

PHCbi

Operating Instructions

Biomedical Freezer

MDF-U443



Please read the operating instructions carefully before using this product, and keep the operating instructions for future use.

See page 37 for model number.

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INTRODUCTION

- Read the operating instructions carefully before using the product and follow the instructions for safe operation.
- PHC Corporation takes no responsibility for safety if the product is not used as intended or is used with any procedures other than those given in the operating instructions.
- Keep the operating instructions in a suitable place so that they can be referred to as necessary.
- The operating instructions are subject to change without notice for improvement of performance or function.
- Contact our sales representative or agent if any page of the operating instructions is lost or the page order is incorrect, or if the instructions are unclear or inaccurate.
- No part of the operating instructions may be reproduced in any form without the express written permission of PHC Corporation.

IMPORTANT NOTICE

PHC Corporation guarantees this product under certain warranty conditions. However, please note that PHC Corporation shall not be responsible for any loss or damage to the contents of the product.

<Intended Use>

This equipment is designed for low temperature storage of human cells, organs, plasma and DNAs.

PRECAUTIONS FOR SAFE OPERATION

It is imperative that the user complies with the operating instructions as it contains important safety advice.

Items and procedures are described so that you can use this unit correctly and safely. If the precautions advised are followed, this will prevent possible injury to the user and any other person.

Precautions are illustrated in the following way:




WARNING

Failure to observe WARNING signs could result in a hazard to personnel possibly resulting in serious injury or death.

CAUTION

Failure to observe CAUTION signs could result in injury to personnel and damage to the unit and associated property.

Symbol shows;

-  This symbol means caution.
-  This symbol means an action is prohibited.
-  This symbol means an instruction must be followed.

Be sure to keep the operating instructions in a place accessible to users of this unit.

< Label on the unit >

















This mark is labeled on the cover in which the electrical components of high voltage are enclosed to prevent the electric shock.

The cover should be removed by a qualified engineer or a service personnel only.















PRECAUTIONS FOR SAFE OPERATION

WARNING

-  **Do not use the unit outdoors.** Current leakage or electric shock may result if the unit is exposed to rain water.
-  **Only qualified engineers or service personnel should install the unit.** The installation by unqualified personnel may cause electric shock or fire.
-  **Install the unit on a sturdy floor and take an adequate precaution to prevent the unit from turning over.** If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.
-  **Never install the unit in a humid place or a place where it is likely to be splashed by water.** Deterioration of the insulation may result which could cause current leakage or electric shock.
-  **Never install the unit in a flammable or volatile location.** This may cause explosion or fire.
-  **Never install the unit where acid or corrosive gases are present** as current leakage or electric shock may result due to corrosion.
-  **Always ground (earth) the unit to prevent electric shock.** If the power supply outlet is not grounded, it will be necessary to install a ground by qualified engineers.
-  **Never ground the unit through a gas pipe, water main, telephone line or lightning rod.** Such grounding may cause electric shock in the case of an incomplete circuit.
-  **Connect the unit to a power source as indicated on the rating label attached to the unit.** Use of any other voltage or frequency other than that on the rating label may cause fire or electric shock.
-  **Never store volatile or flammable substances** in this unit if the container cannot be sealed. These may cause explosion or fire.
-  **Do not insert metal objects such as a pin or a wire into any vent, gap or any outlet on the unit.** This may cause electric shock or injury by accidental contact with moving parts.
-  **Use this unit in safe area when treating the poison, harmful or radiate articles.** Improper use may cause bad effect on your health or environment.
-  **Turn off the power switch (if provided) and disconnect the power supply to the unit prior to any repair or maintenance** of the unit in order to prevent electric shock or injury.
-  **Do not touch any electrical parts (such as power supply plug) or operate switches with a wet hand.** This may cause electric shock.








PRECAUTIONS FOR SAFE OPERATION

WARNING

-  **Ensure you do not inhale or consume medication or aerosols** from around the unit at the time of maintenance. These may be harmful to your health.
-  **Never splash water directly onto the unit** as this may cause electric shock or short circuit.
-  **Never put containers with liquid on the unit** as this may cause electric shock or short circuit when the liquid is spilled.
-  **Never bind, process, or step on the power supply cord, or never damage or break the power supply plug.** A broken supply cord or plug may cause fire or electric shock.
-  **Do not use the supply cord if its plug is loose.** Such supply cord may cause fire or electric shock.
-  **Never disassemble, repair, or modify the unit yourself.** Any such work carried out by an unauthorized person may result in fire, or electric shock or injury due to a malfunction.
-  **Disconnect the power supply plug if there is something wrong with the unit.** Continued abnormal operation may cause electric shock or fire.
-  **When removing the plug from the power supply outlet, grip the power supply plug, not the cord.** Pulling the cord may result in electric shock or fire by short circuit.
-  **Disconnect the power supply plug** before moving the unit. Take care not to damage the power cord. A damaged cord may cause electric shock or fire.
-  **Disconnect the power plug when the unit is not used for long periods.** Keeping the connection may cause electric shock, current leakage, or fire due to the deterioration of insulation.
-  If the unit is to be stored unused in an unsupervised area for an extended period, **ensure that children do not have access and that doors cannot be closed completely.**
-  **The disposal of the unit should be accomplished by appropriate personnel.** Remove doors to prevent accidents such as suffocation.
-  **Do not put the packing plastic bag within reach of children** as suffocation may result.
-  **Do not place this unit in a location where it is difficult to disconnect the power supply plug.** Failure to disconnect the power supply plug may cause fire in the event of a problem or malfunction.

PRECAUTIONS FOR SAFE OPERATION

CAUTION

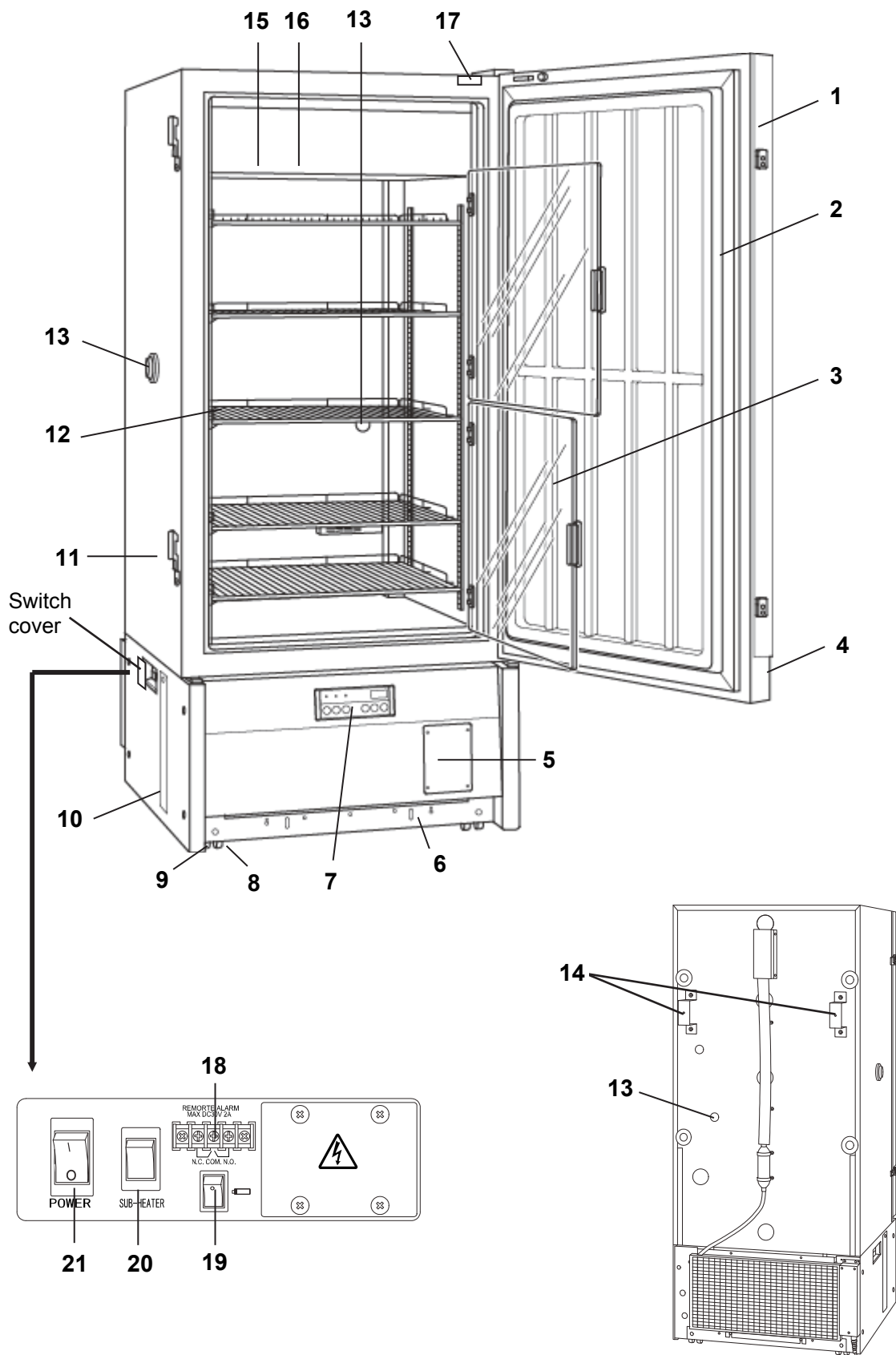
-  This unit must be plug into a dedicated circuit protected by branch circuit breaker.
-  Use a dedicated power source as indicated on the rating label attached to the unit. A multiple-tap may cause fire resulting from abnormal heating.
-  **Connect the power supply plug to the power source firmly after removing the dust on the plug.**
A dusty plug or improper insertion may cause a heat or ignition.
-  **Never store corrosive substances such as acid or alkali** in this unit if the container cannot be sealed. These may cause corrosion of inner components or electric parts.
-  **Check the setting when starting up of operation after power failure or turning off of power switch.** The stored items may be damaged due to the change of setting.
-  **Be careful not to tip over the unit** during movement to prevent damage or injury.
-  **Prepare a safety check sheet** when you request any repair or maintenance for the safety of service personnel.

