of the setting field will blink a 0 (or numerical value) and display the cursor. In this state, the system accepts a numerical input. Press cursor keys to move the cursor.

To set a run condition, enter the cursor into an input wait state, move the cursor to the item you want to set, then enter a value. If you have made no keystroke (such as a numerical input) for more than 30 seconds, the system will automatically enter a determined input state.

NOTE When the screen is in a determined input state without a cursor (when the Run Screen is on after power-up), if you wish to enter a numerical value in a specified parameter field by using cursor key , press a cursor key (either of the upward, downward, right, and left arrow keys), move the cursor to the specified parameter field, then enter the value.
The cursor keys display and move a cursor. Once a cursor appears, pressing a cursor key moves the cursor to the corresponding direction (upward, downward, rightward, or leftward).



The system does not accept a numerical input.

The system accepts a numerical input. Use cursor keys to move to the next setting item.

(1)Determined input state

(2)Input wait state

Fig. 3-2-2 Setting indicator

The next page describes how to set run condition by citing some examples.

NOTE (1) If you enter the wrong value, press CE key to return to the input wait state.
If you have pressed ENTER key, touch the screen or press a cursor key, enter the device into an input wait state, then enter the correct value.

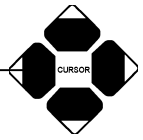
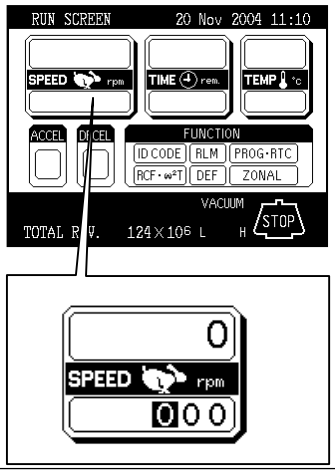
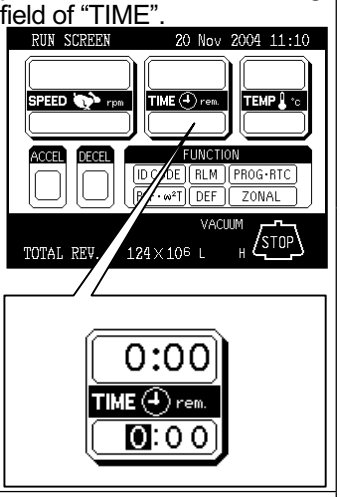
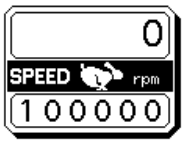
(2) When setting two or more run conditions, you do not have to press ENTER key after each setting. Pressing the cursor key will enter the setting, thus making the system wait for a new input.

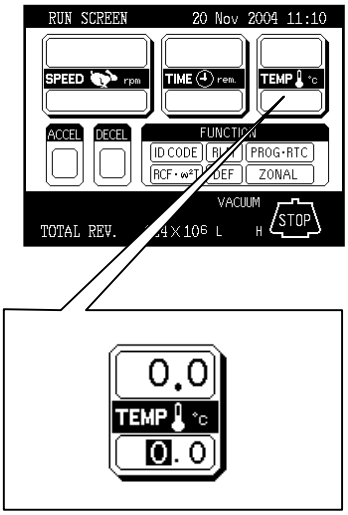
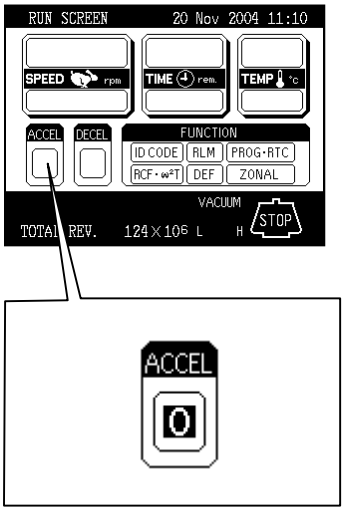
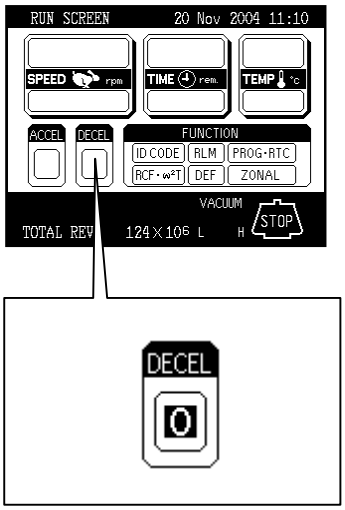
(3) If the system is running in (HOLD) and you want to set it to shut down at a future time, enter a new time setting while the instrument is in operation; enter the sum of the time elapsed plus the time remaining. If, for example, this machine has run continuously for five hours and you want to stop it one and a half hours later, touch the inside of the “TIME” frame or use cursor keys to enter TIME into an input wait state, then enter

6 ·/: 3 0 ENTER .

• How to set speed, running time, temperature, and other parameters

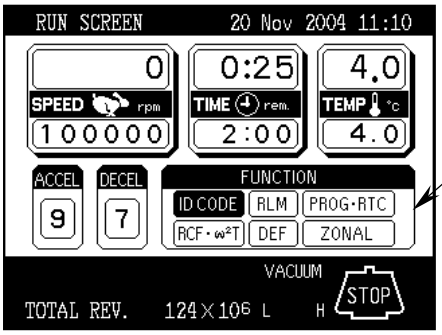
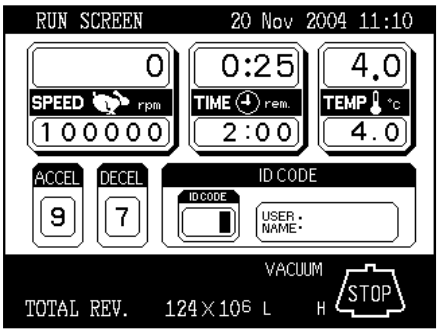
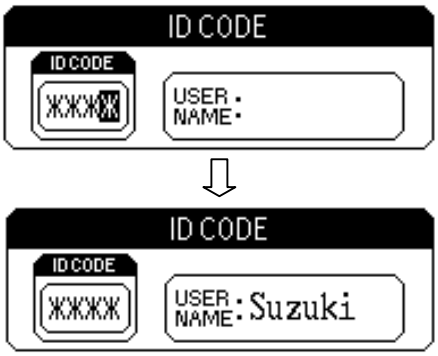
Here are some examples and descriptions:

Setting item			RPM (SPEED)	Running time (TIME)
Typical setting			100,000rpm	2 hours 30 minutes
Operation procedure	1	Touch the item of the screen you want to set or press cursor keys to enter the system into an input wait state.	The system enters an input wait state.	Enters an input wait state.
	2	Move the cursor to the status indicator if pressing cursor keys. (The arrows indicate the directions the cursor can be moved). Arrow 		The cursor blinks at the place of one on the setting field of “TIME”. 
	3	The cursor in the setting item field blinks for about 30 seconds. Blinking means that the system enters an input wait state.		
	4	Use numeric keys to enter a setting. 7 8 9 4 5 6 1 2 3 0 ·/: HOLD/FREE CE ENTER Entered numbers are moved to the left every time a new number is entered.	1 0 0 0 The last two digits are fixed.	2 ·/: 3 0 Press the ·/: key to move the cursor to the “minutes” position. For a continuous run, press HOLD/FREE.
	5	Make a check, then press ENTER. After pressing a cursor key, you can still enter a setting similarly to the ENTER key. Use CE to cancel an input.	Set it to 100,000 rpm. 	Set it to 2:30 (2 hours 30 minutes). 
Setting range and units			Can be set to any value in the range from 1,000 rpm to maximum speed in increments of 100 rpm.	Can be set to any value up to 99 hours 59 minutes in in crements of 1 minute.

Temperature (TEMP)	Acceleration (ACCEL)	**Deceleration** (DECEL)
4.5℃	9	7
Enters an input wait state.	Enters an input wait state.	Enters an input wait state.
The cursor blinks at the place of one. 		
4 ⁄: 5 When one decimal place is not required, you do not need to enter ⁄:. If you press ⁄:, it becomes a “decimal place” input and the machine waits for an input of decimal places.	9	7 For free coast, press HOLD/FREE. Display: F
Set it to 4.5℃ 	Set it to 9. 	Set it to 7. 
Can be set to any value in the range from 0 to 40 °C in increments of 0.1 °C.	1～9	1～9 + free coast(F)

3−2−2 Setting user ID code

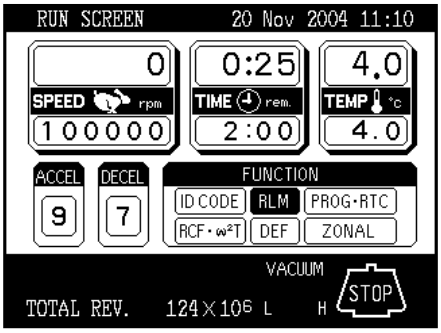
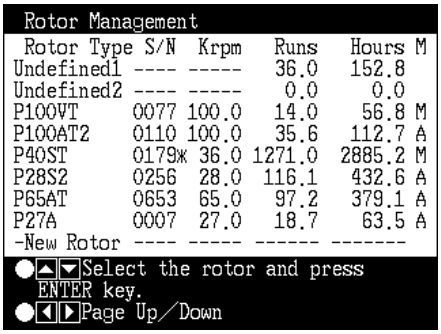
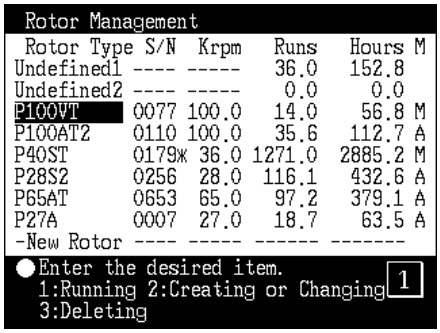
• To use a name (user name) corresponding to the user ID code or ID code, it must be registered.
For the registration method, see 3-8-2 User list.

Step	Key operation	Screen display and considerations
1	On the Run Screen, touch ID CODE. While ID CODE is blinking, touch ID CODE again. If using the cursor keys, move the cursor to ID CODE on the run screen and press the ENTER key.	 FUNCTION field  ● The FUNCTION field switches to the ID CODE field. ● The number of units of ID code blinks.
2	Use numeric keys to enter ID code(4 digits). (When entering 0123) [0] [1] [2] [3] [ENTER]	 ● The entered number is not displayed on the screen. ✱ is displayed instead of the number. >>After the registered ID CODE is entered, the name (USER NAME) corresponding to the ID CODE is displayed.
3	Press the ESC key on the keyboard to return to the FUNCTION field.	

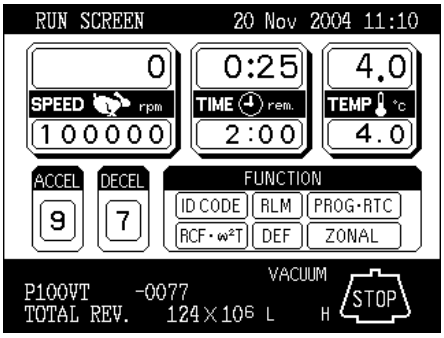
The USER ID CODE is a number to identify each user and can be set in up to 4 digits.
When the user ID CODE is entered, the user record will be stored in the memory of the centrifuge and can be printed if a printout operation is done (optional).
Entering a user ID CODE may not be always required for operation. If the user does not need to be identified, the centrifuge can be operated without an ID CODE.

3－2－3 Rotor type and serial number setting（P100VT－0077）

The setting requires prior registration of the P100VT-0077 rotor (Section 3-6-2) because the rotor is not automatically registered for rotor life management. You are advised to registered all of your rotors that are not automatically registered.

Step	Key operation	Screen display and considerations
1	On the Run Screen, touch RLM . While RLM is blinking, touch RLM again. If using the cursor keys, move the cursor to RLM on the run screen and press the ENTER key.	
2	On the rotor control field, use the left and right arrow keys ◀ and ▶ to select each page. I	 >>The display switches to the rotor control field, which displays the Rotor List screen.
3	Use the up and down arrow keys to move the cursor to the row of the rotor type to be used and press the ENTER key. ENTER In this example, the cursor moves to “P100VT-0077”.	

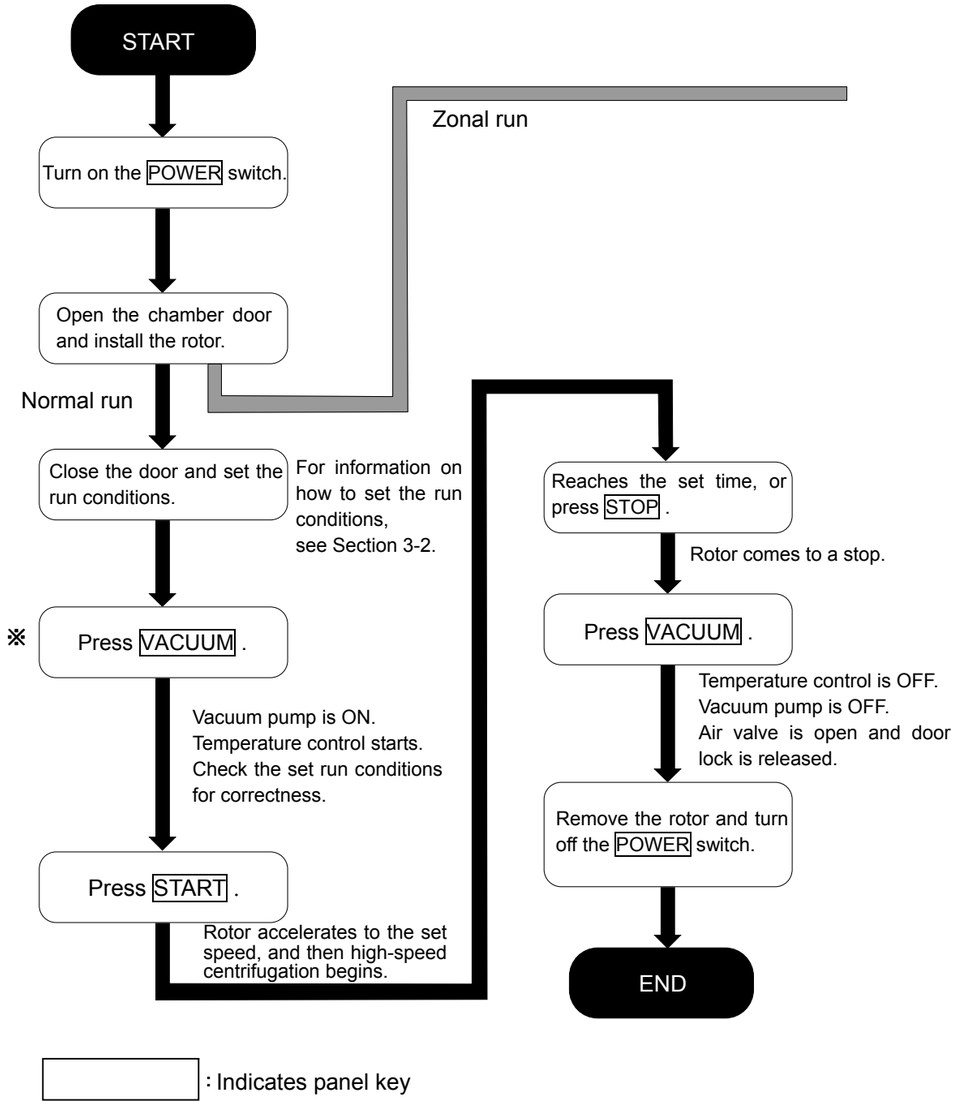
Note: “P100VT” means the rotor type and “0077” means the serial number in “P100VT-0077”.
Both the rotor type and the serial number are inscribed on the rotor surface.

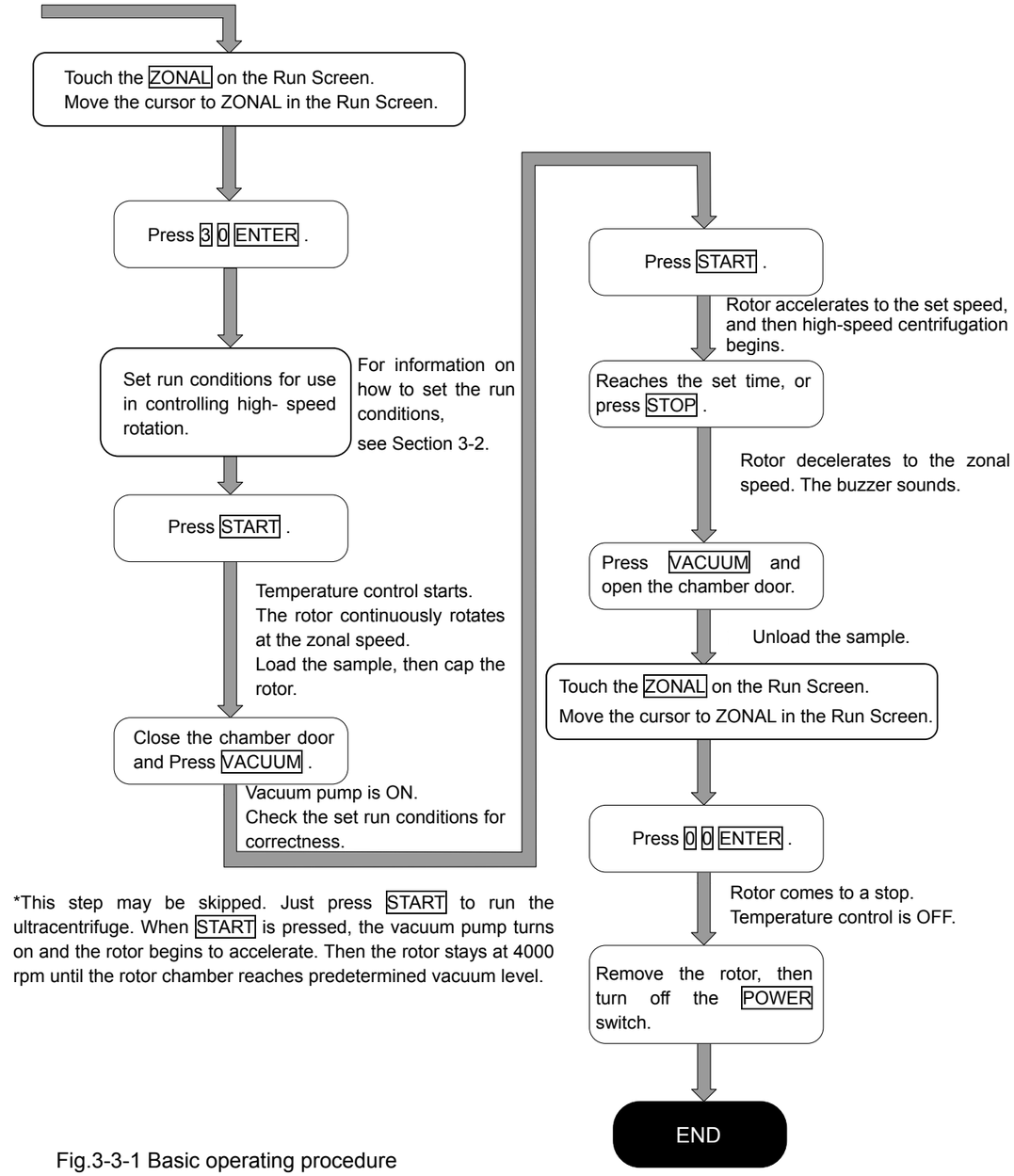
Step	Key operation	Screen display and considerations
	Select “Running” . 1 ENTER	 >>The display switches back to the Run Screen and “P100VT-0077” is displayed in the message field

The rotor type and serial number may or may not be set. Whether the rotor type and serial number for a particular rotor have been set or not, it does not affect the normal operation of the ultracentrifuge. However, you are advised to set the rotor type and serial number of the rotor for each run to allow effective rotor life management. Any registered rotor that does not have its rotor type and serial number set will appear as an undefined rotor in the displayed list ("Undefined Rotor 1").
You can use a particular rotor as undefined if you need to manage the rotor separately from the other defined rotors in terms of the number of runs made and accumulated run time ("Undefined Rotor 2").
For more information on rotor life management, see Section 3-6, "Rotor management".

3 — 3 Basic operating procedure

There are two basic modes of operation, normal and zonal. The procedures for these two mode shown in Fig.3-3-1. Before performing the basic operating procedure, switch on the power distribution panel which supplies electric power to the ultracentrifuge. If power failure occurs during the operation, see Section3-7,"Happenings when power failure occurs."





*This step may be skipped. Just press START to run the ultracentrifuge. When START is pressed, the vacuum pump turns on and the rotor begins to accelerate. Then the rotor stays at 4000 rpm until the rotor chamber reaches predetermined vacuum level.

Fig.3-3-1 Basic operating procedure

3－3－1 Normal operation

Given below is a description of the operational procedure for a normal run.

NOTE : Before starting up this machine, carefully read the operation manual for your rotor and make sure that you have selected the correct type of tubes and entered the correct amount of sample.

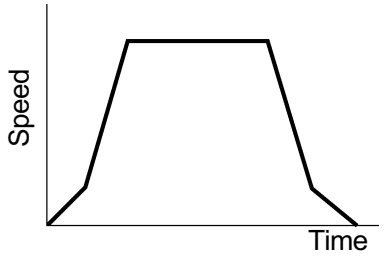
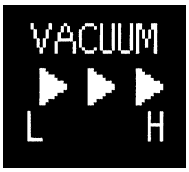


Fig.3-3-2 Normal operation mode

Step	Key operation	Screen display and considerations
1	Turn on the POWER switch on this machine.	>> TheTpanel display lights up. >> The door is unlocked.
2	Install the rotor.	>> Before installation, read the rotor instruction manual carefully.
3	Set run conditions.	>> See 3-2-1 “Setting run conditions” and set run conditions.
4	Press VACUUM key. (You can omit this step.) VACUUM	>> The machine starts evacuating the rotor chamber. >> Temperature control starts. >> The degree of vacuum in the rotor chamber is displayed on the vacuum indicator on the display panel.  (1) In a low vacuum ▶ (1 indicator) (2) In an intermediate vacuum ▶▶ (2 indicator) (3) In a high vacuum ▶▶▶ (3 indicator) >> If the rotor compartment has moisture or frost on it, it takes a long time to reach an intermediate high vacuum. In that case, wipe it off with a clean, dry cloth or sponge. >> If the sample is sensitive to a temperature rise, do not press the START key until the chamber is at high vacuum level.
5	Press START key. START	>> The rotor starts spinning. >> The timer begins operating. >> During acceleration, the rotor continuously rotates at 1,000 rpm for several seconds to check the rotor. >> The rotor accelerates to the set speed. >> This ultracentrifuge waits at 4,000 rpm until an intermediate vacuum is reached.

Step	Key operation	Screen display and considerations
6	The specified centrifugation time elapses (time-out). Or press STOP key. STOP	>> The rotor decelerates and stops.
7	The rotor stops.	>> Beeps to indicate that the rotor has stopped.
8	Press VACUUM key. VACUUM	>> The vacuum stops, the air leak valve gets activates, and the rotor chamber reaches atmospheric pressure. >> The door unlocks, and is able to be opened and closed.
9	Take out the rotor.	>> Stop the rotor completely before taking it out.

The run mode indicator on the display panel displays the following:

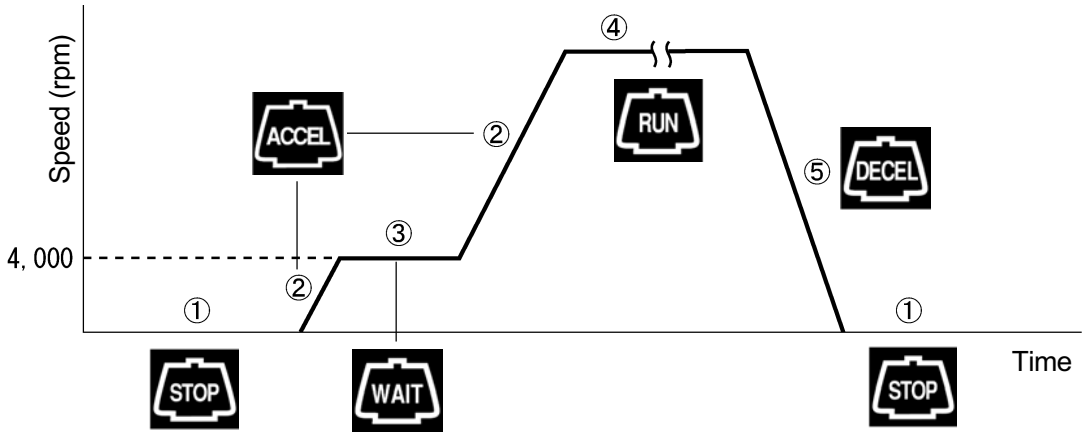


Fig.3-3-3 Displays of run modes

NOTE : When the rotor chamber is vacuumed insufficiently before starting operation or the ambient temperature is low (10℃ or below), the vacuum waiting time at 4000rpm may become longer. Also, during acceleration up to the set speed, the instrument may become a vacuum waiting state. Therefore, before starting operation, vacuum the rotor chamber sufficiently (approx. 15 minutes) by pressing theVACUUM key.

3－3－2 Zonal operation

Zonal operation is a mode of operation using a zonal rotor for density gradient centrifugation with large amounts of sample .The zonal operation consist of the following three stage.

(1) Centrifugation at low speed, called the zonal speed *, the gradient or sample being loaded in this stage.
(2) Acceleration to set speed and separation of the sample,
(3) Centrifugation at zonal speed, the sample being unloaded in this stage.

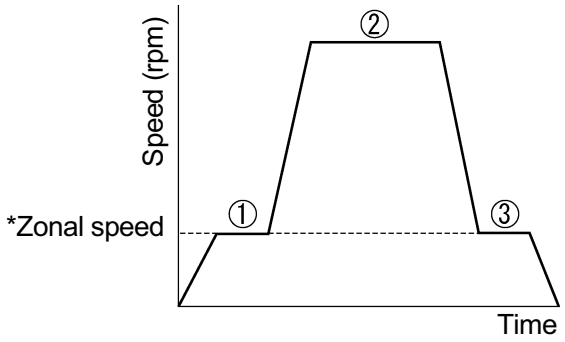


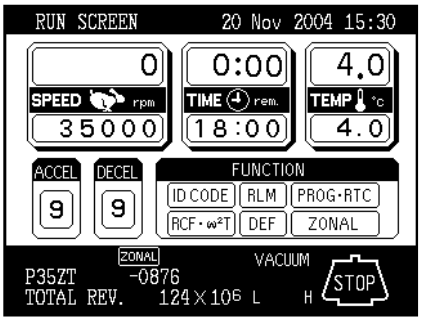
Fig.3-3-4 Zonal operation mode

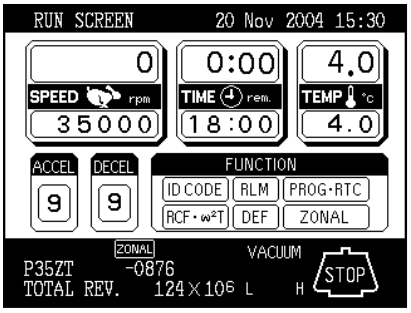
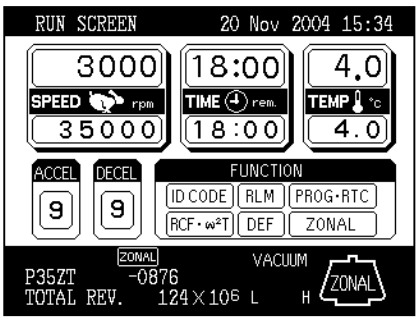
*Zonal speed : The zonal speed is one that is required for loading and unloading the sample. The zonal speed is normally set at 3,000 rpm, but it can be set in the range from 2,000 to 3,000 rpm in increments of 100 rpm to obtain the required speed. For details of how to change zonal speed, see Section 3-8-5, “User customizations”.

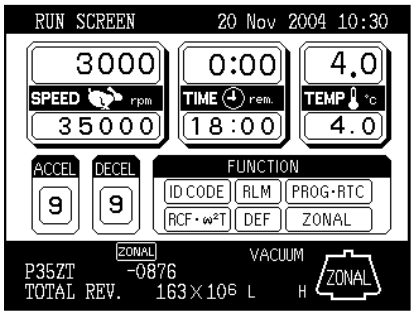
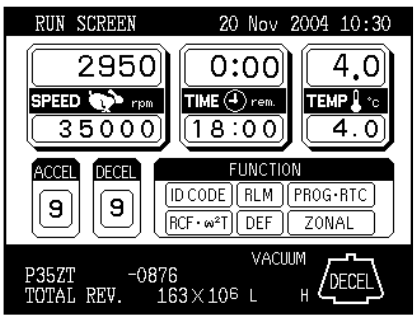
⚠ CAUTION：For details of zonal centrifugation, see zonal rotor manual.

The following explains how to perform a zonal run.

Step	Key operation	Screen display and considerations
1	Install the zonal rotor on the drive shaft.	>> See zonal rotor manual.
2	Install the guard plate assembly on the bowl of the rotor chamber.	



Step	Key operation	Screen display and considerations
3	On the Run Screen, touch ZONAL. While ZONAL are blinking,.enter the following by operating numeric keys to set the ZONAL mode. If using cursor key, move the cursor to ZONAL on the run screen and enter the following by operating numeric keys to set the zonal operation mode. [3] [0] [ENTER]	 ●The characters ZONAL are displayed in the message display field on the screen and the zonal operation mode is set.
4	Set the run conditions.	>>For details, see Section3-2,"Basic operation" .
5	Press the START key. [START]	 • Rotor begins to accelerate to the zonal speed. • Temperature control begins. NOTE : The time being consumed at zonal speed is not counted as part of the run.
6	Install the seal assembly on the rotor.	>>For details, see zonal rotor manual.
7	Load the sample and the gradient solution.	
8	Install the cap assembly on the rotor.	
9	Close the chamber door.	
10	Press the VACUUM key.(This step may be omitted.) [VACUUM]	>>Vacuum pump begins to work. >>Chamber door is locked.
11	Press the START key again. [START]	>>Rotor brgins to accelerate to the set speed. NOTE : The run time is counted from when the START key is pressed. The instrument can also count only the time elapsing while the rotor is spinning at high speed. This is possible by changing the run time setting range. For details, see Section 3-5-8(3).

