Operating Instructions

Ultra-Low Temperature Freezer

MDF-DC102VH
MDF-DC202VH

MDF-DC202VH

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

See page 58 for all model numbers.

CONTENTS

3. MAINTENANCE & TROUBLESHOOTING

4. OPTIONS & SPECIFICATIONS etc.

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.

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
- any indirect damage caused by data damage or loss

<Intended Use>
This equipment is designed for low temperature storage of biomedical samples.

SAFETY PRECAUTIONS

Be sure to observe the operating instructions as they contain important safety advice.

For correct and safe use of the product, follow the precautions and procedures in these operating instructions carefully. Failure to do so could result in injury or damage to the product.

Precautions are illustrated in the following way:

⚠ WARNING

Warning indicates a potentially hazardous situation which, if not avoided, could result 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.

The following symbols are used in this document and some of them are attached to the unit.

	Actions are prohibited. The illustration in the circle and the description adjacent to the symbol provide detailed information about the action which is prohibited.
	Actions are mandatory. The illustration in the circle and the description adjacent to the symbol provide detailed information about the action to be taken.
	Caution must be taken. The description adjacent to the symbol provides detailed information about the caution to be taken.
	This symbol indicates the possibility of an electric shock. High-voltage electrical components are placed under the covers. Only a qualified engineer or service personnel should be allowed to open these covers.
	This symbol indicates that there is flammable gas inside the unit. There may be a risk of fire or explosion. Keep away from any ignition sources.
	This symbol indicates low temperature or freezing conditions. Take care to avoid exposure to low temperature or freezing conditions.
	This symbol indicates earth. Connect the earth terminal to the ground to prevent an electric shock.

For the State of California, USA Only:
This product contains a CR Coin Cell Lithium Battery which contains Perchlorate Material – special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate.

SAFETY PRECAUTIONS

⚠WARNING

Installation

- **Do not use the unit outdoors.**
  Exposure to rain may cause an electric leakage and/or an electric shock.
- **Do not install the unit in a location where flammable or volatile substances are present.**
  Installing the unit in such a location may cause explosions and/or a fire.
- **Do not install the unit in a location where there are high levels of moisture or where it may be splashed with water.**
  This may cause the insulation to deteriorate, leading to an electric leakage and/or an electric shock.
- **Do not install the unit in a location where corrosive gases such as acids are present.**
  Deterioration of the insulation due to corrosion of the electric components may cause an electric leakage or an electric shock. Also, corrosion of the refrigerant piping can result in explosions and/or a fire caused by gas leakage.
- **Do not leave the plastic bags used for packing in a place where they can be reached by small children.**
  This may result in unexpected accidents such as suffocation.

- **Only qualified engineers or service personnel should install the unit.**
  Installation by unqualified personnel may cause water leakage, an electric shock, or a fire.
- **Install the unit in a location capable of bearing the total combined weight (product + optional accessories + stored items). After installing the unit, be absolutely sure to take precautions to prevent the unit from falling over.**
  If the unit is installed in a location which is not strong enough or if the proper precautions are not taken, the unit may fall over and cause injuries.
- **Use the fixtures on the back panel of the unit, and secure the unit to the wall by passing a strong rope or chain through the fixtures.**
  The unit may tilt or fall over, causing injuries.
- **Connect the unit to a dedicated 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 a fire or an electric shock. Also, a power strip may cause a fire resulting from abnormal heating.
- **When handling harmful samples (for example, those which consist of toxic, pathogenic or radioactive substances), install the unit inside a designated isolation facility.**
  If the unit is installed in a location other than an isolation facility, there may be detrimental effects on both people and the natural environment.
- **Install the unit in a well-ventilated (airy) location to prevent the accumulation of flammable refrigerant.**
  - If flammable refrigerant leaks, it may accumulate and cause explosions or a fire.
  - (When optional backup cooling system is installed) As with any equipment that uses CO_2 gas, there is a likelihood of oxygen depletion in the vicinity of the equipment. It is important that you assess the work site to ensure there is suitable and sufficient ventilation. If lack of ventilation is suspected, then other methods of ensuring a safe environment must be considered. These may include atmosphere monitoring systems and warning devices with alarms.
- **Risk of fire or explosion. Flammable refrigerant used.**
  The unit contains flammable refrigerant. Consult repair manual/owner's guide before attempting to install or service this product. All safety precautions must be followed.
- **This unit must be plugged into a dedicated circuit protected by branch circuit breaker.**
  Otherwise it may cause an electric shock or a fire.

- **Be absolutely sure to earth (ground) the unit to prevent an electric shock.**
  Failure to earth the product may cause an electric shock. If necessary, ask a qualified contractor to do this work.
- **Do not connect the earth wire to a gas pipe, water pipe, or lightning rod when earthing the unit.**
  Earthing the unit improperly may cause an electric shock.

⚠WARNING

Power supply plug and cord

- **Never damage the power supply cord or power supply plug (by breaking, adapting, placing near a source of heat, bending with force, twisting, pulling, adding weight, or binding).**
  A damaged power supply cord or power supply plug may cause an electric shock, a short circuit, or a fire. Contact our sales representative or agent for repairing the cord and plug.
- **Do not place this unit or other equipment in a position where it is difficult to disconnect the power supply plug.**
  Failure to disconnect the power supply plug may cause a fire in the event of a problem or malfunction.
- **Do not pull the power supply cord and the power supply plug hard.**
  If the cord breaks, it may cause electric shock or fire.

- **Do not plug or unplug the power supply plug with wet hands.**
  This may cause an electric shock.

- **Remove dust from the power supply plug periodically.**
  Dust on the power supply plug may lead to an insulation failure due to moisture and thus cause a fire. Disconnect the power supply plug and wipe it with a dry cloth.
- **Make sure the power supply plug is pushed fully in.**
  Faulty insertion of the power supply plug may cause an electric shock or a fire due to a generation of heat. Never use a damaged power supply plug or loose power outlet.
- **Grip the power supply plug when disconnecting the power supply cord from the outlet.**
  Pulling the power supply cord may cause an electric shock or a short circuit.

- **Disconnect the power supply plug before moving the unit.**
  Take care not to damage the power supply cord. A damaged power supply cord may cause an electric shock or a fire**.**
- **Disconnect the power supply plug when the unit is not in use for long periods.**
  Keeping the unit connected may cause an electric shock, an electric leakage, or a fire due to the deterioration of insulation.
- **Before proceeding with maintenance or checking the unit, turn the power switch OFF (if the switch is provided), and disconnect the power supply plug.**
  Performing the work while power is still being supplied to the product or while the power supply plug is still connected may cause an electric shock and/or injuries.

When something is wrong with the unit

- **Never disassemble, repair, or modify the unit yourself.**
  A high-voltage area is located inside the unit. Any work carried out by unauthorized personnel may result in an electric shock. Contact our sales representative or agent for maintenance or repair.

- **Disconnect the power supply plug if something is wrong with the unit.**
  If the unit keeps running under such conditions, there may be a risk of an electric shock or a fire. Contact our sales representative or agent immediately for maintenance or repair.

- **Use designated parts for parts replacement.**
  Using an incorrect part may cause a fire.

SAFETY PRECAUTIONS

⚠WARNING

When using the unit

- **Never put containers with liquid on top of the unit.**
  This may cause an electric shock or short circuit if the liquid is spilled.
- **Never insert metal objects such as pins and wires into any vent, gap, or outlet on the unit.**
  This may cause an electric shock or injury by accidental contact with moving parts.
- **Do not use equipment or other measures for facilitating the defrosting work.**
  It may cause explosions and/or a fire in case of refrigerant leakage.

- **Never splash water directly onto the unit.**
  This may cause an electric shock or short circuit.

- **Never store volatile or flammable substances in this unit except in a sealed container.**
  Such substances may cause an explosion or a fire if they leak.
- **Ask a qualified contractor to carry out replacement of the battery for the power failure alarm and the battery for backup cooling system.**
  Improper handling will result in an electric shock or a fire.

- **Do not give strong shock or vibration when moving or using the unit.**
  The piping may be damaged, causing a fire.
- **Never damage the chamber wall or pipework in the chamber when removing frost.**
  It may cause explosions and/or a fire in case of refrigerant leakage.

- **Flammable and explosive product.**
  The unit contains flammable refrigerant. When repairing or recycling the unit, only trained service personnel should perform the work. Follow the procedure below.
  - ■ Well ventilate the room to prevent refrigerant accumulation.
  - ■ Keep fire away when the refrigerant is contained in the product.
  - ■ Do not damage or break the pipework.
    It may cause explosions and/or a fire in case of refrigerant leakage.

When storing and disposing the unit

- **If the unit is to be stored unused in an unsupervised area for a long period, ensure that children do not have access to the unit and that doors cannot be closed completely.**
  There may be a risk of child entrapment.
- **Ask a qualified contractor to carry out disassembly/disposal of the unit and do not leave the unit in a location that can be accessed by third parties**
  This may result in unexpected accidents (e.g. the unit may be used for unintended purposes).
- **The unit contains flammable refrigerant and flammable blowing gas. When the unit is disassembled or disposed of, the work must be performed in a well-ventilated place and avoid the place near fire.**
  It may cause explosions and/or a fire in case of refrigerant or gas leakage.

⚠CAUTION

- **Do not touch stored samples in the chamber or inner walls of the chamber with bare hands.**
  Frostbite can occur at low temperatures. Wear insulated gloves when reaching into the chamber.

- **Do not climb on top of the unit or put any objects on the unit.**
  Falling from the unit may cause injury; falling objects may cause damage to the unit.

- **Turn the leveling feet to raise the casters above the floor and secure the unit.**
  If they are left touching the floor, the unit may inadvertently move out of position when its door is opened or closed. It may cause injury.
- **Never store corrosive substances such as acids or alkalis in this unit except in a sealed container.**
  These may be harmful to your health and may cause corrosion of internal components or electrical parts.
- **Wear protective gloves and a mask when handling frozen items or cleaning the chamber.**
  Without gloves, you may get frostbite or get injured by the corners of interior parts.
  Also, touching or inhaling chemicals or aerosols from around the unit may be detrimental to health.

- **When moving the unit, be sure to take precautions to prevent it from falling over.**
  Moving the unit with too much force may cause it to fall over, possibly resulting in injury. A qualified individual must be assigned to supervise the safe movement and relocation of the unit.
- **When using the optional inventory racks, be careful not to drop the racks.**
  If the rack falls down, it may cause injury or damage to the contents.

SYMBOLS ON UNIT

The following symbols are attached to the unit.

	This symbol indicates possibility of an electric shock. High-voltage electrical components are placed under the covers. Only a qualified engineer or service personnel should be allowed to open these covers.
	This symbol indicates that caution is required. Refer to product documentation for details.
	This symbol indicates incorrect usage could lead to a fire hazard.
	This symbol indicates low temperature or freezing conditions. Take care to avoid exposure to low temperature or freezing conditions.
	This symbol indicates an earth.
	This symbol indicates the “ON” for the power switch.
	This symbol indicates the “OFF” for the power switch.

FOR SAFELY STORING SAMPLES

Ultra-low temperature freezers control temperature by mechanical systems that run on electricity. If the systems stop due to a power failure or some other reason, the temperature in the freezer rises.
The following tips can help protect your valuable samples from unexpected failure of the freezer.

- Store valuable samples separately into multiple ultra-low temperature freezers.
- Install the temperature recorder, backup cooling system, and remote alarm system for protecting samples.
- Use the remote alarm system to ensure that the alarm notifies the administrator of the unusual status of the freezer. Especially, the use of the remote alarm system is recommended if the freezer is placed in an unattended environment.
- Replace the battery for backup cooling system and the battery for power failure alarm every three years. They are consumable parts. If the battery drains, audible alarms do not sound and the backup cooling system does not work. Contact our sales representative or agent for the replacement of the batteries.

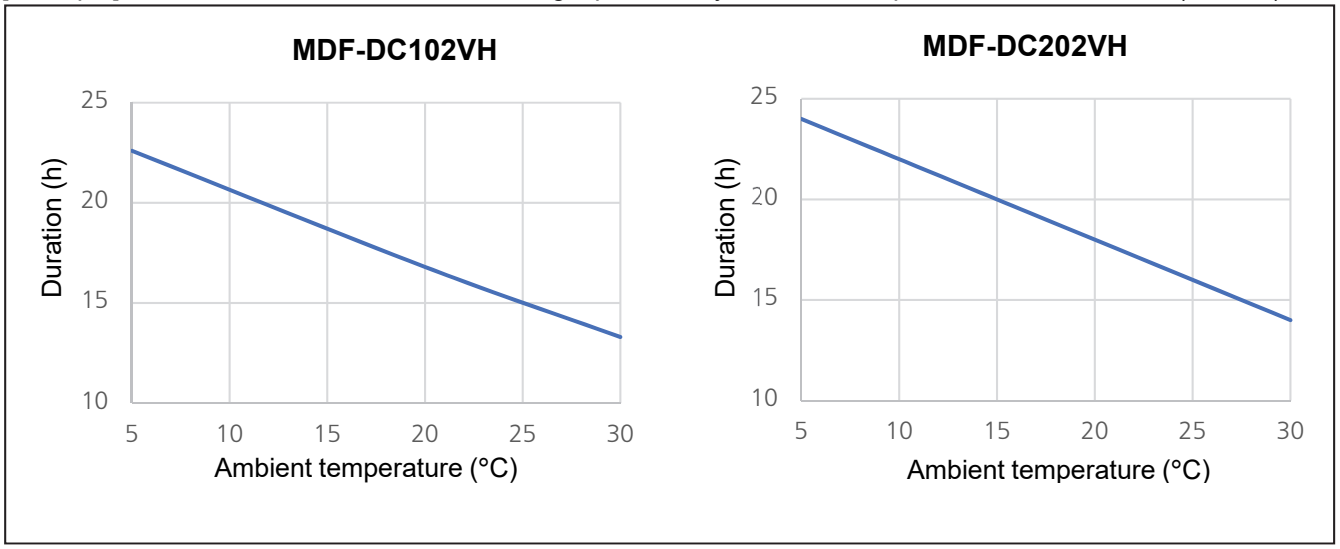
Note:
PHC Corporation shall not be responsible for any loss or damage to the samples stored in the freezer.

About backup cooling system

When the unit stops operation in the event of a power failure, the optional backup cooling kit MDF-UB8I and the liquid CO_2 cylinder can prevent the chamber temperature from rising for several hours by injecting liquid CO_2 into the chamber. For details about the backup cooling system, refer to page 56.
For purchase of the backup cooling kit, contact our sales representative or agent.

Note:
The cooling function of the backup cooling system can last only several hours even if the liquid CO_2 cylinder is full. Also, degradation of the battery shortens the cooling duration. The duration of time for which a full 30 kg liquid CO_2 cylinder can keep the chamber at -70°C varies depending on the size of the freezer and the volume of samples in the chamber. The following graphs show examples of the duration.

[Example] Duration of time for which a full 30 kg liquid CO_2 cylinder can keep the chamber at -70°C (no load)



Notes:
- If the backup cooling system is used in a small room, or many freezers with backup cooling system are in a same room, a large amount of CO_2 gas is injected or released in the room. This may cause oxygen lack temporarily. For safety operation, install an alarm sensor and a ventilation device.
- Injecting liquid CO_2 into the chamber decreases pH in the chamber. Therefore, care should be taken for the samples that may be affected.

In the event of emergency

When an Alarm or Notification message appears at the message display area on the Home screen (page 20), determine the cause of the situation by referring to pages 48 and 49 and take proper measures. If the temperature in the freezer has risen, take the following measures.

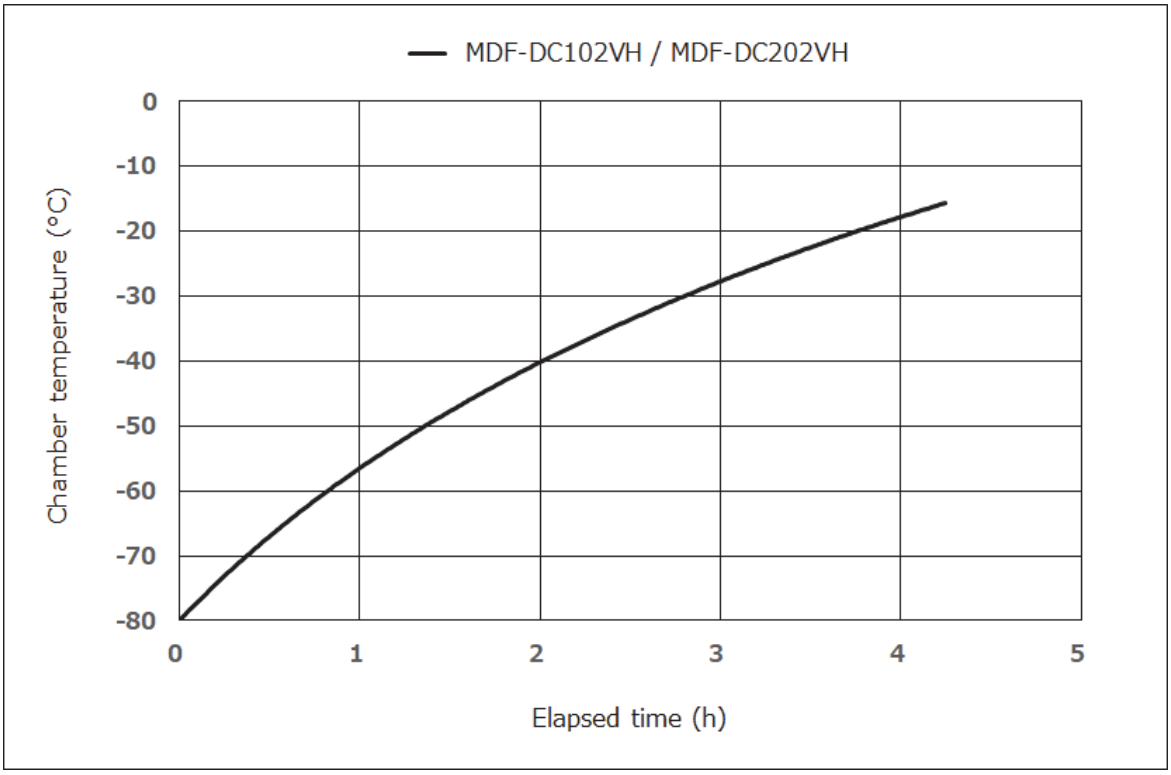
● Make sure to determine the cause of the temperature rise.
The alarm status continues until the temperature in the chamber falls below the high alarm temperature. If the alarm status continues for more than an hour, or the chamber temperature does not fall, the freezer may be malfunctioning. Move the samples into a different freezer immediately and contact our sales representative or agent.
If there are no other ultra-low temperature freezers, protect your samples using the backup cooling system or dry ice.