ENVIRONMENTAL CONDITIONS

This equipment is designed to be safe at least under the following conditions (based on the IEC 61010-1):

- Indoor use;
- Altitude up to 2000 m;
- Ambient temperature 5°C to 40°C;
- Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C;
- Mains supply voltage fluctuations up to $\pm 10\%$ of the nominal voltage;
- Transient overvoltages up to the levels of OVERVOLTAGE CATEGORY II;
- Temporary OVERVOLTAGES occurring on the mains supply;
- Applicable pollution degree of the intended environment (POLLUTION DEGREE 2 in most cases);

FREEZER COMPONENTS



FREEZER COMPONENTS

1. Outer door: To open the outer door, grip the handle.

2. Door gasket: This provides a tight outer door seal and prevents cold air leakage. Keep clean.

3. Inner door: Transparent acrylic plate minimizes cold air leakage.

4. Lock: Turn counterclockwise to 180° with a key and the outer door is securely locked.

5. Space for temperature recorder: Refer to page 32 for installation.

6. Evaporating tray: Defrost water from the evaporator accumulates on the tray and evaporates into the atmosphere. See page 23 for cleaning.

7. Control panel: See page 10 for the details.

8. Leveling foot: Two feet are provided on the front side (right and left). Keep the unit in level by adjusting these feet at the installation. See page 12.

9. Caster: 4 casters are provided to facilitate moving of the cabinet.

10. Condenser filter (inside): Clean a clogged condenser filter. See page 24 for the details.

11. Latch: This firmly latches the outer door to the freezer frame and prevents cold air leakage.

12. Shelf: Shelf location can be freely adjusted to match size of stored items.

13. Access port (left side, rear side): This is used for leading the measuring cable from the chamber to the outside.


14. Fixture (rear side):

15. Lamp: Lights up when door is open.

16. Circulating fan (inside): Sucks in cold air that has been circulating in the chamber and sends it out for further circulation after re-cooling it.

17. Door switch: Stops the circulating fan when the door is open to prevent cold air leakage. Also activates the door lamp.

18. Remote alarm terminal: This is used to notice an alarm condition of the unit to remote location. Refer to page 21 "Remote alarm terminal".

19. Battery switch (): This is a switch for power failure alarm. Be sure to turn off this switch to save the battery if the freezer is not in operation for long period. After installation, turn on the power switch and battery switch.

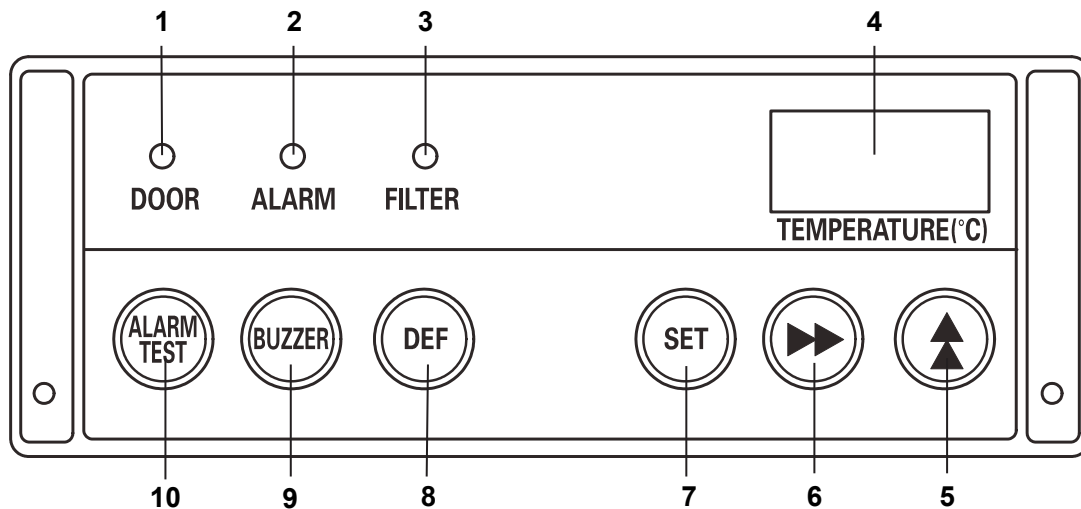
20. Sub-heater switch: Normally, turn this switch ON. Refer to page 20.

21. Power switch: This is for turning ON/OFF the power to the unit. ON – "I" OFF – "O"

The switch is covered by a switch cover to prevent the accidental push. To turn on or off the switch, remove the switch cover by loosening the screw.

FREEZER COMPONENTS

Control panel



1. Door lamp (DOOR): This indicator lights when the outer door is open.

2. Alarm lamp (ALARM): This lamp is flashed at the time of power failure or in the event of alarm.

3. Filter check lamp (FILTER): This lamp blinks and alarm buzzer sounds when the condenser filter is clogged. Clean the condenser filter according to page 24.

4. Digital temperature indicator: This indicator shows the current chamber temperature or set temperature. and error code is also indicated in the event of alarm.

5. Numerical value shift key (▲): Pressing this key in the setting mode causes the numerical value to change. ON-OFF of key lock can be selected by pressing this key in the key lock setting mode.

6. Digit shift key (▶▶): Pressing this key in the setting mode causes the changeable digit to shift. Key lock setting mode is led by pressing this key for more than 5 seconds in the temperature display mode. Refer to page 14 for the key lock function.

7. Set key (SET): Temperature setting mode is led by pressing this key. Once the key is pressed, the changeable digit is flashed. Pressing this key again after setting desired temperature, the setting is stored into computer memory. If there is no key operation for 90 seconds during the temperature setting mode, the temperature setting mode is invalid automatically. See page 14 for the details.

8. Defrost key (DEF): Manual defrosting is available by pressing this key for about 5 seconds in addition to the automatic defrosting. As for the details, see page 20.

NOTE: A defrost key (DEF) doesn't work during the warm up of the product. (Con and chamber temperature are displayed alternately.)

9. Alarm buzzer stop key (BUZZER): Press this key to silence the alarm buzzer in the event that the alarm operates and the buzzer sounds. The alarm buzzer sounds again with delay time when the same alarm status continues (refer to page 21).

10. Alarm test key (ALARM TEST): To check the alarm system during freezer operation. Pressing this key with the battery switch ON gets the alarm lamp to flash, the remote alarm to operate, and the alarm buzzer to sound.

INSTALLATION SITE

To operate this unit properly and to obtain maximum performance, install the unit in a location with the following conditions:

■ **A location not subjected to direct sunlight**

Do not install the unit under direct sunlight. Installation in a location subjected to direct sunlight cannot obtain the intended performance.

■ **A location with adequate ventilation**

Leave at least 10 cm around the unit for ventilation. Poor ventilation will result in a reduction of the performance and consequently the failure.

■ **A location away from heat generating sources**

Avoid installing the unit near heat-emitting appliances such as a heater or a boiler etc. Heat can decrease the intended performance of the unit.

■ **A location with little temperature change**

Install the unit under stable ambient temperature. The allowable ambient temperature is between -5 and +35°C.

■ **A location with a sturdy and level floor**

Always install the unit on a sturdy and level floor. The uneven floor or tilted installation may cause failure or injury. Install the unit in stable condition to avoid the vibration or noise. Unstable condition may cause vibration or noise.