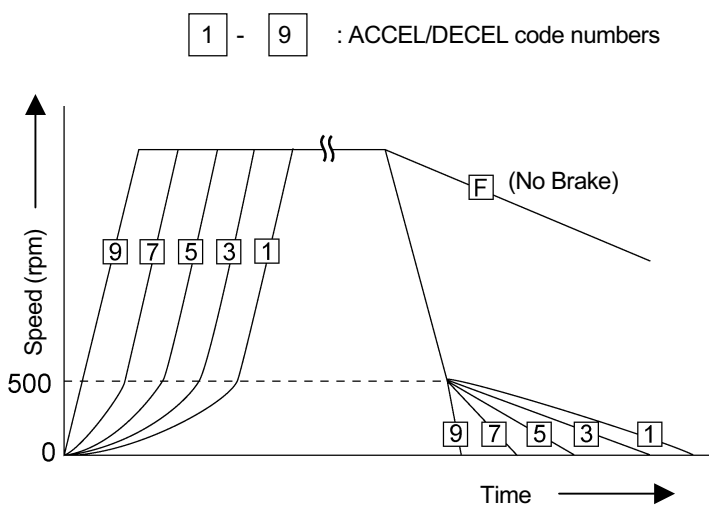
Step	Key operation	Screen display and considerations
12	If you need to stop the run before the set time elapses, press the STOP key. [STOP]	>> Rotor is decelerated to the zonal speed and then the buzzer sounds.
13	Press the VACUUM key. [VACUUM]	>> Vacuum pump stops working and air enters the rotor chamber. >> Door lock is released.
14	Open the chamber door.	>> For details, see zonal rotor manual. 
15	Remove the cap assembly.	
16	Install the seal assembly and unload the sample.	
17	On the Run Screen, touch ZONAL. While ZONAL are blinking,.enter the following by operating numeric keys to set the normal operation mode. If using cursor key, move the cursor to ZONAL on the run screen and enter the following by operating numeric keys to set the normal operation mode. [0] [0] [ENTER]	>> Rotor decelerates to a stop.  NOTE : During the zonal mode, the rotor will not decelerate even if the STOP key is pressed during the rotor's spinning at the zonal sped.
18	Be sure that the rotor is at rest, then remove the rotor.	>> If the rotor is still spinning, do not remove it. Wait until it comes to a complete stop.

NOTE : By changing to the NORMAL mode when loading and unloading the sample, you can decelerate the rotor to a stop.

3-4 Acceleration and deceleration rates

In order to meet various experimental protocols, the acceleration and deceleration rates can be adjusted between 0 to 500 rpm.

The figure and table below show the relationship between ACCEL/DECEL code numbers selected and resulting approximate acceleration/deceleration times.



Code No.	Acceleration time (minutes) from rest to 500 rpm	Deceleration time (minutes) from 500 rpm to rest
9	Minimum time*	Minimum time*
8	1	1
7	2	2
6	3	3
5	4	4
4	5	5
3	6	6
2	7	7
1	8	8
F**	-	Coasting deceleration

* Minumum time is the time for accelerating or decelerating by the driving motor with maximum torque. This time depends on the type of the rotor, mechanical resistance of the driving motor, etc.

**When the DECEL code "F" is selected, coasting deceleration is applied to stop the drive motor without braking. The deceleration time may vary greatly depending on the slight mechanical resistance of the driving motor, difference of vacuum levels in the rotor chamber, etc.

Typical examples of application of acceleration and deceleration rates

	Suggested code nos.		Characteristic of separation
	ACCEL	DECEL	
Density gradient centrifugation using a vertical rotor	5	7	The sample and gradient in tubes reorient during acceleration and deceleration. Therefore, the sample and gradient can become mixed, especially in wide tubes, if you use rapid acceleration or deceleration.
DNA separation by CsCl isopycnic separation (self-forming gradients)	9	7	You can operate at maximum acceleration because the density gradient is not formed during the run. As for the deceleration, it is better to decelerate slowly to obtain sharp bands.
Pelleting using a fixed angle rotor	9	9	Rapid pelleting of samples is possible (the run time decreases).
Density gradient centrifugation using a swinging bucket rotor	8	8	The sample and gradient do not reorient. Therefore, mixing of the layers is less than that in the case of using a vertical rotor. But it is safe not to accelerate or decelerate the rotor by selecting minimum time.

NOTE For swinging rotor, there is no difference with regard to turbulence if ACCEL/DECEL is less than or equal to 8. However, when the mode for long acceleration time is selected, run-out of the rotor becomes large and an imbalance alarm indicator may light.

When using a carbon fiber rotor without pins

When using a carbon fiber rotor without pins, be sure to operate using the settings ACCEL = 0 and DECEL = 0 . If any other ACCEL and DECEL settings are used, the drive spindle and the rotor may slip. The setting ACCEL = 0 causes the rotor to accelerate from 0 to 500 rpm in about two minutes and then up to the allowable maximum speed in about fifteen minutes. The setting DECEL + 0 causes the rotor to decelerated from the allowable maximum speed to 500 rpm in about fifteen minutes and then up to 0 rpm in about two minutes.

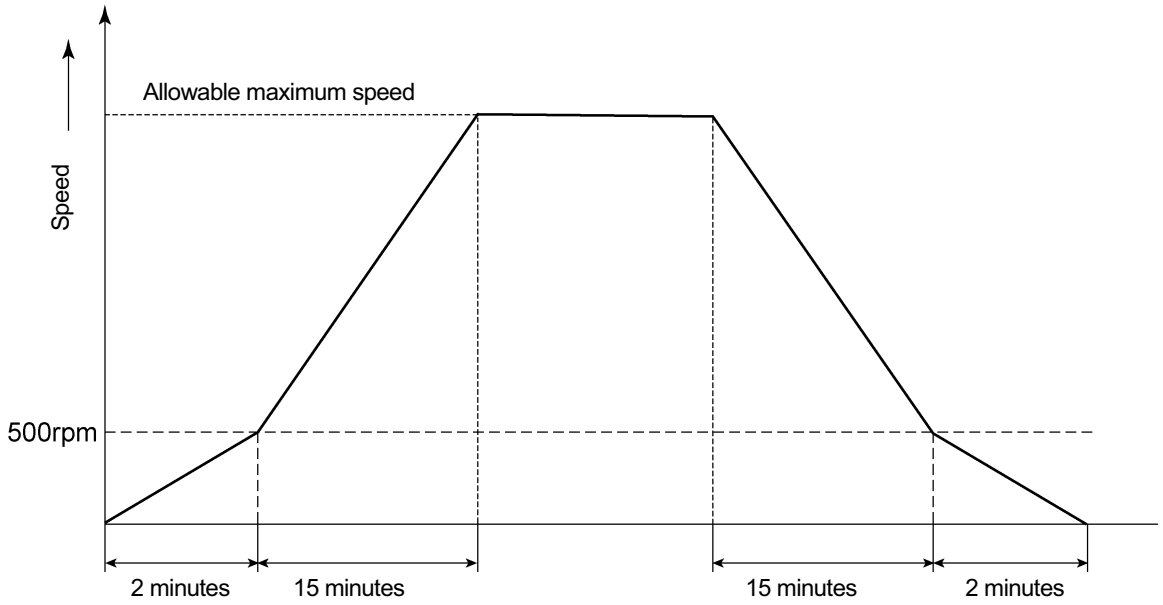


Fig. 3-4-1 Operation with setting ACCEL = 0 and DECEL = 0

The serial numbers of the various types of carbon fiber rotors without pins are shown below.

RP67VF	Nos.101 to 205
RP65VF	Nos.101 to 112
RP55VF	Nos.101 to 141
RP55VF2	Nos.101 to 116
RP50VF	Nos.101 to 128
RP65AF	Nos.101 to 118

Carbon fiber rotors of each type having serial numbers greater than those listed above can be used with any of the ACCEL and DECEL codes.

3-5 How to use the FUNCTION field

This ultracentrifuge incorporates a number of features, such as step-mode and other programmed running, display and setting of centrifugal force, and RTC (real-time control) that can run the centrifuge at a required date and time. These features are displayed and specified in the FUNCTION field.
The FUNCTION field is extended as shown in the following figure.

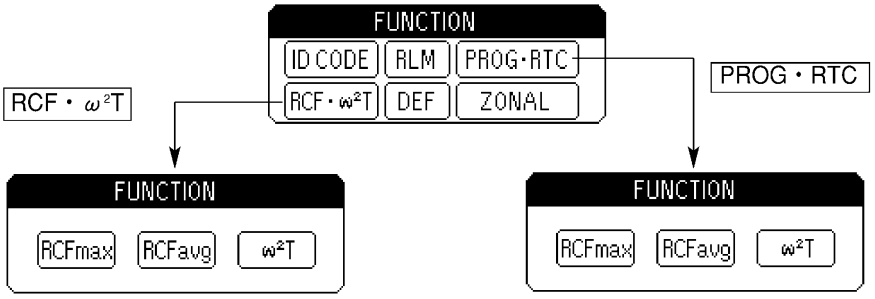


Fig. 3-5-1 FUNCTION field

ID CODE : Sets an ID code.
RLM : Switches the Run Screen to the rotor management field.
PROG : Programs, stores, and recalls run conditions.
This feature also offers a step-mode operation:
a continuous run of multiple run conditions.
RTC : Sets a start time or a finish time and runs the ultracentrifuge at a desired date and time.
RCFmax : Maximum centrifugal force for the maximum radius **r max** of the rotor used. This feature is used to cause the system to automatically calculate and display RCFmax. It also sets an RCFmax value and calculates the speed.
RCFavg : Causes the system to automatically calculate and display the average centrifugal force RCFavg for the average radius **r avg** of the rotor used. It also sets an RCFavg value and calculates the speed.
ω^2T : Performs an ω^2T run and arithmetic operations.
DEF : Turns on and off the defroster.
ZONAL : Selects between zonal operation and normal operation.

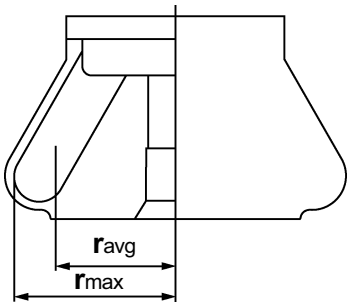


Fig. 3-5-2 Rotor radius

The above features can be used in combination.
When all settings are entered, press ESC to move back to the Run Screen. Then enter a setting for another feature to form a combination.

NOTE To perform a combination of PROG and RTC , first set PROG and then set RTC .
Once RTC is activated, you cannot change the run time. You therefore cannot activate PROG .

3-5-1 Programmed operation

When a centrifugal condition is to be used frequently, entering the same condition every time you want to perform centrifugation is inconvenient.

This ultracentrifuge has a programmed operation feature that stores run conditions. Storing run conditions which you often use allows you to call those conditions however often you may wish, thus saving time in setting. (Even while the POWER switch is OFF, this centrifuge retains the conditions entered.)

This centrifuge incorporates the program areas indicated below. It has twenty memory areas and nine steps in each memory unit.

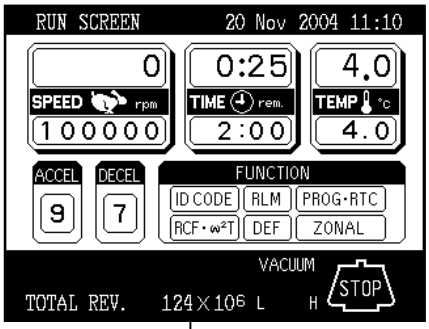
Accordingly, twenty patterns of run conditions can be stored and each memory can store nine steps. Running this machine with each memory unit retaining multiple steps will allow you to change the speed, run time, temperature, and others while in operation.

(Step-mode operation)

Memory 1	Step 1	Step 2	· · · · · ·	Step 9
Memory 2	Step 1	Step 2	· · · · · ·	Step 9
Memory 3	Step 1	Step 2	· · · · · ·	Step 9
.	.	.	· · · · · ·	.
.	.	.	· · · · · ·	.
.	.	.	· · · · · ·	.
.	.	.	· · · · · ·	.
.	.	.	· · · · · ·	.
Memory 20	Step 1	Step 2	· · · · · ·	Step 9

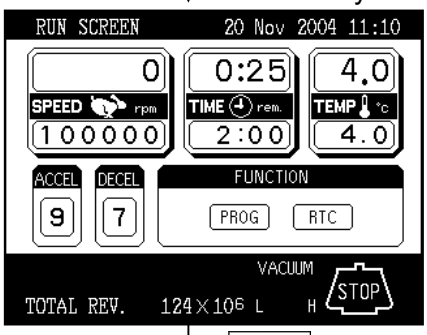
Fig. 3-5-3 Program areas

(Basic operation of the programmed operation feature)



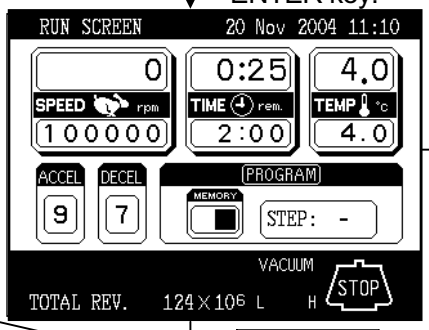
Ttouch PROG·RTC.
While PROG·RTC is blinking, touch PROG·RTC again.
If using the cursor keys, use cursor keys to select PROG·RTC and press ENTER key.

PROG·RTC
ENTER key.



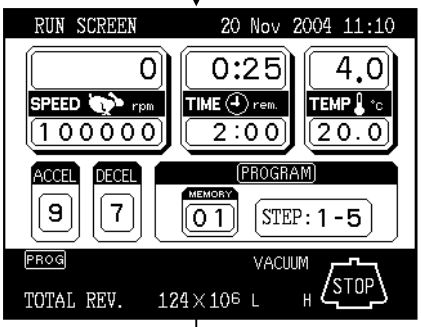
Ttouch PROG.
While PROG is blinking, touch PROG again.
If using the cursor keys, use cursor keys to select PROG and press ENTER key.

PROG
ENTER key.



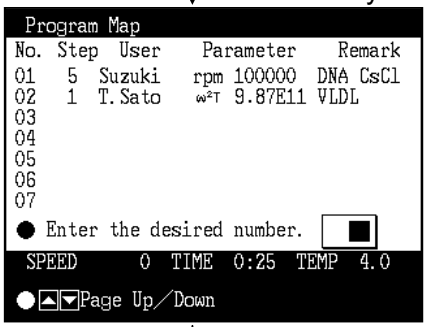
If you know which memory unit number stores the run condition.

Enter a memory unit number.



To store, change, or delete a program, or if you have forgotten the memory unit number where the run conditions are stored.

PROGRAM
ENTER key.



Ttouch PROGRAM.
While PROGRAM is blinking, touch PROGRAM again.
If using the cursor keys, Press key to cause PROGRAM to blink and press ENTER key.

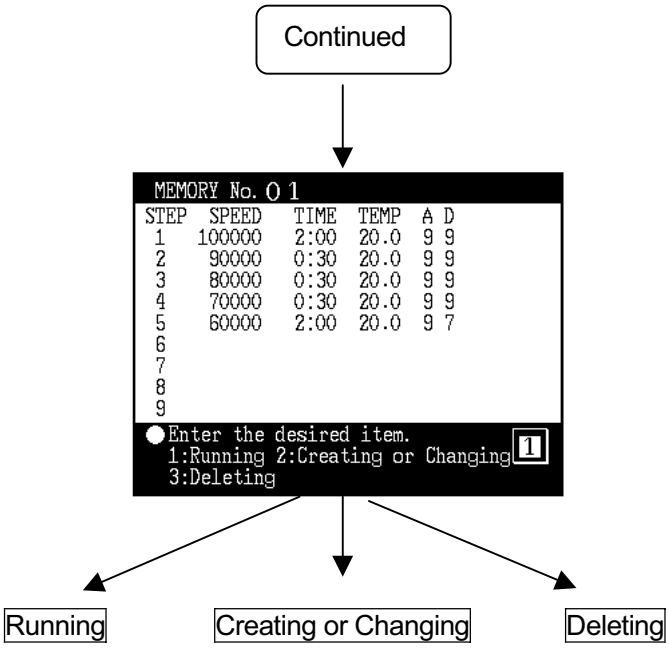
Enter a desired memory unit number and press ENTER key.

Memory unit number
ENTER key.

Programmed operation possible

Press ESC several times to go back to the Run Screen.

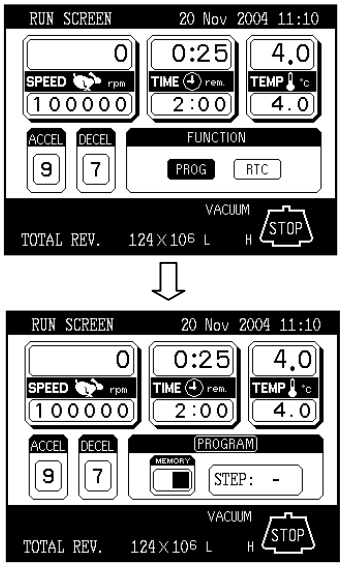
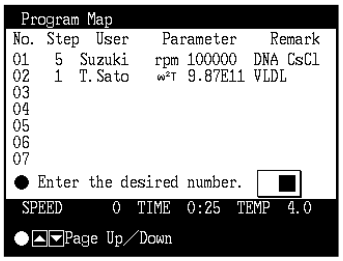
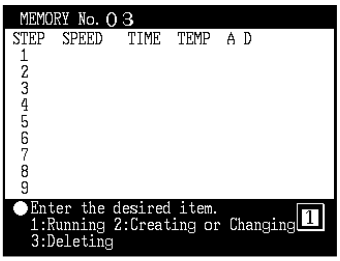
Next page



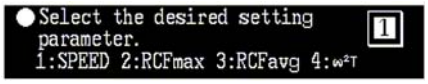
NOTE You cannot create, change, or delete a program while in running. Perform these operations while not in running. However, you can search the memory screen every time.

1. Programming procedure for run conditions (creating or changing)

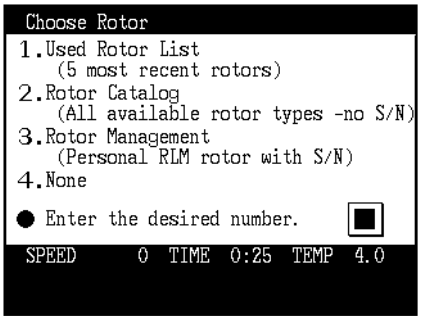
Shown below is the procedure for storing (creating) or changing an run condition.

Step	Key operation	Screen display and considerations
1	On the Run Screen, touch PROG·RTC. While PROG·RTC is blinking, touch PROG·RTC again. Then, touch PROG. While PROG is blinking, touch PROG again. If using the cursor keys ,move the cursor to PROG·RTC and press ENTER key. Then, move the cursor to PROG and press ENTER key	 ● The FUNCTION field switches to the PROGRAM field. ● The MEMORY No. setting field blinks.
2	Touch PROGRAM. While PROGRAM is blinking, touch PROGRAM again. If using the cursor keys, press the upward cursor key to cause PROGRAM to blink, then press ENTER key.	 ● The display switches to the Program Map screen and the MEMORY No.selection field blinks. >>If you wish to store a new condition, enter it into an empty memory unit.
3	Use numeric keys to enter a memory unit number you wish to store (or change). Example: To store a condition in memory unit 3, press 3 ENTER	 ● The memory screen you have just specified appears.

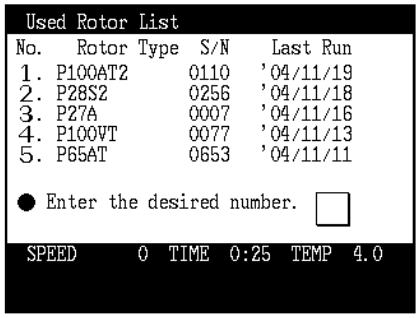
<table>
<tr><th>Step</th><th>Key operation</th><th>Screen display and considerations</th></tr>
<tr><td>4</td><td>Select "Creating or Changing."

2 ENTER</td><td> 

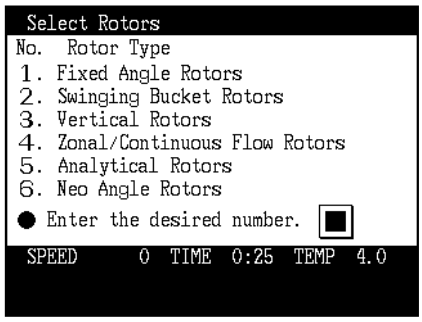
● The message field in the bottom row switches to what is shown in the figure to the left.</td></tr>
<tr><td>5</td><td>Enter a desired condition.
For example, select "SPEED".

1 ENTER</td><td> 

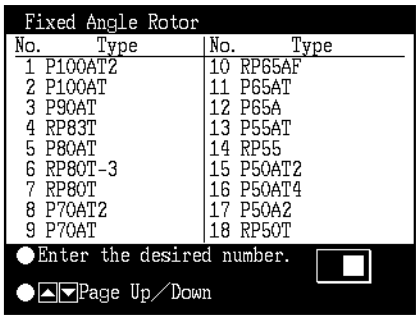
● The display switches to the Choose Rotor screen.</td></tr>
<tr><td rowspan="3">6</td><td>Select a desired rotor.
To select a desired rotor from the "Used Rotor List":

1 ENTER</td><td> 

● The display switches to the Used Rotor List screen.
● You can search for the rotor number you need in the order starting with the latest date/time.</td></tr>
<tr><td>To select a desired rotor from the "Rotor Catalog":
(1) Select "Rotor Catalog".

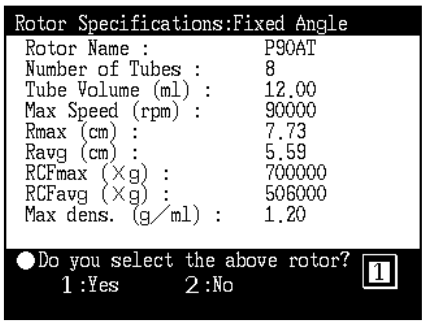
2 ENTER</td><td> 

● The display switches to the Select Rotors screen.</td></tr>
<tr><td>(2) Select Fixed Angle Rotors in the rotor types.
(When using fixed angle rotor P90AT)

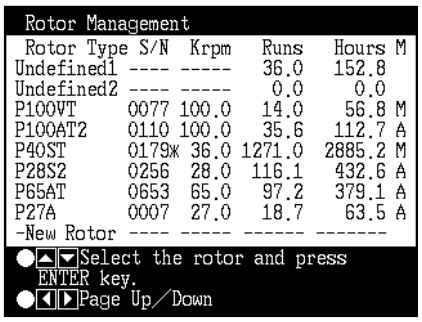
1 ENTER</td><td> 

● The display switches to the Fixed Angle Rotor list screen.</td></tr>
</table>

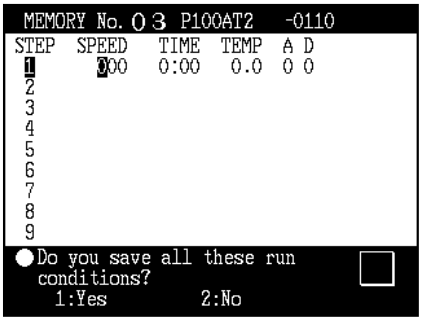
<table>
<tr><th>Step</th><th>Key operation</th><th>Screen display and considerations</th></tr>
<tr><td rowspan="4">6</td><td>(3) Select fixed angle rotor P90AT.

3 ENTER</td><td> 

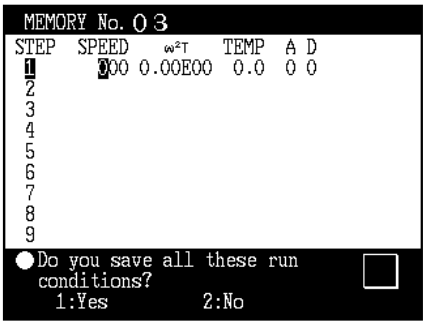
● The specifications of the P90AT are displayed.</td></tr>
<tr><td>To select a desired rotor from the "Rotor Management":
(1) Select "Rotor Management".

3 ENTER</td><td> 

● The display switches to the Rotor Management screen and the Rotor List is displayed.</td></tr>
<tr><td>(2) Select a desired rotor using the upward or downward cursor key ▲ ▼ .
(When using fixed angle rotor P100AT2)

▼ · · ENTER</td><td> 

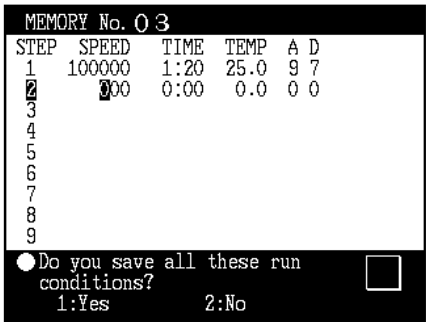
● The rotor type you have just entered appears in the top row in the screen.
● The SPEED field in the SPEED priority screen blinks.</td></tr>
<tr><td>To select no rotor:
(1) Select "None".

4 ENTER</td><td> 

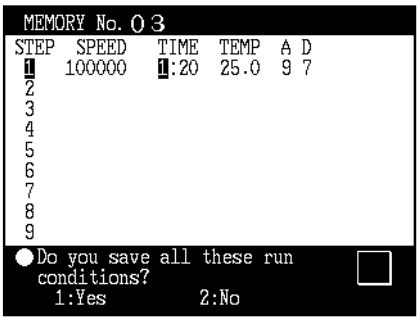
● The SPEED field in the SPEED priority screen blinks.</td></tr>
</table>

<table>
<tr><th>Step</th><th>Key operation</th><th>Screen display and considerations</th></tr>
<tr><td>7</td><td>Enter values into SPEED (RCFmax or RCFavg or ω²T), TIME, TEMP, A (ACCEL), and D (DECEL).

Example
1 0 0 0 ◗
1 [ ] 2 0 ◗
2 5 ◗
9 ◗
7 ▼

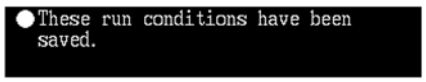
(Downward cursor key)</td><td> 

● When you finish entering run conditions for step 1, step 2 enters into an input wait state.

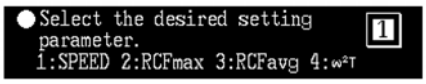
>> To enter run conditions in multiple steps in a step-mode operation, continue the operation from the above. (See 3-5-2 “Step-mode operation.”)
>> You cannot skip a step. (You cannot enter anything in step 2 with nothing entered into step 1.)</td></tr>
<tr><td></td><td>To change an run condition, use cursor keys to move to the item you want to change and then enter a value.</td><td> 

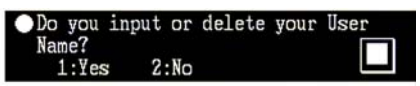
● This diagram shows what you will get if you move the cursor and enter the TIME field into an input wait.</td></tr>
<tr><td>8</td><td>Press the downward cursor key ▼ to blink the value part of the message field in the bottom row. Then select "Yes".

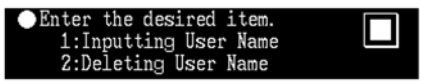
Yes [1] [ENTER]

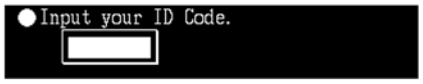
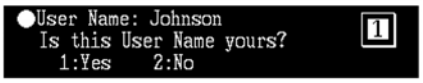
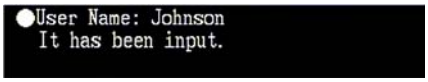
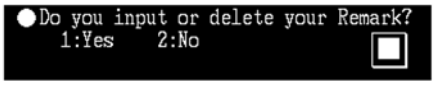
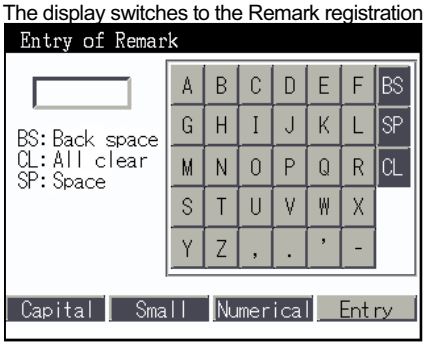
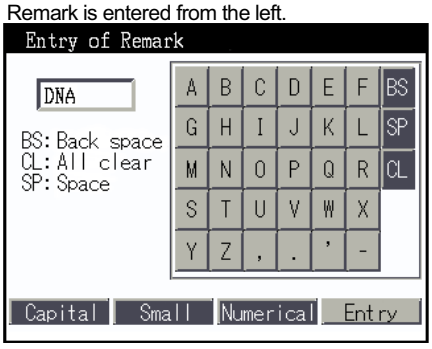
No [2] [ENTER]</td><td>>> If you select "Yes":
 

● The message field in the bottom row switches to what is shown in the diagram to the left, and the storing of the run conditions in memory unit 3 is completed.

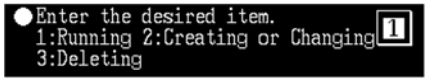
>> If you select “No”, the message field in the bottom row switches to what you see in process 4. Select a new setting.
 
</td></tr>
<tr><td>9</td><td>After entering memory run conditions, perform an entry operations for User Name.
(1) Press the ESC key.
(2) When attaching User Name to the memory run conditions, select "Yes".

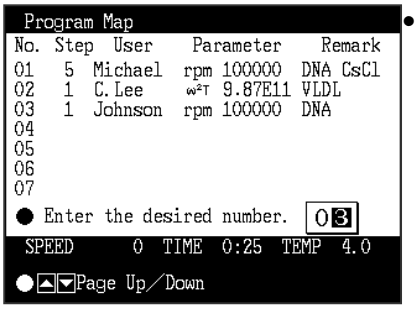
[1] [ENTER]</td><td>>> When you press ESC key, the bottom row message is displayed.
(1) A selection field as to whether User Name should be input or deleted appears.
 

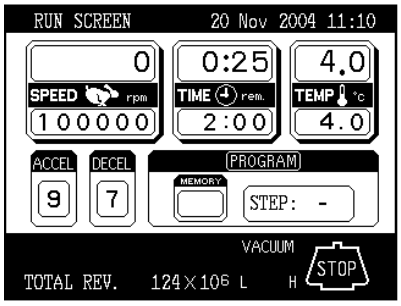
(2) A selection field for selecting either inputting or deleting appears.
 