● In the event of a power failure, check the duration and take alternate measures to cool the samples. If the power failure is expected to continue for several hours, protect your samples using the backup cooling system or dry ice.

● Amount of dry ice
To keep MDF-DC102VH (inner capacity: 84 L) to -70°C, firstly, put at least 5 kg of dry ice into the chamber. Then, add 0.5 kg of dry ice every hour. Wrap dry ice with paper such as newspaper and put it in the chamber.
To keep MDF-DC202VH (inner capacity: 180 L) to -70°C, firstly, put at least 10 kg of dry ice into the chamber. Then, add 1 kg of dry ice every hour. Wrap dry ice with paper such as newspaper and put it in the chamber.

Note:
The CO_2 gas concentration in the chamber becomes high after the sublimation of the dry ice. The pH of the water solution that does not includes buffer solution may become lower if it is left under such an atmosphere for a long time.

[Example] Characteristics of chamber temperature rise during power failure (no load)



INSTALLATION SITE

To run the freezer unit properly, the unit must be installed in a location which meets all the conditions described below. If the location does not meet these conditions, the specified performance of the unit may not be achieved or malfunctions and accidents may occur.

■ A location not exposed to direct sunlight
Avoid any location which is exposed to direct sunlight. Installing the unit in a location exposed to direct sunlight may degrade its cooling performance.

■ A well-ventilated (airy) location
In order to ensure ventilation, leave clearances of at least 10 cm around the unit (at the left, right, top and back). Blocking the ventilation may degrade the unit's cooling performance or cause the unit to malfunction. Also, when installing multiple freezers back to back, leave clearances between them by considering the exhaust heat from the freezers.

■ A location away from heat sources
Avoid any location which is close to a major source of heat (such as a heater or boiler). Installing the unit near a major source of heat may degrade the unit's cooling performance.

■ A location with minimal changes in temperature
Avoid any location where the ambient temperature is subject to sudden changes. If the unit is installed in such a location, stable cooling performance may not be achieved. The ambient temperature range (environmental condition) for using this product is 5°C to 30°C.

■ A firm and level location where the floor can bear the total combined weight (product + optional accessories + stored items)
Install the unit on a level surface which is capable of bearing the total combined weight (product + optional accessories + stored items). If the unit is installed in a location where the floor surface is uneven or where the unit will be inclined at an angle, the unit will be unstable, and accidents or injuries may occur and/or unnecessary vibration or noise may be generated.

■ A location with minimal humidity
Install the unit in a location where the relative humidity is 80% RH or lower. Installing the unit in a very humid location may cause earth faults and/or electric shock.

■ A location free of flammable or corrosive gases
Avoid any location exposed to flammable or corrosive gases. Flammable or corrosive gases can cause explosions and/or a fire. Furthermore, corrosion of the electrical parts may cause the insulation to be deteriorated and result in earth faults and/or electric shock.

■ A location where corrosive materials are not generated
Never install the unit in a location where corrosive materials such as sulphur compounds are likely to be generated (e.g. near a drainage facility). Corrosion of the copper pipes may result in the deterioration and consequently the failure of the cooling unit.

■ A location where nothing can fall onto the unit
Avoid locations where objects may fall onto the unit. Objects falling and hitting the unit may cause it to break down or fail.

Note:
Keep electric products which emit electromagnetic waves away from the unit. A noise from the electromagnetic waves may cause the unit to malfunction.

INSTALLATION

When installing the unit, follow the steps below to secure the unit properly.

1. Preparations after unpacking

Remove all the tape used to secure the doors and interior parts, and leave the doors open for a short while for ventilation. If any outer surfaces of the freezer are dirty, wipe the surfaces using a cloth moistened with a diluted neutral dish-washing detergent (using an undiluted solution of detergent may cause the unit's plastic areas to crack. Follow the directions on the detergent for details of dilution).

After wiping the unit using the diluted detergent, be sure to wipe the surfaces with a cloth dipped in clean water to remove traces of the detergent. After this, be sure to wipe the surfaces with a dry cloth, allowing the outer surfaces of the freezer to dry out completely, and then proceed with the installation.

Note:

Remove the cable tie that bands the power supply cord. Prolonged contact with the tie may cause corrosion of the cord coating.

2. Securing and leveling the unit using the leveling feet

Rotate the front leveling feet clockwise until the casters are raised 5 mm to 10 mm above the floor surface (Fig. 1).

Then, rotate the leveling feet slightly clockwise or anticlockwise to adjust them so that the unit is completely level.

- The unit becomes stable with the casters not contacting the floor. If the casters are left in contact with the floor, the unit may accidentally move when its door is opened or closed.

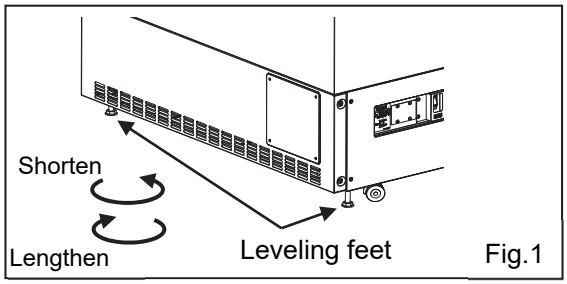


Fig.1

3. Securing the unit using fixtures

Use the fixtures on the back panel of the unit, and secure the unit to the wall by passing a strong rope or chain through the fixtures (Fig. 2).

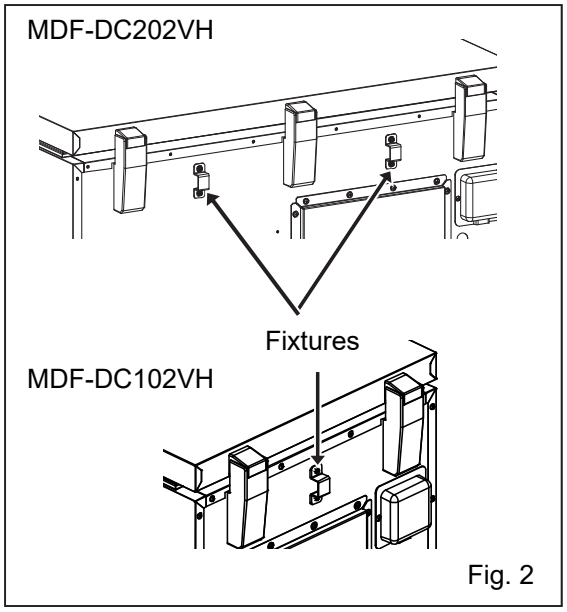


Fig. 2

4. Preventing electric shock by earthing the unit

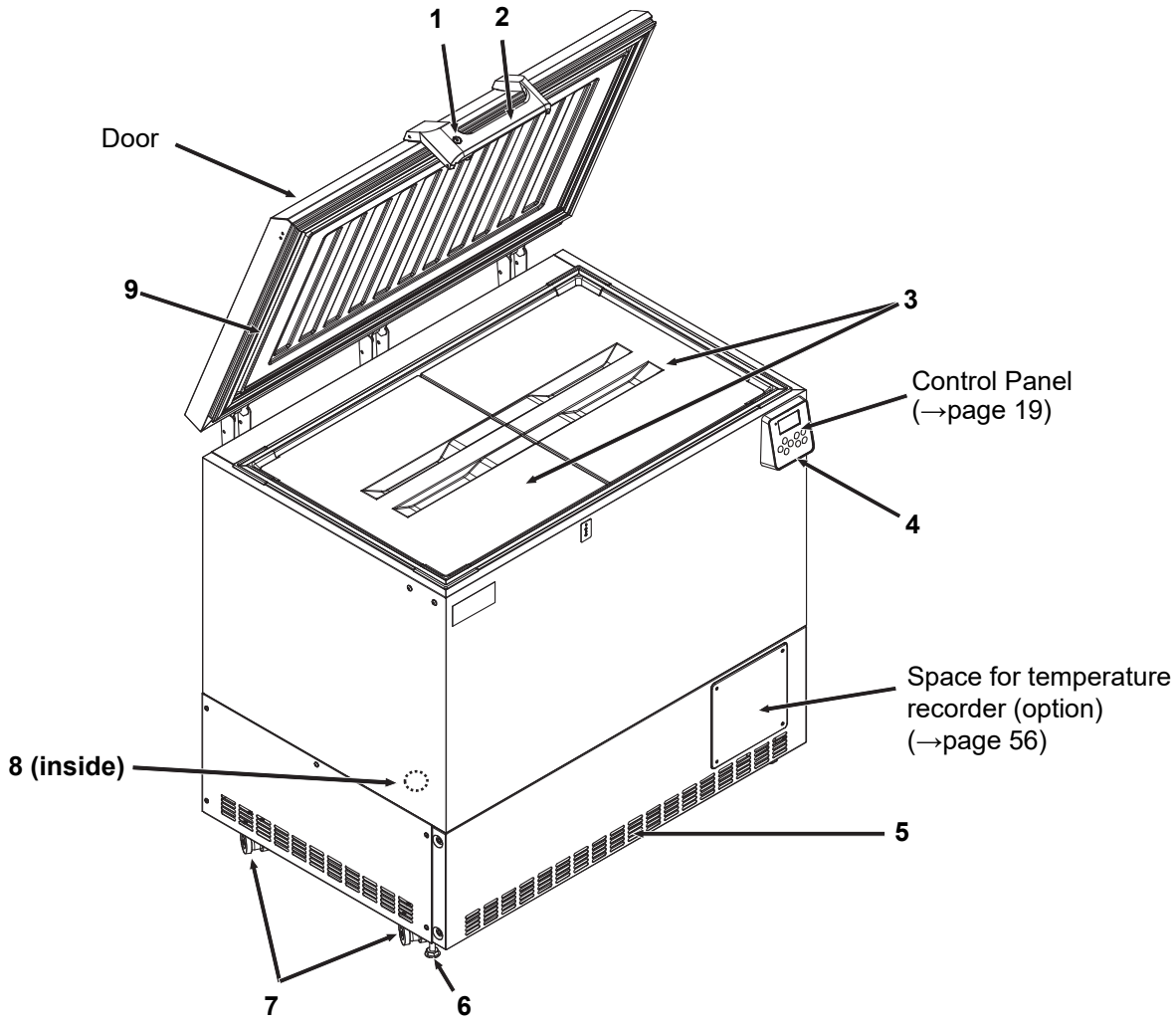
When installing the unit, be sure to earth (ground) it. Earthing is necessary to prevent electric shock resulting from deterioration of electrical insulations.

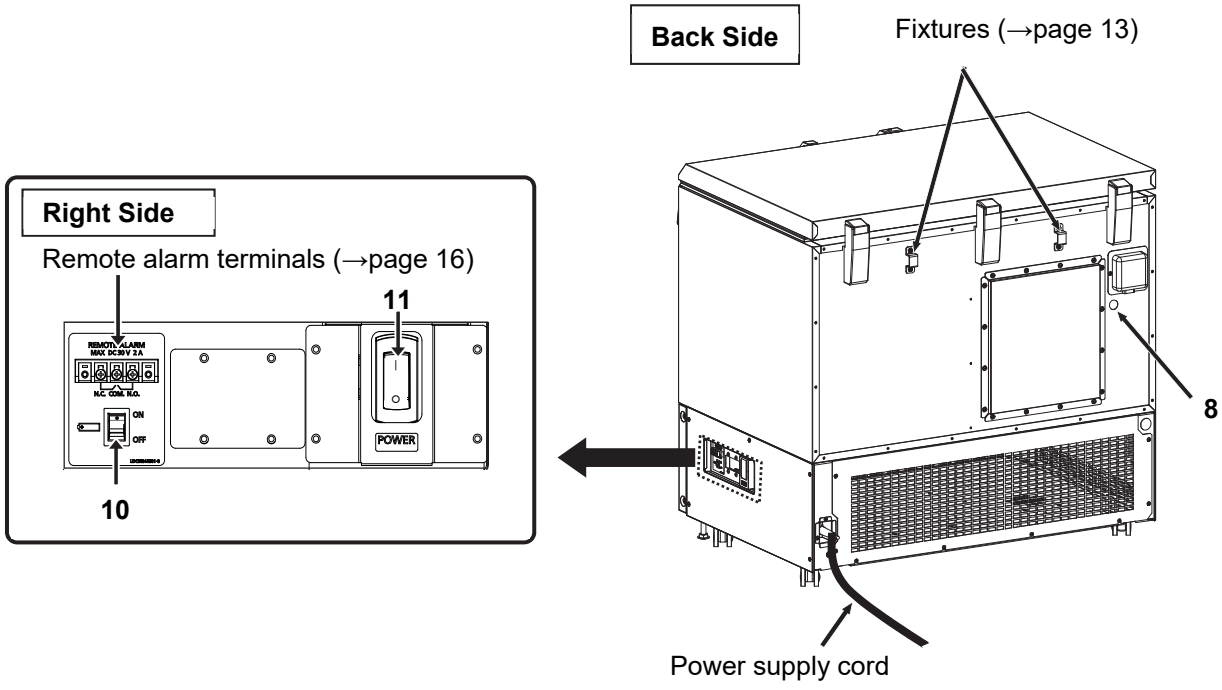
- This unit comes with a power plug having one earth pin. Earthing work is not required in the case of a power outlet equipped with an earth contact.
- If the power outlet is not equipped with an earth contact, ask a qualified contractor to do the earthing work.

FREEZER COMPONENTS

Main body

The model below shows MDF-DC202VH (MDF-DC102VH also has an equivalent structure).





1. Key slot: The door can be locked using the accessory key.
Lock: Insert the key here and turn it 180° clockwise, and then take it out of the slot.
Unlock: Insert the key here and turn it 180° counterclockwise and then take it out of the slot.

2. Handle: Used for opening and closing the door. The latch is provided at the handle for securely closing the door. When closing the door, grab the handle firmly and push it towards the cabinet side to engage the latch (you can hear clicking sound). Otherwise, samples in the chamber may be damaged due to the temperature changes in the chamber. When opening the door, grab the handle firmly and pull it towards you to disengage the latch, and then lift the door upwards.

3. Inner lid (MDF-DC102VH: 1 lid, MDF-DC202VH: 2 lids): Reduces the cold air leakage when the door is open. If the lids are not fitted properly, samples in the chamber may be damaged due to the temperature changes in the chamber. Remove the frost on the lids regularly.

4. USB port: A USB flash drive is inserted here when exporting log data.
Note: USB flash drives with a capacity of 32 GB or less that employ the FAT16/FAT32 file system are supported. USB flash drives that require passwords cannot be used. We do not guarantee the correct operation of all USB flash drives even if these conditions are satisfied. Do not insert devices other than USB flash drives into the USB port.

5. Grille (air intake vent): The outer air is taken into the chamber from this vent. Do not block this vent. If the vent is blocked, the cooling performance of the freezer deteriorates.

6. Leveling feet: These are screw bolts used to secure and level the unit. Adjust the height of the leveling feet by turning them until the two front casters are away from the floor (page 13).

7. Caster: Four casters are provided to facilitate moving of the freezer. For the installation, adjust the leveling feet so that the two front casters cannot contact the floor.

8. Access ports (rear and bottom): Used to route the sensor/cable of measuring equipment etc. into the chamber.
Note: Be sure to put back the cap and insulation for the access ports after using the access ports. If they are not attached properly, the chamber temperature may not go down, or condensation may occur outside the access ports.

9. Magnetic door gasket: Seals the door and prevents cold air leakage from the door.
Note: Excessive accumulation of frost is likely to create gaps between the door and the magnetic door gasket, which can degrade the cooling performance. Remove the frost using the scraper that came with the unit before the accumulation becomes too thick.

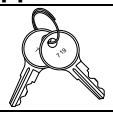
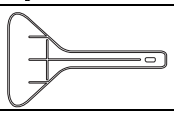
10. Battery switch for power failure alarm: Switch for turning ON/OFF the battery for power failure alarm. Always turn this switch on when the unit is operating to ensure that the power failure alarm is working. Turn this switch off when the unit is not used for a long period.

11. Power switch: Power switch for the freezer unit (ON="I", OFF="○").

FREEZER COMPONENTS

Accessories

Check that following accessories are included with this unit. If any accessories are missing, contact our sales representative or agent.

Name	Qty	Appearance	Usage
Key	1 set		For locking and unlocking the door (page 15).
Scraper	1		For removing frost in the chamber (page 51).

Remote alarm terminals

The alarm condition of the freezer can be transferred to a remote location by connecting an external alarm device (commercially available) to the remote alarm terminals. Especially, the use of the remote alarm device is recommended if the freezer is placed in an unattended environment to ensure that alarm condition is notified to the administrator. For installing the alarm device, contact our sales representative or agent.

The terminals for the remote alarm are provided at the right side of the unit (see the right figure). Alarm signals are transmitted from these terminals as non-voltage contact outputs. Contact capacity is DC 30 V, 2 A.
Table 1 shows the terminal status and the behavior of the remote alarm when the BUZZER STOP button is pressed.

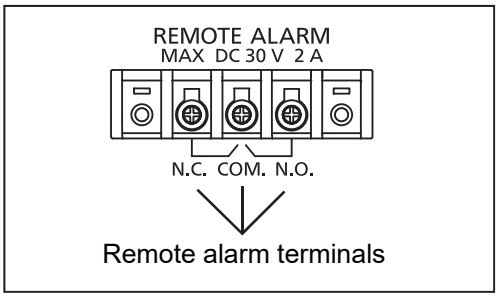


Table 1 Terminal status and behavior of remote alarm when BUZZER STOP button is pressed

"Remote Alarm" setting (page 28)	Connection terminal	Normal condition	Abnormal condition (Including in the event of power outage and when power plug is pulled out.)	
				When BUZZER STOP button is pressed.
ON: Not linked with BUZZER STOP button	COM.-N.C.	Close	Open	Open (indicates abnormal condition)
	COM.-N.O.	Open	Close	Close (indicates abnormal condition)
OFF: Linked with BUZZER STOP button	COM.-N.C.	Close	Open	Close (goes back to normal condition)
	COM.-N.O.	Open	Close	Open (goes back to normal condition)

Notes:

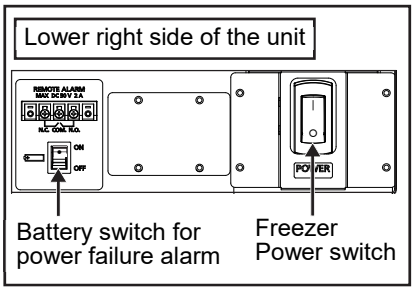
- For the types of alarms that can be transferred to the remote alarm device, refer to page 48.
- Use a commercially available alarm device when using the remote alarm function. Making a new device or remaking an existing device yourself may cause an electric shock or malfunction.
- When connecting an alarm device to the remote alarm terminals, turn off the power switches for the alarm device and the freezer, and unplug the freezer. Otherwise, it may cause an electric shock.
- Use shielded wire for connection. A maximum length of 30 meters of the cable is recommended.