 **WARNING**

Install the unit on a sturdy floor. If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.

Select a level and sturdy floor for installation. This precaution will prevent the unit from tipping. Improper installation may result in water spillage or injury from the unit tipping over.

■ **A location not prone to high humidity**

Install the unit in the ambient of 80% R.H. or less humidity. Installation under high humidity may cause current leakage or electric shock.

 **WARNING**

Do not use the unit outdoors. Current leakage or electric shock may result if the unit is exposed to rain water.

Never install the unit in a humid place or a place where it is likely to be splashed by water. Deterioration of the insulation may result which could cause current leakage or electric shock.

■ **A location without flammable or corrosive gas**

Never install the unit in a flammable or volatile location. This may cause explosion or fire or may result in the current leakage or electric shock by the corrosion of the electrical components.

■ **A location without the possibility of anything fall**

Avoid installing the unit in the location where anything can fall down onto the unit. This may cause the breakdown or failure of the unit.

INSTALLATION

1. Removing the packaging materials and tapes

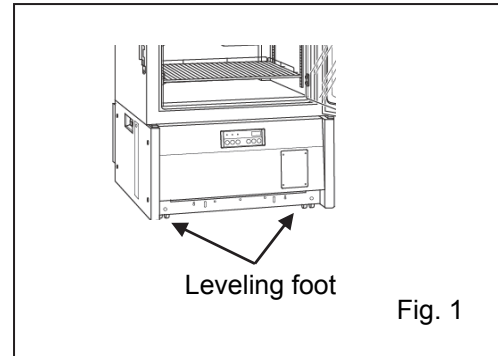
Remove all transportation packaging materials and tapes. Open the doors and ventilate the unit. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent. (Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.) After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the panels with a dry cloth.

Note:

Remove the cable tie banding the power supply cord. Prolonged banding may cause the corrosion of the cord coating.

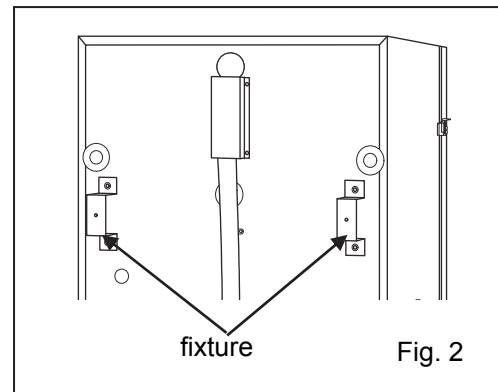
2. Adjusting the leveling foot

Extend the leveling feet by rotating them counterclockwise to contact them to the floor. Ensure the unit is level. (Fig. 1)



3. Fixing the unit

Two fixtures are attached to the rear of the frame. (Fig. 2) Fix the frame to the wall with these fixtures and rope or chain.



4. Ground (earth)

The ground (earth) is for preventing the electric shock in the case of the electrical insulation is somehow degraded. Always ground the unit at the time of installation.

⚠ WARNING

Use a power supply outlet with ground (earth) to prevent electric shock. If the power supply outlet is not grounded, it is necessary to install a ground by qualified engineers.

Never ground the unit through a gas pipe, water main, telephone line or lightning rod. Such grounding may cause electric shock in the case of an incomplete circuit.

START-UP OF UNIT

Follow the procedures for the initial and consequent operations of the unit.

1. Check the power switch is off, battery switch is off and sub-heater switch is off.
2. Connect the power supply cord to the dedicated outlet with appropriate rating. Then turn on the power switch.
3. Turn on the battery switch and sub-heater switch.

Note:

The battery needs to be replaced about every 3 years. Contact our sales representative or agent for battery replacement.

4. The alarm buzzer sometimes operates. In this case, stop the alarm buzzer by pressing the alarm buzzer stop key (BUZZER).
5. Set the chamber temperature to the desired temperature.
6. Allow the chamber temperature to fall to the desired temperature. Check the chamber temperature on the digital temperature indicator.
7. Press the alarm test key (ALARM TEST) and check that the alarm lamp blinks and alarm buzzer activates.
8. Begin slowly placing items into the chamber to minimize the temperature rise.
 - When the ambient temperature is low at power-up, the compressor is continuously operated after repeated on / off.Digital temperature indicator is displayed alternately of the chamber temperature and "Con". (It cannot be used (DEF) defrost key.)

⚠ CAUTION

Do not put too many warm articles into a freezer compartment before enough operating. Put items in a few at a time after the freezer compartment temperature has cooled to at least -20°C.

Start-up of unit:

The unit is programmed to repeatedly turn the compressor on and off in order to make its startability better when you start the unit at low ambient temperature (about 25°C or lower). If the ambient temperature of the installation site is high, the product does not turn on the power for four hours after installation. When you power-up of the product, there is a possibility that the breaker to operate. The unit should be exposed to ambient temperature sufficiently, 4 hours at least to avoid the breaker from trapping.

Operation after power failure

The memory (chamber temperature setting and alarm temperature setting) is backed-up by nonvolatile memory. Accordingly, the freezer resumes the operation with setting before power failure.

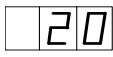
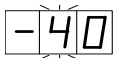


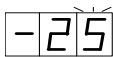
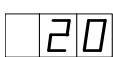
⚠ CAUTION

The start-up after power failure is subject to adverse affection such as voltage drop because all electrical appliance start to operate simultaneously. Always check the running status.

CHAMBER TEMPERATURE SETTING

Table 1 shows the basic procedure for setting the chamber temperature. Perform key operations in the sequence indicated in the table. The example in the table is based on the assumption that the desired temperature is -25°C. The chamber temperature is set to -40°C at the factory.

Table 1 Basic operation sequence (Example: Chamber temperature -25°C)

	Description of operation	Key operated	Indication after operation
1	Turn the power switch on.	----	The current chamber temperature is displayed. 
2	Press set key.	SET	The second digit is flashed. 
3	Set the temperature to -25 with the digit shift key and the numerical value shift key.		When pressed, the settable digit shifted.
			When pressed, the figure of settable digit changes. 
4	Press set key.	SET	Set temperature is memorized and the current chamber temperature is displayed. 

Note:


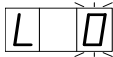


- Although the value of the chamber temperature setting can range from -15°C to -44°C, the guaranteed temperature is -40°C when there is no load at the ambient temperature at 35°C.
- The setting mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

KEY LOCK FUNCTION

This unit is provided with the key lock function. When the key lock is ON, change of the setting through the key pad is not available. The key lock is set in OFF at the factory.

Display	Mode	Function
L 0	Key lock is OFF	Enable to change of the setting
L 1	Key lock is ON	Disable to change of the setting

Table 2 Procedure for key lock setting (change from key lock OFF to key lock ON)

	Description of operation	Key operated	Indication after operation
1	Press digit shift key for 5 seconds.		The first digit is flashed. 
2	Press numerical value shift key and scroll the figure to 1.		When pressed, the figure of settable digit changes. 
3	Press set key.	SET	The key lock is set to ON. The current chamber temperature is displayed.

- The setting mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

FUNCTION MODE

This unit has the following function mode.

Indication	Mode	Settable range
F01	Setting of high temperature alarm	Between 5 and 20°C higher than the chamber set temperature (1°C gradient)
F02	Setting of low temperature alarm	Between -5 and -20°C lower than the chamber set temperature (1°C gradient)
F04	Setting of delay time of door alarm	Between 1 and 15 minutes (1 minute gradient)
F05	Setting of compressor delay time (for low stage side only)	Between 2 and 15 minutes (1 minute gradient)
F25	Setting of alarm resume time	000 or between 10 and 60 minutes (10-minute gradient)
F50	Setting of alarm delay time	Between 0 and 15 minutes (1 minute gradient)

SETTING OF ALARM DELAY TIME

The delay time of the buzzer and remote alarm for high and low temperature alarm can be set between 0 and 15 minutes. The procedure in table 3 shows the sequence to set the delay time to 10 minutes. The delay time is set to 15 minutes at the factory.

Table 3 Setting procedure for alarm delay time (change from 15 minutes to 10 minutes)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for 5 seconds.		The first digit is flashed.
3	Scroll the figure to F50 by using digit shift key and numerical value shift key		When pressed, the figure of settable digit changes.
			When pressed, the changeable digit shifted.
4	Press set key.	SET	The current delay time is displayed. The first digit is flashed.
5	Set the figure to 010 with the numerical value shift key.		When pressed, the figure of the first digit changes.
6	Press set key.	SET	The delay time is memorized and the current chamber temperature is displayed.

■ The setting mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

SETTING OF TEMPERATURE ALARM

This unit is provided with the high and low temperature alarm and the temperature at which the alarm is activated is changeable.