</td></tr>
</table>

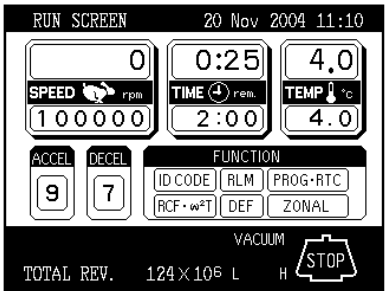
Step	Key operation	Screen display and considerations
9	(3) Select "Inputting User Name". [1] [ENTER] (4) Enter 4 digits of the ID CODE that is already registered. [0] [1] [2] [3] [ENTER] (5) Check User name and select “Yes”. [1] [ENTER]	(3) The display switches to the ID CODE input field.  (4) The display switches to the User Name check field.  (5) The display switches to the Registration completion message field. 
10	Add Remark to the run conditions in the memory. (1) Press the ESC key. (2) To add Remark to the run conditions in the memory, select “Yes”. [1] [ENTER] (3) Select “Inputting Remark”. [1] [ENTER] (4) Touch the screen to enter Remark in 8 characters or less.	>> When you press ESC key, the bottom row message is displayed. (1) A selection field to input or delete Remark appears.  (2) A selection field to select either inputting or deleting appears.  (3) The display switches to the Remark registration field.  (4) Remark is entered from the left. 

<table>
<tr><th>Step</th><th>Key operation</th><th>Screen display and considerations</th></tr>
<tr><td></td><td>(5) After entering the characters of Remark, touch the Entry on the lower right of the screen to register the character string.
(6) Check the contents of Remark and select "Yes".
[1] [ENTER]</td><td>(5) The display switches to the Remark check field.
 

(6) The display switches to the registration completion message field.
 
</td></tr>
<tr><td>11</td><td>When the storing is over, press ESC key several times.</td><td>>> The first push on ESC key switches the message display in the bottom row to what you see in process 3 as shown below. To run this centrifuge, select Running.
 

>> Pushing ESC key a second time displays the Program Map screen shown in process 3.
 

● Make sure that the condition is stored in memory number 3.
>> The third push on ESC key switches you back to the Run Screen (program screen).
 
</td></tr>
</table>

Step	Key operation	Screen display and considerations
11		>> The fifth push on ESC key switches you back to the Run Screen (FUNCTION field). 

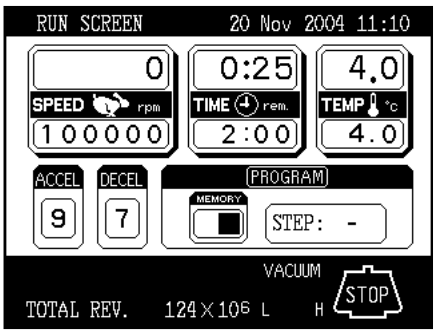
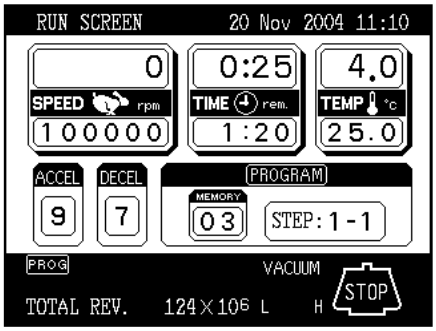
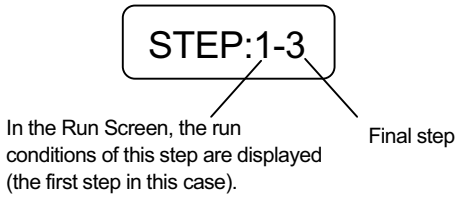
NOTE (1) If you make and store changes in a memory area that already stores run conditions, the previous conditions are replaced by the new conditions.

(2) You cannot store a run condition while in running (while the rotor is rotating). Always perform this function while not in running.

1. How to perform a programmed operation

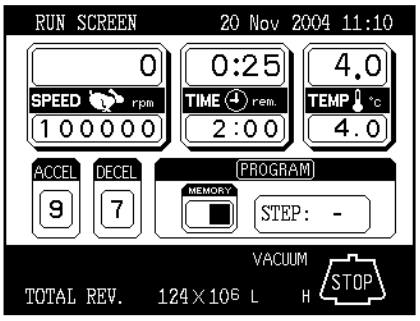
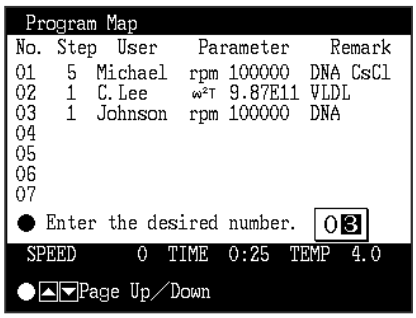
Shown below is how to perform a “programmed operation”, that is, how to call a stored set of run conditions and run this centrifuge accordingly.

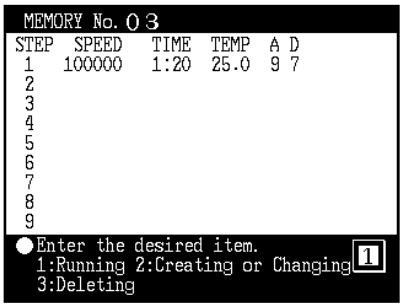
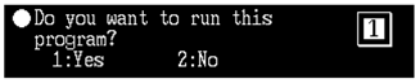
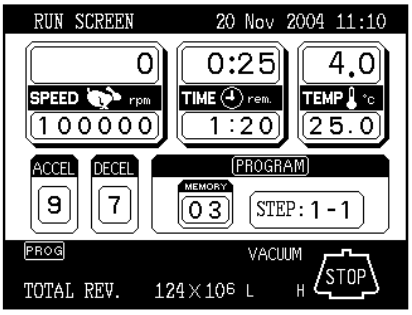
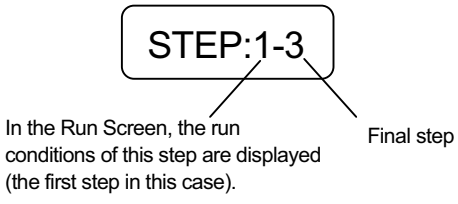
(a) If you know which memory unit number you need

Step	Key operation	Screen display and considerations
1	Turn on the POWER switch on the centrifuge.	>> The panel display appears. >> The door unlocks.
2	Install a rotor.	>> Install the rotor securely on the shaft.
3	On the Run Screen, touch PROG·RTC. While PROG·RTC is blinking, touch PROG·RTC again. Then, touch PROG. While PROG is blinking, touch PROG again. If using the cursor keys,move the cursor to PROG·RTC and then press ENTER key. Next, move the cursor to PROG and press ENTER key.	 ● The FUNCTION field switches to the PROGRAM field. ● The MEMORY No. setting field blinks.
4	Enter the memory unit number you wish to operate. Example: To call memory unit 3, press 3 ENTER	 ● The run conditions in memory appear in the respective fields. >> The message field in the bottom row displays PROG . >> If the STEP field displays what is shown below, this means that the memory unit you have just called stores multiple run conditions (step-mode feature). For details, see 3-5-2 “Step-mode operation”.  >> The system does not accept any key input to specify a memory unit number that stores no data.

Step	Key operation	Screen display and considerations
5	Run the centrifuge under normal operation without making changes to the run conditions.	>> Run this machine according to 3-3-1 ﾒNormal operationﾓ. >> If you make changes to the run conditions (such as SPEED and TIME) after calling a program, the program you have just called is canceled. You must call it again to use it.

(b) If you do not know which memory number you need

Step	Key operation	Screen display and considerations
1	Turn on the POWER switch of this machine.	>> The panel display appears. >> The door unlocks.
2	Install a rotor.	>> Install the rotor securely on the shaft.
3	On the Run Screen, touch PROG･RTC. While PROG ･ RTC is blinking, touch PROG･RTC again. Then, touch PROG. While PROG is blinking, touch PROG If using the cursor keys, move the cursor to PROG･RTC and then press ENTER key. Then, move the cursor to PROG and press ENTER key.	 ● The FUNCTION field switches to the PROGRAM field. ● The MEMORY No. setting field blinks.
4	Touch PROGRAM. While PROGRAM is blinking, touch PROGRAM again. If using the cursor keys, press the upward cursor key to blink PROGRAM . Then press ENTER key.	 ● The display switches to the Program Map screen and the MEMORY No. selection field blinks.

Step	Key operation	Screen display and considerations
	Use numeric keys to enter the memory number where you have stored data. To call memory unit 3, press [3] [ENTER]	 ● The image of the specified memory unit appears. >> If the contents of the memory unit you have just called is not what you want, press ESC to switch back to the Program Map screen and then call another memory unit number.
6	If you get the memory unit you want, select Running. [1] [ENTER]	 ● The message field in the bottom row switches to what you see below.
7	To run the centrifuge, select "Yes". Yes [1] [ENTER] No [2] [ENTER]	 ● The display switches to the Run Screen. ● The run conditions in memory appear in the respective fields. >> The message field in the bottom row displays PROG . >> If the STEP field displays what is shown below, this means that the memory unit you have just called stores multiple run conditions (step-mode feature). For details, see 3-5-2 “Step-mode run”.  >> If you select "No", the message field in the bottom row displays what you see in process 4. Select a new condition.

Step	Key operation	Screen display and considerations
8	Start running the centrifuge under normal operation with no changes made to the run conditions.	>> Run this machine according to 3-3-1 "Normal operation". >> If you make changes to the run conditions (such as SPEED and TIME) after calling a program, the program you have just called will be canceled. You must call the program again to use it.

NOTE (1) To check the contents (run conditions) of the memory unit for the program while in running, follow processes 3 through 5 in (b) "If you do not know which memory unit number you need." After the check, press ESC to get back to the Run Screen.

(2) To perform a combination of a programmed run with RTC (real-time control) (see 3-5-3 "RTC feature"), call a programmed memory unit, then set RTC. The system will then calculate the total of the running times of all steps of the programmed run and calculate the start time for RTC. Therefore, cannot call the program memory after setting RTC.

3-5-2 Step-mode operation

This ultracentrifuge incorporates a step-mode operation feature, which stores two or more run conditions in one program memory area and switches between different values of speed, running time, temperature, and other parameters while in operation. This centrifuge can store up to nine steps.
This section explains how to make settings by citing some examples.

(1) How to activate a step-mode operation

[Typical settings]

Shown below is the example of a three-step run and how to activate a step-mode operation.

	Step 1	Step 2	Step 3
Speed	100,000 rpm	90,000 rpm	80,000 rpm
Run time	3 h	2 h	1 h
Temperature	20℃	20℃	20℃
Acceleration mode	9	9	9
Deceleration mode	9	9	7

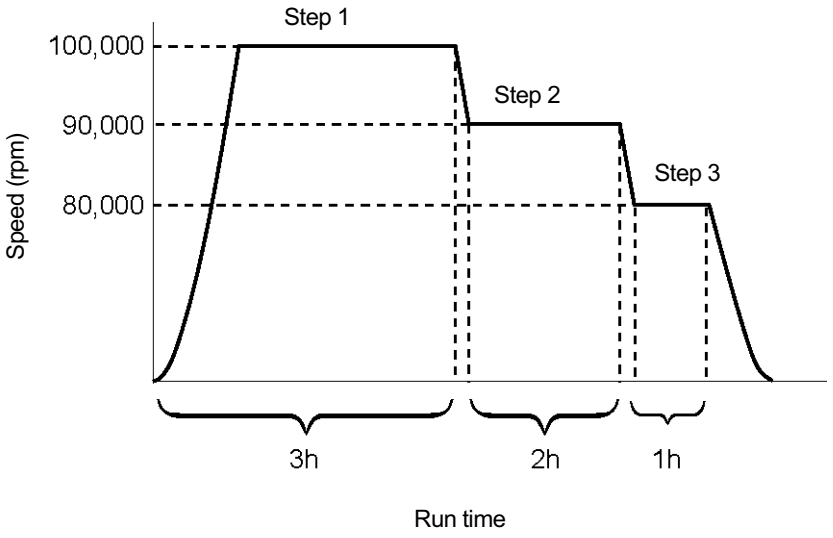
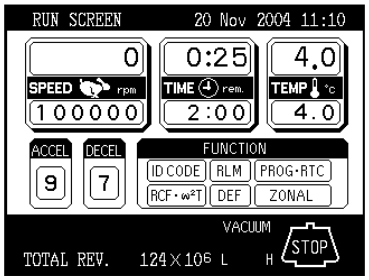
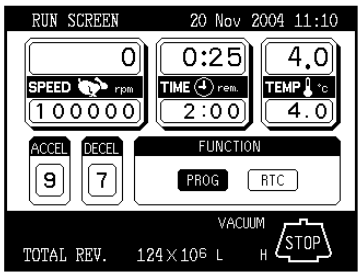
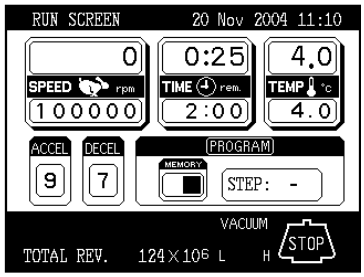
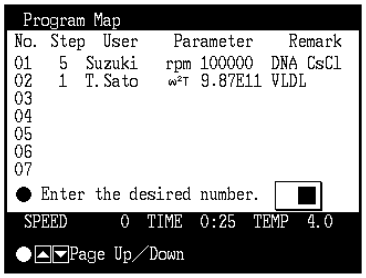
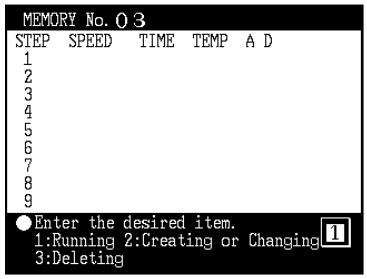
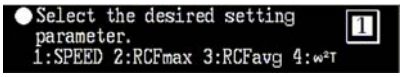


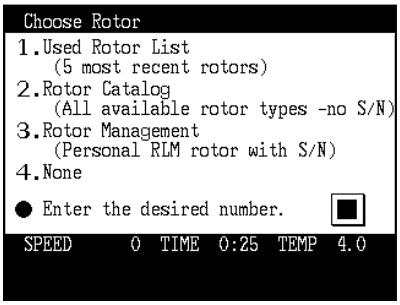
Fig. 3-5-4 A typical step-mode run

Step	Key operation	Screen display and considerations
1	On the Run Screen, touch PROG·RTC. While PROG · RTC is blinking, touch PROG·RTC again. Then, touch PROG. While PROG is blinking, touch PROG again. If using the cursor keys, move the cursor to PROG·RTC and press ENTER key. Then, move the cursor to PROG and press ENTER key.	   ● The FUNCTION field switches to the PROGRAM field. ● The MEMORY No. setting field blinks.
2	Touch PROGRAM. While PROGRAM is blinking, touch PROGRAM again. If using the cursor keys, press the upward cursor key to cause PROGRAM to blink, then press ENTER key.	 ● The display switches to the Program Map screen and the MEMORY No.selection field blinks. ● To store a new condition, enter it into an empty memory unit.
3	Use numeric keys to enter a memory unit number you wish to store. To store a condition in memory unit 3, press 3 ENTER	 ● The image of the specified memory unit appears.

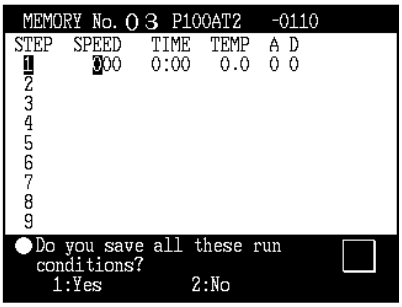
<table>
<tr><th>Step</th><th>Key operation</th><th>Screen display and considerations</th></tr>
<tr><td>4</td><td>Select "Creating or Changing."

2 ENTER</td><td> 

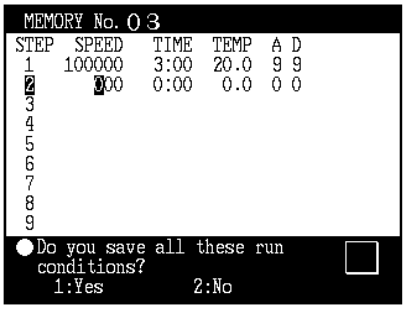
● The message field in the bottom row switches to what you see on your left-hand side.</td></tr>
<tr><td rowspan="2">5</td><td>Enter a desired condition.
To select SPEED, press

1 ENTER</td><td> 

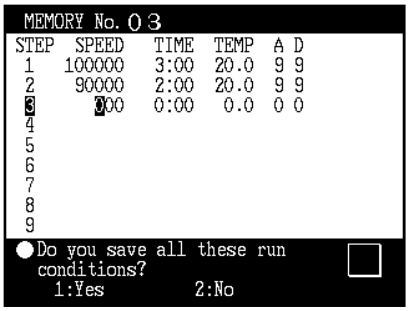
● The display switches to the Choose Rotor screen.</td></tr>
<tr><td>To select no rotor, press

4 ENTER</td><td> 

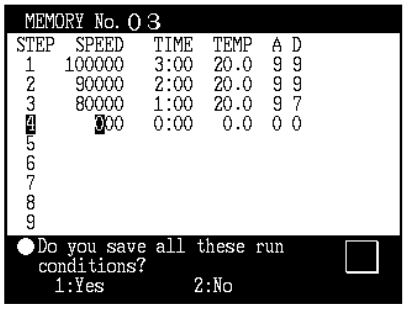
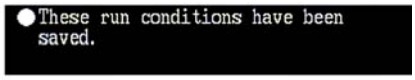
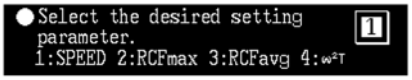
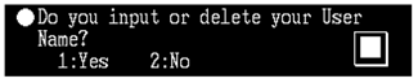
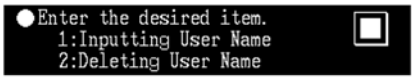
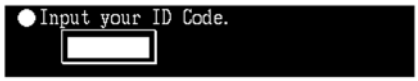
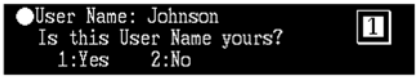
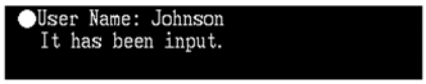
● The display switches to the SPEED priority setting field and the SPEED area blinks.
>> To select and enter RCFmax or RCFavg, see 3-5-1 (1) "Program-ming procedure for run conditions (Creating or Changing).</td></tr>
<tr><td>6</td><td>Specify run conditions for step 1.

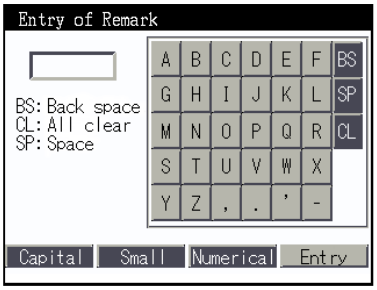
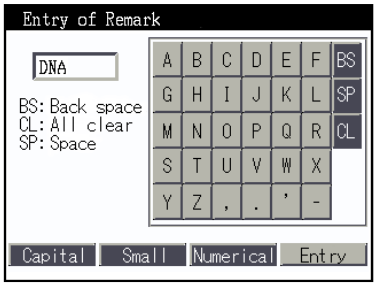
1 0 0 0 ◐
3 ◐
2 0 ◐
9 ◐
9 ◒ (Downward cursor key)</td><td> 

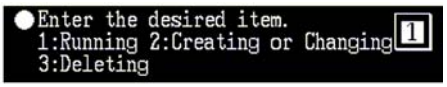
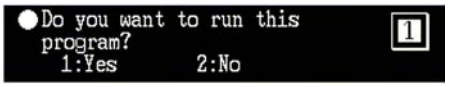
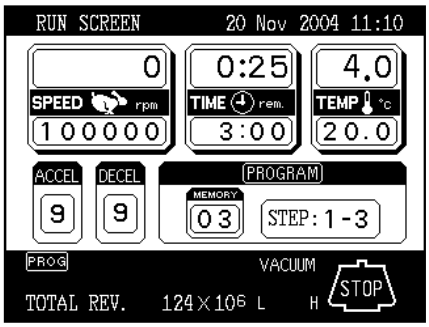
● The entry of run conditions for step 1 is complete.
>> If you press the cursor key ◒ (downward) after setting numeric value for DECEL (D) in step 1, setting the run conditions in step 1 finishes and step 2 enters into an input wait state.</td></tr>
<tr><td>7</td><td>Then specify run conditions for step 2.

9 0 0 ◐
2 ◐
2 0 ◐
9 ◐
9 ◒ (Downward cursor key)</td><td> 

● The entry of run conditions for step 2 is complete.</td></tr>
</table>

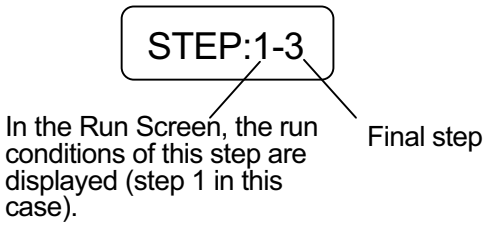
Step	Key operation	Screen display and considerations
8	Lastly, specify run conditions for step 3. 8 0 0 ◗ 1 ◗ 2 0 ◗ 9 ◗ 7 ◆ (Downward cursor key)	 ● The entry of run conditions for step 3 is complete and step 4 is ready for into.
9	Press the downward cursor key ◆ to blink the value part of the message field in the bottom row. Then select "Yes". Yes 1 ENTER No 2 ENTER	>> If you select "Yes":  >> If you select “No”, the message field in the bottom row switches to what you see in process 4. Select a new setting.  ● The message field in the bottom row switches to what is shown in the diagram on your left-hand side, and the storing of the run conditions in the appropriate memory unit is completed.
10	After entering step-mode run conditions, perform an entry operations for User Name. (1) Press the ESC key. (2) When attaching User Name to the memory run conditions, select "Yes". 1 ENTER (3) Select "Inputting User Name". 1 ENTER (4) Enter 4 digits of the ID CODE that is already registered. 0 1 2 3 ENTER (5) Check User Name and select "Yes". 1 ENTER	>> When you press ESC key, the bottom row message is displayed. (1) A selection field as to whether User Name should be input or deleted appears.  (2) A selection field for selecting either inputting or deleting appears.  (3) The display switches to the ID CODE input field.  (4) The display switches to the User Name check field.  (5) The display switches to the Registration completion message field. 

Step	Key operation	Screen display and considerations
11	Add Remark to the run conditions in the memory. (1) Press the ESC key.	>> When you press ESC key, the bottom row message is displayed. (1) A selection field to input or delete Remark appears. 
	(2) To add Remark to the run conditions in the memory, select “Yes”. 1 ENTER	(2) A selection field to select either inputting or deleting appears. 
	(3) Select “Inputting Remark”. 1 ENTER	(3) The display switches to the Remark registration field. 
	(4) Enter Remark in 8 characters or less.	(4) Remark is entered from the left. 
	(5) After entering the haracters of Remark, touch the Entry on the lower right of the screen to register the character string.	(5) The display switches to the Remark check field. 
	(6) Check the contents of Remark and select "Yes". 1 ENTER	(6) The display switches to the registration completion message field. 

Step	Key operation	Screen display and considerations
12	Press ESC key when the storing is over. ESC	
13	Select "Running" 1 ENTER	
14	To run the centrifuge, select "Yes". Yes 1 ENTER No 2 ENTER	>> If you select "Yes"  • The display switches back to the Run Screen. • The run conditions of step 1 in memory appear in the respective fields. >> The message field in the bottom row displays PROG . >> If you select "No", the message field in the bottom row displays what you see in process 2. Make the selection again.
15	Start running the centrifuge under normal operation with no changes made to the operational conditions.	>> Run the centrifuge according to 3-3-1 ﾒNormal operationﾓ. >> If you make changes to the run conditions (such as SPEED and TIME) after calling a program, the program you have just called gets canceled. You must call the program again. >> Pressing START makes the rotor rotate under the run condition of step 1. >> When step 1 ends, the system moves to steps 2 and 3 automatically.

NOTE (1) Step display

The PROGRAM field displays steps as follows:



When the system finishes separating step 1 and moves to step 2,

When the system moves from step 2 to the final step 3,

Thus, you can see at a glance how many steps are stored in the specified memory and which step the centrifuge is following.

(2) While in running (while the rotor is rotating), you cannot store a step-mode run condition. Always perform this function while not in running.

(3) To check the contents (run conditions) of a step-mode program memory unit, follow processes 1 through 3. To get back to the Run Screen after the check, press ESC key.

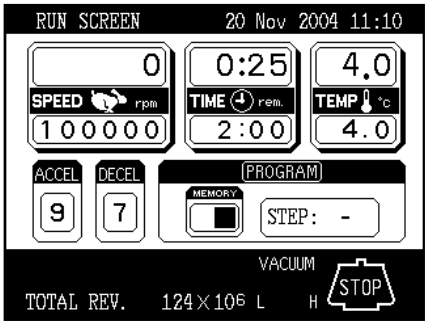
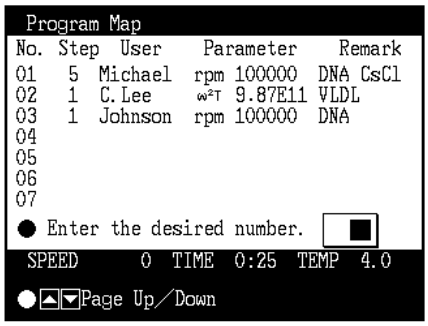
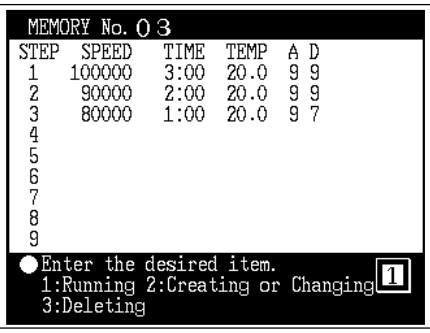
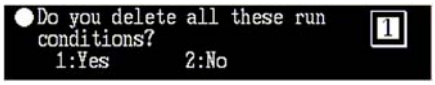
(4) To perform a combination of a step mode run with an RTC (real-time control) run (see Section 3-5-3 “RTC feature”), call a program memory unit, then set RTC.

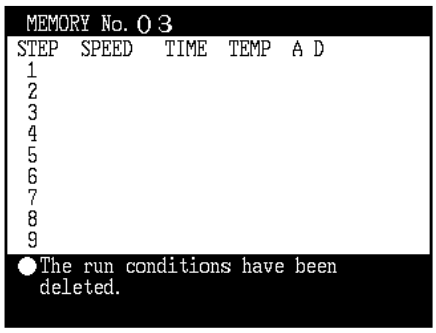
The system then calculates the total of running times of all steps of the programmed run and calculates the startup time for RTC. You therefore cannot call a program memory unit after setting RTC.

(2) Deleting a program

This section explains how to delete a set of run conditions stored in program memory.
To delete a memory unit, delete all steps in that memory unit.

NOTE While in running, you cannot delete a program memory unit. Do not perform this function while not in function.

Step	Key operation	Screen display and considerations
1	On the Run Screen, touch PROG·RTC. While PROG · RTC is blinking, touch PROG·RTC again. Then, touch PROG. While PROG is blinking, touch PROG again. If using the cursor keys, move the cursor to PROG·RTC and press ENTER key. Then, move the cursor to PROG and press ENTER key.	 ● The FUNCTION field switches to the PROGRAM field. ● The MEMORY No. setting field blinks.
2	Touch PROGRAM. While PROGRAM is blinking, touch PROGRAM again. If using the cursor keys, press the upward cursor key to cause PROGRAM to blink, then press ENTER key.	 ● The display switches to the Program Map screen and the MEMORY No.selection field blinks.
3	Use numeric keys to enter a memory unit number you wish to store. To store a condition in memory unit 3, press 3 ENTER	 ● The image of the specified memory unit appears.
4	Select "Deleting." 3 ENTER	 ● The message field in the bottom row switches to what you see on your left.

Step	Key operation	Screen display and considerations
5	To delete this memory unit, select Yes. Yes [1] [ENTER] No [2] [ENTER]	>> If you select "Yes":  ● The system deletes all run conditions in memory unit 3. (While in step mode, all steps get deleted.) >> If you select "No", the screen switches to what you see in process 3. Make the selection again.
6	Press ESC several times to move back to the Run Screen.	>> If you delete a memory unit, you can no longer run the centrifuge according to that unit.

(3) Other procedures

1) Making changes to the run conditions
Call the memory unit you want to make changes to and make the changes. Alternatively, delete the memory unit, then store a new set of run conditions.
To make a change that will result in fewer steps, delete the memory unit and then enter a new set of run conditions and store them.
While in a programmed run, modification of a run condition is limited to the step which is currently running.

2) Running the centrifuge starting from an intermediate step
You cannot run the centrifuge starting from an intermediate step in a memory unit that contains multiple steps.
Store (register) run conditions for the intermediate step and later steps in another memory unit. Then call the memory unit and run it.

3) What if a SPEED alarm goes on?
If a step stores a speed exceeding the maximum allowable speed of your rotor, the system will detect it in the step 1 run and display the SPEED alarm.
Double-check the speed of all steps and correct any wrong ones.

4) Stopping the centrifuge in operation
Press STOP. The rotor stops and the system does not move to the next step.

3-5-3 RTC (real-time control) feature

The CP-WX Series contains an internal clock, allowing you to run the machine at a specified start or finish time for centrifugation. This feature for running the machine at a specified time is called the RTC (real-time control) feature. The feature saves you the trouble of calculating the delay time for "delayed-start operation". Explained below is how to perform an RTC run, with an example.