START-UP PROCEDURE

Follow the procedure below to start test run or start operation of this product.

Preparation

1. Check that the following switches at the lower right side of the unit are turned off: power switch, battery switch for power failure alarm, backup power switch (if the optional backup cooling system is installed).
Note: Power failure alarm will activate if the battery switch for power failure alarm is turned on when the power to the freezer is off.



Start-up

2. Without putting anything into the chamber, connect the power supply cord to the dedicated outlet.

3. Turn on the power switch for the freezer to start operation.
"N04:Temp.HighDelay" is displayed on the Home screen since the chamber temperature is not reached the temperature set point immediately after turning on the freezer. This is not an error.

Setting after start-up

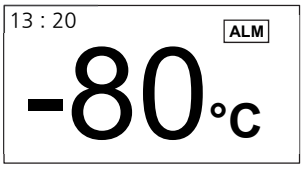
4. Turn on the battery switch for power failure alarm.
Note: When the battery switch for power failure alarm is OFF, the message "N22:BattSwitch OFF." is displayed on the Home screen. This message disappears when the battery switch for power failure alarm is turned ON.

5. Set the desired chamber temperature set point and high and low temperature alarms (pages 22 to 24).
Note: Keep the ambient temperature 5°C to 30°C. The chamber temperature may not reach to the set point if the ambient temperature exceeds 30°C.

Check

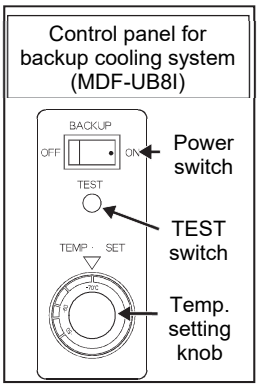
6. Check that the chamber temperature has cooled to the set point by looking at the temperature displayed on the Home screen.

7. Perform the alarm test (see "6. BUZZER STOP button" on page 19). Press the BUZZER STOP button for about 3 seconds when the Home screen is displayed. During the test, the audible alarm, alarm lamp, and remote alarm (if an external alarm device is installed) activate, and ALM is displayed on the Home screen. Pressing the BUZZER STOP button again stops the alarm test.



Setting optional device function

8. Turn on the backup power switch (BACKUP) for the optional backup cooling system (if installed). Then, press the backup test switch (TEST) for the optional backup cooling system to check if it works properly (you can hear a slight injection sound).
Note: If the backup cooling system is not charged enough when this product is turned on for the first time or this product is not used for a long time, the backup cooing system may not work properly. In this case, charge the backup cooling system by running the freezer for more than 6 hours. For fully charging the completely discharged backup cooling system, the freezer should run more than three days.



9. Set the injection start temperature of the backup cooling system (if installed) using the temperature setting knob (TEMP.SET).

10. Put the samples into the chamber little by little.
- ♦Putting a large volume of samples into the chamber at a time causes the temperature to rise rapidly.
- ♦Putting too many high-temperature items into the chamber may raise the chamber temperature, causing the samples to deteriorate.

11. Configure settings (alarm setting, keypad lock setting, etc.) as necessary.

Notes:
- When closing the door, push the handle towards the cabinet side until the latch is engaged. Insufficient pushing can cause temperature rise in the chamber.
- If some optional inventory racks are in the chamber, be careful not to drop inventory rack when pulling it out.

DURING/AFTER POWER FAILURE

Operation during power failure

When the battery switch for power failure alarm is ON, the unit behaves as follows even during a power failure.

- The power failure alarm activates (page 48).*
  Press the BUZZER STOP button to silence the sound of the power failure alarm. If the ring back function is turned ON, the audible alarm sounds again when the power failure still continues after the set ring back time has elapsed (page 25). When the power comes back while the audible alarm is silenced by pressing the BUZZER STOP button, the freezer exits the alarm condition and returns to normal condition.
- The alarm lamp (LED) blinks in red (page 19).*
- The display turns off (page 19).
  Pressing the BUZZER STOP button turns the display on for 5 seconds.*
- The High/Low alarm can activate even during a power failure (pages 23, 24 and 48).*
  However, the alarm notification for the power failure alarm (page 48) (the error code and message on the Home screen, the audible alarm, the alarm lamp, and the remote alarm) continues.
- The clock does not stop.
- Recording of the temperature log and alarm log continues during a power failure.*

*When the battery for power failure alarm is flat, these functions do not work.

Operation after recovery from power failure

During a power failure, the setting values are stored in the nonvolatile memory. Therefore, after the power comes back, the freezer resumes the operation using the set values before the power failure. Reconfiguration for set values is not required but check the settings such as operation settings and alarm settings. If the settings have been changed for some reasons, stored items inside the unit may be adversely affected after the operation resumes.

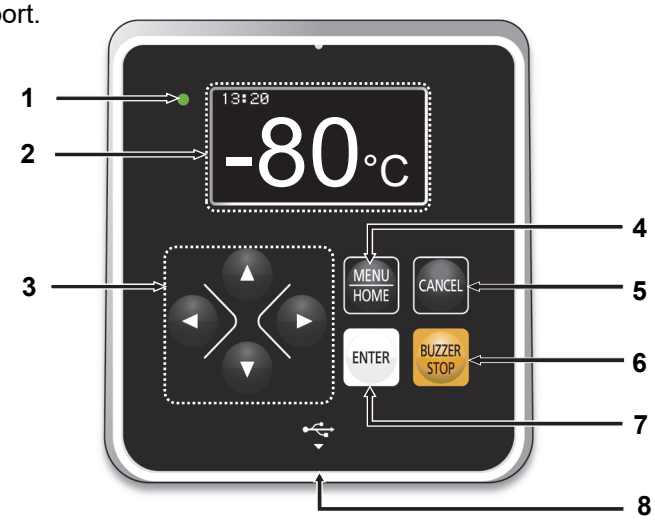
Although the power failure alarm is canceled after the power comes back, the fact that there was a power failure is notified to the user by the “Power Fail.Log” message, audible alarm, and orange flashing power/alarm lamp (page 48). Pressing the BUZZER STOP button cancels the message, stops the audible alarm, and changes the lamp to steady green.
Also, you can check whether a power failure has occurred or not, by referring to the alarm log (page 45).

Notes:
- In case of a power failure, take appropriate measures to protect the valuable samples following the tips described on pages 10 and 11.
- If multiple ultra-low temperature freezers are used, all of the freezers will start up at the same time after the power comes back. This will lead to a temporary voltage drop and may affect the starting of the freezers. To prevent this situation, set the appropriate compressor delay time for the freezers (page 29).

2. SETTINGS AND OPERATION

CONTROL PANEL

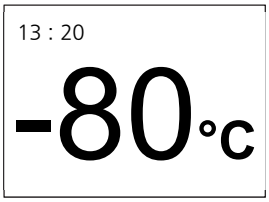
The control panel is provided at the front upper right side of the freezer. It is composed of the power/alarm lamp, a display for showing the operation status of the freezer or setting screens, buttons for controlling the freezer, and a USB port.



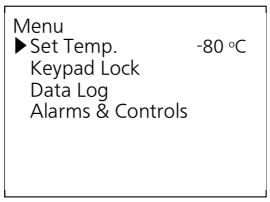
1. Power/Alarm lamp (LED)
When the power to the unit is ON, the lamp illuminates in green. When the unit is in the Alarm condition (page 48), the lamp blinks in red. When the unit is in the Notification condition (page 49), the lamp blinks in orange.

2. Display
On this display, various information of the freezer such as current temperature and alarm messages (Home screen), setting menu (Menu screen), and temperature log chart is displayed.

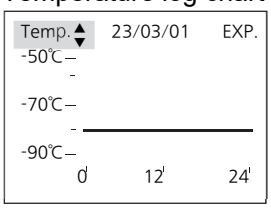
Home screen



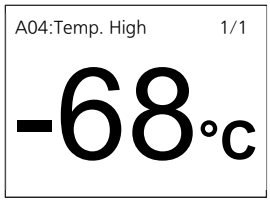
Menu screen



Temperature log chart



Alarm message



3. Up/down/left/right buttons (△▽◁ ▷)
Move the cursor for selecting a menu item or change setting values.

4. MENU/HOME button
On the Home screen (the screen displaying the current chamber temperature), pressing this button displays the MENU screen. On the screens other than the Home screen, pressing this button displays the Home screen.
Note: When setting values on the screens other than the MENU screen, if you press this button before pressing the ENTER button to confirm the setting, the value is not saved in the freezer.

5. CANCEL button
Pressing this button returns to the previous screen.
Note: When setting values on the screen, if you press this button before pressing the ENTER button, the value is not saved in the freezer.

6. BUZZER STOP button
When an alarm condition occurs and the alarm is beeping, pressing this button stops the alarm sound. If the ring back delay time (page 25) is set to 10 or more minutes, and the alarm condition still continues after the set ring back delay time has elapsed, the audible alarm sounds again. Also, you can perform the alarm test by pressing the BUZZER STOP button for about 3 seconds when the Home screen is displayed. For details, refer to step 7 on page 17.

7. ENTER button
Pressing this button finalizes the selected menu item or selected setting value.

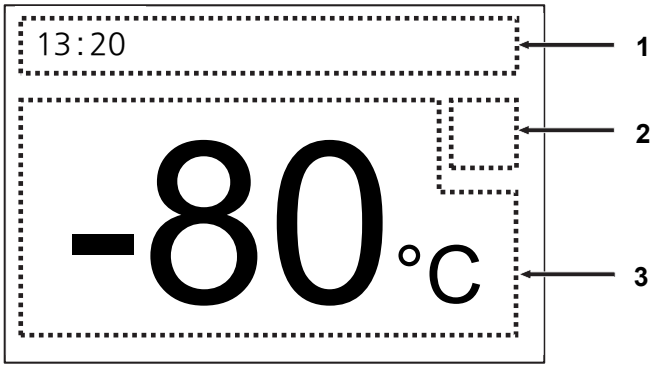
8. USB port
Insert a USB flash drive here to export log data (temperature log, alarm log) stored in this product.

CONTROL PANEL

Home screen

The following screen showing the freezer temperature appears on the display after turning on the power switch for the freezer. This screen is called “Home screen” and shows basic information about the status of the freezer.

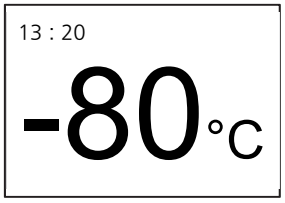
Home Screen



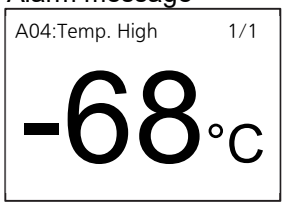
1. Message area

Normally, the current time is displayed. When the freezer is in an error state, Alarm or Notification message and number of messages are displayed here.

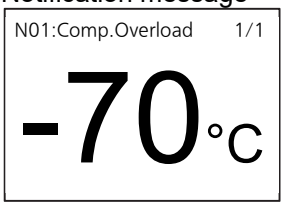
Current time



Alarm message

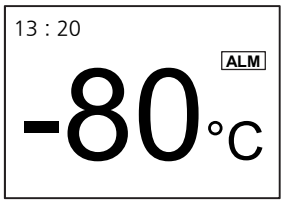


Notification message



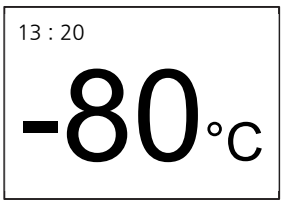
2. Mode indication

ALM indication is displayed here during the alarm test.



3. Current freezer temperature

Current temperature in the freezer chamber is displayed.



Note:

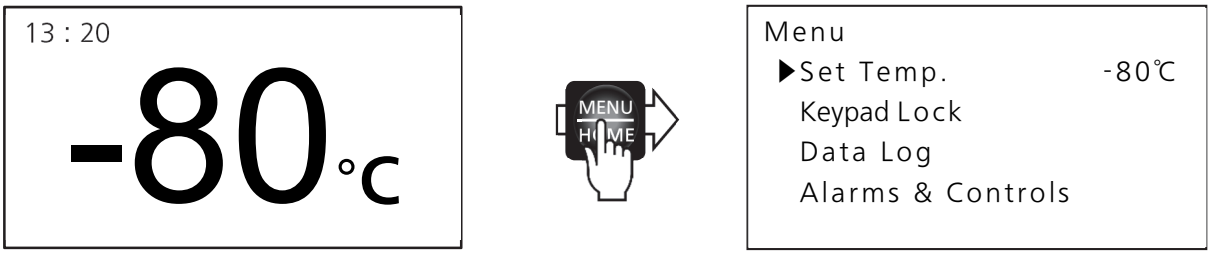
When there is no alarm condition and the buttons are not pressed for more than 90 seconds, the screen enters into the screen sleep mode. During the screen sleep mode, the display becomes dark, and the time and the freezer temperature indication automatically scrolls from right to left.

The screen wakes up when:

- the MENU/HOME button on the control panel is pressed (→the Menu screen is displayed),
- a button other than MENU/Home button on the control panel is pressed (→normal Home screen is displayed), or
- audible alarm sounds due to alarm condition (→the Home screen indicating alarm condition is displayed).

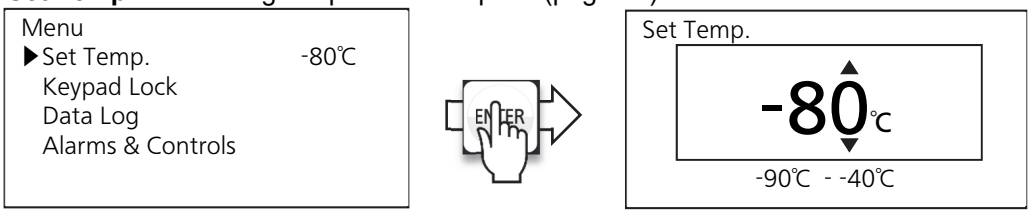
Menu screen

When the Home screen is displayed, pressing the MENU/HOME button on the control panel displays the Menu screen. On the Menu screen, menu items for configuring various setting or checking logs (log chart display, log export) are listed.

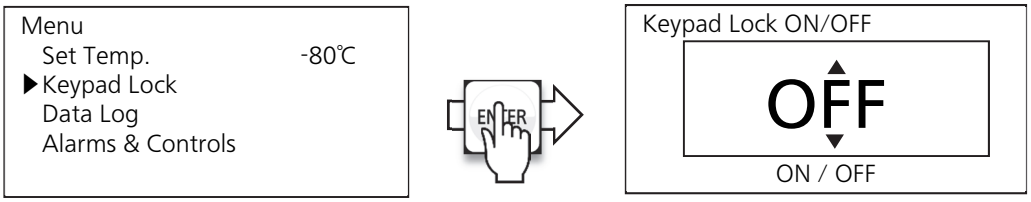


Menu items on the Menu screen

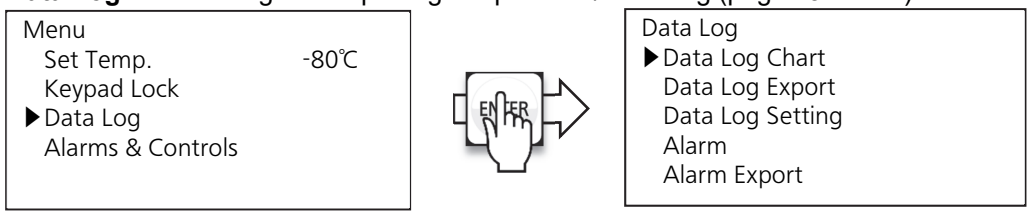
1. Set Temp.: For setting temperature set point (page 22).



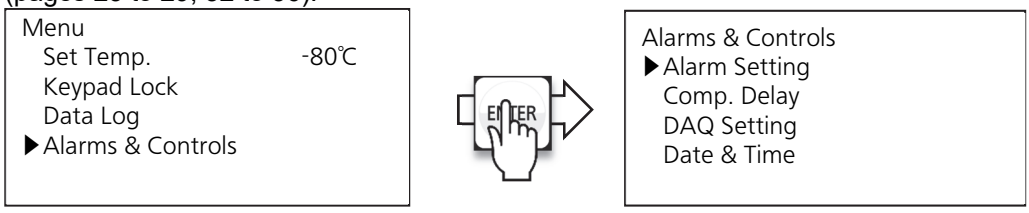
2. Keypad Lock: For setting the keypad lock (pages 30 and 31).



3. Data Log: For viewing and exporting temperature/alarm log (pages 37 to 47).



4. Alarm & Controls: For other settings such as alarm setting, compressor delay time, and date and time (pages 23 to 29, 32 to 36).



Note:
When a screen other than the Home screen is displayed and there is no alarm condition, and the buttons are not pressed for more than 90 seconds, the screen enters into the screen sleep mode. During the screen sleep mode, the display becomes dark and the time and the freezer temperature indication automatically scrolls from right to left. When you are in the middle of setting a value and the screen enters into sleep, the setting is not saved in the freezer.
The screen wakes up when:
- the MENU/HOME button on the control panel is pressed (→the Menu screen is displayed),
- a button other than MENU/Home button on the control panel is pressed (→normal Home screen is displayed), or
- audible alarm sounds due to alarm condition (→the Home screen indicating alarm condition is displayed).