The following procedure shows the setting of alarm temperature according to the condition below:

High temperature alarm: activates at the temperature 10°C higher than the set temperature

Low temperature alarm: activates at the temperature -10°C lower than the set temperature

Note:

The alarm temperature is set at the factory 15°C higher and lower than the set temperature.

The available range of alarm temperature is between 5°C and 20°C higher or lower than the set temperature.

Table 4. Procedure for setting high temperature alarm (Change from 15°C to 10°C)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for about 5 seconds.		The first digit is flashed.
3	Press numerical value shift key and scroll the figure to 1.		When pressed, the figure of settable digit changes.
4	Press set key.	SET	The current setting is displayed and the first digit is flashed.
5	Scroll the figure to 010 by using the numerical value shift key		When pressed, the figure of settable digit changes.
6	Press set key.	SET	Alarm temperature is memorized and the current chamber temperature is displayed.

Table 5. Procedure for setting low temperature alarm (Change from -15°C to -10°C)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for about 5 seconds.		The first digit is flashed.
3	Press numerical value shift key and scroll the figure to 2.		When pressed, the figure of settable digit changes.
4	Press set key.	SET	The current setting is displayed and the first digit is flashed.
5	Scroll the figure to -10 by using the numerical value shift key		When pressed, the figure of settable digit changes.
6	Press set key.	SET	Alarm temperature is memorized and the current chamber temperature is displayed.

■ The setting mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

SETTING OF ALARM RESUME TIME

The alarm buzzer is silenced by pressing alarm buzzer stop key (BUZZER) on the control panel during alarm condition.

The alarm buzzer will be activated again after certain suspension if the alarm condition is continued. The suspension time can be set by following the procedure shown in the Table 6 below.

The example in the table is based on the assumption that the desired duration is 20 minutes. The duration is set to 30 minutes at the factory.

Table 6 Setting procedure for alarm resume time (change from 30 minutes to 20 minutes)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for 5 seconds.		The first digit is flashed.
3	Set the figure to F25 with the numerical value shift key and the digit shift key.		When pressed, the figure of settable digit changes.
			When pressed, the changeable digit shifted.
4	Press set key.	SET	The current setting is displayed. The second digit is flashed.
5	Scroll the figure to 020 with the numerical value shift key.		When pressed, the figure of settable digit changes.
6	Press set key.	SET	The setting is memorized and the current chamber temperature is displayed.

■ The settable alarm resume time is 10, 20, 30, 40, 50, or 60 minutes (The setting is 010, 020, 030, 040, 050, or 060). The buzzer would not resume if the resume time is set in 000.

■ It is recommended to set the alarm resume time when the freezer is not under alarm condition. The setting during alarm condition is effective on the next alarm condition.

■ The setting mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

■ The setting of alarm resume time is invalid when the delay time for high and low temperature alarm is set to 000.

SETTING OF DOOR ALARM DELAY TIME

The buzzer of door alarm is activated with 2 minutes delay when the door is open. The delay time is changeable.

Follow the procedure in table 7 below to change the setting of delay time. The procedure assumes that the delay time is changed from 2 minutes to 3 minutes.

(The delay time is set in 2 minutes at the factory.)

Table 7. Changing procedure for delay time (change from 2 minutes to 3 minutes)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for 5 seconds.		The first digit is flashed.
3	Set the figure to F04 with the numerical value shift key.		When pressed, the figure of settable digit changes.
4	Press set key.	SET	The current delay time is displayed. The first digit is flashed.
5	Set the figure to 003 with the numerical value shift key.		When pressed, the figure of the first digit changes.
6	Press set key.	SET	The delay time is memorized and the current chamber temperature is displayed.

Note:

- The setting range for delay time is between 1 and 15 minutes.
- The setting mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

SETTING OF COMPRESSOR DELAY TIME

The delay time of low stage side compressor can be set to reduce the load on the power line and to facilitate the start-up (reset) of the freezer after power failure.

The example in the table is based on the assumption that the delay time is changed to 4 minutes. The delay time is set to 5 minutes at the factory.

Note:

- The setting range for delay time is between 2 and 15 minutes. The cool down of chamber temperature may be slow when the setting of delay time is over 8 minutes, depending on the installation environment.
- There is no need of changing the delay time when the capacity of power source is enough.

Table 8 Changing procedure for delay time (change from 5 minutes to 4 minutes)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for 5 seconds.		The first digit is flashed.
3	Set the figure to F05 with the numerical value shift key.		When pressed, the figure of settable digit changes.
4	Press set key.	SET	The current delay time is displayed. The first digit is flashed.
5	Set the figure to 004 with the numerical value shift key.		When pressed, the figure of the first digit changes.
6	Press set key.	SET	The delay time is memorized and the current chamber temperature is displayed.

- The start-up may be behind the delay time set by the above procedure because the compressor is affected by the chamber temperature and temperature of cascade condenser installed in the freezer. (The high stage side compressor starts to operate without delay time at the time of power on or after power failure.)
- The setting mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

DEFROSTING

CAUTION

Do not defrost inside walls using a knife or ice pick. There are pipelines for cooling behind the walls. Be careful not to damage the lines as this could cause a breakdown. Also, do not make a hole in the wall for installation of attachments.

Automatic defrosting

- Defrosting is carried out in a short period of time by a special heater built into the evaporator.
- During defrosting, the internal temperature may rise slightly, but this has almost no effect on the temperature of the stored items, so leave them in the freezer during defrosting. During defrosting, dF and the current chamber temperature is displayed alternately.
- Water resulting from defrosting flows through into the evaporating tray, in which the water automatically evaporates.

Note:

- Automatic defrosting is carried out with 12-hour cycle. When pushed the defrost key (DEF) for approximately 5 seconds to start the defrosting process, the automatic defrosting of 12-hour cycle is started at this point.

Manual defrosting

In the case of manual defrosting, perform key operations as follows:

1. Press the defrost key (DEF) for approximately 5 seconds to start the defrosting process. During defrosting, dF and the current chamber temperature is displayed alternately.
2. The unit automatically finishes the defrosting process and returns to normal operation.

Sub-heater switch

This freezer has a sub-heater for defrosting at the cold air outlet. When the sub-heater switch is ON, the blockage by frost inside the cold air line can be prevented.

Normally, set this switch in ON position.

When this switch is OFF, pay attention to the following:

- If this switch is OFF, the chamber temperature at the completion of defrosting is lower about 3°C than that when the switch is ON. Therefore, when opening the door is not frequent and the sample is stored for long period, OFF position is suitable.
- When opening the door very often or freezing the samples again and again, set this switch in ON position.

REMOTE ALARM TERMINAL

WARNING

Always disconnect the power supply cord before connecting an alarm device to the remote alarm terminal.

The terminal of the remote alarm is installed at the lower left side of the unit. The alarm is outputted from this terminal. Contact capacity is DC 30 V, 2 A.

Contact output:

	Between COM. and N.O.	Between COM. and N.C.
At normal	Open	Close
At abnormal	Close	Open

ALARMS & SAFETY FUNCTIONS

This unit has the alarms and safety functions shown in Table 9, and also self diagnostic functions.

Table 9 Alarms & safety functions

Alarm & Safety	Situation	Indication	Alarm buzzer	Safety operation
High temperature alarm	If the chamber temperature is higher than the temperature at which the high temperature alarm is activated.	Alarm lamp is flashed. Chamber temperature is displayed flashed.	Intermittent tone with 15 minutes delay.	Remote alarm with 15 minutes delay.
Low temperature alarm	If the chamber temperature is lower than the temperature at which the low temperature alarm is activated.	Alarm lamp is flashed. Chamber temperature is displayed flashed.	Intermittent tone with 15 minutes delay.	Remote alarm with 15 minutes delay.
Power failure alarm	When the power fails or power switch off or the plug for the freezer is pulled out of the outlet.	Alarm lamp is flashed.	Intermittent tone	Remote alarm.
Door alarm	When the door is opened.	Door lamp is lights.	Intermittent tone with 2 minutes delay.	-----
Filter check	When condenser filter is clogged.	Filter check lamp is brinks.	Intermittent tone	-----
Auto-return	When there is no key pressing in each setting mode for 90 seconds.	Chamber temperature is displayed.	-----	The setting mode is cancelled.