Example: If you wish to install your rotor on the centrifuge under the run conditions listed below on the evening of November 20 and to take out the samples around 9:30 the next morning;

(1) Rotor: P100AT2
(2) RPM: 100,000 rpm
(3) Separation time: 4 hours
(4) Control temperature: 4 ℃
(5) Acceleration mode: 9
(6) Deceleration mode: 7

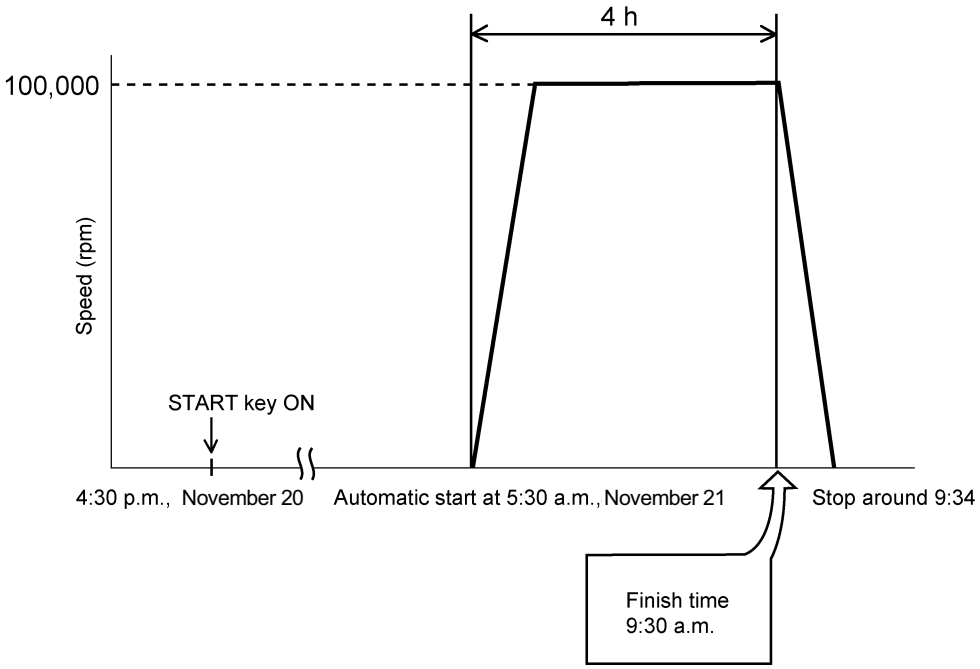
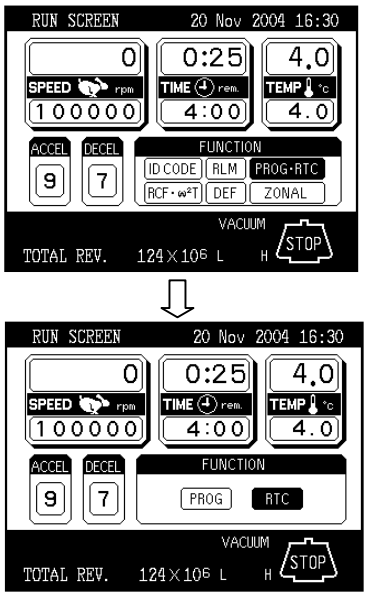
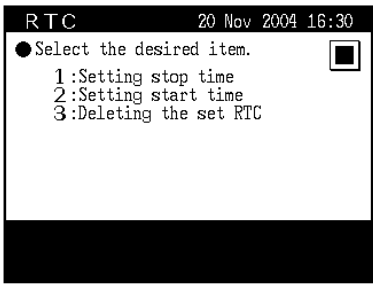
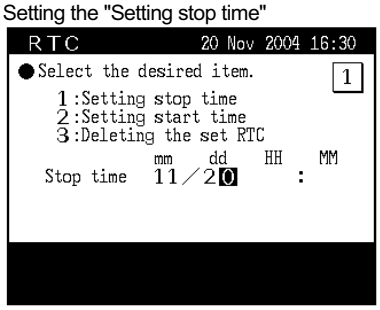
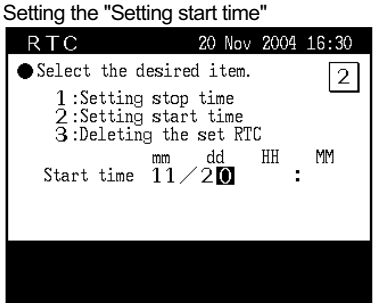
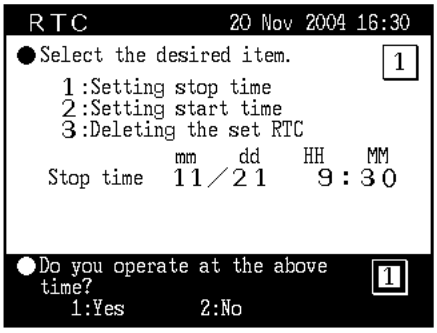
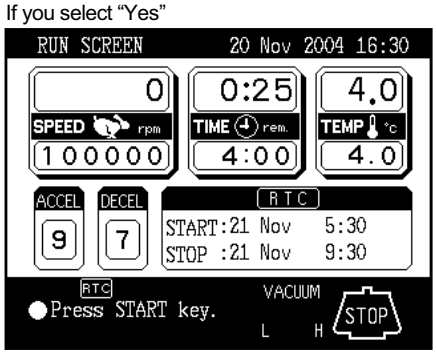


Fig. 3-5-5 A typical RTC run

In this example, you set the above run conditions (2) through (6), set the finish time for RTC run to 9:30, November 21 and start the centrifuge.
(You can make an identical setting by setting the start time to 5:30 instead of setting the finish time to 9:30.)

1. How to perform an RTC run

Step	Key operation	Screen display and considerations
1	Set operational conditions while in the Run Screen. Example: RPM: 100,000 rpm Separation time: 4 hours Control temperature: 4 ℃ Acceleration mode: 9 Deceleration mode: 7 Next,touch PROG･RTC. While PROG ･ RTC is blinking, touch PROG･RTC again. If using the cursor keys , move the cursor to PROG･RTC and press ENTER key.	 ● Blink the PROG･RTC in the FUNCTION field. ● To specify the run time (centrifugation time), do not set HOLD. Use ten keys to enter the run time instead.
2	Touch RTC. While RTC is blinking, touch RTC again. If using the cursor keys , move the cursor to RTC and press ENTER key.	 ● The display switches to the RTC Setup screen.
3	Select the item you wish to set. To select the “Setting stop time”, press 1 ENTER	>> Setting the "Setting stop time"  ● The "dd" item blinks. "mm" and "dd" indicate the current date as a default. >> Setting the "Setting start time"  ● If you do not make any input for 30 seconds, the cursor disappears, and you cannot make an input. At that time, press a cursor key.

Step	Key operation	Screen display and considerations
4	Use cursor keys and numeric keys to enter month, day, hours, and minutes. Lastly, press ENTER key.	 >> To set the hours, use a number between 0 and 23 (in the 24-hour system). >> Enter a time later than the current time. When setting the “Setting stop time”, allow for centrifugation time and set the centrifugation start time to a time later than the current time. >> You cannot set the centrifugation start time to a date more than 20 days in the future.
5	If you are sure that you have made the correct settings, select Yes. Yes [1] [ENTER] No [2] [ENTER]	>> If you select “Yes”  • The display switches to the Run Screen and the specified RTC time appears. • The message field displays RTC . >> If you select “No”, you will get the display you see in process 2. Make the selection again.
6	Check the RTC setting in the Run Screen, then press START key. [START] The RTC run does not get activated unless you press START key.	>> Run this machine according to Section 3-3-1 “Normal operation”. >> Once the RTC setting is made, you cannot change the run time (centrifugation time). If you wish to make a change to the run time, cancel RTC first. >> Pressing START enters the system into a “DELAY” condition causing the centrifuge to wait until the set time comes. This centrifuge will turn the rotor automatically at the specified time and run it for the specified period. The RTC run does not get activated unless you press START key.  • The run mode in the message display field switches to “DELAY.”

NOTE

1. For an RTC run, the run mode indicator on the display panel displays the following:

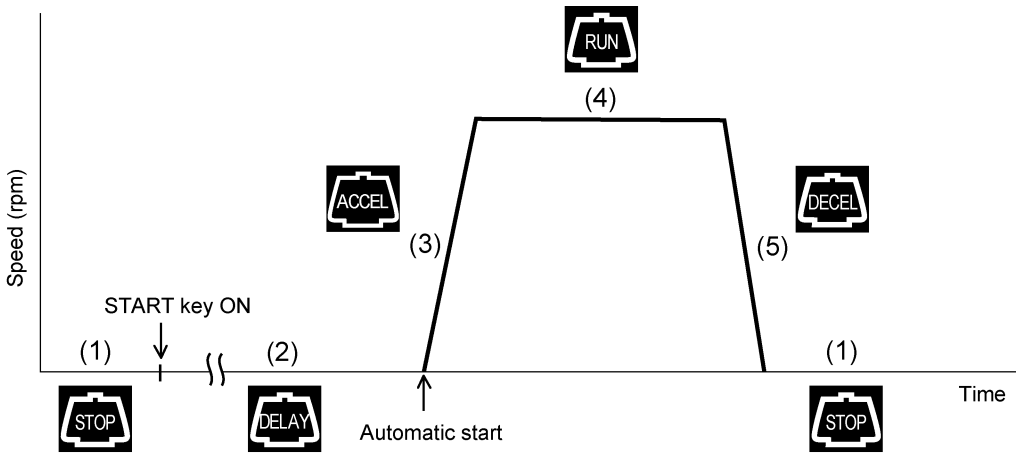


Fig. 3-5-6 Run mode display (RTC)

2. You cannot make an RTC setting in any of the following cases:
   (1) When the Run Screen is set to HOLD (continuous run)
   ☞ Set the run time (centrifugation time) not to HOLD but to a numerical value.

   (2) When it is past the start time
   ☞ Set the start time to a time later than the current time.

   (3) When the start time is more than 20 days after the current time
   ☞ Set the time to a time no more than 20 days afterwards.

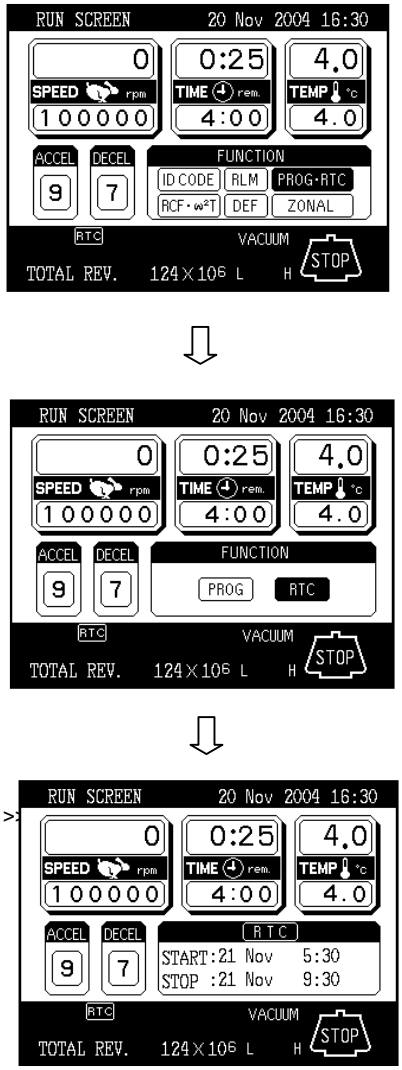
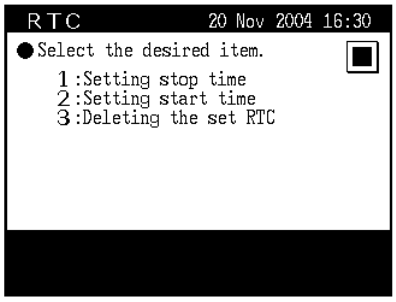
3. To change the run time (centrifugation time) after making an RTC setting, cancel RTC and then set a new run time.

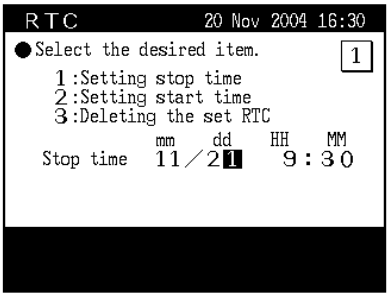
4. To perform a combination of a programmed operation (including a step-mode operation) with an RTC run, call a program memory unit, then set RTC.
   The system calculates the total run times of all steps of the programmed operation and calculates the start time for RTC.
   Therefore, cannot call the program memory unit after setting RTC.

5. To stop this ultracentrifuge in RTC operation, press STOP key. The system then stops RTC and stops the rotor.

2. Making changes to the RTC settings

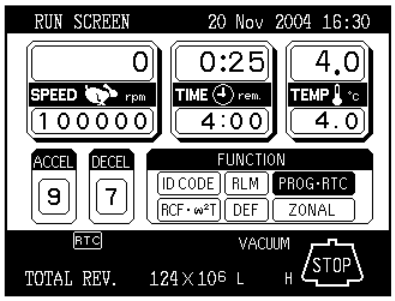
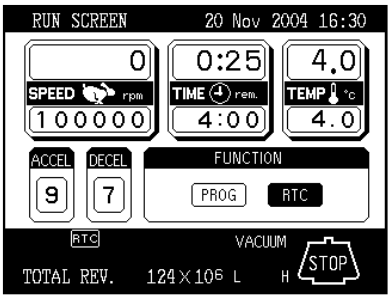
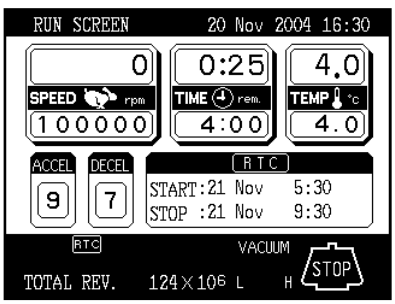
This section shows how to make changes to the RTC settings you have made.
If you have already started an RTC run, press STOP to abort the RTC first. Press STOP to cancel the RTC run.

Step	Key operation	Screen display and considerations
1	(1) On the Run Screen, touch PROG·RTC. While PROG · RTC is blinking, touch PROG·RTC again. If using the cursor keys , move the cursor to PROG·RTC and press ENTER key. (2) Touch RTC. While RTC is blinking, touch RTC again. If using the cursor keys , move the cursor to RTC and then press ENTER key.	 ● The FUNCTION field switches to the RTC field.
2	Touch RTC. While RTC is blinking, touch RTC again. If using the cursor keys press cursor keys to blink RTC and then press ENTER key.	

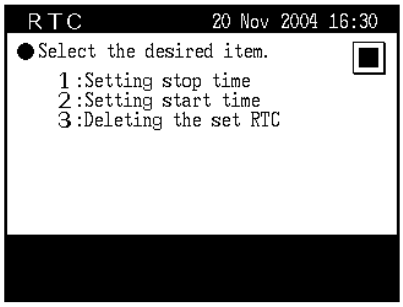
Step	Key operation	Screen display and considerations
3	Making a change to date and time settings (1) Select “Setting stop time” or “Setting start time”. To change the “Setting stop time”, press [1] [ENTER]	 ● The screen switches to a screen where you can enter a stop time (or start time).
	(2) Perform process 4 and later ones in 1. "How to perform an RTC run" mentioned above and change the date and time settings.	See (1) "How to perform an RTC run."

3. Canceling the RTC settings

The canceling procedure varies depending on whether the RTC run is started (START is pressed) or not.

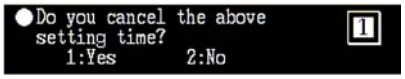
Step	Key operation	Screen display and considerations
1	(1) On the Run Screen, touch [PROG·RTC]. While [PROG · RTC] is blinking, touch [PROG·RTC] again. If use the cursor keys, move the cursor to [PROG·RTC] and press ENTER key. (2) Touch [RTC]. While [RTC] is blinking, touch [RTC] again. If using cursor keys, move the cursor to [RTC] and then press ENTER key.	 ⇩  ⇩  ● The FUNCTION field switches to the RTC field. >> The message indicator displays [RTC] .

<table>
<tr><th>Step</th><th>Key operation</th><th>Screen display and considerations</th></tr>
<tr><td>2</td><td>Touch RTC.
While RTC is blinking, touch RTC again.

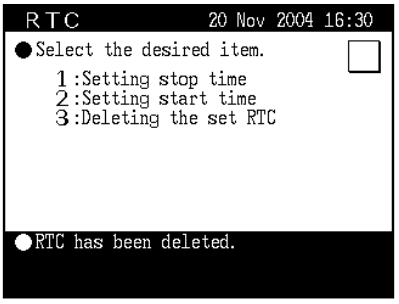
If using the cursor keys, press cursor keys to blink RTC and then press ENTER key.</td><td> 
</td></tr>
<tr><td rowspan="3">3</td><td>[Before starting the RTC run]
(1) Select "Deleting the set RTC".

3 ENTER

(2) Select "Yes".

1 ENTER</td><td>(1) 

• The message indicator in the bottom row changes.

(2) >> If you select "Yes"
 

• The RTC setting has been canceled.
• Press the cursor keys, when making the RTC setting.
• Press the ESC key, when switching back to the Run Screen.

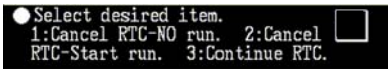
>> If you select "No", the display switches back to the Run Screen.</td></tr>
<tr><td>[After starting the RTC run]
(1) Select "Deleting the set RTC".

3 ENTER

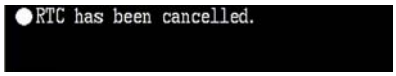
(2) Select "Cancel RTC-NO run".

1 ENTER

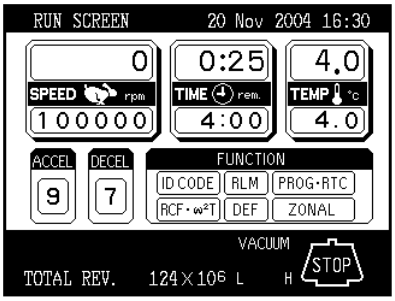
(2') Press ESC key.

ESC</td><td>(1) 

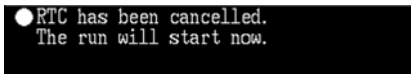
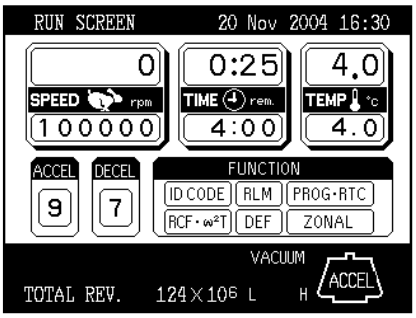
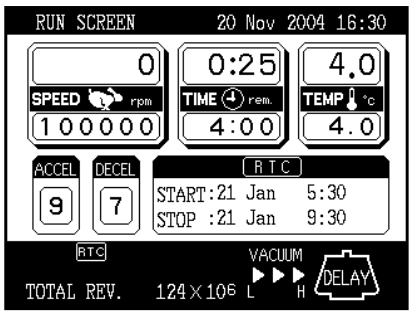
• The message indicator in the bottom row changes.

(2) 

• The RTC setting has been canceled.Then the buzzer sounds to indicate that the rotor stopped.

(2') 

• The display switches back to the Run Screen.
• The RTC in the message indicator in the bottom row disappears</td></tr>
</table>

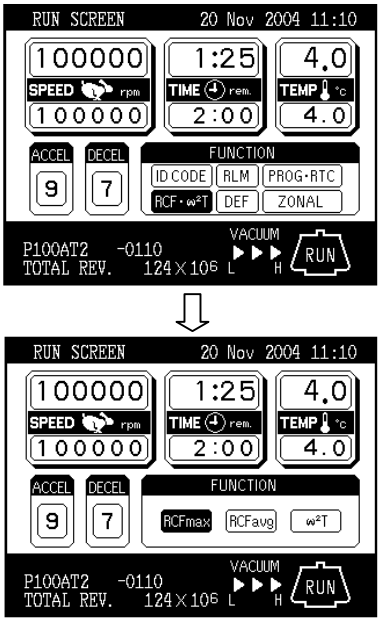
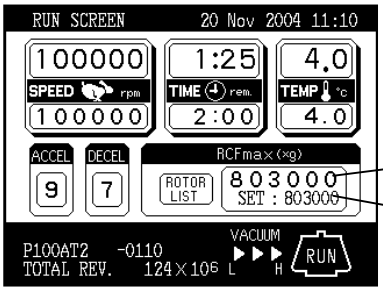
Step	Key operation	Screen display and considerations
	(3) Select "Cancel RTC-Start run". 2 ENTER (3)' Press the ESC key. ESC (4) Select "Continue RTC". 3 ENTER	(3)  (3')  • The display switches back to the Run Screen. • The RTC in the message indicator in the bottom row disappears. (4)  • The display switches back to the Run Screen.

3-5-4 Displaying and setting RCF

This ultracentrifuge stores the maximum and average radii of each rotor in internal memory. Setting a speed causes this centrifuge to automatically calculate and display the RCF (relative centrifugal force) value, while setting an RCF value causes the centrifuge to automatically calculate and display the speed.
Given below is a description of how to display and set RCF.

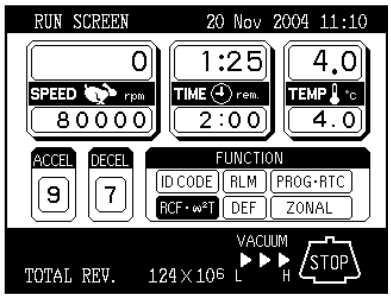
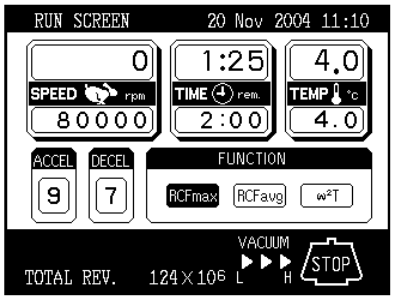
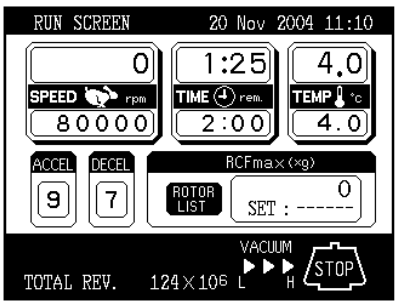
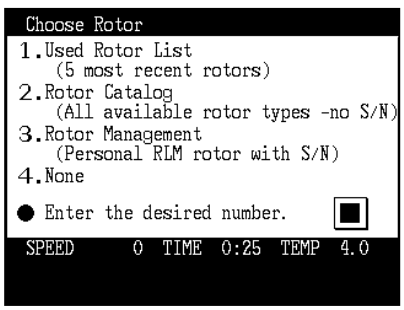
(1) How to display an RCF value

・ When the rotor to be used is already identified
(when Rotor type is displayed in the message display field)

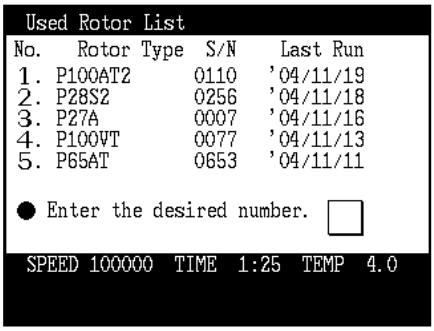
Step	Key operation	Screen display and considerations
1	While in the Run Screen, set a speed.	>> See 3-2-1 “Setting run conditions”.
2	On the Run Screen, touch RCF・ω^2T. While RCF・ω^2T is blinking, touch RCF・ω^2T again. If using the cursor keys, move the cursor to RCF・ω^2T and press ENTER key.	 • The FUNCTION field switches to what is shown in the diagram to the left, and the RCFmax field blinks.
3	Touch RCFmax (or RCFavg). While RCFmax (or RCFavg) is blinking, touch RCFmax (or RCFavg) again. If using the cursor keys, move the cursor to RCFmax (or RCFavg) and press ENTER key.	 • The RCF display field displays the RCF value of the rotor in rotating. RCF display field RCF setting field >> The RCF value associated with the set speed you have just entered in process 1 appears in the RCF setting field.

NOTE Press ESC key to cancel the RCF field.

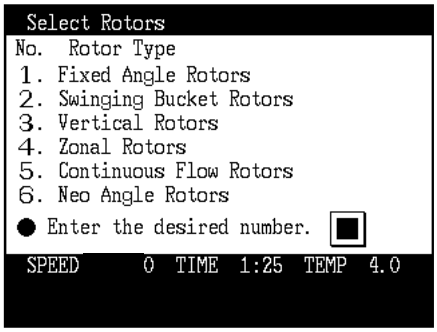
・ When the rotor to be used is not identified
(when Rotor type is displayed in the message display field)

Step	Key operation	Screen display and considerations
1	Set the speed on the Run Screen.	>> See 3-2-1 “Setting run conditions”.
2	(1) On the Run Screen, touch RCF・ω^2T. While RCF・ω^2T is blinking, touch RCF・ω^2T again. If using the cursor keys, move the cursor to RCF・ω^2T and press the ENTER key. (2) Touch RCFmax (or RCFavg). While RCFmax (or RCFavg) is blinking, touch RCFmax (or RCFavg) again. If using the cursor keys, move the cursor to RCFmax (or RCFavg) and press ENTER key.	(1)  (2)  • The contents of the display in the FUNCTION field change. • The RCFmax area blinks.  • The FUNCTION field switches to the RCF field. • ROTOR LIST blinks.
3	Check that ROTOR LIST blinks. Touch the ROTOR LIST or press the ENTER key. If the ROTOR LIST is not blinking, touch the ROTOR LIST or use the cursor keys to move the cursor to the ROTOR LIST . Then the ROTOR LIST blinks.	 • The display switches to the Choose Rotor screen.

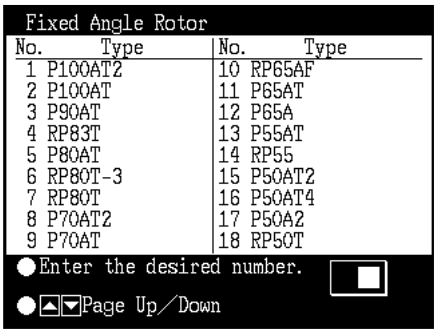
<table>
<tr><th>Step</th><th>Key operation</th><th>Screen display and considerations</th></tr>
<tr><td rowspan="4">4</td><td>Select a desired rotor.
To select a desired rotor from the "Used Rotor List":

1 ENTER</td><td> 

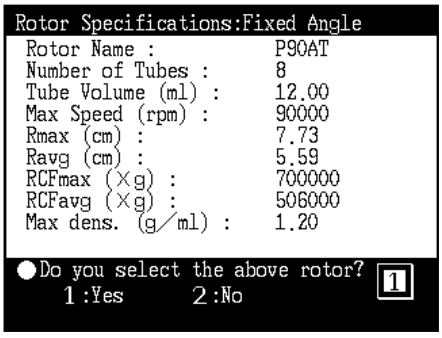
• The display switches to the Used Rotor List screen.
• You can search for the rotor number you need in the order starting with the latest date/time.</td></tr>
<tr><td>To select a desired rotor from the "Rotor Catalog":
(1') Select "Rotor Catalog".

2 ENTER</td><td> 

• The display switches to the Rotor List screen.</td></tr>
<tr><td>(2') Select Fixed Angle Rotors in the rotor types.
(When using fixed angle rotor P90AT)

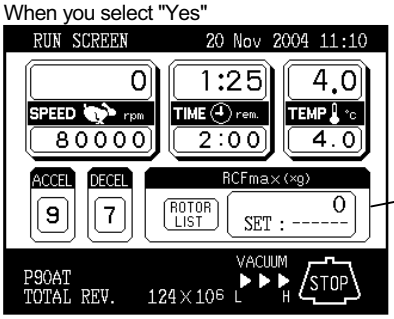
1 ENTER</td><td> 

• The fixed angle rotor list is displayed.</td></tr>
<tr><td>(3') Select fixed angle rotor P90AT.

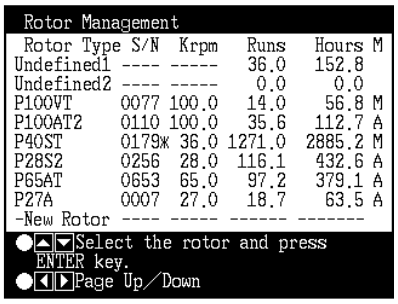
3 ENTER</td><td> 

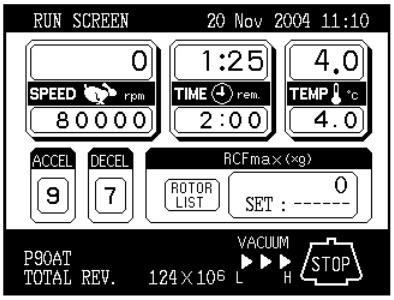
• The specifications of the P90AT rotor are displayed.</td></tr>
</table>

<table>
<tr><th>Step</th><th>Key operation</th><th>Screen display and considerations</th></tr>
<tr><td rowspan="3">4</td><td>(4') After checking the specifications of the rotor, select "Yes".

1 ENTER</td><td>>> When you select "Yes"
 

• The display switches back to the Run Screen and the selected rotor type is displayed in the message display field of the bottom row.
RCF display field
・ The RCF value of the running rotor is displayed in the RCF display field.
>> When you select “No”, the display goes to the same as the display of process 4 (2').</td></tr>
<tr><td>To select a desired rotor from the "Rotor Management":
(1) Select "Rotor Management".