SETTING FOR BASIC OPERATION

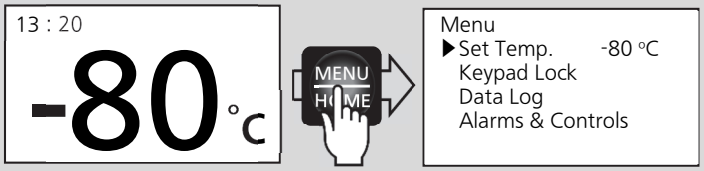
Setting temperature

The temperature set point for the freezer can be set by following the steps below.

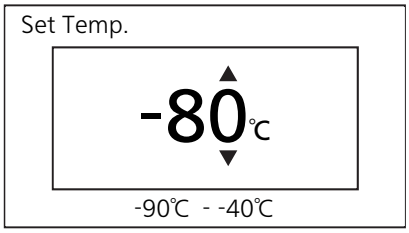
■ Settable range: -90°C to -40°C
■ Default value -80°C

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.

2. With the cursor on the Set Temp., press the ENTER button.
►The Temp. Setting screen is displayed [Fig.1].



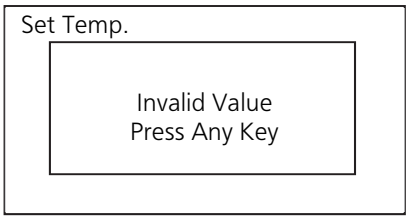
3. Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.



[Fig.1]

4. Press the ENTER button.
►The value is saved and the display returns to the Menu screen.

Note:
If the entered value is out of the settable range, the following message is displayed. Press any button on the control panel to return to the Set Temp. screen, and change the value.



5. Press the MENU/HOME button.
►The display returns to the Home screen.

Setting high temperature alarm

High temperature alarm activates when the chamber temperature exceeds* the temperature (the value set to “Set Temp.” + the value set to “High Temp.”) to notify the user of high temperature status.

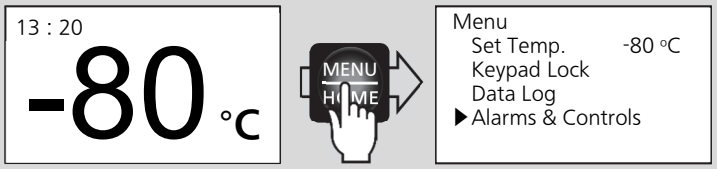
* Since the chamber temperature displayed on the Home screen is the value rounded to the nearest integer, the high temperature alarm may activate when the value of the displayed chamber temperature is equal to the set alarm temperature.

■ Settable range: 5°C to 40°C
■ Default value: 10°C

Note:
When the freezer has exited a high alarm condition spontaneously, the fact that there was a high alarm condition is notified to the user by the “High Temp.Log” message, blinking temperature indication, orange flashing power/alarm lamp, and audible alarm. Pressing the BUZZER STOP button stops the notification.

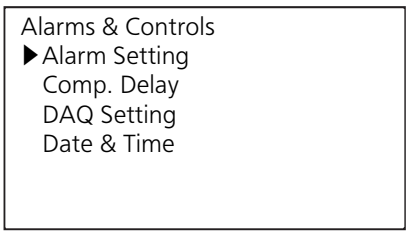
To set the high temperature alarm, follow the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



2. Move the cursor to the Alarms & Controls using the up/down button (△▽), and press the ENTER button.
►The Alarms & Controls screen is displayed [Fig.1].

3. With the cursor on the Alarm Setting, press the ENTER button.
►The Alarms Setting screen is displayed [Fig.2].

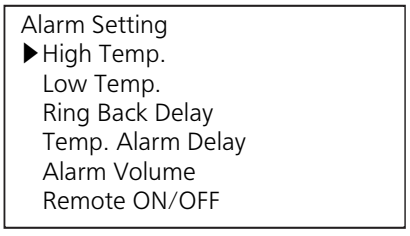


[Fig.1]

4. With the cursor on the High Temp., press the ENTER button
►The High Temp screen with current setting value is displayed [Fig.3].

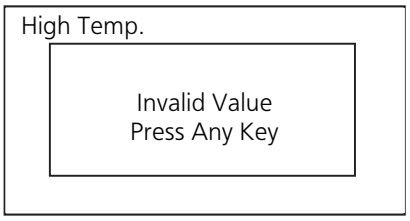
5. Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.

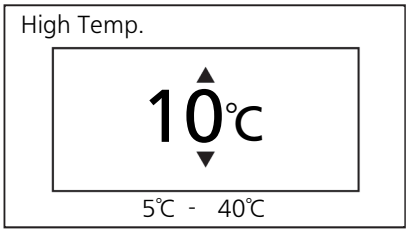
6. Press the ENTER button.
►The value is saved and the display returns to the Alarm Setting screen.



[Fig.2]

Note:
If the entered value is out of the settable range, the following message is displayed. Press any button on the control panel to return to the High Temp. screen, and change the value.





[Fig.3]

7. Press the MENU/HOME button.
►The display returns to the Home screen.

SETTING FOR BASIC OPERATION

Setting low temperature alarm

Low temperature alarm activates when the chamber temperature falls below* the temperature (the value set to “Set Temp.” - the value set to “Low Temp.”) to notify the user of low temperature status.

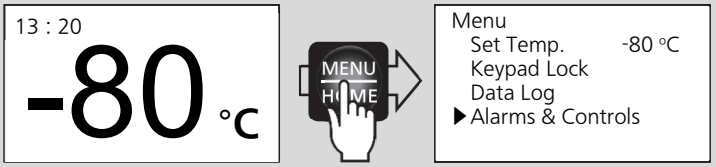
* Since the chamber temperature displayed on the Home screen is the value rounded to the nearest integer, the low temperature alarm may activate when the value of the displayed chamber temperature is equal to the set alarm temperature.

■ Settable range: -40°C to -5°C
■ Default value: -10°C

Note:
When the freezer has exited a low alarm condition spontaneously, the fact that there was a low alarm condition is notified to the user by displaying the “Low Temp.Log” message, blinking temperature indication, orange flashing power/alarm lamp, and audible alarm. Pressing the BUZZER STOP button stops the notification.

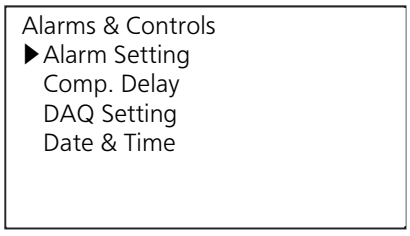
To set the low temperature alarm, follow the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



2. Move the cursor to the Alarms & Controls using the up/down button (△▽), and press the ENTER button.
►The Alarms & Controls screen is displayed [Fig.1].

3. With the cursor on the Alarm Setting, press the ENTER button.
►The Alarms Setting screen is displayed [Fig.2].



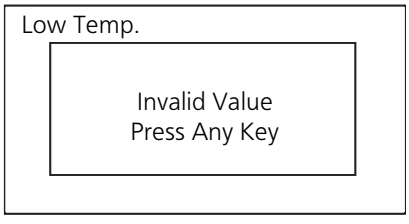
[Fig.1]

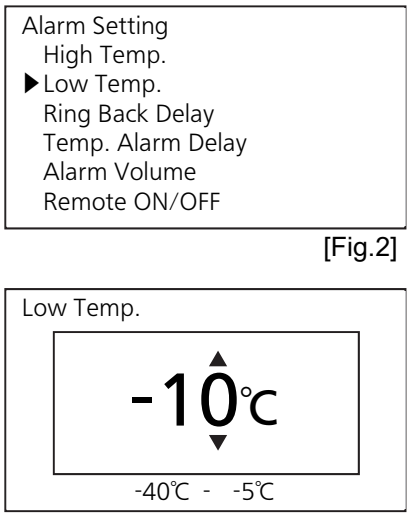
4. Move the cursor to Low Temp. using the up/down button (△▽), and press the ENTER button.
►The Low Temp. screen with current setting value is displayed [Fig.3].

5. Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.

6. Press the ENTER button.
►The value is saved and the display returns to the Alarm Setting screen.

Note:
If the entered value is out of the settable range, the following message is displayed. Press any button on the control panel to return to the Low Temp. screen, and change the value.





[Fig.2]

[Fig.3]

7. Press the MENU/HOME button.
►The display returns to the Home screen.

Setting ring back time

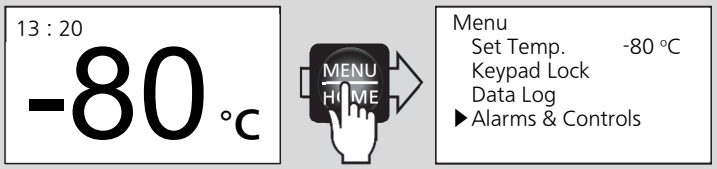
Ring back is a function whereby the audible alarm sounds again when an alarm condition still continues after set ring back time has elapsed even though the alarm sound was stopped by pressing the BUZZER STOP button.

■ Settable range: 0 to 60 minutes (in 10 minute increments).
■ Default value: 30 minutes

Notes:
- When 0 is set, the ring back function is turned off, and the audible alarm does not sound again. For protecting the contents in the freezer, it is advisable to set this value to between 10 to 60.
- You cannot set or change the ring back time while the alarm condition continues even if the audible alarm sound is stopped by pressing the BUZZER STOP button.

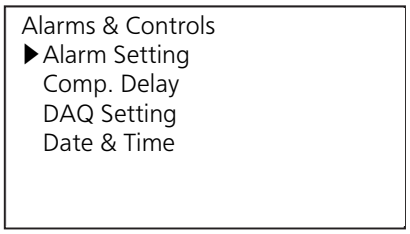
To set the ring back delay time, follow the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



2. Move the cursor to the Alarms & Controls using the up/down button (△▽), and press the ENTER button.
►The Alarms & Controls screen is displayed [Fig.1].

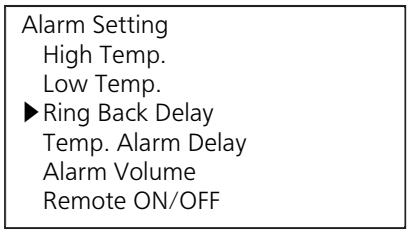
3. With the cursor on the Alarm Setting, press the ENTER button.
►The Alarms Setting screen is displayed [Fig.2].



[Fig.1]

4. Move the cursor to Ring Back Delay using the up/down button (△▽), and press the ENTER button.
►The Ring Back Delay screen with current setting value is displayed [Fig.3].

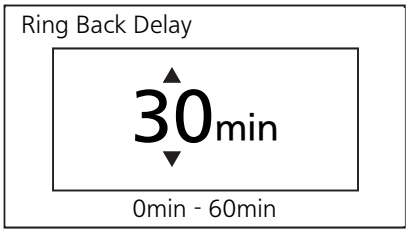
5. Change the value using the up/down button (△▽).
Pressing the up/down button (△▽) increments/decrements the value by 10 minutes.



[Fig.2]

6. Press the ENTER button.
►The value is saved and the display returns to the Alarm Setting screen.

7. Press the MENU/HOME button.
►The display returns to the Home screen.



[Fig.3]

SETTING FOR BASIC OPERATION

Setting temperature alarm delay time

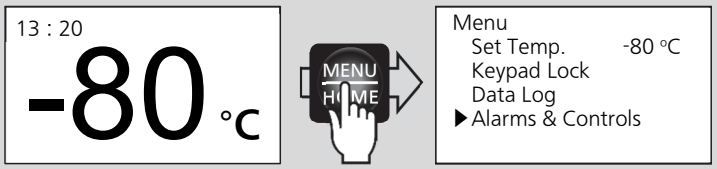
Temperature alarm delay is a function whereby when the high temperature or low temperature alarm condition occurs, instead of activating audible alarm or remote alarm immediately, activates the alarm after the elapse of the set alarm delay time.

■ Settable range: 0 to 15 minutes (when 0 is set, the alarm activates immediately)
■ Default value: 15 minutes

Notes:
- When the freezer recovers from the alarm condition within the set alarm delay time, audible alarm or remote alarm does not activate after the elapse of the temperature alarm delay time.
- If an alarm condition other than the high or low temperature alarm occurs during the temperature alarm delay time, the alarm activates.

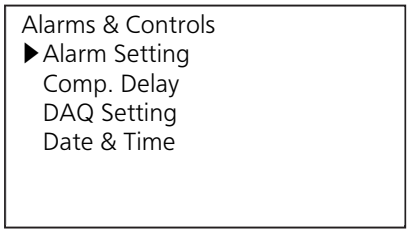
To set the temperature alarm delay time, follow the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



2. Move the cursor to the Alarms & Controls using the up/down button (△▽), and press the ENTER button.
►The Alarms & Controls screen is displayed [Fig.1].

3. With the cursor on the Alarm Setting, press the ENTER button.
►The Alarms Setting screen is displayed [Fig.2].

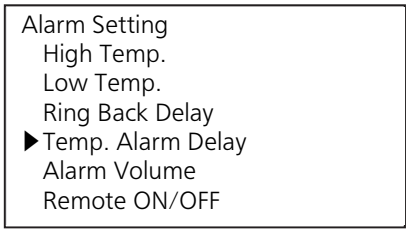


[Fig.1]

4. Move the cursor to Temp. Alarm Delay using the up/down button (△▽), and press the ENTER button.
►The Temp. Alarm Delay screen with current setting value is displayed [Fig.3].

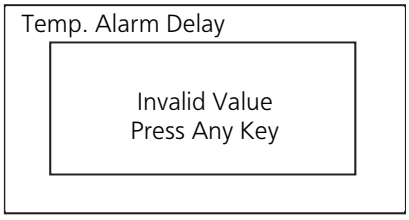
5. Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.

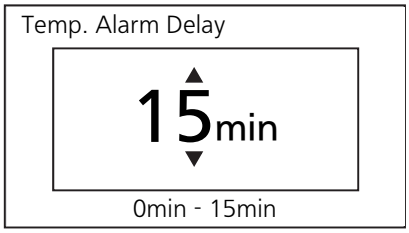
6. Press the ENTER button.
►The value is saved and the display returns to the Alarm Setting screen.



[Fig.2]

Note:
If the entered value is out of the settable range, the following message is displayed. Press any button on the control panel to return to the Temp. Alarm Delay screen, and change the value.





[Fig.3]

7. Press the MENU/HOME button.
►The display returns to the Home screen.

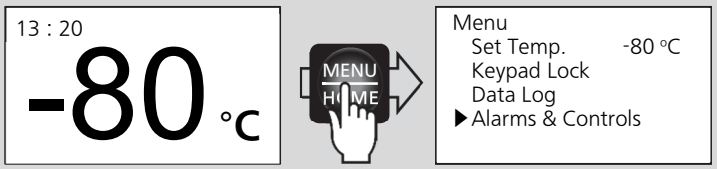
Setting alarm sound volume

You can set the sound volume of the audible alarm to low or high depending on the situation on the installation site.

■ Settable value: LOW or HIGH
■ Default value: LOW

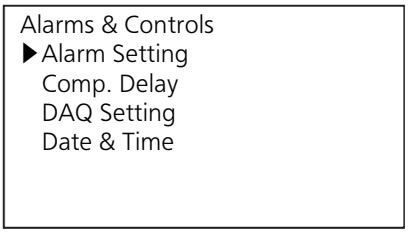
To set the alarm sound volume, follow the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



2. Move the cursor to the Alarms & Controls using the up/down button (△▽), and press the ENTER button.
►The Alarms & Controls screen is displayed [Fig.1].

3. With the cursor on the Alarm Setting, press the ENTER button.
►The Alarms Setting screen is displayed [Fig.2].

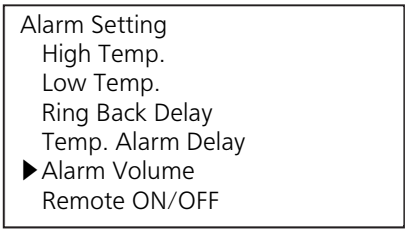


[Fig.1]

4. Move the cursor to Alarm Volume using the up/down button (△▽), and press the ENTER button.
►The Alarm Volume screen with current setting value is displayed [Fig.3].

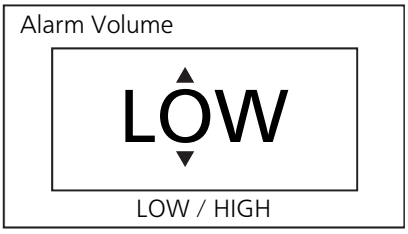
5. Change the value using the up/down button (△▽).
Pressing the up/down button (△▽) toggles the value.

6. Press the ENTER button.
►The value is saved and the display returns to the Alarm Setting screen.



[Fig.2]

7. Press the MENU/HOME button.
►The display returns to the Home screen.



[Fig.3]

SETTING FOR BASIC OPERATION

Setting remote alarm

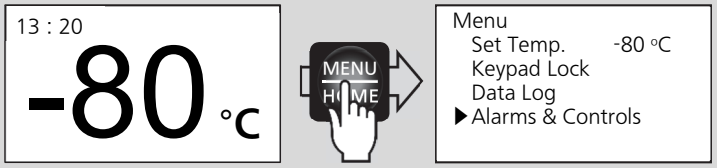
The operation of the remote alarm when the Buzzer Stop button is pressed, to stop the audible alarm, can be selected as follows:

ON: Not linked with the pressing of the BUZZER STOP button (remote alarm indication continues).
OFF: Linked with the pressing of the BUZZER STOP button (remote alarm indication stops).
Note that when the power failure alarm is activated, the remote alarm indication does not stop even if this setting is set to OFF and the BUZZER STOP button is pressed.

■ Settable value: ON / OFF
■ Default value: ON

To turn on or off the remote alarm, follow the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



2. Move the cursor to the Alarms & Controls using the up/down button (△▽), and press the ENTER button.
►The Alarms & Controls screen is displayed [Fig.1].

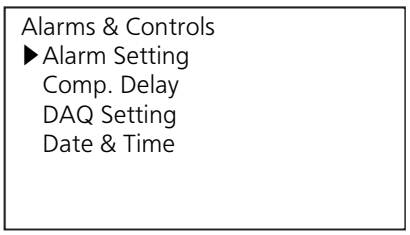
3. With the cursor on the Alarm Setting, press the ENTER button.
►The Alarms Setting screen is displayed [Fig.2].

4. Move the cursor to Remote ON/OFF using the up/down button (△▽), and press the ENTER button.
►The Remote ON/OFF screen with current setting value is displayed [Fig.3].