ALARMS & SAFETY FUNCTIONS

Alarm & Safety	Situation	Indication	Alarm buzzer	Safety operation
Key lock	When the key lock is ON.	-----	-----	Change of setting is disable.
Thermal sensor abnormality	If the thermal sensor goes open circuit.	Alarm lamp is flashed. E01 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm. Continuous running of compressor.
	If the thermal sensor goes short circuit.	Alarm lamp is flashed. E02 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm. Continuous running of compressor.
Defrost sensor abnormality	If the defrost sensor goes open circuit.	Alarm lamp is flashed. E03 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
	If the defrost sensor goes short circuit.	Alarm lamp is flashed. E04 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
Filter sensor abnormality	If the filter sensor goes open circuit.	Alarm lamp is flashed. E05 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
	If the filter sensor goes short circuit.	Alarm lamp is flashed. E06 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
Ambient temperature sensor abnormality	If the ambient temperature sensor goes open circuit.	Alarm lamp is flashed. E07 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
	If the ambient temperature sensor goes short circuit.	Alarm lamp is flashed. E08 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
Battery switch check	When the battery switch is OFF during alarm test.	Alarm lamp is flashed. E09 is flashed.	Intermittent tone	-----
Condenser temp. abnormality	In the event of failure of fan motor for cooling the compressor	E10 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm. Compressor stops.
cascade sensor abnormality	If the cascade sensor goes open circuit.	Alarm lamp is flashed. E11 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
	If the cascade sensor goes short circuited.	Alarm lamp is flashed. E12 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
Battery check	When about 3 years has passed with power switch ON.	F1 and chamber temp. are displayed alternately.	-----	-----
Fan motor check	When about 6 years has passed with power switch ON.	F2 and chamber temp. are displayed alternately.	-----	-----

Note:

- When the operation is started in high ambient temperature, the filter check lamp is sometimes flashed. In this case, the lamp is off automatically when the chamber temperature is getting lower.
- The freezer resumes the operation after power failure with the temperature setting before power failure as the chamber temperature setting and alarm temperature setting are memorized in the nonvolatile memory.
- The chamber temperature is displayed for 5 seconds by pressing alarm buzzer stop key (BUZZER) during power failure alarm. Then the alarm buzzer is stopped. The alarm lamp keeps flashing.

ROUTINE MAINTENANCE

⚠ WARNING

Always disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.

Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.

⚠ CAUTION

Always put on the dry gloves to protect the hands at the time of maintenance. No gloves may cause cut of the finger by the edge or corner.

Cleaning of cabinet

- Clean the unit once a month. Regular cleaning keeps the unit looking new.
- Use a dry cloth to wipe off small amounts of dirt on the outside and inside of the unit and all accessories. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent. (Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.) After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the cabinet or accessories with a dry cloth.
- Never pour water onto or into the unit. Doing so can damage the electric insulation and cause failure.
- The compressor and other mechanical parts are completely sealed. This unit requires absolutely no lubrication.

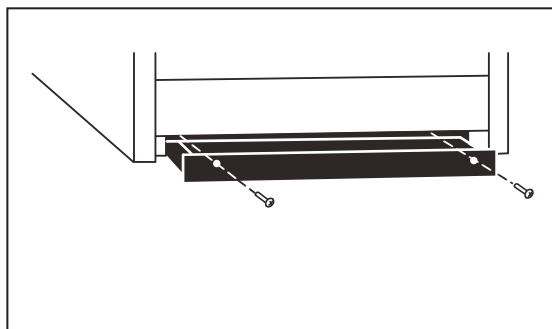
Cleaning of evaporating tray

⚠ CAUTION

Dispose of the water in the evaporating tray completely. Spilled water or splashed water may cause current leakage or electric shock.

Clean the evaporating tray regularly. The dusty tray may cause poor evaporation.

1. Remove 2 black screws at the lower front of the unit.
2. Pull the evaporating tray directly out; it is touching the floor. Pull it out by sliding it along the floor.
3. After cleaning, slide the evaporating tray along the floor. By lifting up the back it can be pushed further inward.
4. Fix the evaporating tray with 2 black screws.



ROUTINE MAINTENANCE

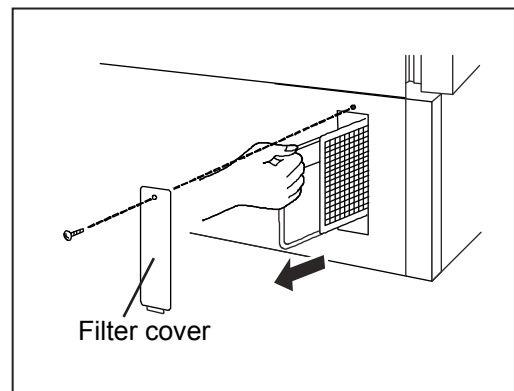
Cleaning of condenser filter

CAUTION

Never touch the condenser directly when the condenser filter is removed for cleaning. It may cause injury by heat.

This unit is provided with the filter check lamp. This lamp blinks and buzzer sounds when the condenser filter is clogged. Clean the condenser filter according to the following procedure. As a clogged condenser filter may cause poor cooling and compressor trouble, clean it once a year.

1. Turn the power switch OFF.
2. Remove a screw on the left side filter cover.
3. Pull the condenser filter in the front of the condenser.
4. For cleaning dust and other foreign substances accumulated on the condenser filter surface, wash it with clean water and dry it naturally.
5. After cleaning, replace the condenser filter.
6. Replace and fix the left side filter cover with a screw and start up the units.



Defrosting of chamber

The frost can be formed on the inside panel when too wet materials are stocked or the access port is not capped completely.

In this case, remove the frost by using a scraper provided with the unit.

CAUTION

Never use knives or picks for defrosting on the inside panel. Use of such implements can damage the inside panel and lead to trouble.

REPLACEMENT OF WEAR-OUT PARTS

Replacement of battery for power failure alarm

Replace the battery for power failure alarm every 3 years (when the F1 and chamber temperature are displayed alternately) to ensure the alarm is operated in the event of power failure. Contact our sales representative or agent for the replacement of battery.

◇ The alarm function (blink of alarm lamp, sound of buzzer) will not operate when the battery for power failure alarm is flat.

◇ The alarm lamp blinks and the alarm buzzer sounds by the battery for power failure alarm. The regular replacement of the battery for power failure alarm is important to prevent the rise of chamber temperature in the case of unexpected situation.

<Important>

The used battery is a recyclable precious resource. Do not dispose of the battery. Always follow the procedure for recycling.

WARNING

The replacement of the battery for power failure alarm should be executed by a qualified engineer or a service personnel only. The replacement of the battery for power failure alarm involves the risk of electric shock.

Replacement of fan motor

Replace the fan motor for cooling circuit every 6 years (when the F2 and chamber temperature are displayed alternately) to ensure the appropriate operation of freezer. Contact our sales representative or agent for the replacement of fan motor for cooling circuit.

◇ The appropriate operation of the unit is maintained by cooling the compressor with a fan. The motor to operate the fan (fan motor for cooling circuit) is a wear-out part. A degraded fan motor may result in the poor cooling performance.

TROUBLESHOOTING

If the unit malfunctions, check out the following before calling for service.

Malfunction	Check/Remedy
Nothing operates even when switched on	<ul style="list-style-type: none"> ■ The unit is not connected to the power supply. ■ There is a power failure. ■ The fuse is blown or the circuit breaker is activated.
The unit does not accept any key operation	<ul style="list-style-type: none"> ■ The key lock is "ON".
The alarm is activated.	<p>< On start-up > The temperature in the unit does not match set value.</p> <p>< In use ></p> <ul style="list-style-type: none"> ■ The door was kept opened for long time. ■ The set value was changed. ■ The containers of high temperature (load) were put in the unit. <p>In these cases, alarm is removed automatically by running the unit for several hours.</p>
The cooling is poor	<ul style="list-style-type: none"> ■ The environmental temperature is too high. ■ The door is not shut tightly. ■ The filter is clogged. ■ The freezer is in the direct sunlight. ■ There is any heating source near the freezer. ■ A rubber cap and insulation for the access port are not set correctly. ■ You put too many unfrozen articles into the freezer compartment. ■ The condenser filter is clogged. (Always clean the condenser filter when the filter check lamp blinks and buzzer sounds.)
The unit has condensation on the surface	<ul style="list-style-type: none"> ■ The freezer sometimes gets condensation under hot and humid weather or depending on environment of installation site. This is not malfunction. Wipe off the condensation with a dry cloth.

Note:

If the malfunction is not eliminated after checking the above items, or the malfunction is not shown in the above table, contact our sales representative or agent.

DISPOSAL OF UNIT

WARNING

If the unit is to be stored unused in an unsupervised area for an extended period **ensure that children do not have access and doors cannot be closed completely.**

The disposal of the unit should be accomplished by appropriate personnel. Always remove doors to prevent accidents such as suffocation.

Recycle of battery



Ni-MH

- Label indication is obliged to comply with Japanese battery regulation.



- Label indication is obliged to comply with Taiwanese battery regulation.