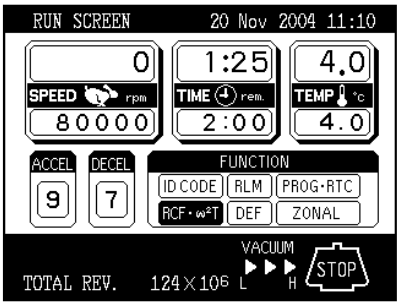
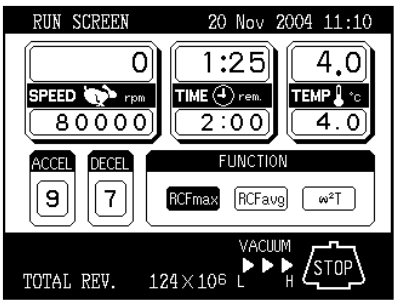
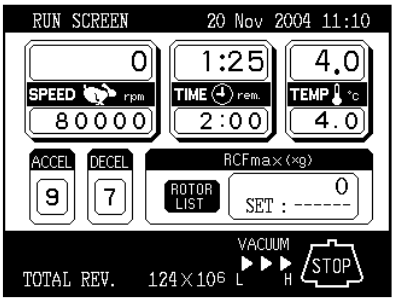
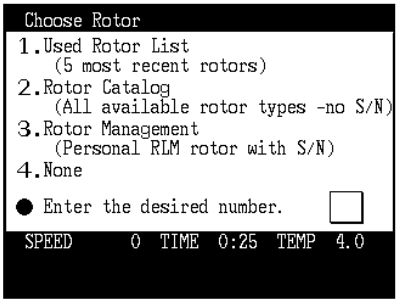
3 ENTER</td><td> 

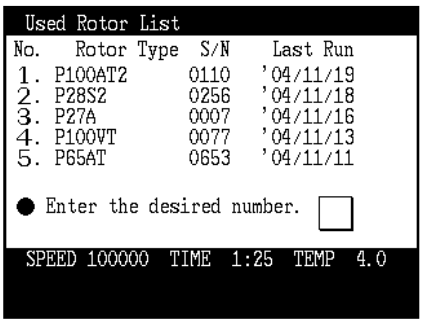
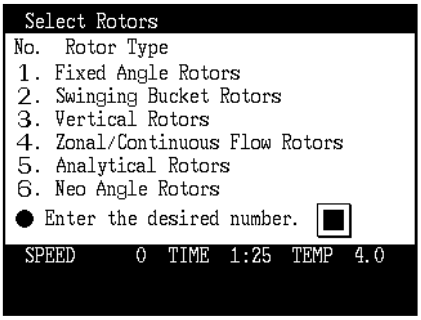
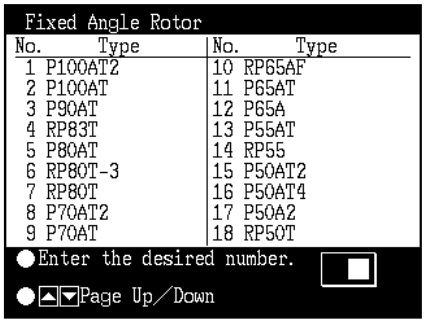
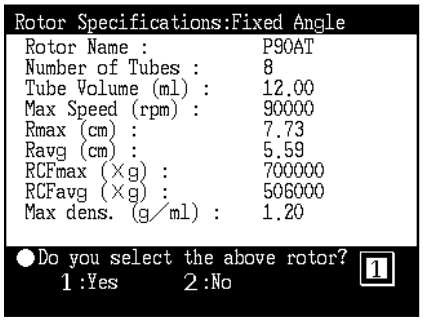
• The display switches to the Rotor Management screen and the Rotor List is displayed.</td></tr>
<tr><td>(2) Select a desired rotor using the upward or downward cursor key ◆ ◆ .
(When using fixed angle rotor P100AT2)
◆ ・・ ENTER</td><td> 

• The display switches back to the Run Screen and the selected rotor type is displayed in the message display field of the bottom row.
RCF display field
>> The RCF value of the running rotor is displayed in the RCF display field.</td></tr>
</table>

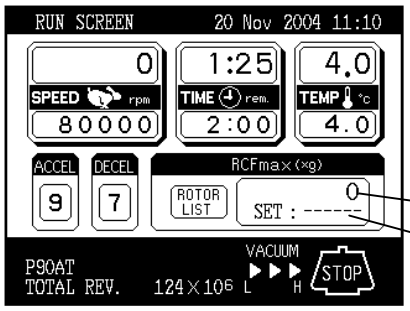
2. How to set an RCF value

Enter a rotor number and an RCF value, and the machine will calculate, set, and display the speed. Shown below is the procedure.

Step	Key operation	Screen display and considerations
1	While in the Run Screen, set a speed.	>> See 3-2-1 “Setting run conditions”.
2	(1) On the Run Screen, touch RCF・ω^2T. While RCF・ω^2T is blinking, touch RCF・ω^2T again. If use the cursor keys, move the cursor to RCF ω^2T and press ENTER key. (2) Touch RCFmax (or RCFavg). While RCFmax (or RCFavg) is blinking, touch RCFmax (or RCFavg) again. If using the cursor keys, move the cursor to RCFmax (or RCFavg) and press ENTER key.	(1)  (2)  • The FUNCTION field switches to what is shown in the diagram to the left. • The RCFmax field blinks.  • The FUNCTION field switches to the RCF field. • The ROTOR LIST field blinks.
3	Check that ROTOR LIST blinks. Touch the ROTOR LIST or press the ENTER key. If the ROTOR LIST is not blinking, touch the ROTOR LIST or use the cursor keys to move the cursor to the ROTOR LIST . Then the ROTOR LIST blinks.	 • The display switches to the Choose Rotor screen.

Step	Key operation	Screen display and considerations
4	Select a desired rotor. To select a desired rotor from the "Used Rotor List": (1) Enter No. that is found in the Rotor List. (Example: Select P100AT2.) [1] [ENTER]	 • The display switches to the Used Rotor List screen. • You can search for the rotor number you need in the order starting with the latest date/time.
	To select a desired rotor from the "Rotor Catalog": (1)' Select "Rotor Catalog". [2] [ENTER]	 • The display switches to the Rotor List screen.
	(2)' Select Fixed Angle Rotors in the rotor types. (When using fixed angle rotor P90AT) [1] [ENTER]	 • The fixed angle rotor list is displayed.
	(3)' Select fixed angle rotor P90AT. [3] [ENTER]	 • The specifications of the P90AT rotor are displayed.

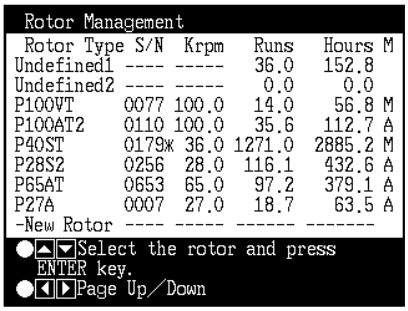
<table>
<tr><th>Step</th><th>Key operation</th><th>Screen display and considerations</th></tr>
<tr><td>4</td><td>(4') After checking the specifications of the rotor, select "Yes".

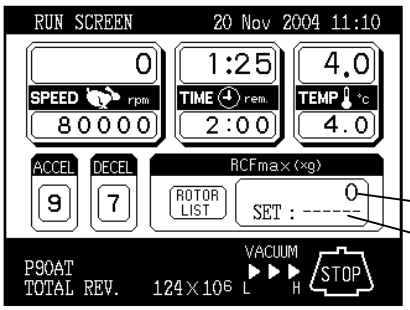
1 ENTER</td><td>>> When you select "Yes"
 

• The display switches back to the Run Screen and the selected rotor type is displayed in the message display field of the bottom row.
RCF display field
RCF setting field

>> The RCF value corresponding to the currently set speed is displayed in the RCF setting field.
(- - - - - - - - : Displayed at the initial time of no setting.)

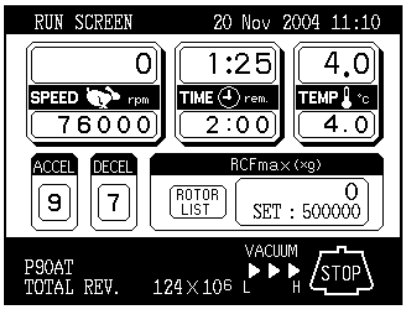
>> When you select “No”, the display goes to the same as the display of process 4 (2'). Perform setting again.</td></tr>
<tr><td></td><td>To select a desired rotor from the "Rotor Management":
(1) Select "Rotor Management".

3 ENTER</td><td> 

• The display switches to the Rotor Management screen and the Rotor List is displayed.</td></tr>
<tr><td></td><td>(2) Select a desired rotor using the upward or downward cursor key ⬢ ⬢ .
(When using fixed angle rotor P100AT2)
⬢ ・・ ENTER</td><td> 

• The display switches back to the Run Screen and the selected rotor type is displayed in the message display field of the bottom row.
RCF display field
RCF setting field

>> The RCF value corresponding to the currently set speed is displayed in the RCF setting field.
(- - - - - - - - : Displayed at the initial time of no setting.)</td></tr>
</table>

Step	Key operation	Screen display and considerations
5	Touch the inside of the frame of the RCF setting field. If using the cursor keys, move the cursor to the RCF setting field And enter a desired centrifugal force. Example: RCFmaX = 5000 x 100g 5 0 0 0 ENTER	 • The value you have just entered appears in the RCF setting field. • Based on the rotor and RCF value, the system automatically calculates the speed and displays it in the SPEED display field. · Specify the RCF value to hundreds. If you make no input for 30 seconds, the cursor will disappear, and you will be unable to make an input. At that time, press a cursor key.

NOTE (1) Press ESC key to cancel the RCF field.

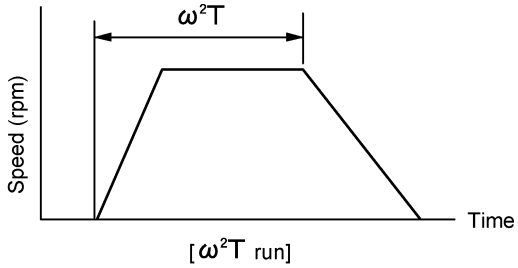
(2) When you run this centrifuge at a speed determined based on an RCF value, there may occur a slight error (of up to 2%) between the set RCF value and the actual value, because the speed setting is set in increments of 100 rpm.

If determining an RCF value based on the set speed, it may include an error (up to 2%) because the speed is set in increments of 100rpm.

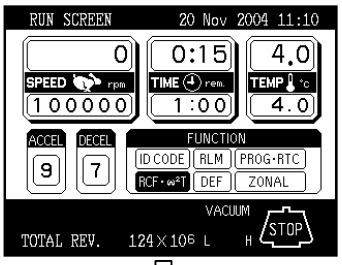
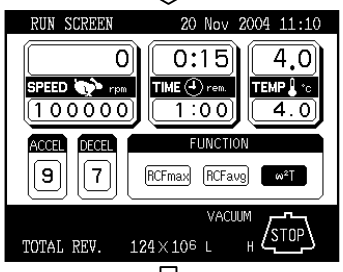
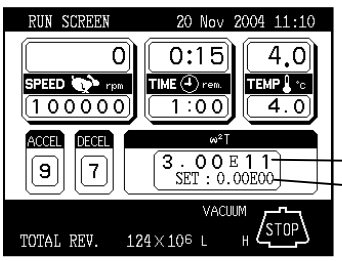
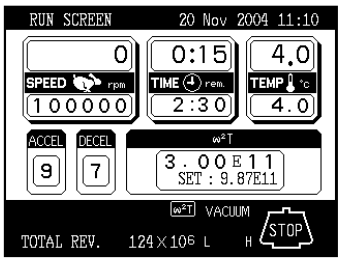
If determining the speed based on the set RCF, it may include an error (up to 2%) because the RCF is set in increments of 100xg.

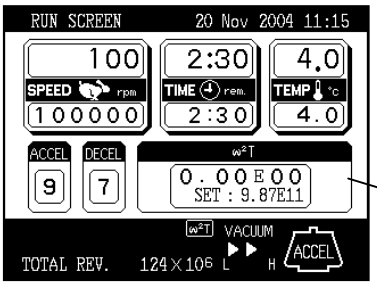
3-5-5 Setting ω²T

This machine is provided with a function to perform an run. To perform an ω²T run, set the ω²T value instead of the run time.



[ω²T run]

Step	Key operation	Screen display and considerations
1	Set the Speed in the Run Screen.	>> See 3-2-1 "Setting run conditions".
2	(1) On the Run Screen, touch RCF・ω²T. While RCF・ω²T is blinking, touch RCF・ω²T again. If using cursor keys, move the cursor to RCF ω²T and press the ENTER key. (2) Touch ω²T. While ω²T is blinking, touch ω²T again. If using the cursor keys, move the cursor to ω²T and press the ENTER key.	(1)  (2)  • The contents of the display in the FUNCTION field change. • ω²T blinks.  • The FUNCTION field switches to the ω²T field. ω²T display field ω²T setting field
3	Touch the inside of the frame of the ω²T setting field. If using cursor keys, move the cursor to the ω²T setting field and enter a desired ω²T value. Example: 9.87 x 1011 9 ⁄ 8 7 ◐ 1 1 ENTER	 • The The value you entered is displayed in the ω²T setting field. • The Time value is calculated from the Speed and the ω²T value and the run time is displayed in the Time setting field.

Step	Key operation	Screen display and considerations
4	When you press START key, the machine starts to perform an ω^2T run.	 • Arithmetic and integral operations are performed in the ω^2T display field. ω^2T display field

NOTE (1) When the ω^2T display field reaches the set value of ω^2T, the machine decelerates and stops. During deceleration, ω^2T is integrated and its result is displayed until a stop.

(2) An ω^2T Run can be cancelled according to the followings.

1) Change the run time setting.

2) Press the CE key when the following conditions are met.

a) During the rotor stops

b) when no alarm indicates

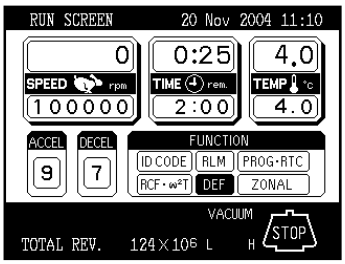
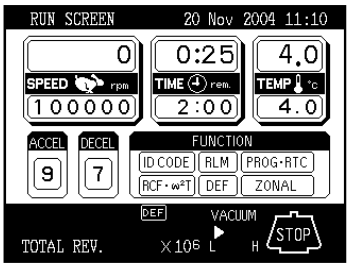
c) when the cursor is not blinking (when any run condition is not input)

The ω^2T in the message indicator in the bottom row disappears on the Run Screen, when an ω^2T Run can be cancelled.

3-5-6 Defrost (defrosting and drying) function

Perform defrosing and drying by using the defrost function in either of the following cases.
(1) To defrost and dry the rotor chamber before operation or after removal of the rotor after operation.
(2) To prevent condensation in the rotor chamber at removal of the rotor after operation.

NOTE (1) It takes much time to reach a high vacuum level if the rotor chamber is wet.
(2) Close the door before starting defrosting operation.
(3) Wipe the rotor chamber well if much water is in the rotor chamber.
(4) Temperature rise of the rotor due to defrost operation (for 10 minutes) is 1℃ or less.

Step	Key operation	Screen display and considerations
1	Move the cursor to DEF on the Run Screen using the cursor keys.	 • Move the cursor to DEF to flash it.
2	Check that DEF is flashing and press the ENTER key.	 • DEF is displayed in the message field. • DEF is flashing in the message field during defrost operation.

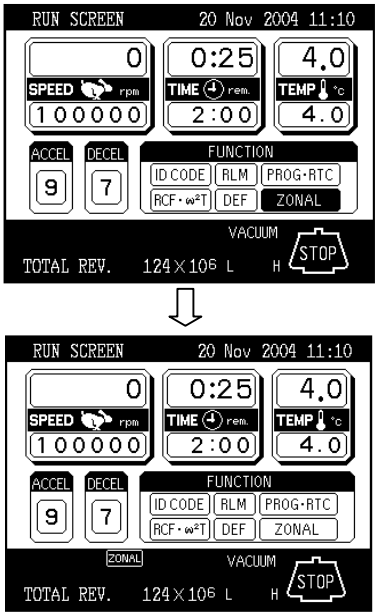
[Defrost operation]
Defrost operation is different depending on the status of the centrifuge at setting the defrost function.
Vacuum operation is simultaneously done while defrost operation is done.

	When the rotor is stopping (Status indication: "STOP")	When the rotor is running (Status indication: "ACCEL", "RUN" or "DECEL")
Operation	Defrost operation is started immediately after setting the defrost function and continued for 10 minutes. After the defrost operation, vacuum is released automatically. If the vacuum pump is not working, the vacuum pump starts operation upon setting the defrost function. After the defrost operation, vacuum is released automatically.	Defrost operation is started when the rotor starts deceleration and continued for 10 minutes. After the defrost operation, the temperature is controlled until vacuum is released. In the case of zonal mode operation, the temperature is controlled until the rotor stops completely even after vacuum is released.
How to stop	Press "VAC" key to release vacuum. Thus the defrost operation is stopped.	Touch DEF or move the cursor to DEF using the cursor keys. Press the ENTER key while DEF is blinking.
Note	Set the defrost function with the door closed. If the door is open, you cannot set the defrost function.	Temperature control is started again after the defrost operation. Therefore, condensation may occur in the rotor chamber if vacuum is not released immediately after the rotor stops to take out the rotor.

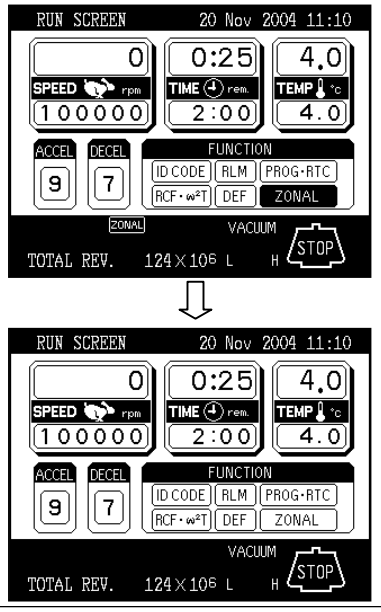
3-5-7 Setting and resetting zonal operation

Selection between normal operation and zonal operation is performed by special operations using the FUNCTION field on the Run Screen.

1. Setting zonal operation

Step	Key operation	Screen display and considerations
1	On the Run Screen, touch ZONAL or . use cursor keys to move the cursor to ZONAL in the FUNCTION field. While ZONAL is blinking, and press 3 0 ENTER	 • ZONAL is displayed in the message field so that the machine is ready to start zonal operation.

2. Resetting zonal operation

Step	Key operation	Screen display and considerations
1	On the Run Screen, touch ZONAL or . use cursor keys to move the cursor to ZONAL in the FUNCTION field. While ZONAL is blinking, and press 0 0 ENTER	 • ZONAL in the message field disappears and the machine status switches to normal operation.

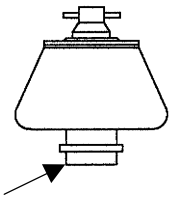
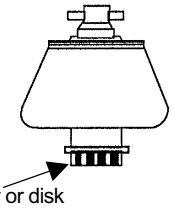
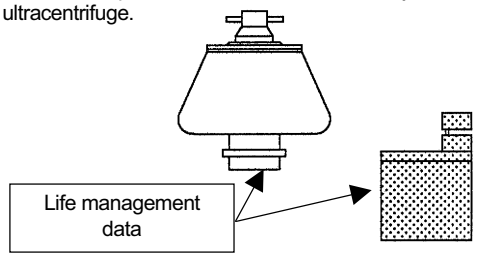
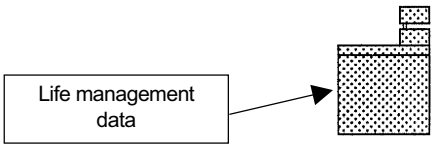
NOTE If no key operation is performed for 30 seconds, the cursor disappears and any entry is disabled. At that time, touch ZONAL or press the cursor key to cause the cursor to blink once again.

3-6 Rotor management

It is very important to manage the life of each rotor you use with the ultracentrifuge.
The life of the rotor here is the time period empirically determined from a combination of the total number of hours the rotor can be used and the total number of runs the rotor can be used for.
If you use the rotor beyond its maximum permitted life, a serious accident may occur.
(For more information, see rotor instruction manual.)
The CP-WX Series has been designed to automatically keep such total numbers as life management data.
The life of rotors can be prolonged easily if they are RLM rotors. (For more information, see Section 3-6-1 "Rotor life management".)

⚠ **CAUTION:** The life of rotors with optical adapters is managed using a rotor log book.
NOTE:RLM rotors are available for a series of a CP-WX/MX/α ultracentrifuge.

1. Usable rotor types for CP-WX Series

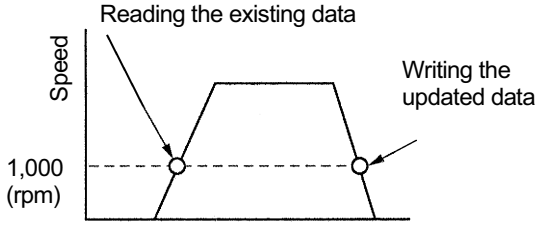
	RLM rotor	Rotor with optical adapter
Appearance		
Usabel or not	Usable	Usable
Outline of rotor life management	Life management data is automatically stored on both the RLM adapter for the rotor and the memory of the ultracentrifuge. 	Life management data is stored for each rotor registered in the memory of the ultracentrifuge. 

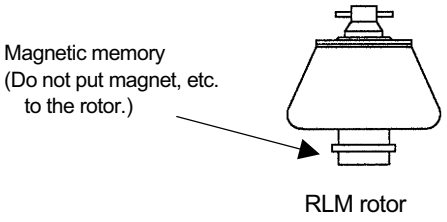
2. RLM rotor

An RLM rotor has an RLM adapter attached on its bottom. The following information is stored on the RLM adapter.

		Remarks
(1)	Rotor type	Stored before shipping.
(2)	Serial no. of the rotor	
(3)	Tatal number of runs	Updated for each run made.
(4)	Tatal number of hours	

The life management data is updated when the rotor accelerates past 1000 rpm:





3. Life management data

The CP-WX Series ultracentrifuges have a printer (optional) to allow you to print the life management data for registered rotors on that printer (Section 3-9, “Print utilities”). The following are printouts of the life management data.

Run record for a registered rotor

```
**************************************
*          ROTOR LOG                 *
**************************************
2004-12-01 11:10  INSTRUMENT ID   N40123

ROTOR              MAX SP      RUNS    HOURS
(SN)
--------------------------------------------
P100AT2            100000      35.6    112.7
(0110)

DATE      SPEED   TIME   TEMP. USER NAME
yy-mm-dd   k/rpm    h:m    °C
--------------------------------------------
04-11-06   65.0    4:00   4.0   Lipo.Gr
04-11-07   65.0    5:00   4.0   Lipo.Gr
04-11-08  100.0    4:00  10.0   Suzuki
04-11-21  100.0    4:00   4.0   Lipo.Gr
04-11-28  100.0    5:00   4.0   MIURA-01
```

Maximum of 20 runs

Run records for all registered rotors

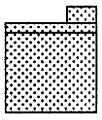
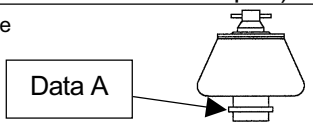
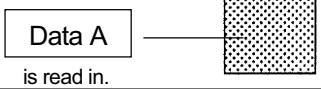
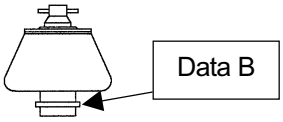
```
**************************************
*  ROTOR MANAGEMENT                  *
**************************************
2004-12-01 11:05  INSTRUMENT ID   N40123

ROTOR              MAX SP      RUNS    HOURS
(SN)
--------------------------------------------
UndefRotor1--      ------       36.0   152.8
UndefRotor2--      ------        0.0     0.0
P100VT             100000       14.0    56.8
 (0077)
P100AT2            100000       35.6   112.7
 (0110)
P40ST               36000*    1271.0  2885.2
 (0179)
P28S                28000      116.1   432.6
 (0256)
P65AT               65000       97.2   379.1
 (0553)
P27A                27000       18.7    63.5
 (0007)
P90AT               90000      500.8  1200.4
 (0123)
```

If the rotor reaches its primary life, this is indicated by the * printed at the right of the maximum speed.

4. Life management for each rotor type

1) RLM rotors

The life of an RLM rotor is automatically managed, whether the rotor is used with a single or multiple CP-WX Series ultracentrifuges. The table below shows an example where an RLM rotor is used with two CP-WX Series ultracentrifuges.

	Ultracentrifuge used with rotor	Rotor management (data stored on RLM adapter)
1	CP-WX Series No. 1 	Life management data augmented when the rotor is used with CP-WX Series NO. 1: A 
2	CP-WX Series No. 2  is read in.	 Life management data augmented when the rotor is used with CP-WX Series NO. 2 : B The updated data is stored in this way.

NOTE: The life of an RLM rotor is automatically managed, whether the rotor is used with a single or multiple CP-WX/MX/α Series ultracentrifuges.

2) Rotor with optical adapter

A rotor with optical adapter can be used with either a CP-WX Series ultracentrifuge or a conventional ultracentrifuge (i.e., the one with no rotor life management feature). The table below shows an example where a rotor with optical adapter is used with CP-WX Series ultracentrifuge, then with a conventional ultracentrifuge. and then with that CP-WX Series ultracentrifuge.

	Ultracentrifuge used with rotor	Rotor management
1	CP-WX Series one, which is used with the rotor several times. 	1) The data is stored in memory as a run record classified by rotor. You can printout this data as required. NOTE : The rotor usage in up to 20 runs can be printed out at a time. Once the data is printed, the original data in memory will be lost. 2) The data is stored in memory as a list of rotor run records. 3) Record this data in the rotor log book.
2	Ultracentrifuge with no rotor life management feature, which is used with the rotor several times. 	Record this data in the rotor log book.
3	Same CP-WX Series one as before, which is used with the rotor once again. 	1) Enter into the CP-WX Series ultracentrifuge the data for the rotor that was used with the conventional ultracentrifuge. This data is stored in the ultracentrifuge memory as part of a list of rotor run records (See Section 3-6-4). 2) Record this data in the rotor log book.

3-6-1 Rotor life management

This section describes the rotor life management done by the ultracentrifuge. For more information, refer to the instruction manual attached to the rotor.

1) Management of RLM rotors

An RLM rotor can be used on only CP-WX Series ultracentrifuges. To manage this type of rotor, the ultracentrifuge automatically stores the information necessary for rotor life management on the RLM adapter and updates it each time a run is made using the rotor. When the rotor reaches the end of its life, the ultracentrifuge indicates it by displaying a message on the screen. Because rotor life is automatically managed in this way, it is not necessary to record the usage of the rotor in a rotor log book as done in the conventional management method. The following are the major features of the life management done for RLM rotors.

(1) Whenever the ultracentrifuge performs a run at less than the maximum permitted speed of the rotor, the managed life of the rotor is prolonged. This is because the run is not counted as one run but as one or more tenths of one run (e.g., five tenths). On the rotor management screen of the centrifuge and in the life management that was printed out by an optional printer, numeric values corrected in units of 0.1 time are displayed.

(2) When the rotor reaches its primary life, the maximum permitted speed is changed and the right side of the rotor S/N on the rotor management screen is marked with [*] on the display. (See Section 3-2-3.) Once the maximum permitted speed is derated, the actual speed of the rotor is automatically restricted within the new limits. This is true even when you are using the rotor with more than one CP-WX Series ultracentrifuge. (When the rotor reaches its primary life, be sure to send the rotor back to the manufacturer for inspection.)

(3) If you have used the rotor with more than one CP-WX Series ultracentrifuge, it is not necessary to correct the total numbers of runs and hours maintained by the ultracentrifuge.

(4) The current total numbers of runs and hours are automatically corrected according to the speed at which the rotor was spun, and are recorded on the RLM adapter.

NOTE : Since the RLM adapter is magnetic memory, it must not be placed near the magnet nor damaged. When there is a strong magnet near the adapter, the memory contents may be destroyed. To protect the memory, be sure to store it by standing it against the rotor stand attached to the rotor.

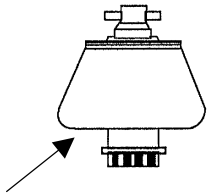
2) Management of rotor with optical adapter

You can register a rotor with optical adapter in the ultracentrifuge before use. After the rotor has been registered, you can utilize the rotor management feature of the ultracentrifuge each time a run is made using the rotor. When the registered rotor comes close to the end of its life, the ultracentrifuge indicates it by displaying a message on the screen. When the rotor reaches its primary life, the ultracentrifuge derates its maximum permitted speed and inserts [*] at the right side of the rotor S/N. Once the maximum permitted speed is derated, the actual speed of the rotor is automatically restricted within the new limits. (When the rotor reaches its primary life, be sure to send the rotor back to the manufacturer for inspection.)

NOTE : The rotor life management data stored in the ultracentrifuge is not covered by the warranty. When a standard rotor is used with the ultracentrifuge, be sure to record the rotor management data in the rotor log book. (You can also paste a printout in the log book.) If the rotor log book is not maintained correctly, the rotor may not be warranted.

3-6-2 Registering a rotor with optical adapter

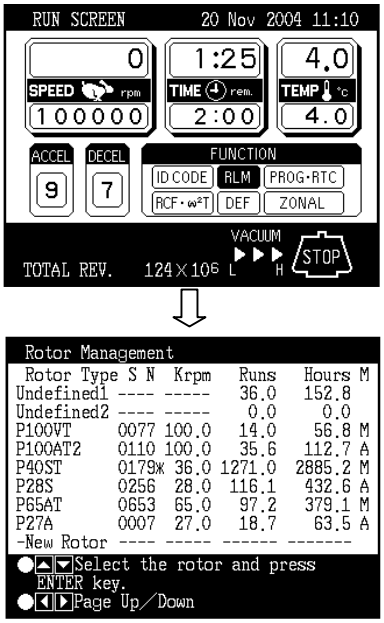
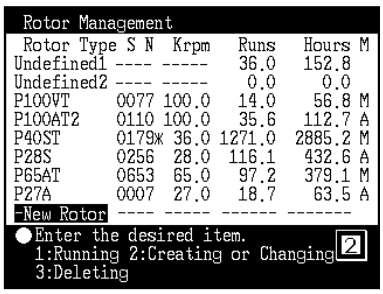
A rotor with optical adapter can be registered when you use the rotor management feature of the ultracentrifuge. If the rotor has not been registered, the feature does not operate for the rotor. To register the rotor with optical adapter, use the procedure described below. RLM rotors are automatically registered when they are first used.

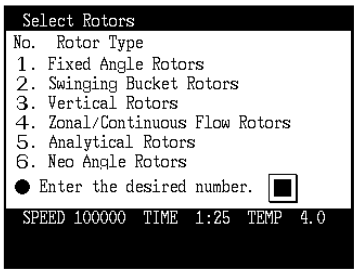
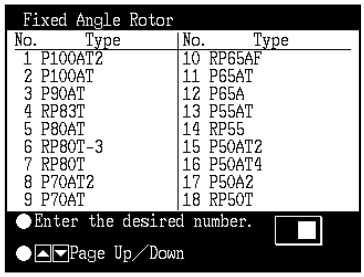
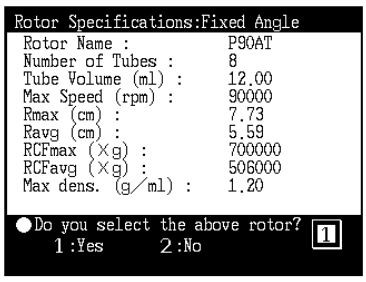
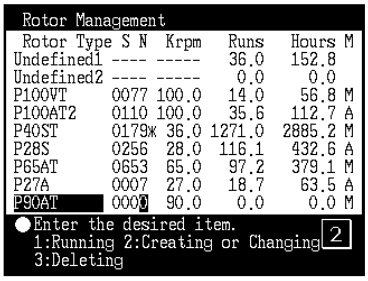
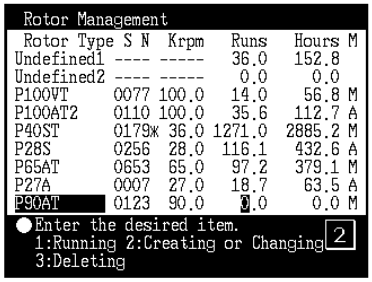


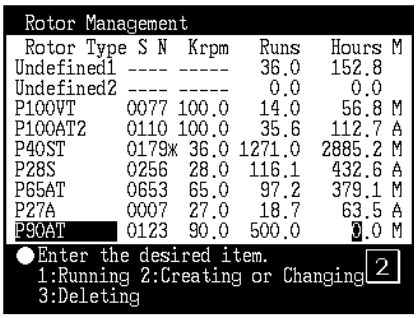
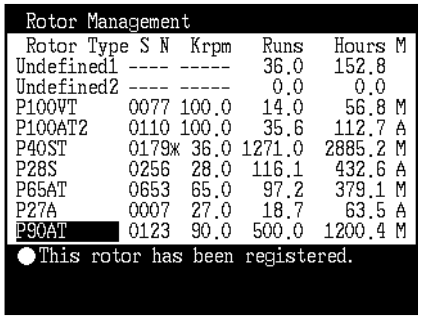
Optical adapter
(Rotor with optical adapter)

As an example, suppose that you need to register an fixed angle rotor with the following data, and that it has been used with an ultracentrifuge of a different model from the one mentioned below:

Model: P90AT Serial no.: 0123
Total number of runs thus far made: 500
Total number of hours thus far spent in the runs: 1200 hours, 24 minutes

Step	Key operation	Screen display and considerations
1	On the Run Screen, touch RLM. While RLM is blinking, touch RLM again. If using the cursor keys,move the cursor to RLM and press ENTER key. Switch each page of the Rotor List by using the left and right arrow keys (◀ and ▶).	 • The display switches to the Rotor Management screen and the Rotor List is displayed.
2	Use the cursor keys (▲ and ▼) to move the cursor to the line that is not yet registered (New Rotor), and press the ENTER key.	