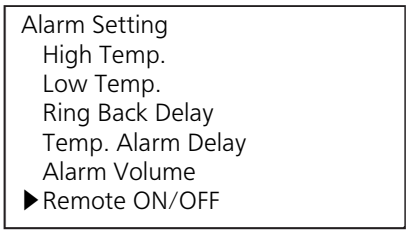
5. Change the value using the up/down button (△▽).
Pressing the up/down button (△▽) toggles the value.

6. Press the ENTER button.
►The value is saved and the display returns to the Alarm Setting screen.

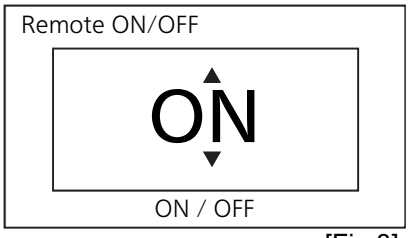
7. Press the MENU/HOME button.
►The display returns to the Home screen.



[Fig.1]



[Fig.2]



[Fig.3]

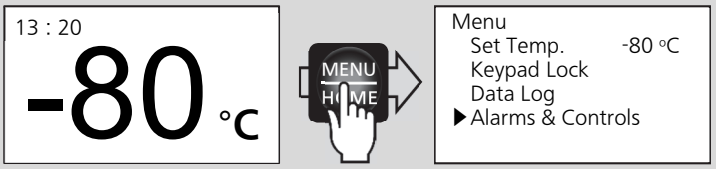
Setting compressor delay time

Compressor delay time is the time from when the freezer is turned ON or the power comes back in the event of a power failure until when the compressor starts up. This freezer requires a large amount of electric power at the instant of compressor start-up. If multiple freezers are installed in a same room, shift the start-up time of each compressor so that the compressors do not start up at the same time after a power failure.

■ Settable range: 3 to 15 minutes
■ Default value: 3 minutes

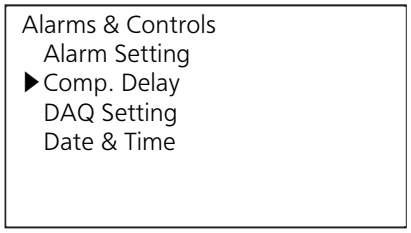
To set the compressor delay time, follow the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



2. Move the cursor to the Alarms & Controls using the up/down button (△▽), and press the ENTER button.
►The Alarms & Controls screen is displayed [Fig.1].

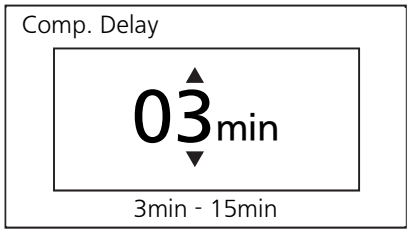
3. Move the cursor to Comp. Delay using the up/down button (△▽), and press the ENTER button.
►The Comp. Delay screen is with the current setting value displayed [Fig.2].



[Fig.1]

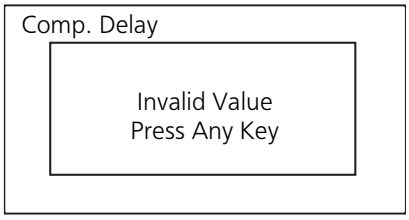
4. Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.

5. Press the ENTER button.
►The value is saved and the display returns to the Alarms & Controls screen.



[Fig.2]

Note:
If the entered value is out of the settable range, the following message is displayed. Press any button on the control panel to return to the Comp. Delay screen, and change the value.



6. Press the MENU/HOME button.
►The display returns to the Home screen.

KEYPAD LOCK

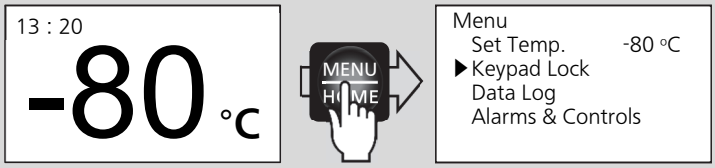
The keypad lock function prevents the freezer settings from being incorrectly changed. When the keypad lock is turned ON using a password, the settings cannot be changed even if the buttons on the control panel are pressed to change the setting value on each setting screen.

Setting keypad lock to ON

■ Settable value: ON / OFF
■ Default value: OFF

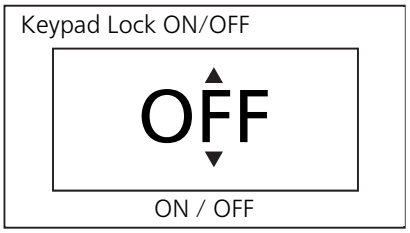
To set the keypad lock to ON, follow the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



2. Move the cursor to the Keypad Lock using the up/down button (△▽), and press the ENTER button.
►The Keypad Lock ON/OFF screen with current setting value is displayed [Fig.1].

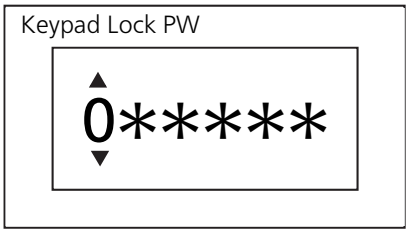
3. Change the value to ON using the up/down button (△▽).
Pressing the up/down button (△▽) toggles the value.



[Fig.1]

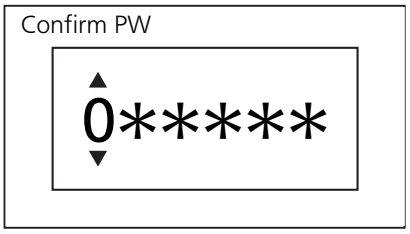
4. Press the ENTER button.
►The Keypad Lock PW screen is displayed [Fig.2].

5. Enter a password (6-digit number) by using the left/right buttons (◁▷) to move the cursor on the digits to be changed and using the up/down buttons (△▽) to set the numerical values, and then press the ENTER button.
►The Confirm PW screen is displayed [Fig.3].



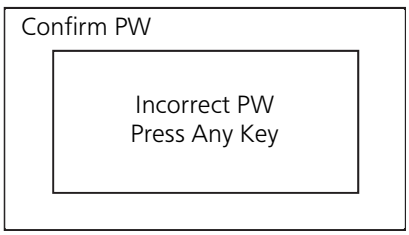
[Fig.2]

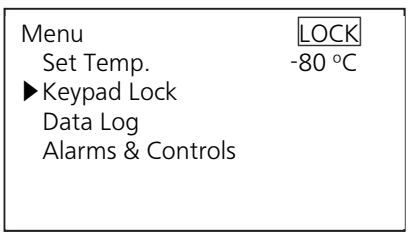
6. Enter the same password (6-digit number) as step 5 for confirmation in the same manner and press the ENTER button.
►The Menu screen with LOCK at the upper right corner of the screen is displayed [Fig.4].
While the keypad lock is ON, LOCK is indicated on every screen for configuring settings.



[Fig.3]

Notes:
- This password is required when setting the keypad lock to OFF. Thus, the password should be properly managed.
- If the confirmation password does not match the initially entered password, the following message is displayed. Press any button on the control panel to return to the Menu screen, and then repeat the steps from Step 2 again.





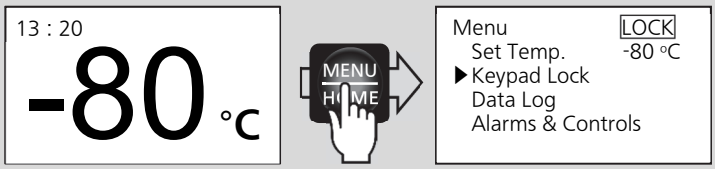
[Fig.4]

7. Press the MENU/HOME button.
►The display returns to the Home screen.

Setting keypad lock to OFF

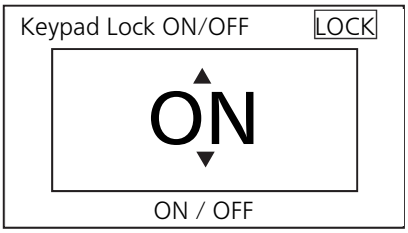
To turn off the keypad lock setting, follow the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



2. Move the cursor to the Keypad Lock using the up/down button (△▽), and press the ENTER button.
►The Keypad Lock ON/OFF screen with current setting value is displayed [Fig.1].

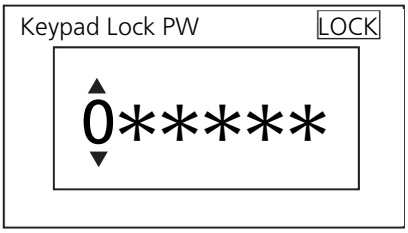
3. Change the value to OFF using the up/down button (△▽).
Pressing the up/down button (△▽) toggles the value.



[Fig.1]

4. Press the ENTER button.
►The Keypad Lock PW screen is displayed [Fig.2].

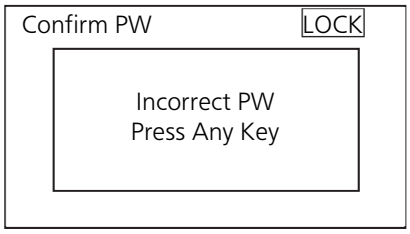
5. Enter the password (6-digit number) by using the left/right buttons (◁▷) to move the cursor on the digits to be changed and using the up/down buttons (△▽) to set the numerical values, and then press the ENTER button.
►The screen returns to the Menu screen and LOCK indication disappears [Fig.3].

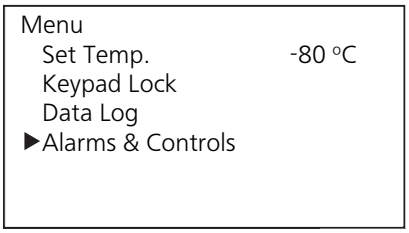


[Fig.2]

Note:

- If the entered password does not match the registered password, the following message is displayed. Press any button on the control panel to return to the Menu screen, and then repeat the steps from Step 2 again.





[Fig.3]

6. Press the MENU/HOME button.
►The display returns to the Home screen.

OTHER SETTINGS

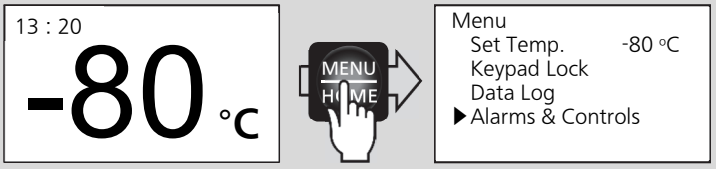
Setting date format

You can set the format of date that will be displayed on the screen and written in log files.

■ Settable value: YY/MM/DD (Year/Month/Day) or DD/MM/YY (Day/Month/Year)
■ Default value: YY/MM/DD (Year/Month/Day)

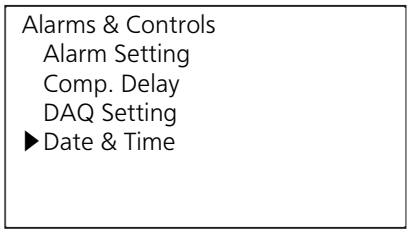
To set the date format, follow the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



2. Move the cursor to the Alarms & Controls using the up/down button (△▽), and press the ENTER button.
►The Alarms & Controls screen is displayed [Fig.1].

3. Move the cursor to Date & Time using the up/down button (△▽), and press the ENTER button.
►The Date & Time screen is displayed [Fig.2].

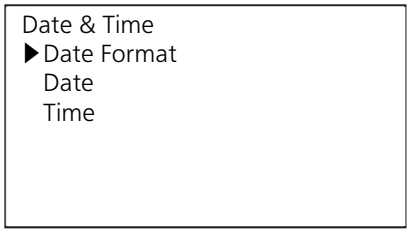


[Fig.1]

4. With the cursor on the Date Format, press the ENTER button.
►The Date Format screen with current setting value is displayed [Fig.3].

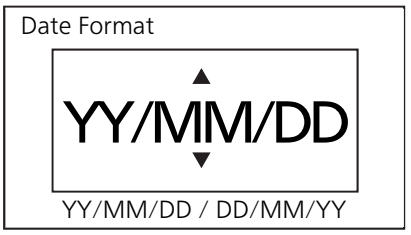
5. Select the date format using the up/down button (△▽).
Pressing the up/down button (△▽) toggles the value.

6. Press the ENTER button.
►The value is saved and the display returns to the Date & Time screen.



[Fig.2]

7. Press the MENU/HOME button.
►The display returns to the Home screen.

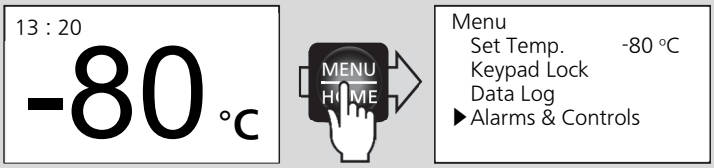


[Fig.3]

Setting date

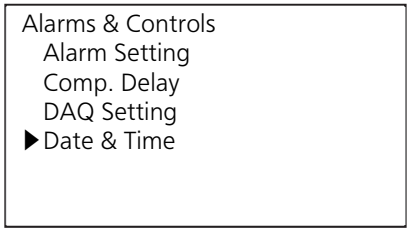
You can set the current date by following the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



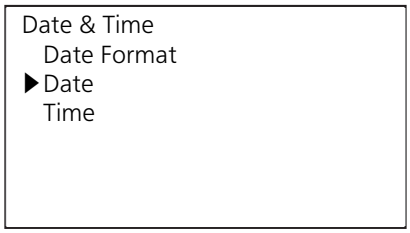
2. Move the cursor to the Alarms & Controls using the up/down button (△▽), and press the ENTER button.
►The Alarms & Controls screen is displayed [Fig.1].

3. Move the cursor to Date & Time using the up/down button (△▽), and press the ENTER button.
►The Date & Time screen is displayed [Fig.2].



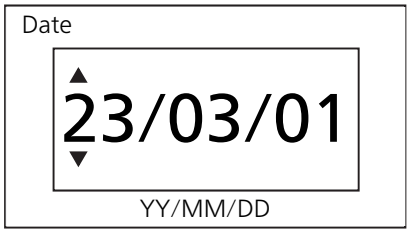
[Fig.1]

4. Move the cursor to Date using the up/down button (△▽), and press the ENTER button.
►The Date screen with currently set date is displayed [Fig.3].
The date is displayed in the format selected on the “Date Format” screen (see page 32).



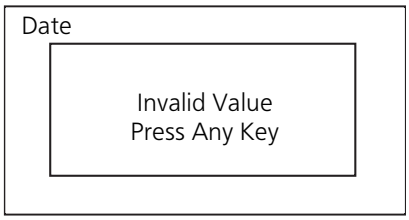
[Fig.2]

5. Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.
Note:
Each of the year, month, and day is set in two digits.
(e.g.) In the case of March 1 in 2023 → 23/03/01



[Fig.3]

6. Press the ENTER button.
►The value is saved and the display returns to the Date & Time screen.
Note:
If the entered value is out of the settable range, the following message is displayed. Press any button on the control panel to return to the Date screen, and change the value.



7. Press the MENU/HOME button.
►The display returns to the Home screen.

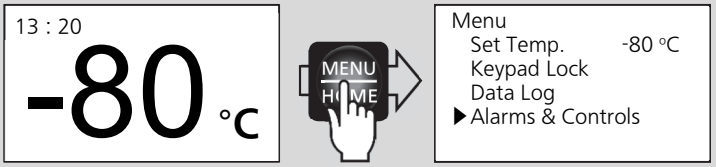
OTHER SETTINGS

Setting time

You can set the current time by following the steps below.

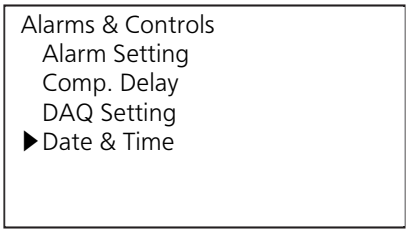
Notes:
- The time is expressed using a 24-hour clock.
- It is advisable to set the right time regularly since an error of about 1 minute may be observed within a month.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



2. Move the cursor to the Alarms & Controls using the up/down button (△▽), and press the ENTER button.
►The Alarms & Controls screen is displayed [Fig.1].

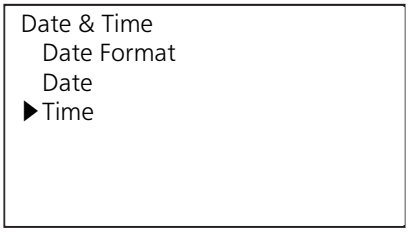
3. Move the cursor to Date & Time using the up/down button (△▽), and press the ENTER button.
►The Date & Time screen is displayed [Fig.2].



[Fig.1]

4. Move the cursor to Time using the up/down button (△▽), and press the ENTER button.
►The Time screen with currently set time is displayed [Fig.3].

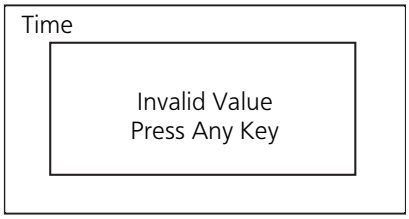
5. Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.
Each of the hour, minute, and second is set in two digits.
(e.g.) In the case of 5:15:30 p.m. → 17:15:30 (hour:minute:second)

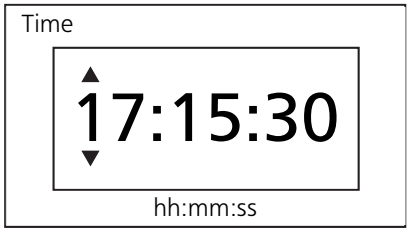


[Fig.2]

6. Press the ENTER button.
►The value is saved and the display returns to the Date & Time screen.

Note:
If the entered value is out of the settable range, the following message is displayed. Press any button on the control panel to return to the Time screen, and change the value.





[Fig.3]

7. Press the MENU/HOME button.
►The display returns to the Home screen.

Setting DAQ

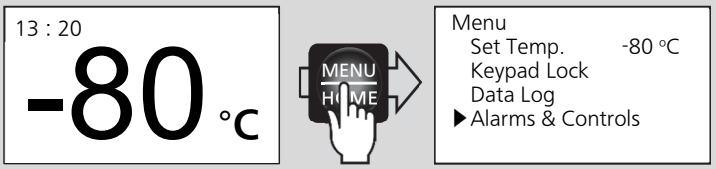
The DAQ setting is required when the optional interface board (page 57) is installed. Settable items are as follows. For installing the interface board, contact our sales representative or agent.