Decontamination of unit

Before disposal of unit with biohazardous danger, decontaminate the unit to the extent possible by the user.

DISPOSAL OF UNIT

(English)

Disposal of Old Equipment and Batteries

Only for European Union and countries with recycling systems



These symbols on the products, packaging, and/or accompanying documents mean that used electrical and electronic products and batteries must not be mixed with general household waste.

For proper treatment, recovery and recycling of old products and used batteries, please take them to applicable collection points in accordance with your national legislation.



By disposing of them correctly, you will help to save valuable resources and prevent any potential negative effects on human health and the environment.

For more information about collection and recycling, please contact your local municipality.

Penalties may be applicable for incorrect disposal of this waste, in accordance with national legislation.

Note for the battery symbol (bottom symbol):

This symbol might be used in combination with a chemical symbol. In this case it complies with the requirement set by the Directive for the chemical involved.

(German)

Entsorgung von Altgeräten und Batterien

Nur für die Europäische Union und Länder mit Recyclingsystemen



Dieses Symbol, auf den Produkten, der Verpackung und/oder den Begleitdokumenten, bedeutet, dass gebrauchte elektrische und elektronische Produkte sowie Batterien nicht in den allgemeinen Hausmüll gegeben werden dürfen.

Bitte führen Sie alte Produkte und verbrauchte Batterien zur Behandlung, Aufarbeitung bzw. zum Recycling gemäß den gesetzlichen Bestimmungen den zuständigen Sammelpunkten zu. Endnutzer sind in Deutschland gesetzlich zur Rückgabe von Altbatterien an einer geeigneten Annahmestelle verpflichtet. Batterien können im Handelsgeschäft unentgeltlich zurückgegeben werden.



Indem Sie diese Produkte und Batterien ordnungsgemäß entsorgen, helfen Sie dabei, wertvolle Ressourcen zu schützen und eventuelle negative Auswirkungen auf die menschliche Gesundheit und die Umwelt zu vermeiden.

Für mehr Informationen zu Sammlung und Recycling, wenden Sie sich bitte an Ihren örtlichen Abfallentsorgungsdienstleister.

Gemäß Landesvorschriften können wegen nicht ordnungsgemäßer Entsorgung dieses Abfalls Strafgerichte verhängt werden.

Hinweis für das Batteriesymbol (Symbol unten):

Dieses Symbol kann in Kombination mit einem chemischen Symbol abgebildet sein. In diesem Fall erfolgt dieses auf Grund der Anforderungen derjenigen Richtlinien, die für die betreffende Chemikalie erlassen wurden.

DISPOSAL OF UNIT

(French)

L'élimination des équipements et des batteries usagés

Applicable uniquement dans les pays membres de l'Union européenne et les pays disposant de systèmes de recyclage.



Apposé sur le produit lui-même, sur son emballage, ou figurant dans la documentation qui l'accompagne, ce pictogramme indique que les piles, appareils électriques et électroniques usagés, doivent être séparées des ordures ménagères.



Afin de permettre le traitement, la valorisation et le recyclage adéquats des piles et des appareils usagés, veuillez les porter à l'un des points de collecte prévus, conformément à la législation nationale en vigueur.



En les éliminant conformément à la réglementation en vigueur, vous contribuez à éviter le gaspillage de ressources précieuses ainsi qu'à protéger la santé humaine et l'environnement.

Pour de plus amples renseignements sur la collecte et le recyclage, veuillez vous renseigner auprès des collectivités locales.

Le non-respect de la réglementation relative à l'élimination des déchets est passible d'une peine d'amende.

Note relative au pictogramme à apposer sur les piles (pictogramme du bas) :

Si ce pictogramme est combiné avec un symbole chimique, il répond également aux exigences posées par la Directive relative au produit chimique concerné.

(Spanish)

Eliminación de Aparatos Viejos y de Pilas y Baterías

Solamente para la Unión Europea y países con sistemas de reciclado.



Estos símbolos en los productos, su embalaje o en los documentos que los acompañen significan que los productos eléctricos y electrónicos y pilas y baterías usadas no deben mezclarse con los residuos domésticos.



Para el adecuado tratamiento, recuperación y reciclaje de los productos viejos y pilas y baterías usadas llévelos a los puntos de recogida de acuerdo con su legislación nacional. En España, los usuarios están obligados a entregar las pilas en los correspondientes puntos de recogida. En cualquier caso, la entrega por los usuarios será sin coste alguno para éstos. El coste de la gestión medioambiental de los residuos de pilas, acumuladores y baterías está incluido en el precio de venta.



Si los elimina correctamente ayudará a preservar valuosos recursos y evitará potenciales efectos negativos sobre la salud de las personas y sobre el medio ambiente.

Para más información sobre la recogida u reciclaje, por favor contacte con su ayuntamiento.

Puede haber sanciones por una incorrecta eliminación de este residuo, de acuerdo con la legislación nacional.

Nota para el símbolo de pilas y baterías (símbolo debajo):

Este símbolo puede usarse en combinación con el símbolo químico. En este caso, cumple con los requisitos de la Directiva del producto químico indicado.

DISPOSAL OF UNIT

(Portuguese)

Eliminação de Equipamentos Usados e Baterias

Apenas para a União Europeia e países com sistemas de reciclagem



Estes símbolos nos produtos, embalagens, e/ou documentos que os acompanham indicam que os produtos elétricos e eletrónicos e as baterias usados não podem ser misturados com os resíduos urbanos indiferenciados.



Para um tratamento adequado, reutilização e reciclagem de produtos e baterias usados, solicitamos que os coloque em pontos de recolha próprios, em conformidade com a respetiva legislação nacional.



Ao eliminar estes produtos corretamente estará a ajudar a poupar recursos valiosos e a prevenir quaisquer potenciais efeitos negativos sobre o ambiente e a saúde humana.

Para mais informações acerca da recolha e reciclagem, por favor contacte a sua autarquia local.

De acordo com a legislação nacional podem ser aplicadas contraordenações pela eliminação incorreta destes resíduos.

Nota para o símbolo da bateria (símbolo na parte inferior):

Este símbolo pode ser utilizado conjuntamente com um símbolo químico. Neste caso estará em conformidade com o estabelecido na Diretiva referente aos produtos químicos em causa.

(Italian)

Smaltimento di vecchie apparecchiature e batterie usate

Solo per Unione Europea e Nazioni con sistemi di raccolta e smaltimento



Questi simboli sui prodotti, sull'imballaggio e/o sulle documentazioni o manuali accompagnanti i prodotti indicano che i prodotti elettrici, elettronici e le batterie usate non devono essere buttati nei rifiuti domestici generici.



Per un trattamento adeguato, recupero e riciclaggio di vecchi prodotti e batterie usate vi invitiamo a portarli negli appositi punti di raccolta secondo la legislazione vigente nel vostro paese.



Con uno smaltimento corretto, contribuirete a salvare importanti risorse e ad evitare i potenziali effetti negativi sulla salute umana e sull'ambiente.

Per ulteriori informazioni su raccolta e riciclaggio, vi invitiamo a contattare il vostro comune.

Lo smaltimento non corretto di questi rifiuti potrebbe comportare sanzioni in accordo con la legislazione nazionale.

Note per il simbolo batterie (simbolo sotto):

Questo simbolo può essere usato in combinazione con un simbolo chimico. In questo caso è conforme ai requisiti indicati dalla Direttiva per il prodotto chimico in questione.

DISPOSAL OF UNIT

(Dutch)

Het ontdoen van oude apparatuur en batterijen.

Enkel voor de Europese Unie en landen met recycle systemen.



Deze symbolen op de producten, verpakkingen en/of begeleidende documenten betekenen dat gebruikte elektrische en elektronische producten en batterijen niet samen mogen worden weggegooid met de rest van het huishoudelijk afval.



Voor een juiste verwerking, hergebruik en recycling van oude producten en batterijen, gelieve deze in te leveren bij de desbetreffende inleverpunten in overeenstemming met uw nationale wetgeving.



Door ze op de juiste wijze weg te gooien, helpt u mee met het besparen van kostbare hulpbronnen en voorkomt u potentiële negatieve effecten op de volksgezondheid en het milieu.

Voor meer informatie over inzameling en recycling kunt u contact opnemen met uw plaatselijke gemeente.

Afhankelijk van uw nationale wetgeving kunnen er boetes worden opgelegd bij het onjuist weggooien van dit soort afval.

Let op: het batterij symbool (Onderstaand symbool).

Dit symbool kan in combinatie met een chemisch symbool gebruikt worden. In dit geval volstaan de eisen, die zijn vastgesteld in de richtlijnen van de desbetreffende chemische stof.