Step	Key operation	Screen display and considerations
3	Select “Creating or Changing”. 2 ENTER	 • The display switches to the Rotor List screen.
4	Select “Fixed Angle Rotor” in the Rotor List screen. 1 ENTER	 • The display switches to the Fixed Angle Rotor List screen
5	Select “P90AT” rotor. 3 ENTER	 • Specifications of the P90AT rotor are displayed.
6	After checking the specifications of the rotor, enter “Yes”. 1 ENTER	 • The display switches to the Rotor Management screen. • You can enter a serial number of the rotor.
7	As the cursor has been moved to the S/N field, enter serial No. of the rotor by using numeric keys. (Do not press the ENTER key.) 1 2 3 Registration of an unused rotor is finished by pressing the ENTER key.	 • The cursor moves to the Runs field. You can enter the total number of runs.

Step	Key operation	Screen display and considerations
8	Enter the total number of runs in the Runs field. (Do not press the ENTER key.) 5 0 0 ◐	 • The cursor moves to the Hours field. You can enter the number of hours.
9	Enter the total number of hours in the Hours field by using numeric keys. (Do not press the ENTER key.) Note: Enter this running time up to one decimal place in units of hour. 1200 hours 24 minutes→ 1200.4 1 2 0 0 ·/: 4	
10	Press the ENTER key. ENTER	

Thus the rotor has been registered.

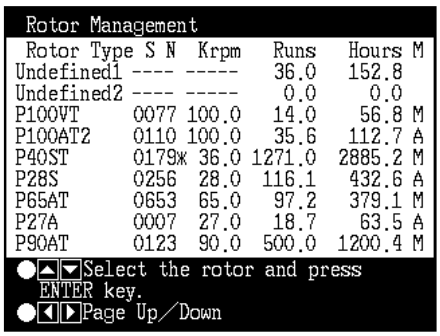
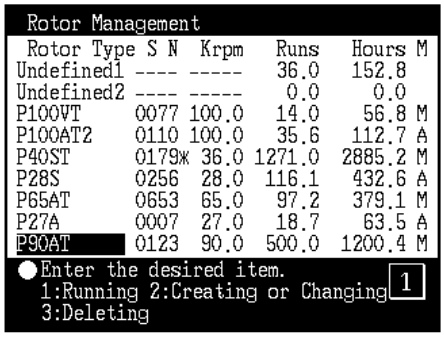
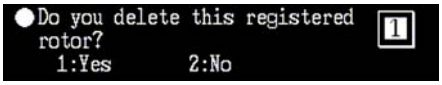
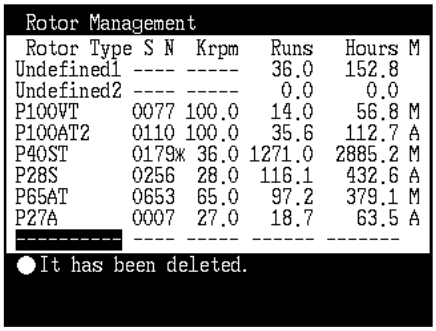
NOTE When the ENTER key is pressed in the above steps “7” to “9”, “0” is registered as a numeric value in each step. When the serial number must be corrected, the rotor must be deleted once and the value must be reentered from step “1”. (See the next page.)
In the steps “7” to “9”, it is possible to change the value repeatedly by moving the cursor with the arrow keys unless the ENTER key is pressed.

3-6-3 Deleting a registered rotor

If a registered rotor becomes unnecessary, you can delete it from ultracentrifuge memory.

NOTE Once a registered rotor is deleted, all of the life management data for the rotor will be lost. If a registered rotor is deleted by mistake, and life management becomes impossible for the rotor, then the rotor may not be warranted.

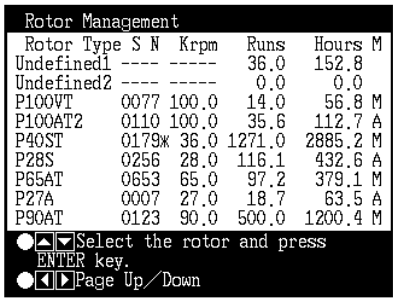
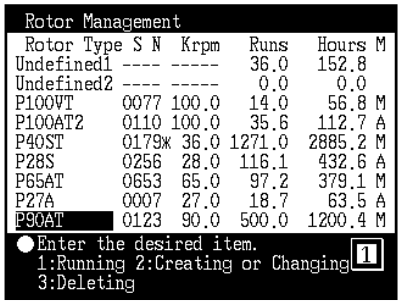
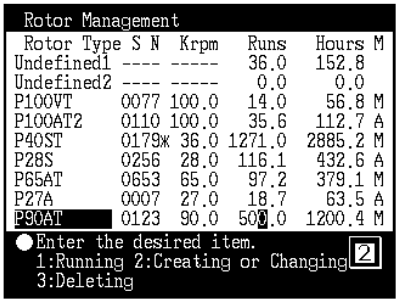
As an example, suppose that you need to delete the P90AT fixed angle rotor registered in the previous section.

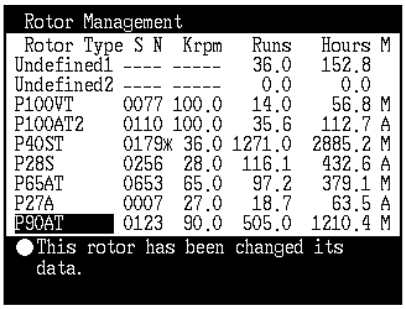
Step	Key operation	Screen display and considerations
1	On the Run Screen, touch RLM. While RLM is blinking, touch RLM again. If using the cursor keys, move the cursor to RLM and press ENTER key.	 • The display switches to the Rotor Management screen.
2	Use cursor keys to move the cursor to the P90AT line to be deleted and press the ENTER key.	
3	Select “Deleting” by pressing the following keys. 3 ENTER	
4	Select “Yes” by pressing the following keys. 1 ENTER	 >> If you select “No”, you will get the display you see in process 2.

3-6-4 Updating the existing data for a rotor when using the centrifuge other than a series of a CP-WX, CP-MX,or CP-α centrifuge

When the rotor with optical adapter registered in CP-WX is operated in the centrifuge without a rotor management function, both Total number of runs and Total number of hours can be updated. However, the existing data for an RLM rotor cannot be updated using this procedure. If you use the RLM rotor with another CP-WX or CP-MX or CP- α Series ultracentrifuge, the data will be automatically updated by the other CP-WX or CP-MX or CP-α Series ultracentrifuge. The update value is accepted only when it is greater than the registered value. It must not be smaller than the registered value.

To update the existing life management data for a rotor with optical adapter, perform the following procedure:

Step	Key operation	Screen display and considerations
1	On the Run Screen, touch RLM. While RLM is blinking, touch RLM again. If using the cursor keys, move the cursor to RLM and press ENTER key.	 • The display switches to the Rotor Management screen.
2	Use cursor keys to move the cursor to the P90AT line to be updated and press the ENTER key.	
3	Select “Creating and Changing” by pressing the following keys. 2 ENTER	 • It the Runs field, the cursor waits for an input.

Step	Key operation	Screen display and considerations
4	Enter the updated total number of runs and the total number of hours by using numeric keys. Total number of runs 500.0→505.0 Total number of hours 1200.4→1210.4 5 0 5 ◐ 1 2 1 0 ・/: 4 ◐ ENTER	

Thus, both Total number of runs and Total number of hours, when the standard rotor is operated in the centrifuge without a rotor life management function, have been updated.

3-7 Happenings when power failure occurs

⚠ **DANGER:** Before removing the cover, table, etc. for maintenance, be sure to turn off the POWER switch of the centrifuge and then power breaker to prevent an electric shock. After a lapse of three minutes or more, start removing them.

⚠ **WARNING:** (1) Never open the door during rotation.
(2) Never touch the rotor during rotation.

⚠ **CAUTION:** Never conduct operations in a manner other than as described in this operation manual. Contact with your nearest service representative if any problem arises.

1. Rotation of the rotor

The rotor coasts to a stop. If the power is restored when the current speed is more than 500 rpm, the rotor will be automatically accelerated to the set speed. If it is restored when the current speed is less than 500 rpm, the rotor will decelerate to a stop.

2. Displays on the panel

All displays on the panel go out. The set values are all backed up by battery during the power failure. When the power is restored, the displays will come on as before the power failure; the set values will be restored; and the message “Power failure” will appear in the message display.

3. Removing the rotor from the ultracentrifuge

First open the chamber door, then remove the rotor according to the following procedure:

(1) Check that the rotor is at rest. Listen carefully for any sounds coming from the drive.

⚠ **WARNING:** It can take more than three hours for the rotor to come to a complete stop because the rotor chamber is under vacuum and the air friction is a little. Before opening the door, wait until the rotor comes to a stop.

(2) Turn off the POWER switch and power circuit breaker for the ultracentrifuge.
(3) Remove the four M5 hexagon head bolts fixing the front cover from both sides and pull down the front cover by pulling its lower side forward. Then, remove the front cover. The upper side of the front cover is an insertion type but not a screw fixing type.

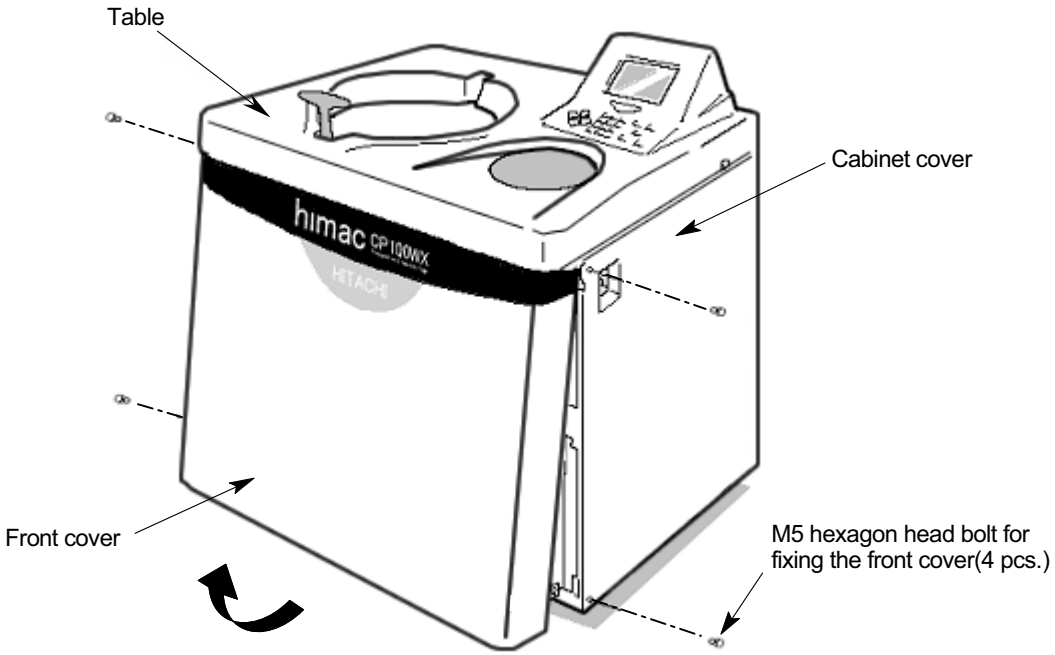


Fig. 3-7-1. Removing the front cover

(4) Open the air vent (by turning the vacuum release screw on the left of the vacuum chamber counterclockwise) to let air into the rotor chamber. When the pressure in the rotor chamber reaches atmospheric pressure, do not forget to tighten the vacuum release screw as it was before. (See Fig. 3-7-2.)
(5) Pull the door unlock wire on the right of the vacuum chamber and, at the same time, push the door handle. Then the door opens. When opening the door, confirm that the rotor is not rotating. If it is still rotating, immediately close the door.

⚠ **WARNING:** Never touch the rotor while it is rotating.

(6) Remove the rotor. After the removal, close the air vent and put the front cover back to the ultracentrifuge. Insert the top surface of the front cover in the bottom surface of the front side of the table and put the bottom surface of the front cover on the support plate of the front cover by reversing the removing procedure. Fix it on the frame with four M5 hexagon head bolts.

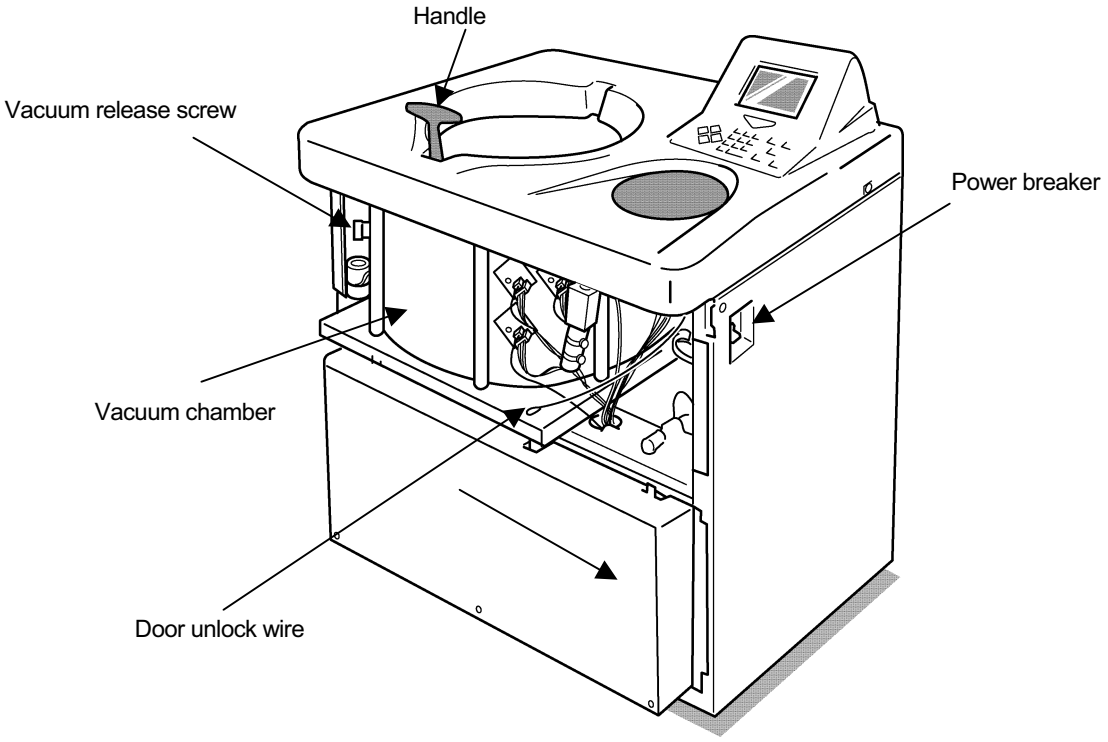


Fig. 3-7-2. Ultracentrifuge with the front cover removed

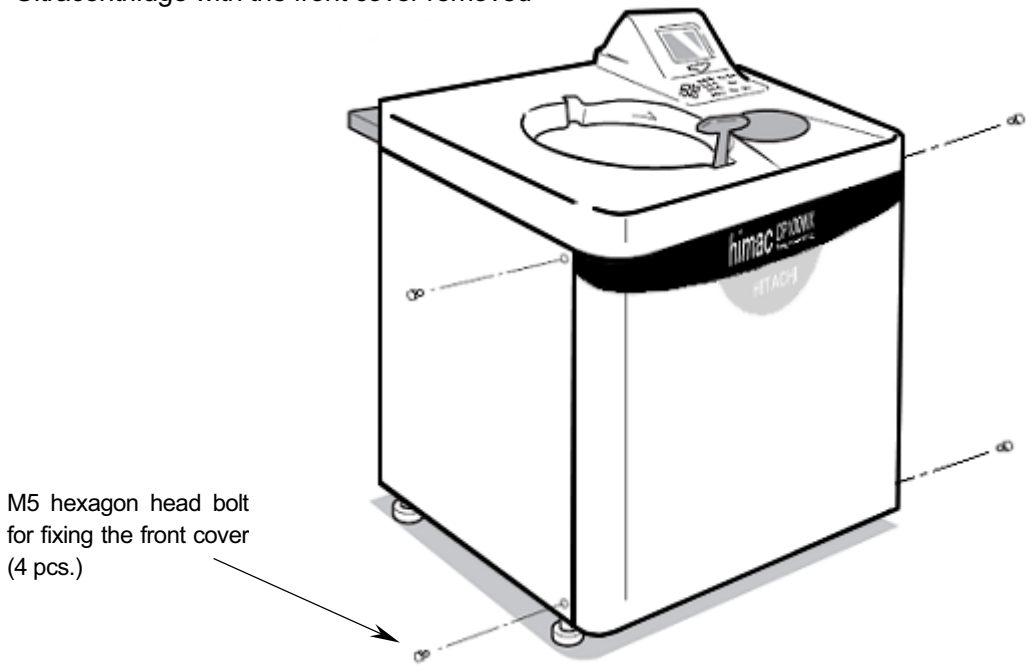


Fig. 3-7-3. Installing the front cover

(7) Turn on the power breaker.

⚠ **WARNING:** When the centrifuge will not be used for a long time, keep the power breaker off.

3-8 Features of the menu screen

Press MENU key on the key board, and the Menu Screen will appear. This feature is designed to allow you to use the CP-WX Series with additional handy options including:

(1) Centrifuge operation schedule
(2) User list
(3) Alarm information
(4) Rotor catalog
(5) User customization routines

Key in the number of the item you wish to use and press the ENTER key, and the respective screen will appear.

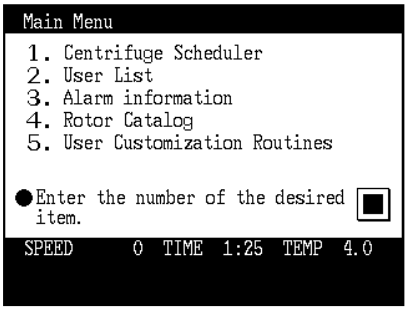
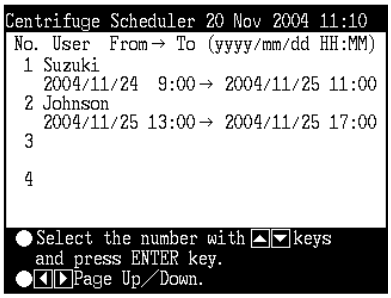
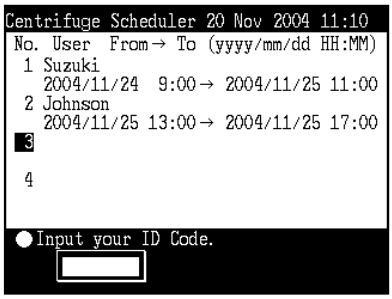
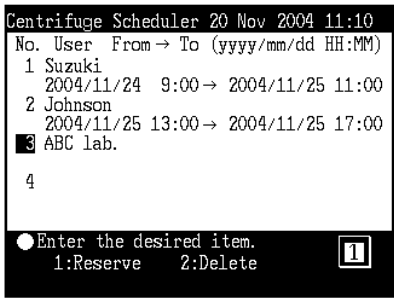


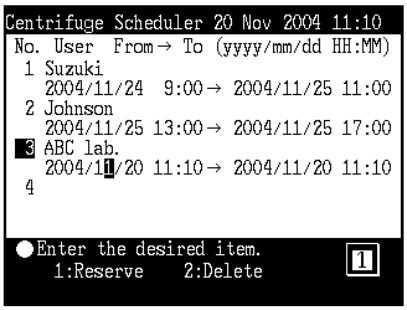
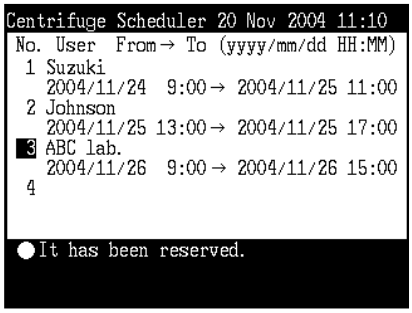
Fig. 3-8-1 Menu screen

3-8-1 Centrifuge operation schedule

Scheduled centrifuge operation can be reserved.

1. Reservation of scheduled centrifuge operation

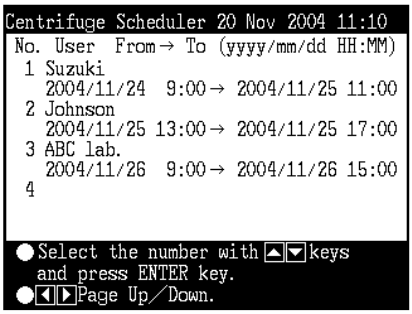
Step	Key operation	Screen display and considerations
1	On the Menu Screen, select a centrifuge operation schedule. [1] [ENTER]	 • The Menu Screen switches to the Centrifuge Reservation screen.
2	Use cursor keys to move the cursor to No. you desire. (In this example, No.3 is selected as new reservation.)	 • The ID Code input field is displayed in the message field of the bottom row.
3	Enter an ID Code that is already registered. (4-digit number)	 • The User Name corresponding to the ID Code is displayed. (In this example, ABC lab. is displayed.)

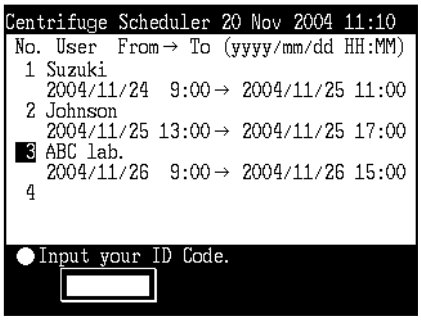
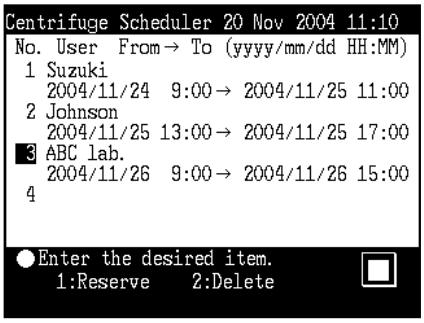
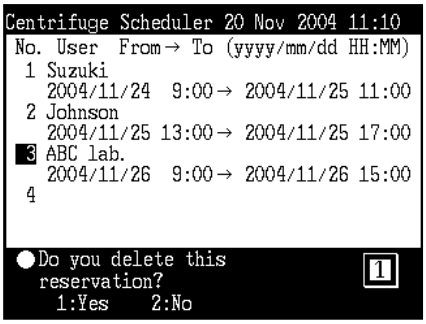
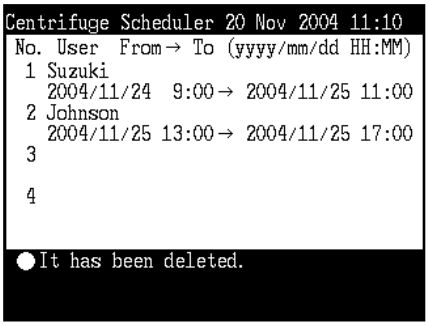
Step	Key operation	Screen display and considerations
4	Select “Reserve”. 1 ENTER	 • The current date/time is displayed at the reservation time of the specified reservation No.3.
5	Use cursor keys to move the cursor to the position at which you want to change the date/time of reservation, and enter a number by using numeric keys.	
6	At the desired date/time of reservation, press the ENTER key. ENTER	NOTE Enter a time later than the current time

2. Deleting the centrifuge reservation

You can cancel the operation schedule that is already reserved. This cancellation of reservation is limited to the reserving person proper (with the same ID Code).

The reserved operation schedule will be deleted from the centrifuge reservation list after the lapse of the scheduled date/time regardless of operation/non-operation of the centrifuge.

Step	Key operation	Screen display and considerations
1	On the Menu Screen, select a centrifuge operation schedule. 1 ENTER	 • The Menu Screen switches to the Centrifuge Reservation screen

Step	Key operation	Screen display and considerations
2	Use cursor keys to move the cursor to reservation No. you want to delete. (In this example, No. 3 is selected.)	 • The ID Code input field is displayed in the message field in the bottom row.
3	Enter the ID Code of the reserving person proper. (4-digit number)	 • When the ID Code is accepted, the reserve/delete selection message is displayed in the message field
4	Select “Delete”. 2 ENTER	 • The confirmation message is displayed in the bottom row.
5	Select “Yes”. 1 ENTER	 • The No.3 reservation display disappears from the centrifuge reservation list and the reservation delete completion

3-8-2 User List

The Centrifuge User List screen is displayed. This screen allows you to register, change, and delete any ID code and user name.

・ ID code and user name

ID Code	Password comprised of a 4-digit number. This number is not displayed when the centrifuge is operated. The mark * is displayed instead of the number.
User Name	Character string of 8 digits or less. The user name corresponds to the ID Code and displayed on the screen. Alphabetical upper-case and lower-case characters and several types of special characters are available.

・ Using example of ID code and user name

If ID Code is used when the centrifuge is operated:

(1) The user can be known on the screen when the centrifuge is operated.

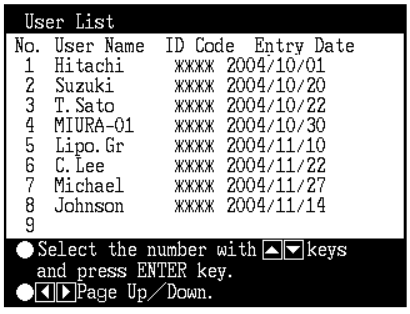
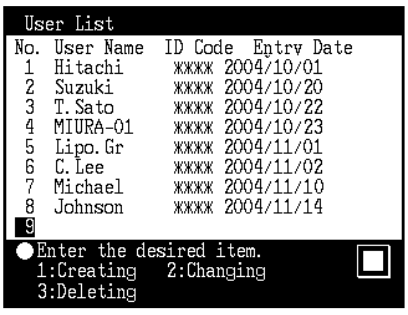
(2) The user record is left in the centrifuge and the using status of each user can be grasped at printout (printer: optional).

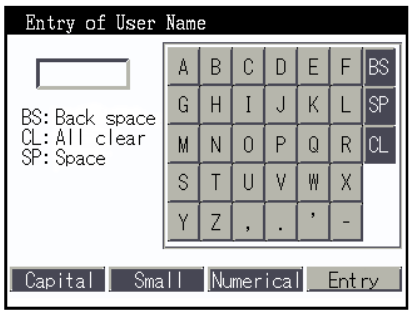
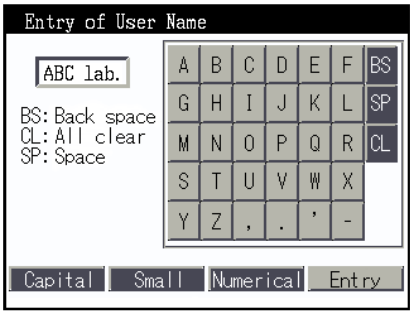
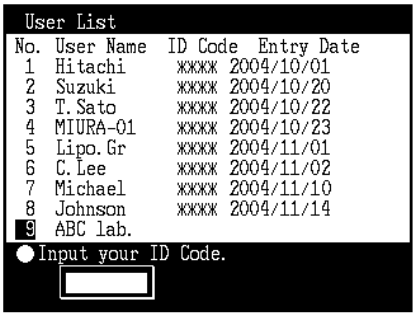
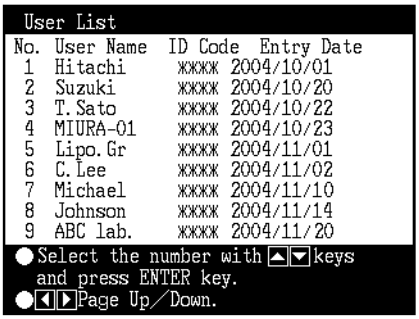
(3) The User Name can be attached to the user's original programmed operation and the user's own program memory can be checked.

(4) Reservation can be attained by the operation schedule table with the User Name attached.

NOTE Registration of ID Code and User Name is not always required for operation.
If the user does not need to be identified, the centrifuge can be operated without entering them.