Item	Details	Settable range	Default value
DAQ ID	Enter an ID value (1 to 255) that is not used for other equipment.	000: OFF 001 to 255: ID value	000
DAQ Speed	Select the communication speed when the centralized monitoring (DAQ system) is connected.	2,400, 4,800, or 9,600 (bps)	2,400
Local/Remote	Select the communication mode. When “REMOTE” is selected, you cannot set the chamber temperature set point, high/low alarms, temperature alarm delay time, ring back time, and compressor delay time from the freezer. The configuration can be set from the remote side.	LOCAL/REMOTE	LOCAL

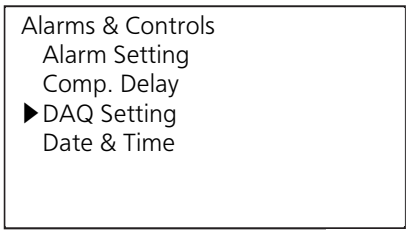
You can set DAQ by following the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.

2. Move the cursor to the Alarms & Controls using the up/down button (△▽), and press the ENTER button.
►The Alarms & Controls screen is displayed [Fig.1].



3. Move the cursor to DAQ Setting using the up/down button (△▽) [Fig.1], and press the ENTER button.
►The DAQ Setting screen is displayed [Fig.2].

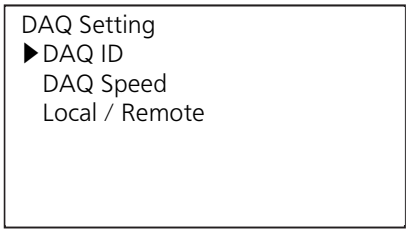


[Fig.1]

4. Set each menu item.

Setting DAQ ID

1) With the cursor on DAQ ID [Fig.2], press the ENTER button.
►The DAQ ID screen is displayed and current setting value is displayed [Fig.3].

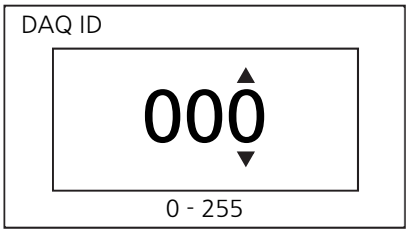


[Fig.2]

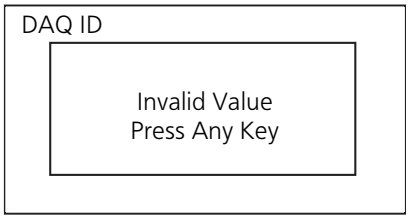
2) Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.

3) Press the ENTER button.
►The value is saved and the screen returns to the DAQ Setting screen.

Note:
If the entered value is out of the settable range, the following message is displayed. Press any button on the control panel to return to the DAQ ID screen, and change the value.



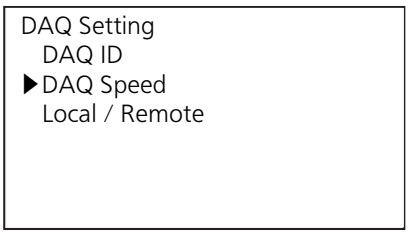
[Fig.3]



OTHER SETTINGS

Setting DAQ speed

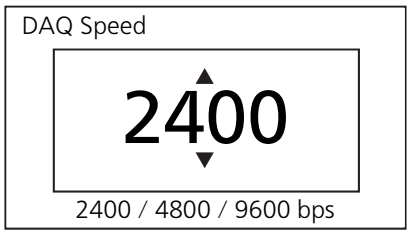
1) Move the cursor to DAQ Speed using the up/down button (△▽) [Fig.4], and press the ENTER button.
►The DAQ Speed screen is displayed and current setting value is displayed [Fig.5].



[Fig.4]

2) Select the speed using the up/down button (△▽).
Every time you press the up/down button (△▽), the value switches to 2400, 4800, and 9600.

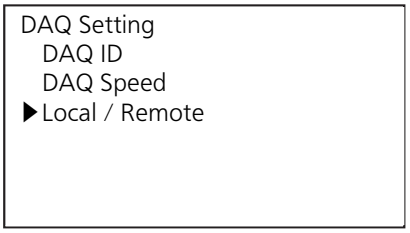
3) Press the ENTER button.
►The value is saved and the screen returns to the DAQ Setting screen.



[Fig.5]

Setting communication mode (Local/Remote)

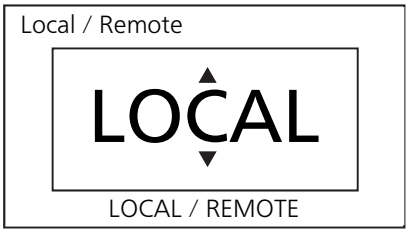
1) Move the cursor to Local/Remote using the up/down button (△▽) [Fig.6], and press the ENTER button.
►The Local/Remote screen is displayed and current setting value is displayed [Fig.7].



[Fig.6]

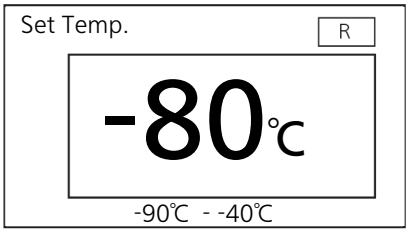
2) Select the communication mode (REMOTE or LOCAL) using the up/down button (△▽).
Pressing the up/down button (△▽) toggles the value.

3) Press the ENTER button.
►The value is saved and the screen returns to the DAQ Setting screen



[Fig.7]

Note:
When REMOTE is selected, R is displayed on the upper right corner of each setting screen for the chamber temperature set point, high/low alarms, temperature alarm delay time, ring back time, and compressor delay time. When this mark is displayed, you cannot change the setting from the freezer. In such a case, the configuration can be set from the remote side.



TEMPERATURE LOG

This product is provided with a function to store temperature log data. You can see the log data in chart format, or you can export the log data to a USB flash drive in CSV format.

Setting log interval

You can set the interval for storing the temperature log.

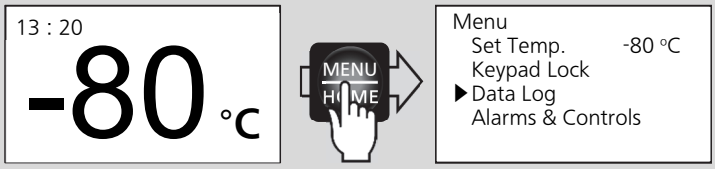
■ Settable range: 1 to 15 minutes
■ Default value: 2 minutes (approx. 180-day data can be stored)

Notes:

- When log data reaches the maximum storage amount, the oldest log data is overwritten with the new data. Log interval and the estimated amount of data that can be stored:
  Every 1 minute: Approx. 90-day data
  Every 6 minutes: Approx. 540-day data
  Every 15 minutes: Approx. 1080-day data
- When the battery switch for power failure alarm is turned on and the battery capacity is remaining, the log data continues to be recorded even during a power failure.

You can set the log interval by following the steps below.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.



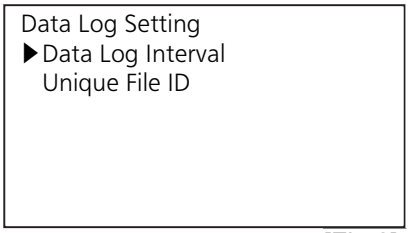
2. Move the cursor to the Data Log using the up/down button (△▽), and press the ENTER button.
►The Data Log screen is displayed [Fig.1].

3. Move the cursor to Data Log Setting using the up/down button (△▽), and press the ENTER button.
►The Data Log Setting screen is displayed [Fig.2].

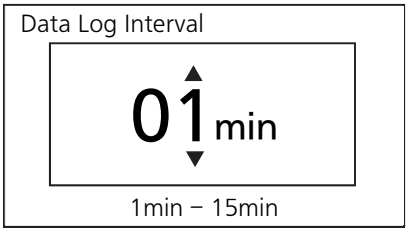
[Fig.1]

4. With the cursor on Data Log Interval [Fig.2], press the ENTER button.
►The Data Log Interval screen is displayed and current setting value is displayed [Fig.3].

5. Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.

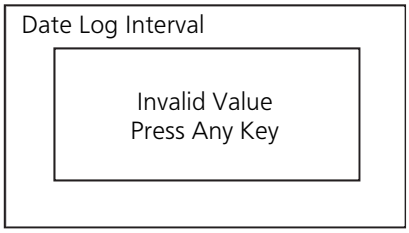


[Fig.2]



[Fig.3]

6. Press the ENTER button.
►The value is saved and the display returns to the Data Log Setting screen.
Note:
If the entered value is out of the settable range, the following message is displayed. Press any button on the control panel to return to the Data Log Interval screen, and change the value.



7. Press the MENU/HOME button.
►The display returns to the Home screen.

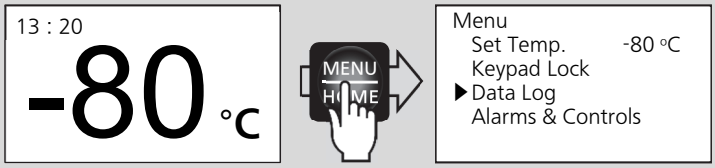
Setting device ID

When exporting a log (temperature log or alarm log) to the USB flash drive, a device ID comes at the beginning of the generated CSV file name. Also, the device ID will appear at the first line of the contents of the CSV file followed by the model name.
(e.g.) When the model name is MDF-DC202VH, and the device ID is set to “ABC001” the first line of the CSV file will be:
MDF-DC202VH, ABC001

■ Settable range: 6-digit alphanumeric characters (capital letters only)
■ Default value: 000000

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.

2. Move the cursor to the Data Log using the up/down button (△▽), and press the ENTER button.
►The Data Log screen is displayed [Fig.1].



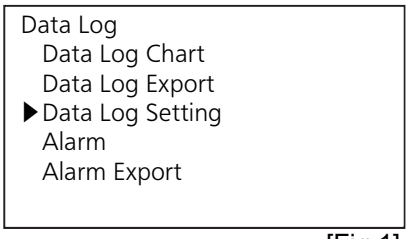
3. Move the cursor to Data Log Setting using the up/down button (△▽), and press the ENTER button.
►The Data Log Setting screen is displayed [Fig.2].

4. Move the cursor to Unique File ID using the up/down button (△▽) [Fig.2], and press the ENTER button.
►The Unique File ID screen is displayed and current setting value is displayed [Fig.3].

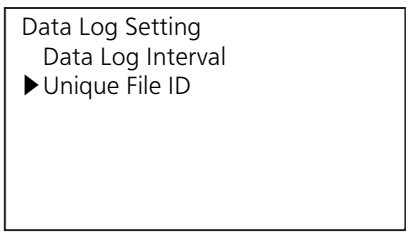
5. Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.

6. Press the ENTER button.
►The value is saved and the display returns to the Data Log Setting screen.

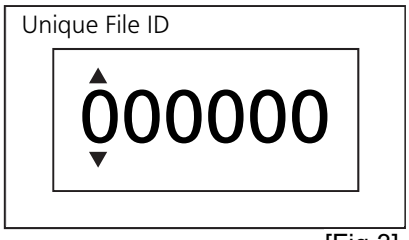
7. Press the MENU/HOME button.
►The display returns to the Home screen.



[Fig.1]



[Fig.2]



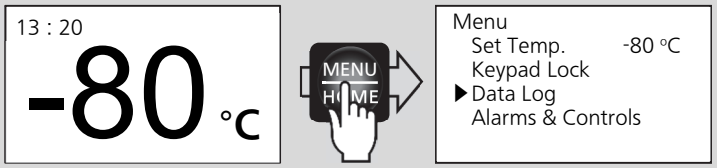
[Fig.3]

Displaying temperature log chart

The temperature log data stored in the freezer can be displayed in a chart format.

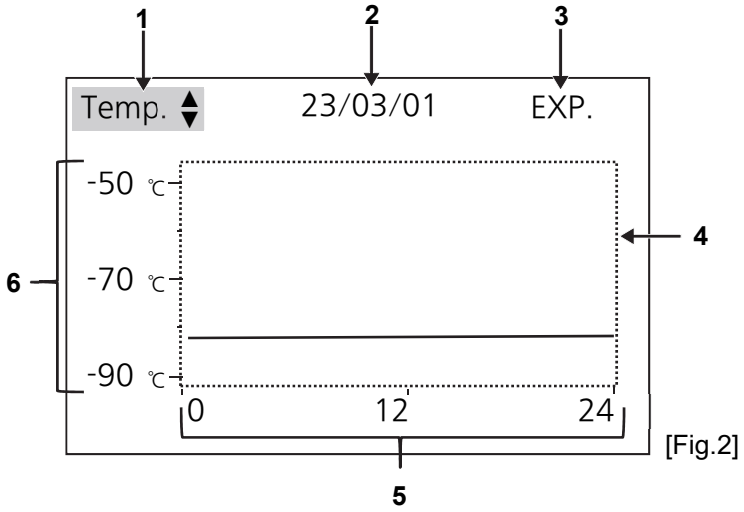
1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.

2. Move the cursor to the Data Log using the up/down button (△▽), and press the ENTER button.
►The Data Log screen is displayed [Fig.1].



3. With the cursor on Data Log Chart [Fig.1], press the ENTER button.
►The temperature log chart is displayed [Fig.2].

[Fig.1]



[Fig.2]

No.	Item	Details
1	Temperature scale scroll	Pressing up/down button (△▽) when the cursor is on this item can scroll the chart up and down. For details, see page 40.
2	Date	When the cursor is on this item, you can change the date of the log data to be displayed on the chart. For details, see pages 40 and 41.
3	Export button	Pressing the ENTER button when the cursor is on this item can export the chart data currently displayed on the screen to the USB flash drive in CSV format. For details, see pages 41 and 42.
4	Chart display area	Temperature log is displayed here in chart format.
5	Time axis	Indicates time.
6	Temperature axis	Indicates the temperature in the chamber.

4. Press the MENU/HOME button.
►The display returns to the Home screen.

TEMPERATURE LOG

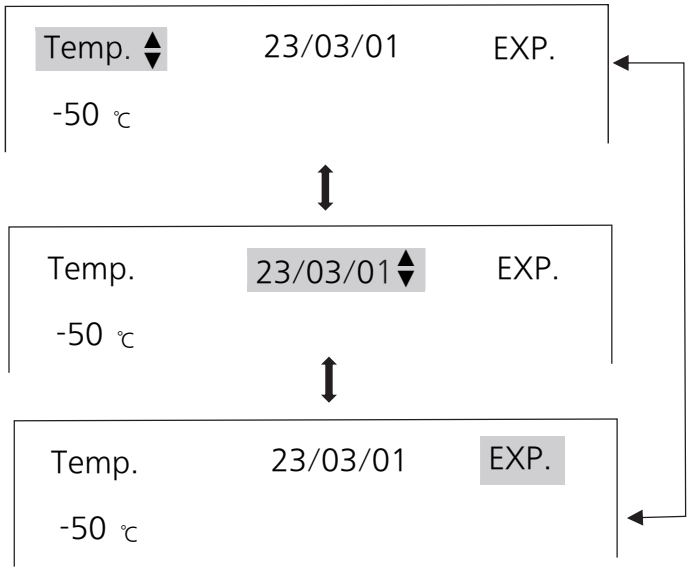
Operation on the temperature log chart

On the temperature log chart, you can scroll up and down, specify the date of the log data, and export the temperature log data currently displayed on the chart to the USB flash drive in CSV format. To do one of these operations, select the item on the chart by moving the cursor using the left/right buttons (◁▷) on the control panel.

When scrolling up and down (default cursor position)

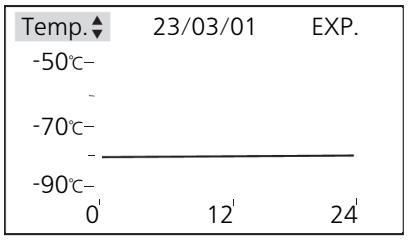
When specifying date

When exporting log data



Scrolling up and down the chart

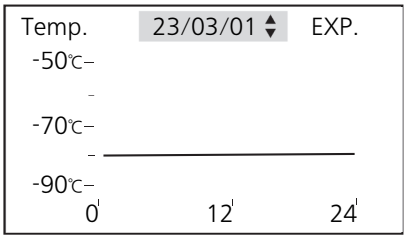
With the cursor on Temp.▲▼ , press the up or down button (△▽) on the control panel to scroll up or down the chart.
►When scrolling up, the higher temperature part on the chart is displayed. While, when scrolling down, the lower temperature part on the chart is displayed (highest 40°C, lowest -120°C).



[Fig.1]

Specifying the date

■ To select previous or next date:
With the cursor on the date [Fig.2], press the up or down button (△▽) on the control panel.
►The temperature log chart recorded on the previous or next date is displayed.

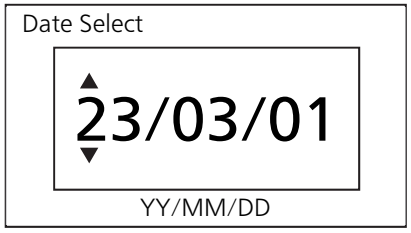


[Fig.2]

■ To select specific date:

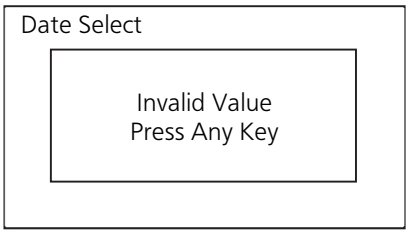
1. With the cursor on the date [Fig.2], press the ENTER button.
►The Date Select screen [Fig.3] is displayed.

2. Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.



[Fig.3]

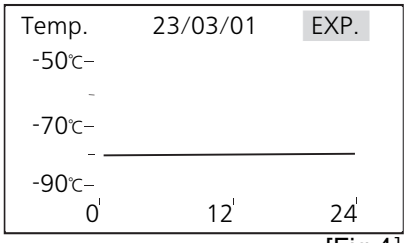
3. Press the ENTER button.
►The temperature log chart recorded on the specified date is displayed.
Note:
If a date which does not exist in the calendar is selected, the following message is displayed. Press any button on the control panel to return to the Date Select screen [Fig.3] and change the date.