(Swedish)

Avfallshantering av produkter och batterier

Endast för Europeiska Unionen och länder med återvinningssystem



Dessa symboler på produkter, förpackningar och/eller medföljande dokument betyder att förbrukade elektriska och elektroniska produkter och batterier inte får blandas med vanliga hushållssopor.



För att gamla produkter och använda batterier ska hanteras och återvinnas på rätt sätt ska dom lämnas till passande uppsamlingsställe i enlighet med nationella bestämmelser.



Genom att ta göra det korrekt hjälper du till att spara värdefulla resurser och förhindrar eventuella negativa effekter på människors hälsa och på miljön.

För mer information om insamling och återvinning kontakta din kommun.

Olämplig avfallshantering kan beläggas med böter i enlighet med nationella bestämmelser.

Notering till batterisymbolen (nedanför):

Denna symbol kan användas i kombination med en kemisk symbol. I detta fall uppfyller den de krav som ställs i direktivet för den aktuella kemikalien.

TEMPERATURE RECORDER (OPTION)

WARNING

Always disconnect the power supply to the unit prior to attachment of a temperature recorder in order to prevent electric shock or injury.

A temperature recorder is available for the freezer as the optional component. The type of the temperature recorder is MTR-4015LH and MTR-85H. Contact our sales representative or agent for the attachment of a temperature recorder.

Setting of MTR-4015LH

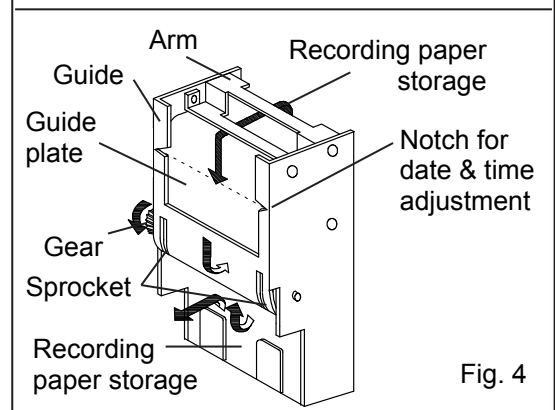
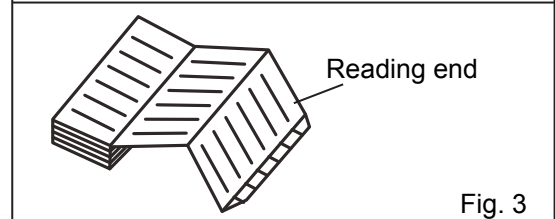
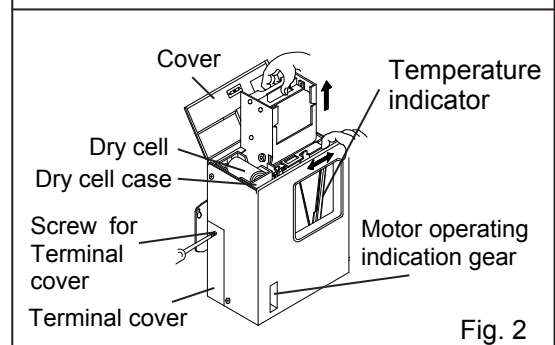
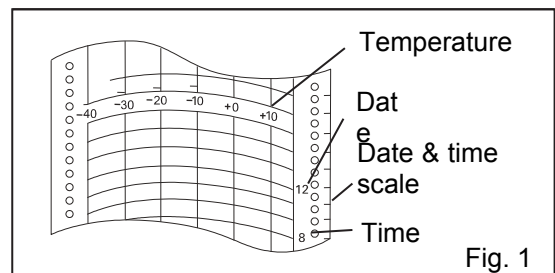
Pull the knob on the upper part of the recorder forward to storage the recording paper or battery.

Setting of recording paper

1. The information on the recording paper is shown in Fig. 1.
2. Pull the cartridge up after opening the cover. See Fig. 2. The cover can be opened by turning the knob counterclockwise. See Fig. 2.
3. Put the recording paper into the cartridge with the printed surface out, from the leading end as shown in Fig. 3.
4. Pass the recording paper under the arm through between the guide plate. See Fig. 4.

Note:

- Do not scratch or put pressure on the recording paper.
- Do not bend the recording paper.
- Do not reverse the recording paper manually.



TEMPERATURE RECORDER (OPTION)

5. Slide the recording paper along the guide plate so that the recording paper will not be forced out of the date & time adjustment slot. See Fig. 5.

6. After ascertaining that the holes on the side of the recording paper are locked into the teeth of the sprocket, turn the gear and send the recording paper into the used recording paper storage.

Setting of time

1. Turn the gear on the date & time adjustment to the desired time.
2. After properly folding the recording paper in the used or unused recording paper storage, replace the cartridge.

Removing of the used recording paper

After recording, take out the cartridge and remove the recording paper from the recording paper outlet. If not all of the recording paper has been fed into the used recording paper storage, send all the recording paper in the recording paper storage first turning the gear.

Battery replacement

To replace the battery, turn the knob counterclockwise to open the cover. Place the battery in the dry cell case according to the plus-minus indications on the bottom of the dry cell case. See Fig. 6.

Replace the battery once a year.

Note :

This temperature recorder is designed for the manganese dry cell and the alkaline dry cell.

Do not use a rechargeable battery because the initial voltage of such battery is low. The rechargeable battery may cause the malfunction of temperature recorder or shorten the battery life significantly.

Start-up

1. The quartz motor is started by placing a "R14" or size "C" dry cell in the dry cell case.
2. Check the operation of the temperature recorder using the quartz motor rotation check gear.

Stopping

The temperature recorder is stopped by taking the dry cell out of the dry cell case.

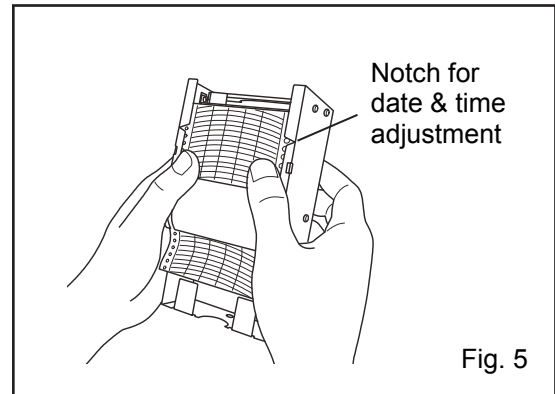


Fig. 5

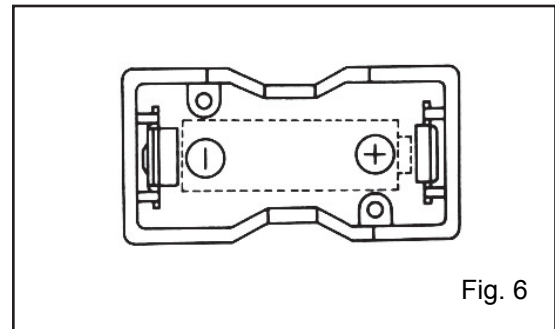
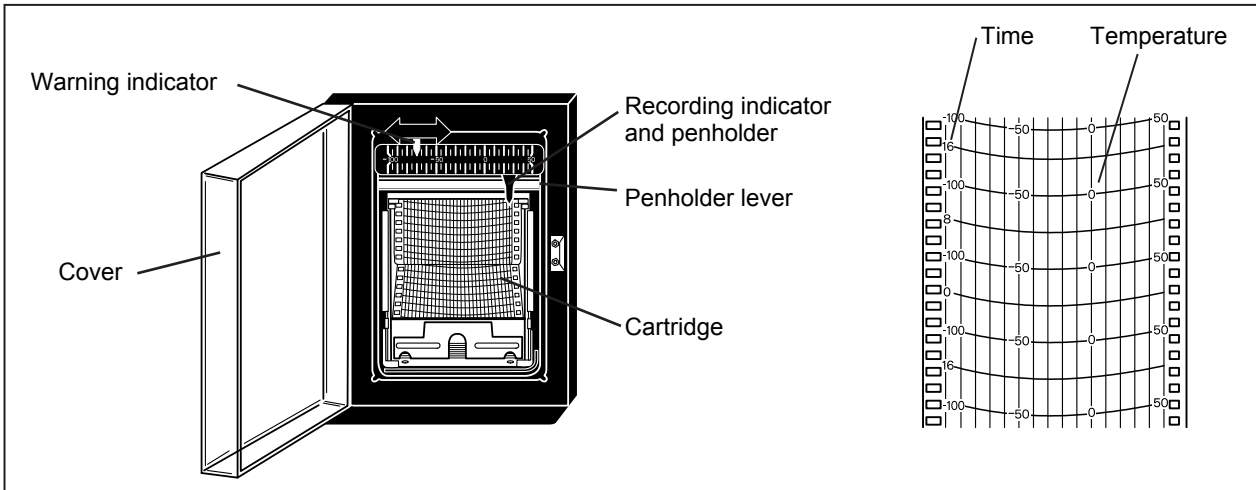