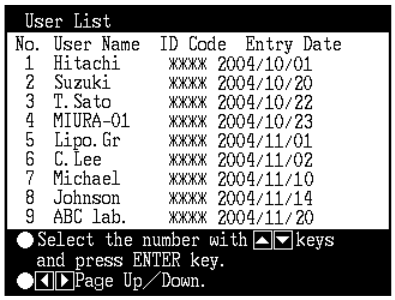
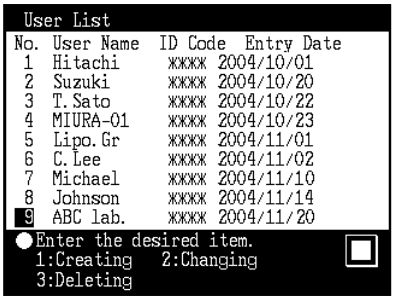
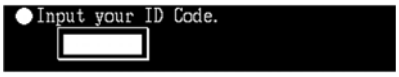
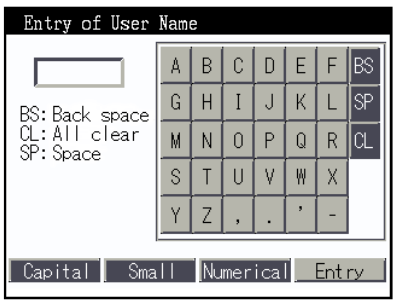
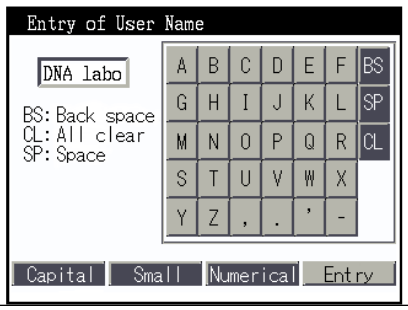
1. Registration of user name

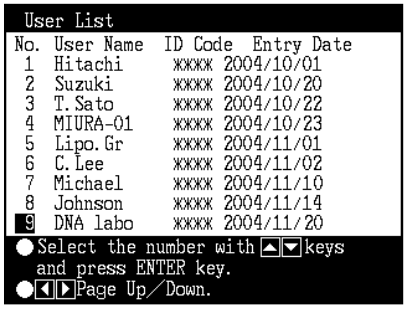
Step	Key operation	Screen display and considerations
1	Select “User List” on the Menu Screen. [2] [ENTER]	 • The Menu Screen switches to the User List Screen. • For registration select unregistered No.
2	Use cursor keys to move the cursor and press the ENTER key. (For registration, select No.9.)	 • The inquiry message to ask what to do in the message field is displayed.

Step	Key operation	Screen display and considerations
3	Select "Creating". 1 ENTER	 • The User List screen switches to the User Name screen.
4	Touch the screen to enter User Name.	 • Screen for entry of characters
5	After entering the characters of User Name, touch the Entry on the lower right of the screen to register the character string.	 • The ID Code input field is displayed in the message field of the bottom row.
6	Enter the ID Code (4 digits) by using numeric keys and press the ENTER key.	 • Enter the ID Code and press the ENTER key, and the date of registration will be displayed. • The mark * is displayed instead of the ID Code on the screen.

2. Change of User Name

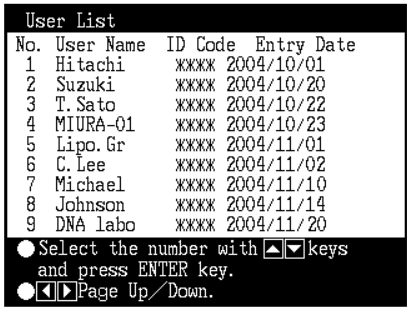
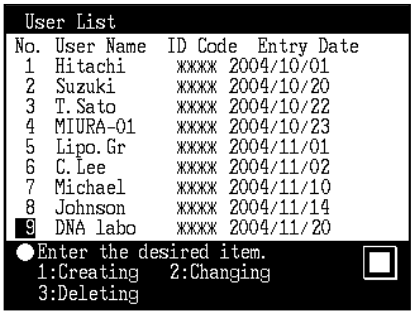
NOTE Changing a User Name is limited to the person (with the same ID Code) who registered it and wants to change it.

Step	Key operation	Screen display and considerations
1	On the Menu Screen, select “User List”. 1 ENTER	 • The Menu Screen switches to the User Listscreen. • For a change, select a registered No.
2	Use cursor keys to move the cursor and press the ENTER key.(Select No.9.)	 • The inquiry message to ask what to do in the message field of the bottom row is displayed.
3	Select “Changing”. 2 ENTER	 • The ID Code input field is displayed in the User List screen.
4	Enter the ID Code used for registering No.9 by using numeric keys.	 • The User List screen switches to the User Name Registration screen.
5	Touch the screen to enter User Name.	 • Character string input status

Step	Key operation	Screen display and considerations
6	After entering the characters of User Name, touch the Entry on the lower right of the screen to register the character string.	 • The changed User Name is displayed together with its date of registration on the User List screen.

3. Deleting a user name setting

NOTE Deleting a User Name is limited to the person (with the same ID Code) who registered it.

Step	Key operation	Screen display and considerations
1	On the Menu Screen, select “User List”. 2 ENTER	 • The Menu Screen switches to the User List screen.
2	Use cursor keys to move the cursor to No.9 and press the ENTER key. (The User Name and ID Code of No.9 are deleted.)	 • The inquiry message to ask what to do is displayed in the message field.

Step	Key operation	Screen display and considerations
3	Select “Deleting”. 3 ENTER	●Input your ID Code. • The ID code input field is displayed.
4	Enter the ID Code used for registering No.9 by using numeric keys.	●Do you delete this User Name? 1:Yes 2:No • The confirmation message is displayed.
5	Select “Yes”. 1 ENTER	User List No. User Name ID Code Entry Date 1 Hitachi ×××× 2004/10/01 2 Suzuki ×××× 2004/10/20 3 T.Sato ×××× 2004/10/22 4 MIURA-01 ×××× 2004/10/23 5 Lipo.Gr ×××× 2004/11/01 6 C.Lee ×××× 2004/11/02 7 Michael ×××× 2004/11/10 8 Johnson ×××× 2004/11/14 9 ●It has been deleted. • The User Name and ID Code of No.9 disappear. >> When you select "No." the display switches back to the screen display of Step 2.
6	Press the ESC key. ESC	>> The User List screen switches to the Menu Screen.

3-8-3 Alarm information

The Alarm Information screen displays the contents of the alarm signals and what to do when such signals occur. If an alarm signal occurs while you are using this centrifuge, you can use this screen to take immediate action.
For details, see Section 4 “Troubleshooting”.

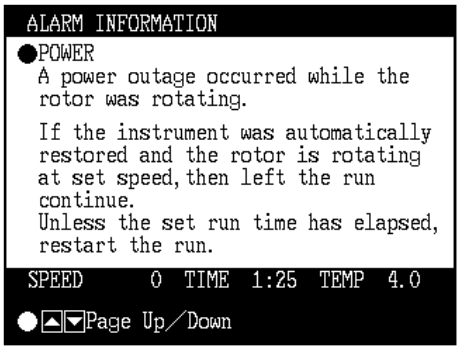
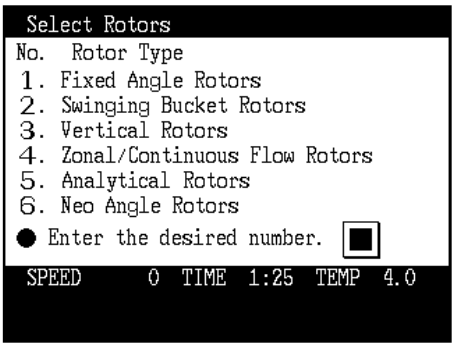
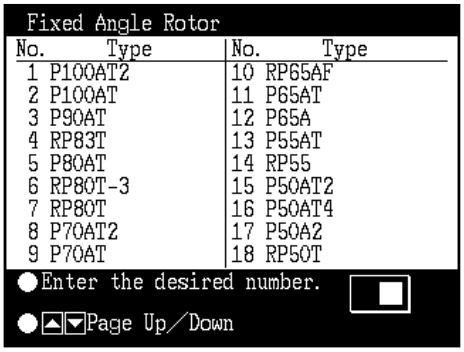
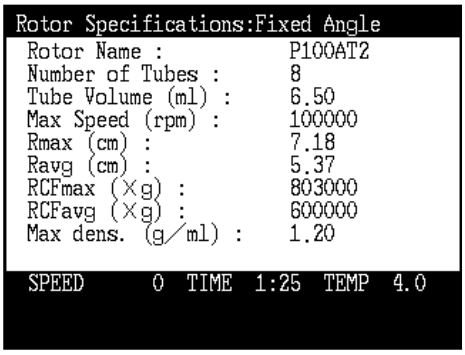


Fig. 3-8-2 Alarm information screen

3-8-4 Rotor Catalog

You can refer to rotor types and rotor specifications that are available.

Step	Key operation	Screen display and considerations
1	On the Menu Screen, select “Rotor Catalog”. 4 ENTER	 • The display switches to the Rotor List screen.
2	To refer to the fixed angle rotor P100AT2, select “Fixed Angle Rotors” on the Rotor List screen. 1 ENTER	 • The display switches to the Fixed Angle Rotor List screen.
3	Select the “P100AT2” rotor. 1 ENTER	 • Specifications of the P100AT2 rotor is displayed.
4	Press the ESC key several times to go back to the Run Screen. ESC	>> The Rotor Specification screen switches to the Run Screen.

3-8-5 User Customizations

You can specify the language in which displays are given, set the current time, adjust screen contrast, and make other settings, all of which enable you to easily run the centrifuge.

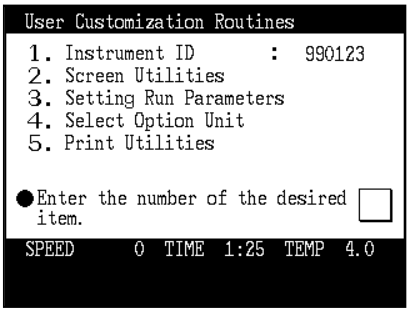


Fig. 3-8-3 User Customizations screen

1. Centrifuge identification number

This function is intended to enter a centrifuge identification number (ID number).
You can enter a number of up to 7 digits.
The centrifuge identification number is printed when the machine log is output to the printer (printer: optional).
The same identification number is also used as the centrifuge identification number for managing log data by using the operation log management program (option) on a PC.
The identification number is not factory-set.
Unless you need it specially, use it as it is.

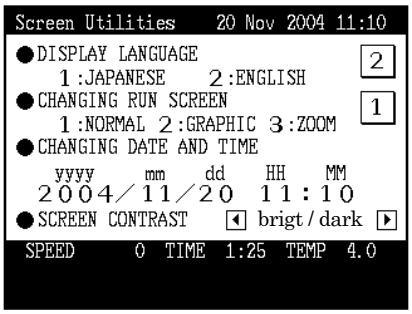


Fig. 3-8-4 Screen Utilities screen

2. Screen display settings

(1) Toggling between Japanese and English

Select whether to give displays in Japanese or English. Key in the number of the desired language and press ENTER key.

(2) Switching from the Run Screen

>> Normal: Displays the Run Screen.

>> Graphics and zoom:

Twenty seconds after the actual speed reaches the set speed while in the Run Screen, the display will automatically switch to the screen shown in Fig. 3-8-5 or 3-8-6.
The display will then return to the Run Screen if you press any key on the keyboard or while a deceleration shift is in progress.

Fig. 3-8-5 Graphics screen

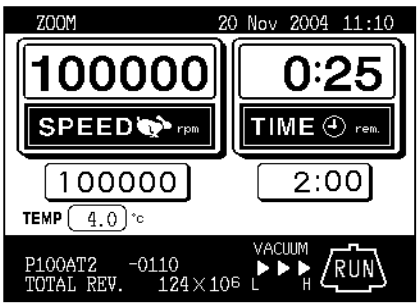


Fig. 3-8-6 Zoom screen

(3) Changing the current time setting

Use this option to precisely set the current time setting of the internal clock.

Set an exact date and time for RTC operation.

Use cursor keys and numeric keys and then press ENTER to make a setting.

(4) Screen contrast

Use cursor keys ◁ and ▷ to adjust the contrast.

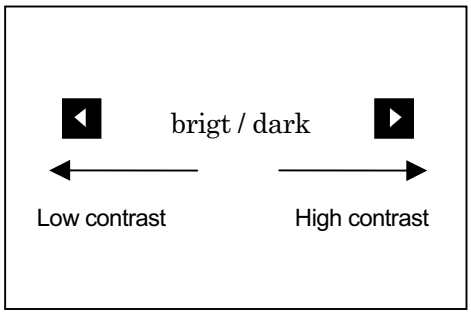


Fig. 3-8-7 Contrast adjustment

NOTE >> To get back to the Run Screen, press ESC several times.

>> If you make no entry for 30 seconds, the cursor will disappear, and you will be unable to make a further input. If this happens, press a cursor key.

3. Setting run conditions

(1) Switching the running time display

This function selects either “Time elapsed” or ”Remaining time” as the time display in the run status.

When you select “Time elapsed”, “lapse” is displayed in the time display frame on the screen.

When you select “Remaining time”, “rem.” is displayed in the same frame.

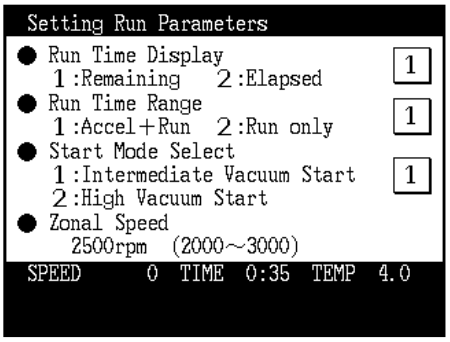


Fig. 3-8-8 Run condition setting screen

(2) Switching the running time

This function selects one of the following two items as the running time setting range in the normal operation mode or zonal operation mode:

>> Accel + Run

Time from pressing the START key to a start of deceleration: T1 (ordinary running time)

NOTE The vacuum waiting time is not counted in the normal operation. To eliminate the run time difference in the high vacuum start mode, vacuum the rotor chamber up to a high degree during the rotor stop and then start the operation.

>> Run

Time from reaching to the set speed to a start of deceleration: T2

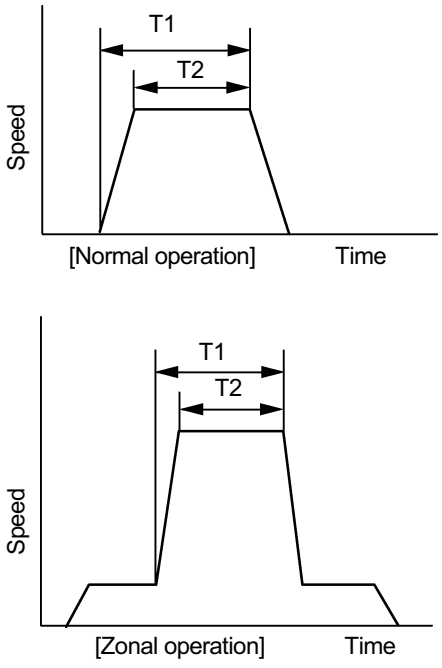


Fig. 3-8-9 Run time range setting

(3) Selecting the start mode

This function allows you to select one of the following values as the degree of vacuum in the process from the vacuum wait to acceleration to the set speed:

>> Medium vacuum: Approx. 133 Pa (ordinary)

>> High vacuum: Approx. 13 Pa

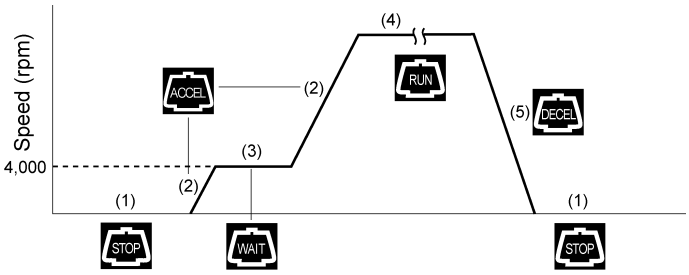


Fig. 3-8-10 Vacuum waiting operation mode

(4) Setting the zonal speed

This function can change (in units of 100 rpm) the zonal speed in the range of 2,000 to 3,000 rpm. (For the zonal speed, see "2-3-2 Zonal operation procedure.")

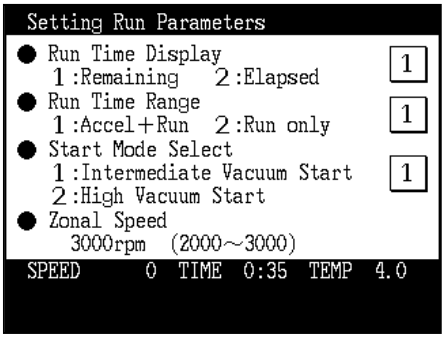


Fig. 3-8-11 Run condition setting screen

4. Connecting an optional unit

This function allows you to set one of the following optional units through the RS232C.

>> Printer

>> Personal computer

>> Unused

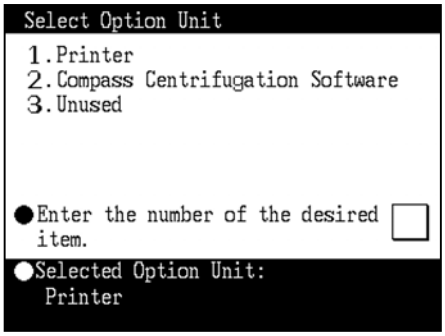


Fig. 3-8-12 Optional unit connection screen

NOTE When "Unused" is selected in the optional unit setting, machine log data will be deleted in the order starting with the oldest data and new data will be stored in the memory if the machine log data exceeds the memory area capacity of the centrifuge. For managing such machine log data, be sure to set an optional unit. When such an optional unit has been set, the printer printout or PC data input request message is displayed if the machine log data exceeds the memory area capacity.

3-9 Print utilities

This submenu option is used to print the various information maintained in the ultracentrifuge on the optional printer. The information includes run records, rotor usages, memory contents, etc. When you select “5. PRINT UTILITIES” from the customization submenu, this submenu option starts working and displays the PRINT UTILITIES screen.

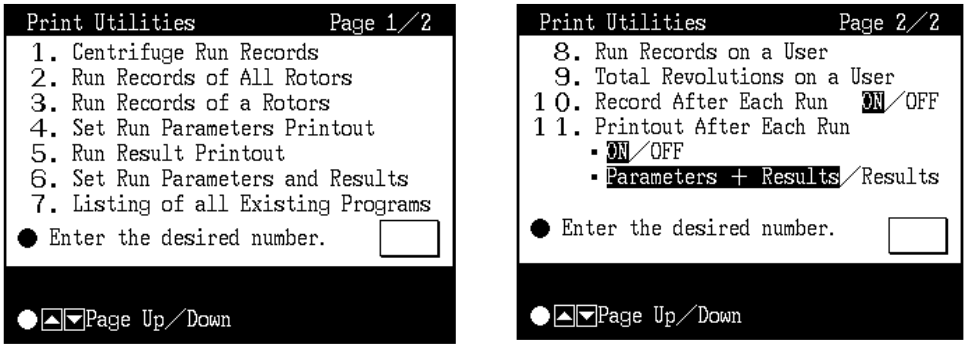
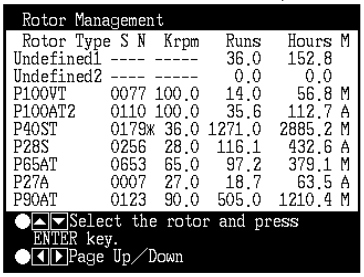
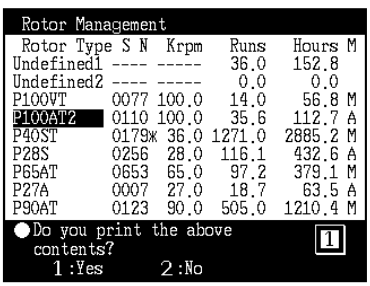
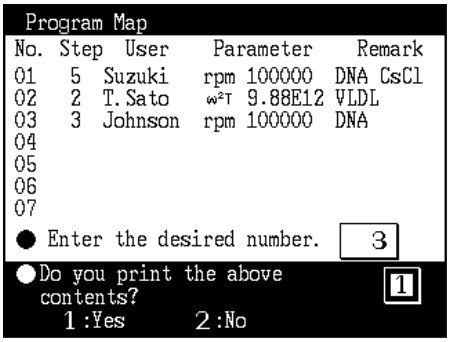


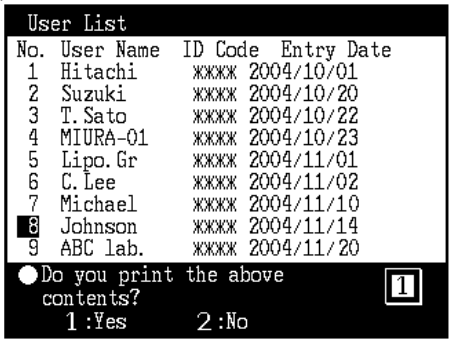
Fig. 3-9 PRINT UTILITIES Screen

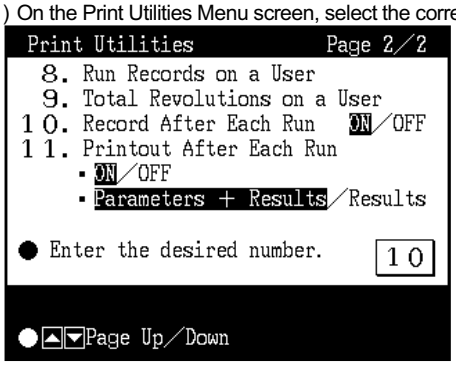
NOTE Select “1. Printer” of “Optional unit connection” in the User Customization screen.

3-9-1 Operating procedure

No.	Item	Operating procedure
1	Machine log	(1) Select the corresponding item number on the Print Utilities Menu screen.
2	Rotor management	
3	Rotor log	(1) On the Print Utilities Menu screen, select “3. Rotor Log”.  • The display switches to the Rotor management screen. (2) On the Rotor management screen, move the cursor to select a rotor.  (3) Select “1: Yes” as print permission.

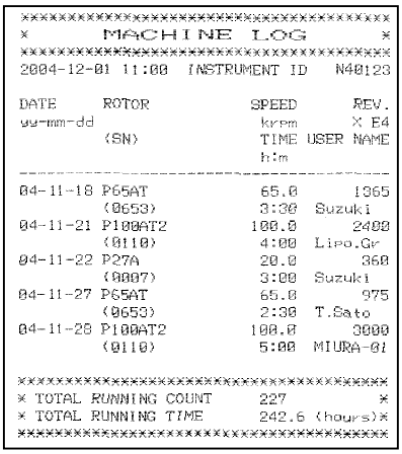
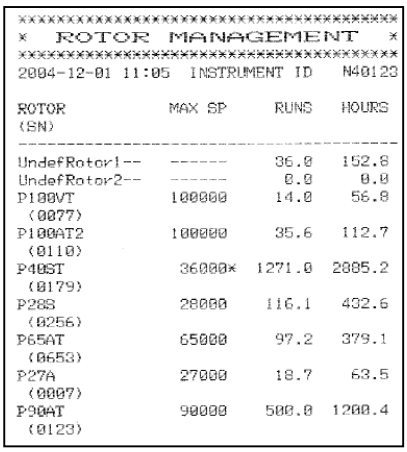
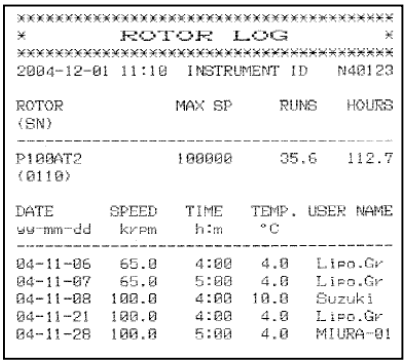
<table>
<tr><th>No.</th><th>Item</th><th>Operating procedure</th></tr>
<tr><td>4</td><td>Set run parameters</td><td rowspan="3">(1) Select the corresponding item number on the Print Utilities Menu screen.</td></tr>
<tr><td>5</td><td>Run result</td></tr>
<tr><td>6</td><td>Set run parameters/Run result</td></tr>
<tr><td>7</td><td>Existing programs</td><td>(1) On the Print Utilities Menu screen, select “7. Print Program”.
 

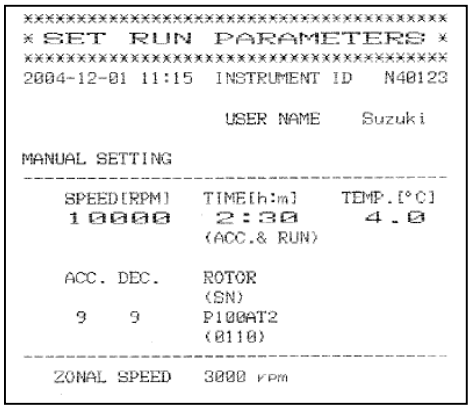
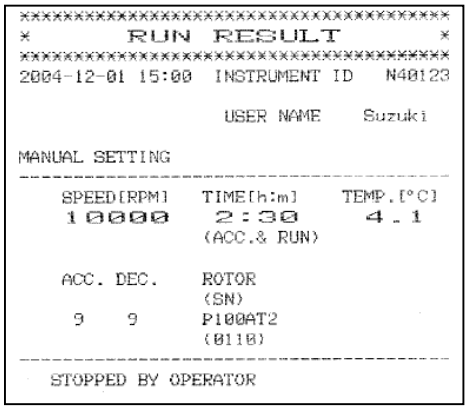
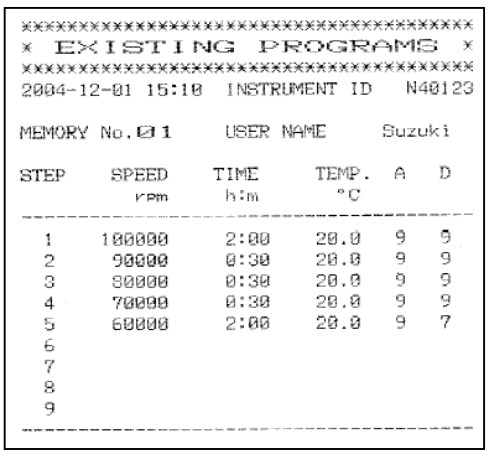
• The display switches to the Program Map screen.
(2) Select a program No. to be printed.</td></tr>
<tr><td>8</td><td>User log</td><td>(1) On the Print Utilities Menu screen, select “8. User Log”.
 

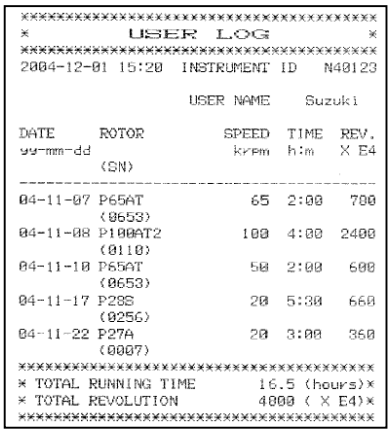
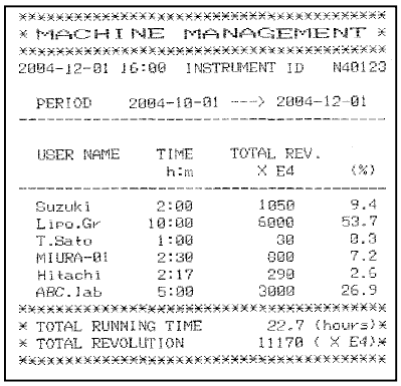
• The display switches to the User List screen.
(2) Move the cursor to select a User Name and perform printing.</td></tr>
<tr><td>9</td><td>Machine management</td><td>(1) On the Print Utilities Menu screen, select “9. Machine Management”.</td></tr>
<tr><td>10</td><td>Machine log switching</td><td rowspan="2">(1) On the Print Utilities Menu screen, select the corresponding item number.
 

(2) Move the cursor and select a setting condition.</td></tr>
<tr><td>11</td><td>Automatic log printout</td></tr>
</table>

3-9-2 Contents of print utilities

No.	Item	Example printout
1	CENTRIFUGE RUN RECORDS >> Ultracentrifuge run records for a maximum of 40 runs can be printed out at a time. >> Once the ultracentrifuge run records are printed out, they will be lost. Therefore, if necessary, save the produced printout for future reference.	 MACHINE LOG 2004-12-01 11:00 INSTRUMENT ID N40123 DATE / ROTOR (SN) / SPEED krpm / TIME h:m / REV. X E4 / USER NAME 04-11-18 P65AT (0653) 65.0 3:30 1365 Suzuki 04-11-21 P100AT2 (0110) 100.0 4:00 2400 Lipo.Gr 04-11-22 P27A (0007) 20.0 3:00 360 Suzuki 04-11-27 P65AT (0653) 65.0 2:30 975 T.Sato 04-11-28 P100AT2 (0110) 100.0 5:00 3000 MIURA-01 TOTAL RUNNING COUNT 227 TOTAL RUNNING TIME 242.6 (hours)
2	RUN RECORDS OF ALL ROTORS >> Run records of all the rotors registered are printed out. >> When a rotor reaches its primary life, an asterisk ([*]) is displayed at the right of the maximum speed and the maximum rated speed is derated by 10 %.	 ROTOR MANAGEMENT 2004-12-01 11:05 INSTRUMENT ID N40123 ROTOR (SN) / MAX SP / RUNS / HOURS UndefRotor1-- ------ 36.0 152.8 UndefRotor2-- ------ 0.0 0.0 P100VT (0077) 100000 14.0 56.8 P100AT2 (0110) 100000 35.6 112.7 P40ST (0179) 36000* 1271.0 2885.2 P28S (0256) 28000 116.1 432.6 P65AT (0653) 65000 97.2 379.1 P27A (0007) 27000 18.7 63.5 P90AT (0123) 90000 500.0 1200.4
3	RUN RECORDS OF A ROTOR >> Run records of a particular rotor are printed out; a maximum of 20 runs can be printed out at a time. >> When you select this option, a list of registered rotors is displayed. Move the cursor to the rotor the run records of which you want to print out, and then press the ENTER key. >> Once the run records of the run are printed out, they will be lost. Therefore, if necessary, save the produced printout for future reference.	 ROTOR LOG 2004-12-01 11:10 INSTRUMENT ID N40123 ROTOR (SN) / MAX SP / RUNS / HOURS P100AT2 (0110) 100000 35.6 112.7 DATE / SPEED krpm / TIME h:m / TEMP. °C / USER NAME 04-11-06 65.0 4:00 4.0 Lipo.Gr 04-11-07 65.0 5:00 4.0 Lipo.Gr 04-11-08 100.0 4:00 10.0 Suzuki 04-11-21 100.0 4:00 4.0 Lipo.Gr 04-11-28 100.0 5:00 4.0 MIURA-01

No.	Item	Example printout
4	SET RUN PARAMETERS PRINTOUT >> The currently set run parameters are printed out.	
5	RUN RESULT PRINTOUT >> The result of the last run made is printed out.	
6	RUN CONDITION/LOG OUTPUT >> The up-to-date run log is printed out together with the run conditions.	Same as the examples of Nos. 4 and 5.
7	LISTING OF ALL EXISTING PROGRAMS >> A list of all the programs in the ultracentrifuge is printed out.	

No.	Item	Example printout
8	USER LOG OUTPUT >> The centrifuge user's run log is printed out up to 20 runs. >> Once the user log is output, the previous run record is deleted and cannot be printed out once again. MACHINE MANAGEMENT OUTPUT	
9	MACHINE MANAGEMENT OUTPUT >> The running time and the total number of revolutions are totalized for each user. Regarding the total number of revolutions, the ratio (%) of each user in the total number of revolutions is calculated and printed out. >> Totalization is performed in the period from the previous printout to the current printout. After the printout, totalized data is cleared.	