4. Press the MENU/HOME button.
►The display returns to the Home screen.

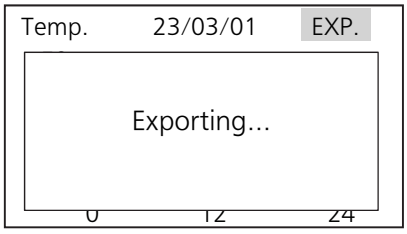
Exporting the temperature log data currently displayed on the chart

1. Insert a USB flash drive into the USB port.
Note:
For details about supported USB flash drive, refer to page 15.



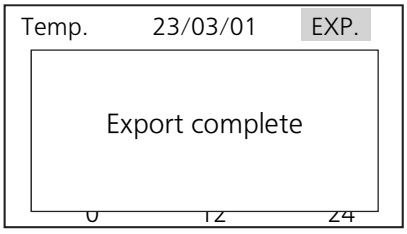
[Fig.4]

2. With the cursor on EXP. [Fig 4], press the ENTER button.
►The temperature log data currently displayed on the chart is exported. During the export process, “Exporting...” is displayed on the screen [Fig.5].



[Fig.5]

3. When “Export complete” is displayed on the screen [Fig.6], press any button on the control panel.
►The screen returns to the chart screen.
A folder named “log” is created in the USB flash drive and the exported data file is saved in the folder in CSV format.
The file name consists of the device ID, the date (YYYY/MM/DD or DD/MMM/YYYY), and data name (DataLog). For the date, the specified date format is used (see page 32).



[Fig.6]

Examples of temperature log file names exported on March 1 in 2023 with the device ID set to “A00001”.

When YY/MM/DD format is selected	When DD/MM/YY format is selected
A00001_20230301_DataLog.csv	A00001_01Mar2023_DataLog.csv

TEMPERATURE LOG

Notes:

- When the device ID has not been set, default value “000000” is used for the device ID.
- If the file names are duplicated, older data is overwritten with new data.
- The temperature log data stored in the freezer is not deleted even if the temperature log data is exported to the USB flash drive.
- If an export error occurs, one of the following messages appears.

•USB flash drive is not inserted into the USB port. •USB flash drive is not inserted properly. USB memory is disconnected ►Press any button on the control panel, and then insert a USB flash drive properly into the USB port.	•There is not enough free space in the USB flash drive. •The USB flash drive is not formatted in FAT16 or FAT32 format. USB memory is full ►Press any button on the control panel, and then check the capacity and format type of the USB flash drive.
•The log data during the specified period does not exist. No Data ►Press any button on the control panel, and then specify the period again.	•An error has occurred during the export process. An error occurred ►Press any button on the control panel, and then retry.

4. Remove the USB flash drive from the USB port.

5. Press the MENU/HOME button.
►The display returns to the Home screen.

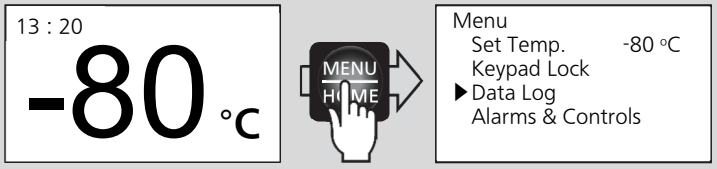
Exporting temperature log data

You can export the temperature log data on a specified date (24 hours) or all the temperature log data stored in the freezer to a USB flash drive inserted in the USB port in CSV format.

1. Insert a USB flash drive into the USB port.
Note:
For details about supported USB flash drive, refer to page 15.

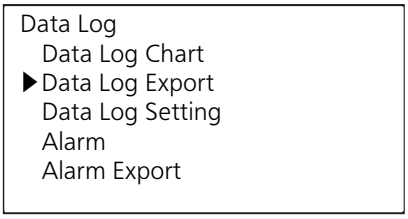
2. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.

3. Move the cursor to the Data Log using the up/down button (△▽), and press the ENTER button.
►The Data Log screen is displayed [Fig.1].



4. Move the cursor to Data Log Export using the up/down button (△▽) [Fig.1], and press the ENTER button.
►The Data Log Export screen is displayed [Fig.2].

5. Select the log period.



[Fig.1]

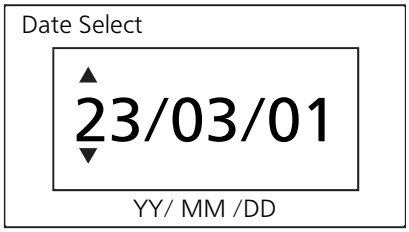
When exporting temperature log data on a specific date

1) With the cursor on 24 Hours [Fig.2], press the ENTER button.
►The Date Select screen is displayed [Fig.3].

[Fig.2]

2) Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.

3) Proceed to step 6 (page 44).



[Fig.3]

When exporting all temperature log data stored in the freezer

1) Move the cursor to All using the up/down button (△▽) [Fig.4].

2) Proceed to step 6 (page 44).

[Fig.4]

6. Press the ENTER button.
►The temperature log data during the selected period is exported.
During the export process, “Exporting...” is displayed on the screen [Fig.5].

[Fig.5]

7. When “Export complete” is displayed on the screen [Fig.6], press any button on the control panel.
►The screen returns to the Data Log Export screen [Fig.2].
A folder named “log” is created in the USB flash drive and the exported data file is saved in the folder in CSV format.
The file name consists of the device ID, the date (YYYY/MM/DD or DD/MMM/YYYY), and data name (DataLog). For the date, the specified date format is used (see page 32).

[Fig.6]

Examples of exported temperature log file names when the log data is exported with the device ID set to “A00001” and “24 Hours” selected (in this case, March 1 in 2023).

When YY/MM/DD format is selected	When DD/MM/YY format is selected
A00001_20230301_DataLog.csv	A00001_01Mar2023_DataLog.csv

Examples of exported temperature log file names when the log data is exported with the device ID set to “A00001” and “All” selected (in this case, January 1 to March 1 in 2023).

When YY/MM/DD format is selected	When DD/MM/YY format is selected
A00001_20230101-20230301_DataLog.csv	A00001_01Jan2023-01Mar2023_DataLog.csv

Notes:
- When the device ID has not been set, default value “000000” is used for the device ID.
- If the file names are duplicated, older data is overwritten with new data.
- The temperature log data stored in the freezer is not deleted even if the temperature log data is exported to the USB flash drive.
- If an export error occurs, one of the messages shown on page 42 appears.

8. Remove the USB flash drive from the USB port.

9. Press the MENU/HOME button.
►The display returns to the Home screen.

ALARM LOG

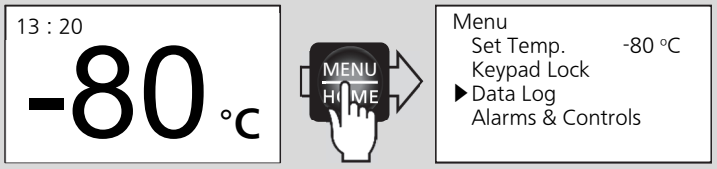
This product is equipped with a function to store alarm log data.
- Up to about 255 events can be stored. When the number of events exceeds the maximum number, the oldest event data is overwritten with the new data.
- When the battery switch for power failure alarm is turned on and the battery capacity is remaining, the log data continues to be recorded even during a power failure.

Displaying alarm log

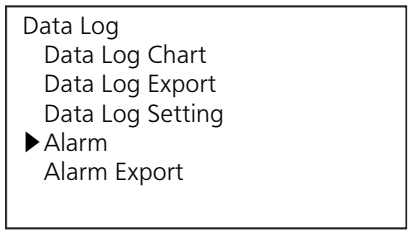
Alarm log data stored in the freezer can be displayed for reference.

1. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.

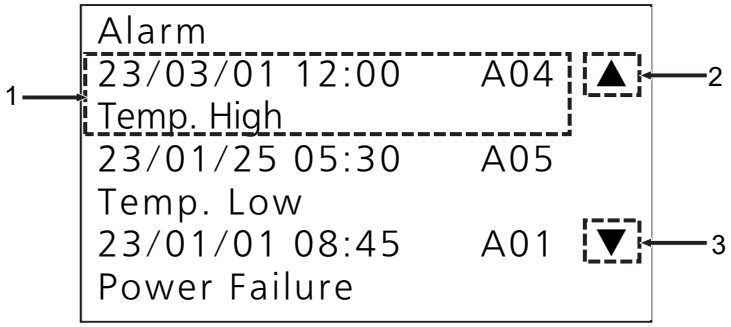
2. Move the cursor to the Data Log using the up/down button (△▽), and press the ENTER button.
►The Data Log screen is displayed [Fig.1].



3. Move the cursor to Alarm using the up/down button (△▽) [Fig.1], and press the ENTER button.
►The Alarm screen is displayed [Fig.2].



[Fig.1]



[Fig.2]

No.	Item	Details
1	Details of an alarm event	One alarm event is indicated in two lines. On the first line, the date and time when the alarm situation occurred, and its error cord are displayed. On the second line, the alarm message is displayed. Up to three alarm events can be displayed on the screen. For details about error cords, see pages 48 and 49.
2	Scroll up mark	When ▲ is displayed on the screen, you can scroll up by pressing the up button (△) on the control panel to see the newer alarm event.
3	Scroll down mark	When ▼ is displayed on the screen, you can scroll down by pressing the down button (▽) on the control panel to see the older alarm event.

4. Press the MENU/HOME button.
►The display returns to the Home screen.

ALARM LOG

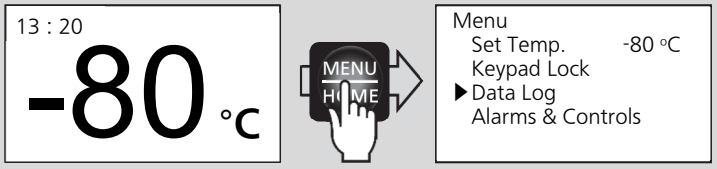
Exporting alarm log data

You can export the alarm log data on a specified date (24 hours) or all the alarm log data stored in the freezer to a USB flash drive inserted in the USB port in CSV format.

1. Insert a USB flash drive into the USB port.
Note:
For details about supported USB flash drive, refer to page 15.

2. On the Home screen, press the MENU/HOME button.
►The Menu screen is displayed.

3. Move the cursor to the Data Log using the up/down button (△▽), and press the ENTER button.
►The Data Log screen is displayed [Fig.1].



4. Move the cursor to Alarm Export using the up/down button (△▽) [Fig.1], and press the ENTER button.
►The Alarm Export screen is displayed [Fig.2].

5. Select the log period.

[Fig.1]

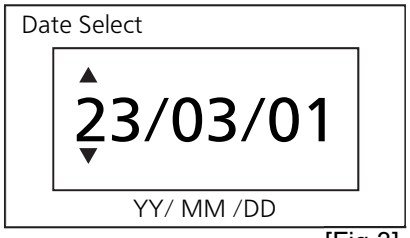
When exporting alarm log data on a specific date

1) With the cursor on 24 Hours [Fig.2], press the ENTER button.
►The Date Select screen is displayed [Fig.3].

[Fig.2]

2) Move the cursor using the left/right buttons (◁▷) and select the digit you want to change, and then use the up/down buttons (△▽) to change the number.

3) Proceed to step 6 (page 47).



[Fig.3]

When exporting all alarm log data stored in the freezer

1) Move the cursor to All using the up/down button (△▽) [Fig.4].

2) Proceed to step 6 (page 47).

[Fig.4]

6. Press the ENTER button.
►The alarm log data during the selected period is exported.
During the export process, “Exporting...” is displayed on the screen [Fig.5].

[Fig.5]

7. When “Export complete” is displayed on the screen [Fig.6], press any button on the control panel.
►The screen returns to the Alarm Export screen [Fig.2].
A folder named “log” is created in the USB flash drive and the exported data file is saved in the folder in CSV format.
The file name consists of the device ID, the date (YYYY/MM/DD or DD/MMM/YYYY), and data name (AlarmLog). For the date, the specified date format is used (see page 32).

[Fig.6]

Examples of exported alarm log file names when the log data is exported with the device ID set to “A00001” and “24 Hours” selected (in this case, March 1 in 2023).

When YY/MM/DD format is selected	When DD/MM/YY format is selected
A00001_20230301_AlarmLog.csv	A00001_01Mar2023_AlarmLog.csv

Examples of exported alarm log file names when the log data is exported with the device ID set to “A00001” and “All” selected (in this case, January 1 to March 1 in 2023).

When YY/MM/DD format is selected	When DD/MM/YY format is selected
A00001_20230101-20230301_AlarmLog.csv	A00001_01Jan2023-01Mar2023_AlarmLog.csv

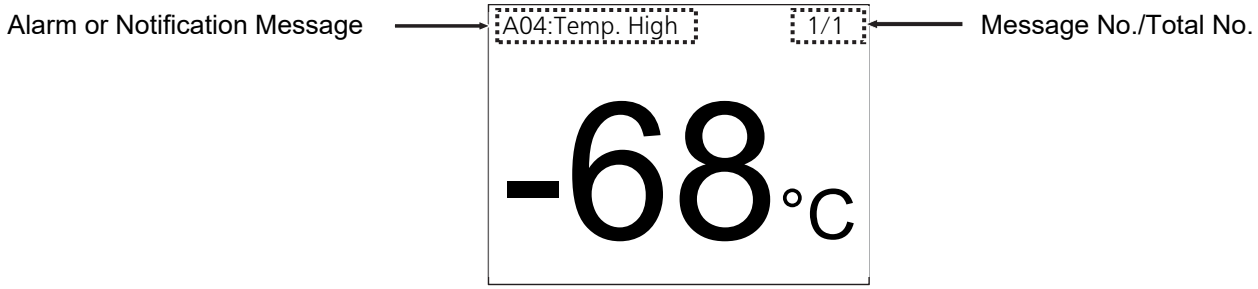
Notes:
- When the device ID has not been set, default value “000000” is used for the device ID.
- If the file names are duplicated, older data is overwritten with new data.
- The temperature log data stored in the freezer is not deleted even if the temperature log data is exported to the USB flash drive.
- If an export error occurs, one of the messages shown on page 42 appears.

8. Remove the USB flash drive from the USB port.

9. Press the MENU/HOME button.
►The display returns to the Home screen.

ALARMS AND SELF-DIAGNOSIS

When the freezer is in an alarm condition or in a condition to be noticed, the situation is notified to the user by an Alarm message or Notification message on the Home screen, audible alarm sound, alarm lamp, and temperature indication.



Alarm messages

The cooling performance has been significantly reduced. Thus, the chamber temperature may get considerably higher. Take some measures to protect the stored samples immediately (e.g. transferring the stored samples to another ultra-low temperature freezer) except when the cause is apparent and the chamber temperature can recover soon. Turn off the power switch and unplug the freezer, and then contact our sales representative or agent.

Home Screen Error Code: Message	Alarm type, Situation	Audible Alarm	Alarm Lamp	Temp. Indication	Remote Alarm
A01: Power Failure	[Power failure alarm] The battery switch for power failure alarm is ON, and under any of the following conditions: •During a power failure •Power switch is OFF •Power supply cord is disconnected.	Intermittent tone	Blinking in red	OFF	ON
A02: Comp. TempHigh*1	[Compressor temp. abnormal] When the fan motor for cooling the compressor fails or when the ambient temperature is out of the usable environment condition.			Normal indication	
A04: Temp.High	[High temp. alarm] (after set alarm delay time has elapsed) The chamber temperature has exceeded the temp. set point + the value set for High Alarm.			Blinking	
A05: Temp.Low	[Low temp. alarm] (after set alarm delay time has elapsed) The chamber temperature has fallen below the temp. set point - the value set for Low Alarm.				
A12: COMM Err.	[Internal communication error] Communication between the display and control circuit board is unstable.			"—" is displayed.	—
A13: TempSNSR Open*2	[Temperature sensor disconnected] The thermal sensor has been disconnected.			Normal indication	ON
A14: TempSNSR Short*2	[Temperature sensor short-circuited] The thermal sensor has been short-circuited.				

*1: The compressor stops in the case of A02.
*2: The compressor runs continuously in the case of A13 or A14.
If the two situations (A02 and A13/A14) occur at the same time, stopping of the compressor has a higher priority over running continuously.

Note:
In the case of alarms A01, A04, or A05, when the freezer exits an alarm condition without user intervention (the remote alarm stops at this point), the fact that there was an alarm condition is notified to the user by the following indication. You can stop the indication by pressing the BUZZER STOP button.

Alarm	Indication			
	Message on Home screen	Audible Alarm	Alarm Lamp	Temp. Indication
A01 (Power Failure)	Power Fail.Log	Intermittent tone	Blinking in orange	Normal indication
A04 (Temp.High)	High Temp. Log			Blinking
A05 (Temp.Low)	Low Temp. Log			

Notification messages

There is a possibility of failure other than the cooling performance. The chamber temperature is controlled. If this status continues, the alarm may not activate in the case of any failure. Contact our sales representative or agent.

Home Screen Error Code: Message	Alarm type, Situation	Audible Alarm	Alarm Lamp	Temp. Indication	Remote Alarm
N01 : Comp. Overload*3	[Overload operation] The chamber temp. has not reached the temp. set point for approx. 5 days or more.	—	Blinking in orange	Normal indication	—
N02: Ambient Abnorm*4	[Abnormal ambient temperature] The ambient temp. is over 35°C, or lower than 0°C.				
N04 : Temp. HighDelay	[High temp. alarm] (during set alarm delay time) The chamber temperature has exceeded the temp. setpoint + the set value of High Alarm.			Blinking	
N05: Temp. LowDelay	[Low temp. alarm] (during set alarm delay time) The chamber temperature has fallen below the temp. setpoint. - the set value of Low Alarm.				
N14: CompSNSR Open	[Compressor sensor disconnected] The compressor sensor has been disconnected.			Normal indication	
N15: CompSNSR Short	[Compressor sensor short-circuited] The compressor sensor has short-circuited.				
N18: Low Power Batt	[Battery for power failure alarm charging failure] The battery voltage does not increase after a certain period of time.				
N20: Replace Batt	[Battery for power failure alarm replacement] About 3-year total operation time has passed.				
N21: Replace BUBatt	[Battery for backup cooling system replacement] The backup cooling system has been ON for over 3 years in total.				
N22: BattSwitch OFF	[Battery switch for power failure alarm OFF] The battery switch for power failure alarm is OFF.				