Fig. 6

TEMPERATURE RECORDER (OPTION)

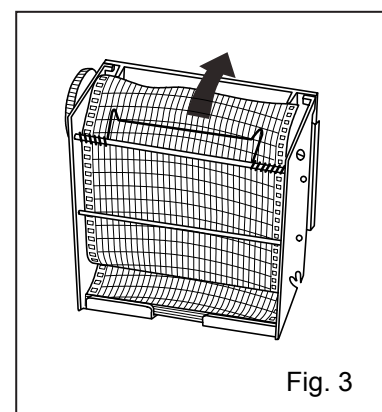
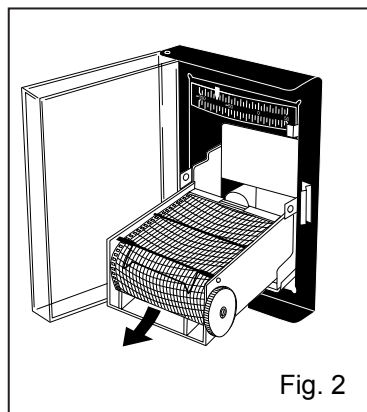
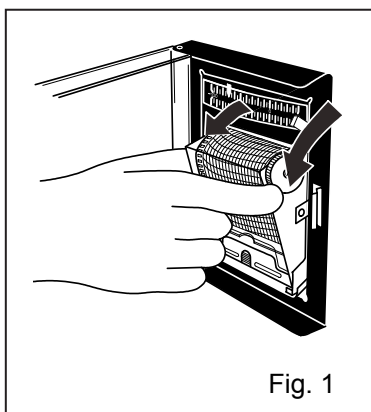
Setting of MTR-85H

The figure below shows the description of a temperature recorder. The temperature recorder is provided as an option.



Setting of recording paper

1. Open the cover and let down the penholder lever; the pen point is apart from the recording paper.
2. Pull the cartridge out of the mounted position. (Fig. 1), (Fig. 2)
3. Set a new recording paper in place on the rear bottom of the cartridge. Set the hole on the recording paper in the cog of the paper driving assembly and feed the recording paper in the direction of the arrow by driving the cog wheel. (Fig. 3)
4. Set the recording paper according to the mark of day and time.
5. When mounting, lay down the cartridge first, and push into the mounting position with the groove set a the projection on the position.
6. Set up the cartridge and settle in position.
7. Let up the penholder lever and close the cover.



TEMPERATURE RECORDER (OPTION)

Replacement of dry cell

Note :

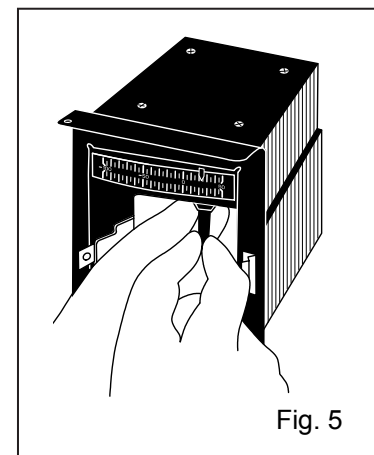
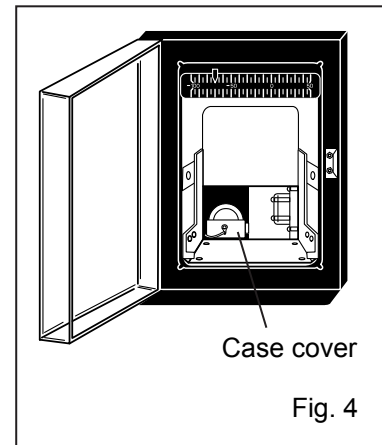
This temperature recorder is designed for the manganese dry cell and the alkaline dry cell.

Do not use a rechargeable battery because the initial voltage of such battery is low. The rechargeable battery may cause the malfunction of recorder or shorten the battery life significantly.

1. Open the cover and let down the pen holder lever. With this operation, the pen point is apart from the recording paper.
2. Pull the cartridge out of the mounted position as shown in Fig. 1 and Fig. 2 (page 34).
3. Open the case cover of dry cell at the left bottom (Fig. 4). Set a dry cell in the case with its minus pole positioned backward.
4. Close the case cover and replace the cartridge.
5. Lift up the pen holder lever and close the cover.

Setting of Ink pen

1. Open the cover and let down the pen holder lever. With this operation, the pen point is apart from the recording paper.
2. Pull the cartridge out of the mounted position as shown in Fig. 1 and Fig. 2 (page 34).
3. Set a ink pen in the pen holder properly keeping the pen holder with the left hand. (Fig. 5)
Improper setting will result in inaccurate temperature recording.
4. Replace the cartridge and lift up the pen holder lever, and close the cover.
5. Check that the pen tip contacts with the recording paper properly



SPECIFICATIONS

Product name	Biomedical Freezer MDF-U443
External dimensions	W800 mm x D832 mm x H1,810 mm
Internal dimensions	W640 mm x D615 mm x H1,090 mm
Effective capacity	426 L
Exterior	Painted steel
Interior	Stainless steel plate
Door	Painted steel
Inner door	Acrylic resin, 2 doors
Shelf	Polyethylene coated wire, 5 shelves, Max. load; 50 kg/shelf
Access port	Inner diameter 40 mm, Left side, rear
Insulation	Rigid polyurethane foamed-in place
Compressor	Hermetic rotary type (high stage side), Hermetic reciprocate type (low stage side)
Compressor motor	Output 450 W (high stage side), Output 750 W (low stage side)
Evaporator	Shell and tube type (high stage side), Fin and tube type (low stage side)
Condenser	Fin and tube type (high stage side), Shell and tube type (low stage side)
Condenser fan motor	10 W
Cooling fan motor	9 W (in the chamber)
Refrigerant	R-134a (high stage side), R-404A (low stage side)
Temperature control	Microprocessor control system
Temperature display	Digital display
Temperature sensor	Thermister sensor
Alarm	High temperature alarm, Low temperature alarm, Power failure alarm, Filter alarm, Door alarm
Remote alarm contact	Allowable capacity: DC 30 V, 2 A
Battery	For power failure alarm; Nickel-metal-hydrate battery, DC 6 V, 1100 mAh, Auto-recharge
Weight	213 kg
Accessories	1 set of key, 1 temperature sensor cover for MTR-4015LH/MTR-85H, 2 nylon clips for MTR-4015LH/MTR-85H, 1 scraper
Optional component	Temperature recorder (MTR-4015LH, MTR-85H)

Note:

- Design or specifications will be changed without notice.
- Refer to the updated catalog when ordering an optional component.
- The battery for power failure alarm is an article for consumption. It is recommended that the battery will be replaced about every 3 years. Contact our sales representative or agent at the time of replacement of the battery for recycling.
- Fan motor is expendable supplies. Replace the fan motor for about every 6 years. Contact our sales representative or agent at the time of replacement of the fan motor.

PERFORMANCE

Product name	Biomedical Freezer MDF-U443
Model number	MDF-U443-PR
Cooling performance	-40°C (center of chamber) (ambient temperature; 35°C, no load)
Temperature control range	-15°C to -40°C
Rated voltage	AC 220 V
Rated frequency	60 Hz
Amperage	4.3 A
Rated power consumption	675 W
Noise level	51 dB (A scale)
Maximum pressure	1640 kPa

⚠ CAUTION

**Please fill in this form before servicing.
Hand over this form to the service engineer to keep for his and your safety.**

Safety check sheet

1. Unit contents :

- Risk of infection: Yes No
Risk of toxicity: Yes No
Risk from radioactive sources: Yes No

(List all potentially hazardous materials that have been stored in this unit.)

Notes :

2. Contamination of the unit

Unit interior

- No contamination Yes No
Decontaminated Yes No
Contaminated Yes No

Others:

3. Instructions for safe repair/maintenance/disposal of the unit

- a) The unit is safe to work on Yes No
b) There is some danger (see below) Yes No

Procedure to be adhered to in order to reduce safety risk indicated in b) below.

Date :

Signature :

Address, Division :

Telephone :

Product name: Biomedical Freezer	Model: MDF-	Serial number:	Date of installation:
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Please decontaminate the unit yourself before calling the service engineer.

Original Operating Instructions



PHC Europe B.V.

Nijverheidsweg 120 4879 AZ Etten Leur, The Netherlands



PHC Corporation

1-1-1 Sakada, Oizumi-machi, Ora-gun, Gunma 370-0596, Japan