3-9-3 Automatic run result printing

This capability of the ultracentrifuge automatically performs the following services:

1) Automatic printing of run records

Ultracentrifuge run records are retained in the run record buffer. This buffer can hold a maximum of 40 records at any given time. When the buffer becomes full, all of the 40 records are automatically printed out, except when the PRINTOUT AFTER EACH RUN options is toggled on. In this case, the result of the last run made is printed out, followed by all the run records in the buffer.

NOTE When the RECORD AFTER EACH RUN option is toggled off, ultracentrifuge runs are not recorded in the run record buffer (See Section 3-9). Therefore, even if the 40th run in a sequence is completed, the run records, including the 40th, will not be automatically printed out.

2) Automatic printing of run records of rotor

When the number of runs using a particular rotor with the ultracentrifuge has reached 20, the retained run records for the rotor will be automatically printed out.

3) Printout after each run

When the PRINTOUT AFTER EACH RUN option is toggled on, the result of a run is automatically printed out upon completion of that run. The printout produced is exactly the same as that produced by selecting “5. RUN RESULT PRINTOUT”.

This function is performed when the PRINTOUT AFTER EACH RUN options is toggled on (See Section3-9).

3-9-4 Printing-time abnormality handling

If an abnormal condition occurs that causes the printing in progress to be interrupted, do the following:

	Contents of error	Processing (Executing the following processing permits printing out from the beginning.)
1	Centrifuge power OFF	The record is left in the centrifuge proper. After a recovery, perform printout operations once again.
2	Printer power OFF (Dead battery)	The power lamp blinks at intervals of about 0.5 sec and the printer is put into an offline mode. Connect the AC adapter attached to the printer. When data remains in the buffer memory, the online lamp blinks. Do not turn off the power supply but connect the AC adapter as quickly as possible. In the online, the remaining data will be printed out.
3	No print paper	The offline lamp blinks. When paper is set, the offline lamp changes from the blinking state to the lighting state. Press the online switch, and the printer will start to print.

NOTE By clearing the “printer paper exhausted” abnormality, you can continue the operation of the ultracentrifuge. However, if the number of runs of the ultracentrifuge has reached 40, or if the number of runs of the rotor in use has reached 20, then continuing the operation will result in the loss of the oldest record.

4. Maintenance

Be sure to read and keep in mind the following cautionary information before maintenance.

⚠ **DANGER:** 1. When servicing the centrifuge, be sure to turn off the POWER switch and the main circuit breaker. Before removing covers, tables, etc. from the centrifuge, wait for at least three minutes to avoid electrical shock hazards.

⚠ **WARNING**：1.If the centrifuge, rotor or the accessory is contaminated by toxic or radioactive samples or pathogenic or infectious blood samples, be sure to decontaminate it according to good laboratory procedures and methods.

2.If there is a fear that the centrifuge, rotor or the accessory is contaminated by toxic or radioactive samples or pathogenic or infectious blood samples that impair human health, it is your responsibility to sterilize or decontaminate the centrifuge, rotor or the accessory properly before requesting repairs to Hitachi Koki authorized sales/service representative. Note that Hitachi Koki cannot repair the centrifuge, rotor or the accessory unless sterilization or decontamination is completed.

3.It is your responsibility to sterilize or decontaminate the centrifuge, rotor or the accessory properly before returning to Hitachi Koki authorized sales/service representative. In such cases, copy the decontamination sheet at the end of this manual and fill out the copied sheet, then attach it to the item to be returned.
Hitachi Koki may ask you about the treatment for the centrifuge, rotor or the part if the decontamination is checked and judged as insufficient by Hitachi Koki. It is your responsibility to bear the cost of sterilization or decontamination.
If you have any question, please send e-mail to ″himac@hitachi-koki.co.jp″ .
Note that Hitachi koki cannot repair or inspect the centrifuge, the rotor or the accessory unless sterilization or decontamination is completed.

⚠ **CAUTION:** Do not perform any operation not specified in this manual. If any problem is found on your centrifuge, contact Hitachi Koki authorized sales/service representative.

This centrifuge does not require complicated maintenance and inspection. For longer and safe use of this centrifuge without trouble, observe the following instructions.

⚠ **CAUTION:** Using cleaning or sterilization method other than recommended in this instruction manual may cause corrosion or deterioration of this centrifuge. Refer to chemical resistance chart attached to the rotor or contact Hitachi Koki.

For information on the maintenance of rotors and tubes, see rotor instruction manual and “ROTORS, TUBES, BOTTLES AND CAPS(Part No.S999204) ”.

4-1 Rotor chamber

⚠ **CAUTION:** Do not pour any solution such as water, detergent and disinfectant directly into the rotor chamber. Otherwise, the bearings of the drive unit may be corroded or deteriorated.

To maintain the rotor chamber, follow the instructions given below:
(1) When the ultracentrifuge is not in use, keep the rotor chamber ventilated.
(2) If the bowl is moist, wipe it with a clean, dry cloth or sponge.
(3) If the rotor chamber is dirty, wipe it with a clean cloth or sponge dampened with a diluted solution of mild, non-alkaline detergent. While doing this, be careful not to touch the window of the temperature sensor.
(4) If the door seal o-ring is dusty or scratched, high vacuum level will not be obtainable. Always keep the door seal o-ring clean. When the ultracentrifuge is used frequently, take out the door seal o-ring and wipe it with a clean, soft cloth and then put a light coat of vacuum grease on it every three to four months (ordinarily, once a year). If the door seal o-ring is damaged, replace it. Wipe the groove for the door seal o-ring with a clean, soft cloth dampened with alcohol or a similar solvent.

4-2 Drive shaft(Crown)

⚠ **CAUTION:** Clean the inside of the drive hole (crown hole) of the rotor and the surface of the drive shaft (crown) of the centrifuge once a month. If the drive hole or the drive shaft is stained or any foreign matter is adhered, the rotor may be improperly installed and come off during operation

This part is very important because the rotor is mounted on it and the crown transmits driving force to the rotor. Before mounting a rotor, wipe the outer surface of the crown with a soft cloth dampened with water sufficiently.

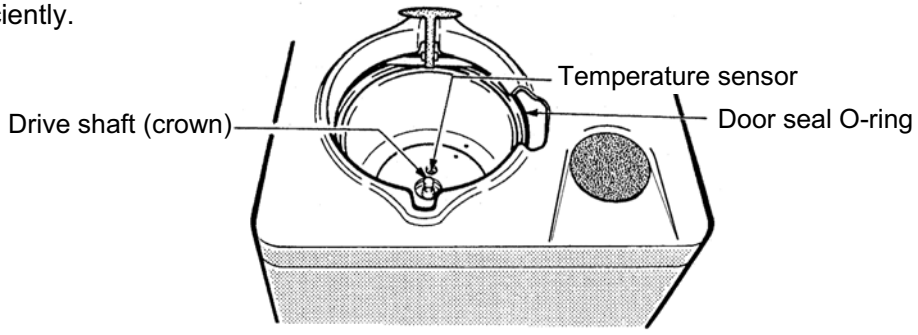


Fig. 4-1 Rotor chamber

4-3 Cabinet

Always keep the top deck and the cabinet of the centrifuge clean to prevent dust and other materials from falling into the rotor chamber. Wipe the top deck and the cabinet with a cloth or sponge dampened with a diluted solution of neutral detergent. If any solution that is toxic, radioactive, or pathogenic is spilt inside or outside the centrifuge, take necessary action according to your proper laboratory procedures and methods.

4-4 Others

(1) Storage period of service parts

Service parts are kept in stock ten years after the discontinuation of production.
The term “service parts” means the parts that are necessary to ensure the correct functioning of the centrifuge.

5. Troubleshooting

Be sure to read and keep in mind the following cautionary information before troubleshooting.

⚠ **DANGER:** 1. When servicing the centrifuge, be sure to turn off the POWER switch and the main circuit breaker. Before removing covers, tables, etc. from the centrifuge, wait for at least three minutes to avoid electrical shock hazards.

⚠ **WARNING:**：1.If the centrifuge, rotor or the accessory is contaminated by toxic or radioactive samples or pathogenic or infectious blood samples, be sure to decontaminate it according to good laboratory procedures and methods.

2.If there is a fear that the centrifuge, rotor or the accessory is contaminated by toxic or radioactive samples or pathogenic or infectious blood samples that impair human health, it is your responsibility to sterilize or decontaminate the centrifuge, rotor or the accessory properly before requesting repairs to Hitachi Koki authorized sales/service representative. Note that Hitachi Koki cannot repair the centrifuge, rotor or the accessory unless sterilization or decontamination is completed.

3.It is your responsibility to sterilize or decontaminate the centrifuge, rotor or the accessory properly before returning to Hitachi Koki authorized sales/service representative. In such cases, copy the decontamination sheet at the end of this manual and fill out the copied sheet, then attach it to the item to be returned.
Hitachi Koki may ask you about the treatment for the centrifuge, rotor or the part if the decontamination is checked and judged as insufficient by Hitachi Koki. It is your responsibility to bear the cost of sterilization or decontamination.
If you have any question, please send e-mail to "himac@hitachi-koki.co.jp" .
Note that Hitachi koki cannot repair or inspect the centrifuge, the rotor or the accessory unless sterilization or decontamination is completed.

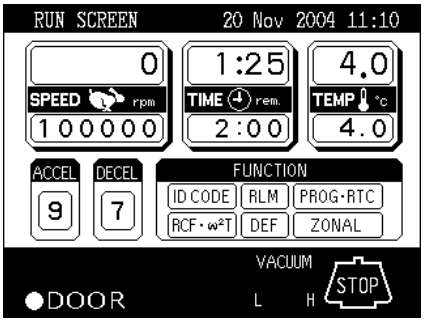
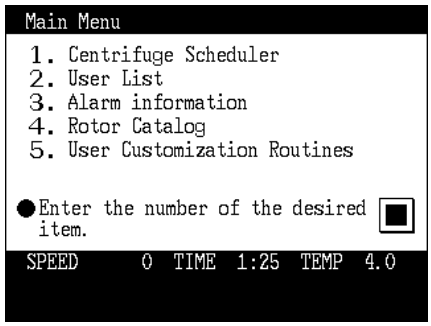
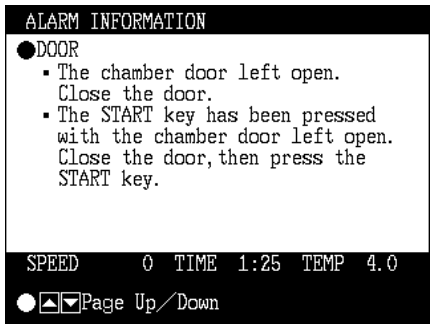
⚠ **CAUTION:** Do not perform any operation not specified in this manual. If any problem is found on your centrifuge, contact Hitachi Koki authorized sales/service representative.

This ultracentrifuge incorporates a “self-diagnosis feature” that diagnoses the cause of any problem which may occur when you start the centrifuge or while in operation.

5-1 Alarm indicators

If any trouble occurs, this machine gives a buzzer sound and display an alarm message in the message field of the Run Screen to warn of the trouble.
This machine incorporates the Alarm Information screen designed to allow you to take immediate action when such an alarm signal is given. You can open the Alarm Information screen as indicated in the following example:

1. Searching for Alarm Information

No.	Key operation	Screen display and considerations
1	A “DOOR” alarm signal occurs.	 •An alarm message appears in the message field of the Run Screen.
2	Press MENU key.	 •The display switches to the Menu Screen.
3	Select “ALARM INFORMATION”. 3 ENTER	 •The “ALARM INFORMATION” screen appears. >> The screen related to the current alarm signal is displayed before any other screen. >> To get back to the Run Screen, press ESC key twice.

2. Responding to an alarm signal
If an alarm message appears, remove the cause of the problem as described below and press CE key. You will then be able to resume your centrifugation.

⚠ **WARNING:** Unspecified repairs,remodeling or disassembly of the centrifuge that is not listed below is strictly prohibited by any person other than Hitachi Koki authorized services representative.

If the alarm message persists even after you have done what is specified below, contact Hitachi Koki sales/ service representative to order a repair.

Alarm	Cause	Action
DOOR	1.The VACUUM or START key has been pressed with the chamber door left open.	• Shut the door completely and press VACUUM or START key.
VACUUM	1. Required level of vacuum cannot be reached. 2. After a satisfactorily high level of vacuum was reached, it lowered (due to, for instance, sample leakage).	• Wipe off the moisture from inside the rotor chamber. • Clean the door seal o-ring, then apply a thin coat of vacuum grease. (Refer to Section 3-1.) • Check if the sample is leaking from the rotor and/or tubes. • If no operation sound is produced from the vacuum pump, check the breaker of the pump.
ROTOR	1. The rotor is not seated on spindle.	• Install rotor.
IMBALANCE	1. Rotor is not properly balanced, and abnormal vibration has occurred in the rotor. 2. Rotor cover or cap is not properly tightened.	• Check if the sample tubes exceed allowable imbalance level. • Check if any one of the tubes is deformed, and if there is any sign of sample leakage. • Tighten rotor cover or cap securely.
SPEED	1. Rotor speed is set higher than the maximum allowable speed.	• Set the speed within the permitted limits.
POWER	1. A power outage occurred while the rotor was rotating.	• Unless the set run time has elapsed, restart the run. • If the power was automatically restored and the rotor is rotating at set speed, then let the run continue.
	(Refer also to Section 2-7 “Happenings When power failure occurs”.	
“Rotor Life 1”	1.The rotor life almost reaches the final life(secondary life). When a “Rotor life 1” alarm signal occurs,it indicates that this rotor reach the final life after it is operated for twenty times or 100 hours or the less.	• Check that the total number of runs and hours on the Rotor Management screen.Do not use the rotor any more when it reaches the final life.Refer to the instruction manuals of each rotors.
“Rotor Life 2”	1.The rotor life almost reaches the primary life. When a “Rotor life 2” alarm signal occurs,it indicates that this rotor reach the primary life after it is operated for twenty times or 100 hours or the less.	• Check that the total number of runs and hours on the Rotor Management screen.If the rotor life has reached the primary life, decrease the maximum speed of the rotor. Refer to the instruction manuals of each rotors.
“Rotor Life 3”	1.Information of the registered rotors is too much to enter the data on the additional rotors.	• Register the additional rotors after deleting unnecessary registered rotors on the Rotor Management screen.
“Rotor Life 4”	1.The rotor life almost reaches the final life(secondary life).	• Do not use the rotor any more when it reaches the final life.Scrap this rotor.

5-2 Diagnosed problems-requiring maintenance

If any of the alarm messages E11 to E86 lights up, it is indicating that the centrifuge has a problem and requires maintenance by Hitachi Koki service representative. When you call the service personnel, tell them the displayed alarm code.

Note When the "No. 13 Unexpected MPG pulse" alarm occurs, the related problem code is impossible to clear until the rotor stops.

5-3 User-corrected Problem

If the ultracentrifuge does not function even if no problems are reported, do the following:

Symptom	Cause	Remedy
The ultracentrifuge can not be energized be by turning ON the POWER switch.	The circuit breaker connected to the ultracentrifuge is tripped.	• Reset the circuit breaker, and turn on the POWER switch.
The rotor cannot cool down or its temperature	Poor vacuum	• Check whether the oil of the vacuum pump needs replacing. • Clean or replace the door seal o-ring.
	The room temperature is higher than 30 °C.	• If there is an air-conditioner working near the ultracentrifuge, run it at a lower room temperature setting. • If there is no air-conditioner working near the ultracentrifuge, lower the set speed.
	The rotor surface contains drops of water.	• Wipe water off the rotor with a soft cloth.
	The window part of the temperature sensor contains drops of water.	• Wipe water off the temperature sensor with a soft cloth being careful not to touch the sensor with your finger.

6. Installation

Installation or relocation of your centrifuge must be done by the authorized Hitachi Koki service representative. Contact your local dealer or Hitachi Koki service representative. In order to use the ultracentrifuge fully and safely, follow the installation instructions given below.

1. Power requirement

⚠ **DANGER:** When servicing the centrifuge, be sure to turn off the POWER switch and the main circuit breaker. Before removing covers, tables, etc. from the centrifuge, wait for at least three minutes to avoid electrical shock hazards.

⚠ **WARNING:** Before changing the power voltage by manually selecting desired tapping on the internal transformer, turn off power to the ultracentrifuge, then unplug the power cord from the wall outlet. Changing the voltage without doing so exposes you to the possibility of electrical shock.

⚠ **CAUTION:** Your ultracentrifuge can be damaged if connected to a wrong voltage. Check the voltage before plugging the ultracentrifuge into a power source.

An emergency switch (breaker) should be installed that turns off the main power supply in the event of malfunctioning.(The desirable installation location of the emergency switch is outside the room or near the exit.) Your ultracentrifuge can be operate on one of the following four power voltages:208,220,230,or 240 Vac(50/60 Hz,20A) You can change voltage by manually selecting the desired tapping on the interal transformer.

⚠ **CAUTION:** The voltage requirement for your ultracentrifuge is mentioned on a rectangular metal plate affixed to the left side of the instrument cabnet. Be sure to read the metal plate before plugging the ultracentrifuge. If the voltage requirement does not match the voltage of the availlable power source, quit plugging and call a service representative.

2.Place of installation

(1) Install the ultracentrifuge on a concrete, stone, or hardwood floor. Avoid such places as soft floor, carpeted floor transmitting external vibrations to the ultracentrifuge.
(2) Ambient temperature for operation is 2 to 40°C. If the room temperature rises above 30°C, the temperature of the rotor may become too high. Avoid installing the ultracentrifuge in direct sunlight or installing it at the place whose ambient temperature is higher than 30°C and 30°C.

(3) The ultracentrifuge requires a clearance of more than 20 cm at its rear and a floor space of at least 90X90cm(See Fig.6-1). Ensure the surrounding of the instrument has a free circulation of air. Avoid installing the ultracentrifuge near any other heat-generating machine/equipment, which might reduce the ultracentrifuge cooling capacity.

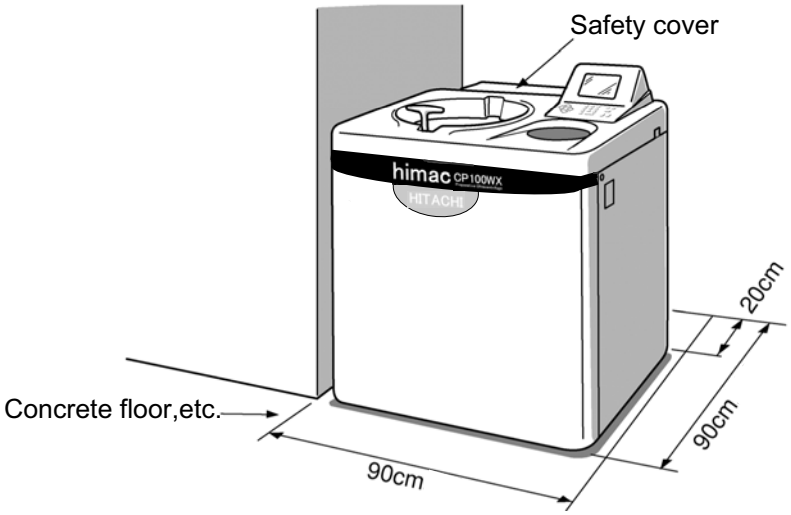


Fig.5-1 Place of installation

⚠ **WARNING:** For operator safety, maintain a 30-cm “clearance envelope” around the instrument and keep out that area while the rotor is spinning. Do not store dangerous substances capable of developing flammable or explosive vapors in the clearance envelope.

3. Fixing the safety cover

The ultracentrifuge is shipped with the safety cover removed from its rear. When installing the ultracentrifuge, remove the packings and insert the lower part of the safety cover into the two hooks protruded from the frame and then secure it with the three M5 binding screws and two M4 binding screws (See Fig.6-2).

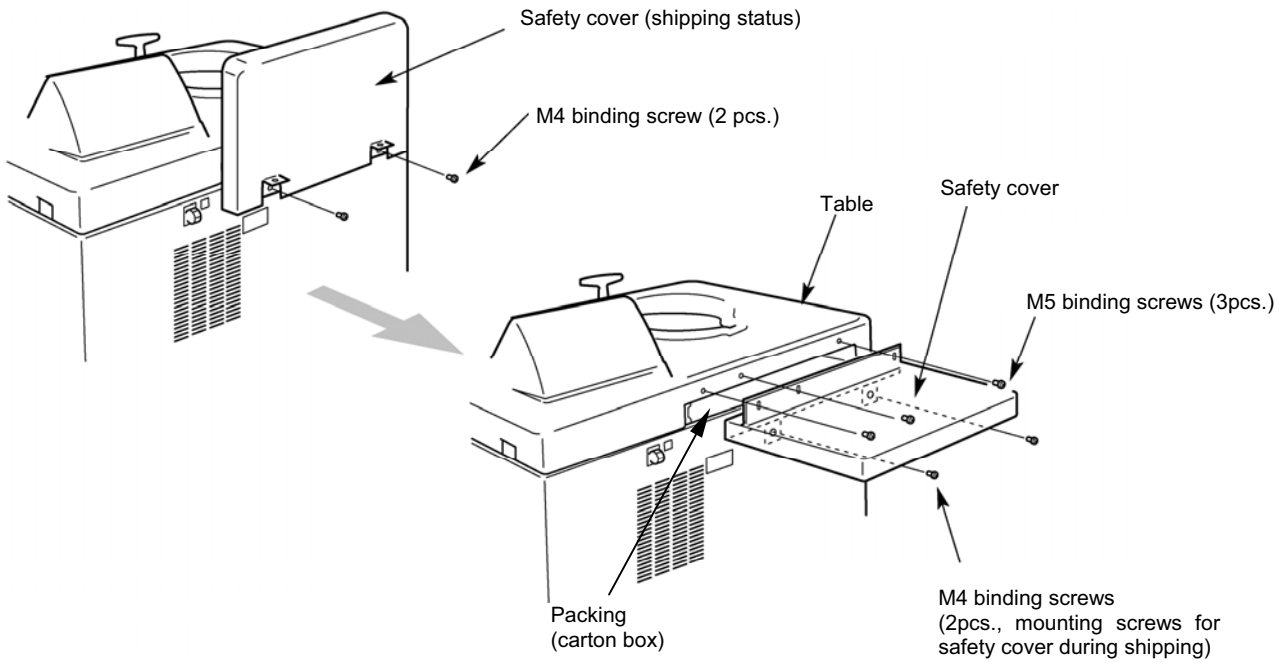


Fig.6-2 Securing the safety cover

4.Connecting power cord

Secure the two terminals (blue: Neutral, brown: Hot) of the power cord to the terminals of the power distribution board. The green/yellow cord is a grounding conductor. Be sure to connect the cord to required ground terminals (earth ground). All electrical connections should be carried out by a suitable qualifed person.

⚠**WARNING :** Your ultracentrifuge must be grounded properly.

5. Leveling

(1) Turn the four leveling screws with a wrench to lift the caster about 10 to 20 mm off the floor as shown in Fig. 6-3.

(2) Turn on the POWER switch and open the chamber door. Then turn off the switch again. If the power cord is not yet connected, remove the front cover and then open the door according to the instructions given in Section 3-7, "Happenings when power failure occurs."

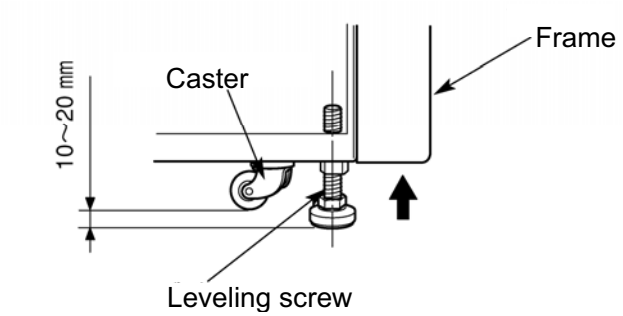


Fig.6-3 Leveling operation

(3) Place the level across the top of the drive shaft in the rotor chamber (see Fig. 6-4). Turn the four leveling screws until the bubble in the level indicates the instrument is level.
(4) When the instrument is level, check that the four leveling screws are secured to the floor.

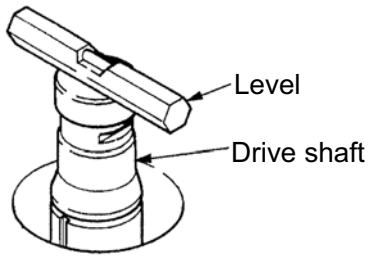


Fig.6-4 Level Placement

(5) Moving the ultracentrifuge
When moving the ultracentrifuge, disconnect the power cord and unscrew the leveling screws with a wrench to lower the caster to the floor. Raise the leveling screws enough to remove the leveling pads, then move the ultracentrifuge. After moving, be sure to install and level the instrument again.

⚠ **CAUTION:** Before moving the ultracentrifuge, be sure to remove the rotor from the drive shaft and store it in a safe place. When installing the ultracentrifuge again, call your authorized Hitachi Koki representative and ask them to check your ultracentrifuge.

7. Warranty for the CP-WX Series Ultracentrifuge

HITACHI KOKI MAKES NO WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, EXCEPT AS PROVIDED HEREIN.

Subject to the exceptions and upon the conditions specified below, Hitachi Koki agrees to correct, either by repair or, at Hitachi Koki's election, by replacement, any defects of material or workmanship which develop within one(1) year after delivery of the CP-WX Series Ultracentrifuge(instrument), provided that investigation and/or factory inspection by Hitachi Koki discloses that such defect developed under normal and proper usage.The exceptions and conditions mentioned above are the following:

1. Some components and accessories by their nature are not intended to and will not function for the warranty period. If any such component or accessory fails to give reasonable service for a reasonable period of time, Hitachi Koki will, at its election, replace or repair such component or accessory.
   What constitutes reasonable service and what constitutes a reasonable period of time shall be determined solely by Hitachi Koki after Hitachi Koki is in possession of all the facts concerning operating conditions and other pertinent factors and after such component or accessory has been investigated and/or factory inspected by Hitachi Koki.
2. All items claimed defective must be returned to Hitachi Koki, transportation charges prepaid, and will be returned to Buyer with transportation charges prepaid.
   Hitachi Koki will be released from all obligations under this warranty in the event that any such instruments have been installed by, or repairs or modifications are made by, persons other than its own or service personnel authorized by it unless such installation, modification and/or repairs by others are made with the prior written consent of Hitachi Koki.
3. Hitachi Koki is not obligated to incorporate into any instrument any design, engineering, or performance change developed after delivery of the instrument to the original purchaser.

In addition to the foregoing one (1) year warranty and subject to the foregoing exceptions and conditions, Hitachi Koki warrants the special drive cartrige assembly of the CP-WX Series Ultracentrifuge to be free from defects in material or workmanship for ten (10) years from the date of delivery, subject to all the conditions, limitations, and other aspects of warranty expressed above and to the following further conditions:

1.The instrument shall be operated only within its rated maximum speed and temperature in accordance with the instructions in this manual.
2. The drive unit shall not be overloaded nor loaded with an unbalanced rotor or an improper rotor and it shall be free from any corrosion or rust caused by spilled sample or solution on the drive spindle or in the chamber.
3. The drive unit shall not be modified, disassembled, or repaired by any party but Hitachi Koki or by a service representative authorized, in writing, by Hitachi Koki.

If any defect should happen to the drive unit within the aforesaid warranty period and accumulated number of revolutions, the defective drive unit shall be replaced at the cost in accordance with the formula set forth below:

(a) First year: free replacement.
(b) Second year through tenth year:

$$\text{Replacement Cost} = s \times \frac{a}{10}$$

Where s is the selling price at the time of replacement and a is actual accumulated years.

Incidental conditions

We do not warrant this centrifuge and the rotor under the following conditions even before the warranty period expires:

（1）Failures caused by incorrect installation
（2）Failures caused by rough and/or improper handling
（3）Failures caused by operation or maintenance in any manner not described in the rotor instruction manual and the centrifuge instruction manual
（4）Failures caused by conveyance or relocation after installation
（5）Failures caused by modification or disassembly without Hitachi Koki's permission
（6）Failures caused by use of rotors, buckets, adapters, tubes and bottles that are not designated for the centrifuge by Hitachi Koki
（7）Failures caused by fire, earthquakes, or other natural disaster
（8）Consumable parts and parts having a limited warranty period
（9）Failures caused by use of a rotor that is out of warranty

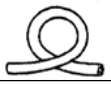
This warranty does not apply to samples or other damage caused by a failure of this centrifuge or the rotor.

8. Supply list

The items below are those supplied with the ultracentrifuge.

Item name	Part no.	Q'ty	Item drawing	Remarks
Instruction manual	S999444	1		
Summarized sheet of instruction manual	S999588	1		
Catalog of rotors tubes,bottles and caps	999511	1		
Instruction manual for rotors,tubes,bottles and caps	S203112K	1		
Vacuum pump oil	3058513	1		Supplied in1-liter NEO VAC Containers(MR100)
M5 screw	————	3		
Hex.bar wrench	8046005	1		
Rotor rubber mat	S308336	1		
Vacuum grease	483719	1		

Optional items

Item name	Part no.	Q'ty	Item drawing	Remarks
Funnel	403585	1		
Vinyl tube	660583	1		
Cleaning bar	S301333	1		
Door seal O-ring	465428	1		

It is requested that you return the faulty product with this Decontamination Sheet in order to repair it safely in our plant.
Be sure to decontaminate the product according to good laboratory procedures and methods, and fill out this Decontamination Sheet and attach it to the product to be returned to Hitachi Koki for repair.

Attention:Hitachi Koki Co., Ltd.

Decontamination Sheet

Date:

Name:

Name of company(organization) or school:

Division or faculty/Subject of study:

Telephone number:

Address:

I performed decontamination to remove biological or chemical contaminants(including radioactive isotope) from this product as follows.

Model of centrifuge: Serial number

Model of rotor: Serial number

Accessory: Serial number

Contaminants used:

Decontamination methods(conditions):

Date of decontamination Signature

After-sales Service

Periodic inspection of the centrifuge is recommended to assure safe and efficient operation.
If the centrifuge fails to function normally, do not attempt to repair it yourself. Contact Hitachi Koki authorized sales/service representative.

Export office

Hitachi High-Technologies Co., Ltd. Head Office:
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Manufacturer

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URL: http://www.hitachi-koki.com/himac/