*3**:** In the case of N01, check the following:
(1) There are too many samples stored in the chamber at a time.
(2) The door is frequently opened or the magnetic door gasket is damaged.
(3) The chamber temperature should be set to -80°C or higher.

*4**:** In the case of N02, check the air conditioning at the installation site. The ambient temperature should be 5°C to 30°C.

Alarm and BUZZER STOP button

The behaviors of the ring back function when pressing the BUZZER STOP button are as follows.

<Setting of the freezer>

Remote alarm setting	Ring back time setting
ON: Not linked with BUZZER STOP button	10 to 60 min
	0 min
OFF: Linked with BUZZER STOP button	10 to 60 min
	0 min

<Alarm behavior>

Alarm sound from freezer		Remote Alarm	
When BUZZER STOP button is pressed	After the set ring back time has elapsed	When BUZZER STOP button is pressed	After the set ring back time has elapsed
OFF (Alarm is not canceled)	ON	ON	ON (Alarm status is continuing)
	OFF		
	ON	OFF (Alarm is not canceled)	ON
	OFF		OFF

Notes:

- For “A12: COMM Err.” alarm, you cannot stop the audible alarm sound even if you press the BUZZER STOP button.
- Pressing the BUZZER STOP button when the audible alarm is beeping stops the sound. However, the cause of the alarm is not solved by only pressing this button. Refer to pages 48 and 49 to know the cause of the alarm and solve the problem. If you do not find the cause, contact our sales representative or agent.

ROUTINE MAINTENANCE

Cleaning the exterior, interior, and accessories

- Clean the unit once a month. Regular cleaning keeps the unit in good condition.
- Use a dry cloth to wipe down the outside and inside of the unit and all accessories. If the outside panels are dirty, clean them with a diluted neutral dish-washing detergent (using an undiluted solution of detergent may cause the unit's plastic areas to crack. Follow the directions on the detergent for details of dilution). After wiping the unit or accessories with a diluted detergent, be absolutely sure to wipe the surfaces using a cloth moistened with clean water to remove traces of the detergent. After this, be absolutely sure to wipe the surfaces with a dry cloth.
- Do not use a brush, acid, thinner, laundry soap, powder detergent, or boiling water for cleaning. These may cause damage to painted surfaces or cause perishing of plastic and rubber components. Moreover, do not wipe plastic and rubber components with a volatile material.
- When wiping the control panel with a damp cloth, wipe out the surface so that the droplets do not remain on the surface.
- Do not clean the entire freezer unit using peracetic acid or hydrogen peroxide, or do not disinfect the unit by formalin fumigation.
- 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.
- In order to maintain the unit's intended level of performance, always put back accessories that have been removed for cleaning.

Defrosting the chamber

⚠WARNING	● **Never damage the chamber walls when removing frost.** It may cause explosions and/or a fire in case of refrigerant leakage.
	● **Wear protective gloves and a mask when handling frozen items or cleaning the chamber.** Without gloves, you may get frostbite or get injured by the corners of interior parts. Also, touching or inhaling chemicals or aerosols from around the unit may be detrimental to health.

Frost may accumulate on the walls in the chamber and around the inner lids. Excessive accumulation of frost is likely to create gaps between the door and the magnetic door gasket, which can degrade the cooling performance. Remove the frost using the scraper that comes with the unit before the accumulation becomes too thick.

When excessive frost builds up in the chamber, follow the steps below to defrost.

1. Turn off the switch for the backup cooling system (if installed).

2. Turn off the battery switch for power failure alarm.

3. Take out all contents from the freezer and transfer them to another freezer or a container which is refrigerated by liquid carbon dioxide or dry ice.

4. Turn off the power switch for the freezer unit.

5. Remove the inner lids.

6. Leave the freezer in this state until the frost in the chamber melts.

7. Wipe up the water accumulated at the bottom of the chamber with a dry cloth.

8. After cleaning the chamber, place the inner lids and start up the unit by following “START-UP PROCEDURE” on page 17.

9. Check that the chamber temperature reaches the set temperature and then put back the contents.

Note:
Do not use a tool with a sharp edge (such as a knife or screw-driver) to remove the frost.

CALIBRATION

During continuous operation, the following service tasks must be performed:

• Temperature calibration at least once a year.

For temperature calibration, contact our sales representative or agent.

REPLACEMENT OF CONSUMABLE PARTS

⚠ WARNING	● **The replacement of the battery for power failure alarm and battery for backup cooling system should be performed by a qualified engineer or service personnel only.** The replacement of the battery involves the risk of electric shock.

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

Replacing the battery for power failure alarm

Replace the battery for power failure alarm about every 3 years. Contact our sales representative or agent for the replacement of battery when “N20: Replace Batt” is displayed on the Home screen.

- The replacement of the battery for power failure alarm is a paid service.
- The power failure alarm (indication on the Home screen, alarm sound, and remote alarm) will not work when the battery for power failure alarm is flat.
- The temperature log and alarm log are not recorded when the battery for power failure alarm is flat.
- In the event of a power failure, the battery for power failure alarm is used for displaying the warning “A01: Power Failure” and activates alarm sounds.

Replacing the battery for backup cooling system (option)

Replace the battery for backup cooling system about every 3 years. Contact our sales representative or agent for the replacement of the battery when “N21: Replace BUBatt” is displayed on the Home screen.

- The replacement of the battery for backup cooling system is a paid service.
- The backup cooling system will not function in the event of a power failure when the battery for backup cooling system is flat.
- When the chamber temperature rises, the backup cooling system is activated by the battery for backup cooling system even during a power failure. The regular replacement of the battery for backup cooling system is important to prevent the rise of chamber temperature in the event of an unexpected situation.

TROUBLESHOOTING

If the freezer does not seem to be working properly, check the following solutions before making a service call.

<Attention>
If the problem is not resolved by checking the following causes/solutions or if the problem is not shown in the table below, contact our sales representative or agent. If the chamber temperature rose due to the freezer failure, move the samples by following the tips on page 11.

Problem	Cause/Solution
Nothing starts up even after the power is turned on.	■ The unit is not connected to the power supply properly. ■ The capacity and voltage of the power supply is not sufficient. ■ There is a power failure. ■ The circuit breaker has tripped. ■ The fuse has blown.
The compressor does not start up when turning ON the power switch (the display is turned ON).	■ The capacity of power supply is not sufficient. When the capacity of power supply is not sufficient to start the compressor, the compressor may not start.
The alarm is activated during operation.	■ A user has made a significant change to the chamber temperature set point. ■ The door has been kept open for a long time. ■ Samples with a high temperature have been put in the chamber. In the above cases, the alarm is spontaneously canceled after a while.
	■ The unit is not connected to the power supply properly. ■ The capacity and voltage of the power supply is not sufficient. ■ There is a power failure. ■ The circuit breaker has tripped. ■ The fuse has blown.
	■ If the control panel is inoperative, turn the power off and then turn it on again.
Cannot set chamber temperature set point.	■ The keypad lock function has been set to ON. → Set the keypad lock function to OFF (page 31). ■ “DAQ Mode” on the DAQ screen is set to “REMOTE.” → Set the “DAQ Mode” to “LOCAL” (pages 35 and 36).
During the setting operation, the screen returns to the Home screen.	■ The display will automatically return from each screen to the Home screen when there is no button operation for about 90 seconds (auto return function).
Excessive noise	■ The floor is not stable. ■ The installation site is not level. ■ The freezer is tilted. ■ The freezer is touching the surrounding wall.

TROUBLESHOOTING

Problem	Cause/Solution
The chamber does not cool down enough.	■ A large amount of warm material has been put in the chamber. ■ There is a large amount of frost built up in the chamber. ■ The door is frequently opened. ■ The chamber temperature has been set to lower than -86°C. Although the temperature settable range is between -90°C to -40°C, the temperature control range that ensures the cooling performance of this freezer is between -86°C to -40°C. ■ The ambient temperature is over 30°C. The ambient temperature that ensures the cooling performance of this freezer is between 5°C to 30°C. ■ The unit is in direct sunlight. ■ The freezer unit is not installed in the appropriate place described in this operating instructions. ■ The ventilation around the unit is blocked. ■ The grille (air intake vent) is blocked. ■ There is a nearby heat source. ■ The access port is not covered. → The access port should be covered with insulation and rubber caps when not in use. ■ The magnetic door gasket is damaged. → If it is damaged, contact our sales representative or agent for replacement. ■ A foreign substance has got into the magnetic door gasket.
The exterior of the freezer is wet with water droplets.	■ When hot humid weather continues or depending on the installation site, the exterior of the freezer may be wet with water droplets. However, this is not a malfunction. When water vapor in the air is cooled down by the cold exterior of the freezer, the vapor condenses into small droplets. Wipe the droplets with a dry cloth.
The motor sound or flowing liquid sound is noisy.	■ Due to the characteristics of the cooling circuit, the sound of the motor or the flowing refrigerant may be heard during operation. Especially a few hours after starting the operation, the sound of the compressor or the flowing refrigerant may be loud, but it is a normal operation.
Cannot export data to the USB flash drive.	■ The USB flash drive is not inserted properly. ■ Data during the specified time period does not exist. ■ The USB flash drive is full. ■ The USB flash drive has not been formatted in FAT16 or FAT32 format. ■ The USB flash drive that requires password is used. ■ The USB flash drive with capacity of more than 32 GB is used.

DISPOSAL OF UNIT

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

⚠WARNING	● **Ask a qualified contractor to carry out disassembly/disposal of the unit and do not leave the unit in a location that can be accessed by third parties** This may result in unexpected accidents (e.g. there may be a risk of child entrapment).
	● **Do not give strong shock or vibration when moving or using the unit.** The piping may be damaged, causing a fire.
	● **Flammable and explosive product.** The unit contains flammable refrigerant. When repairing or recycling the unit, only trained service personnel should perform the work. Follow the procedure below. ■ Well ventilate the room to prevent refrigerant accumulation. ■ Keep fire away when the refrigerant is contained in the product. ■ Do not damage or break the pipework.
	● **There is a risk of fire or explosion.** Dispose of properly in accordance with federal or local regulations. Flammable refrigerant used.

Recycle of battery

Ni-MH

■ This label is a recycle mark complying with the Japanese battery regulation.

■ This label is a recycle mark complying with the Taiwanese battery regulation.

Refrigerant

The refrigerant has the total GWP shown in the following table.

This product contains mixed HC refrigerant (R-600/R-170/R-50).

Product name	GWP	Refrigerant (net) (g)	Weight of CO_2 equivalent (tonnes)
MDF-DC102VH	5	80	0.0004
MDF-DC202VH	6	110	0.0007

OPTIONAL COMPONENTS

Temperature recorder (MTR-85H, MTR-G85A)

The chamber temperature can be recorded and checked by installing the optional temperature recorder MTR-85H or MTR-G85A.

Contact our sales representative or agent for the purchase of the temperature recorder.

Main specifications of temperature recorder

	MTR-85H	MTR-G85A
Temperature recording range	-100°C to +50°C	-100°C to +40°C
Feed speed of recording paper	2-month/batch	1-day/1 turn, 7-day/1 turn, 32-day/1 turn (can be switched)
Recording paper	Strip type	Circular type
Power source	Dry cell	Supplied from the unit

Optional parts required for installing temperature recorders

	MTR-85H	MTR-G85A
Recorder fixing	MDF-S3085	-
Recorder sensor cover	MTR-C8	

Backup cooling kit (MDF-UB8I)

When the unit stops operation in the event of a power failure, the optional backup cooling kit MDF-UB8I and the liquid CO_2 cylinder can prevent the chamber temperature from rising for several hours by injecting liquid CO_2 into the chamber.

● Contact our sales representative or agent for the purchase and installation of the backup cooling kit.

⚠WARNING

● **Install the unit in a well-ventilated (airy) location**
As with any equipment that uses CO_2 gas, there is a likelihood of oxygen depletion in the vicinity of the equipment. It is important that you assess the work site to ensure there is suitable and sufficient ventilation. If restricted ventilation is suspected, then other methods of ensuring a safe environment must be considered. These may include atmosphere monitoring systems and warning devices with alarm functions.

The injection start temperature of the backup cooling system can be set using the temperature setting knob on the system. However, the actual injection start temperature slightly deviates from the set injection start temperature.

Activation of the backup cooling system

- Settable range of the injection start temperature: -70°C to -50°C
  For example, when the injection start temperature of the backup cooling system is set to -70°C, the injection starts at a temperature of -67°C to -65°C and stops at a temperature of -75°C to -74°C.

Backup power switch*	LED* (BACK UP STANDBY)	Condition of the backup cooling system	Chamber temperature	Liquid CO_2
ON	Green light ON	Ready to inject	Lower than the injection start temperature.	No injection
			Equal to or higher than the injection start temperature.	Injection starts
OFF	—	Not ready to inject (Backup test switch does not work)	Lower than the injection start temperature	No injection
			Equal to or higher than the injection start temperature.	

*Equipped with the backup cooling system. For details, refer to the operation instructions for the backup cooling kit (MDF-UB8I).

Note:
Set the injection start temperature of the backup cooling system to at least 10°C higher than the freezer chamber temperature set point. Otherwise, the liquid CO_2 may be injected continuously into the chamber, consuming the liquid CO_2 in the cylinder wastefully.

SPECIFICATIONS

Product name		Ultra-Low Temperature Freezer MDF-DC102VH	Ultra-Low Temperature Freezer MDF-DC202VH
External dimensions	Width	558 mm (22.0 in.)	1018 mm (40.1 in.)
	Depth	688 mm (27.1 in.)	688 mm (27.1 in.)
	Height	993 mm (39.1 in.)	993 mm (39.1 in.)
Internal dimensions	Width	405 mm (15.9 in.)	865 mm (34.1 in.)
	Depth	490 mm (19.3 in.)	490 mm (19.3 in.)
	Height	426 mm (16.8 in.)	426 mm (16.8 in.)
Effective capacity		84 L (3.0 cu.ft.)	180 L (6.4 cu.ft.)
Exterior		Painted steel	
Interior		Painted steel	
Door		Painted steel, Rigid polyurethane foam	
Inner lid		1 lid (styrene foam)	2 lids (styrene foam)
Access port		Inner diameter: 17 mm (0.67 in.), 2 positions (back x 1, bottom x 1)	
Insulation		Flame: Rigid polyurethane foam + Vacuum insulation panel Door: Rigid polyurethane foam	
Compressor		Hermetic type, Output; 550 W	
Evaporator		Tube on sheet type	
Condenser		Wire and tube	
Refrigerant		Mixed HC refrigerant (R-600/R-170/R-50)	
Temperature controller		Microcomputer control system	
Temperature display		Organic EL display	
Thermal sensor		Platinum resistance (Pt 1,000 Ω)	
Alarm		High alarm, Low alarm, Power failure alarm, Compressor temp. abnormal alarm, Communication error alarm, Temperature sensor error alarm	
Remote alarm contact		Allowable contact capacity: DC 30 V, 2 A*1	
Battery		Nickel-metal-hydride battery, DC 6 V, 1,100 mAh, Auto-recharge	
Weight		85 kg (187.4 lbs)	115 kg (253.5 lbs)
Accessories		1 set of keys, 1 scraper	
Optional component		Temperature recorder (MTR-G85A, MTR-85H) Recorder fixing (MDF-S3085); For MTR-85H Recorder sensor cover (MTR-C8) Backup cooling kit (MDF-UB8I)*2; For Liquid CO_2 Interface board (MTR-L03)*1; For LAN Interface board (MTR-480)*1; For RS-232C/RS-485 Inventory rack (IR-207C, IR-305C)	

*1: Standard signal and interface cables with a maximum length of 30 meters are recommended.
*2: Settable range of the injection start temperature is -70°C to -50°C.

Note:
Refer to the latest catalogue when ordering an optional component.

PERFORMANCE

Product name	Ultra-Low Temperature Freezer MDF-DC102VH	Ultra-Low Temperature Freezer MDF-DC202VH
Model number	MDF-DC102VH-PA	MDF-DC202VH-PA
Cooling performance	-86°C at the center of the chamber (ambient temperature; 30°C, no load)*	
Temperature settable range	-90°C to -40°C	
Temperature control range	-86°C to -40°C (ambient temperature; 30°C, no load)	
Rated voltage	AC 115 V	
Rated frequency	60 Hz	
Rated power consumption	345 W (Max. 525 W)	430 W (Max. 595 W)
Noise level	52 dB [A] (background noise; 20 dB)	
Maximum pressure	2,500 kPa	2,850 kPa
Heat emission	1,890 kJ/h	2,142 kJ/h
Environmental conditions	Ambient Temperature: 5°C to 30°C, Humidity: 80% RH or less	

* The value for the cooling performance indicates the lowest achievable temperature at the center of the chamber. For stable long-term use, it is recommended that the chamber temperature be set to at least 5°C higher than the lowest achievable temperature (-86°C). Depending on the actual use conditions, there may be a case where the chamber temperature does not reach the lowest achievable temperature (-86°C).

SAFETY 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 2,000 m;
- 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 ±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);

The above conditions do not indicate the performance of this product. For the performance of this product, refer to the "PERFORMANCE" section.

SAFETY CHECK SHEET

⚠ CAUTION	**Please copy and fill out this form before servicing. Hand over this form to the service engineer for their and your safety.**

Safety check sheet

1. Stored material

   Risk of infection: ☐Yes ☐No ☐Maybe

   Risk of toxicity: ☐Yes ☐No ☐Maybe

   Risk from radioactive sources: ☐Yes ☐No ☐Maybe

   List all potentially hazardous materials that have been stored in this unit:

   _____

   _____

2. Contamination in the unit

   a) Contamination ☐Yes ☐No ☐Maybe

   Types of contamination (if any):_____

   _____

   b) Decontaminated ☐Yes ☐No

   Methods used for the decontamination work:

   _____

   _____

3. Status of the unit

   a) The unit is now safe to work on ☐Yes ☐No

   b) If the answer is "No,"

   Details on the danger:_____

   _____

   Measures we should take to reduce the danger:

   _____

   _____

   Date:

   Signature:

   Address, Division:

   Telephone:

Product name: Ultra-low temperature freezer	Model No. MDF-	Serial number:	Date of Installation:

Please decontaminate the unit yourself before calling the service engineer.

PHC Corporation

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