

PHCbi

Operating Instructions

Ultra-Low Temperature Freezer

MDF-DU901VH



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

See page 60 for model number.

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INTRODUCTION

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

IMPORTANT NOTICE

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

<Intended Use>

This equipment is designed for storage of blood and blood products.

PRECAUTIONS FOR SAFE OPERATION

It is imperative that the user comply with the operating instructions as they contain important safety advice.

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

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.











Symbols have the following meanings:

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

PRECAUTIONS FOR SAFE OPERATION













WARNING

-  **Do not use the unit outdoors.** Exposure to rain may cause leakage and/or electric shock.
-  **Only qualified engineers or service personnel should install the unit.** Installation by unqualified personnel may cause electric shock or 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.
-  **Turn the leveling feet to separate the casters from 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.
-  **Do not install the unit where there are high levels of moisture or where it may be splashed with water.** Installing the unit where there are high levels of moisture or where it may be splashed with water may cause the insulation to deteriorate and give rise to leakage and/or electric shock.
-  **Do not install the unit in a location where flammable or volatile substances are present.** Installing the unit in a location where flammable or volatile substances are present may cause explosions and/or a fire.
-  **Do not install the unit in a location where corrosive gases such as acids are present.** Installing the unit in a location where corrosive substances are present may cause electrical components to corrode, leading to leakage and/or electric shock due to the deterioration of insulation resulting from corroded electrical components.
-  **Do not place this unit in a location where it is difficult to disconnect the power supply plug.** Failure to disconnect the power supply plug may cause fire in the event of a problem or malfunction.
-  **Be absolutely sure to earth (ground) the unit to prevent electric shock.** Failure to earth the product may give rise to 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 give rise to electric shock.
-  **Connect the unit to a power source as indicated on the rating label attached to the unit.** Use of any other voltage or frequency other than that on the rating label may cause fire or electric shock.
-  **Never store volatile or flammable substances in this unit except in a sealed container.** Such substances may cause explosion or fire if they leak.
-  **Never insert metal objects such as pins and wires into any vent, gap, or outlet on the unit.** This may cause electric shock or injury by accidental contact with moving parts.


PRECAUTIONS FOR SAFE OPERATION


WARNING


-  **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 which is not an isolation facility, there may be detrimental effects on both people and the natural environment.
-  **Before proceeding with maintenance or checking the unit, set the power switch to OFF, and disconnect the power supply plug.** Performing the work while power is still flowing to the product or while the power supply plug is still connected may give rise to electric shock and/or injury.
-  **Do not touch any electrical parts (such as power supply plug) or operate switches with a wet hand.** This may cause electric shock.
-  **Wear protective gloves and mask during maintenance.** Touching or inhaling chemicals or aerosols from around the unit may be detrimental to health.
-  **Never splash water directly onto the unit** as this may cause electric shock or short circuit.
-  **Never put containers with liquid on top of the unit** as this may cause electric shock or short circuit if the liquid is spilled.
-  **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 electric shock, short circuit, or fire.
-  **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 electric shock. Contact our sales representative or agent for maintenance or repair.
-  **Make sure the power supply plug is pushed fully in.** Faulty insertion of the power supply plug may cause electric shock or fire due to generation of heat. Never use a damaged power supply plug or loose power outlet.
-  **Disconnect the power supply plug if there is anything wrong with the unit.** Continued abnormal operation may cause electric shock or fire.
-  **Grip the power supply plug when disconnecting the power supply cord from the outlet.** Pulling the power supply cord may cause electric shock or short circuit.
-  **Remove dust from the power supply plug periodically.** Dust on the power supply plug may cause insulation failure due to moisture and thus cause a fire. Disconnect the power supply plug and wipe it with a dry cloth.


PRECAUTIONS FOR SAFE OPERATION

WARNING


 **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 electric shock or fire.


 **Disconnect the power supply cord when the unit is not in use for long periods.** Keeping the unit connected may cause electric shock, leakage, or fire due to the deterioration of insulation.


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


 **Ask a qualified contractor to carry out disassembly and disposal of the unit.** Leaving the unit in a location that can be accessed by third parties may result in unexpected accidents (e.g. the unit may be used for unintended purposes).

 **Do not leave the plastic bags used for packing in a place where they can be reached by small children** as this may result in unexpected accidents such as suffocation.


 **Never replace the battery for the power-failure alarm yourself.** Only qualified engineers or service personnel should replace the battery.


 **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.


 **Install the unit in a well-ventilated (airy) location to prevent the accumulation of flammable refrigerant.** The flammable refrigerant may cause fire if it leaks.


 **Never damage the chamber wall or pipework in the chamber when removing frost.** The refrigerant is flammable and may cause a fire if it leaks.

Flammable and explosive product. The unit contains flammable refrigerant. When repairing or recycling, only trained service personnel will repair and 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.















 **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.

 As with any equipment that uses CO₂ 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.

 **Do not touch the condenser directly when the filter is removed for cleaning.** Touching the condenser may cause injury due to its hot surface.







PRECAUTIONS FOR SAFE OPERATION

CAUTION

-  **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.
-  **This unit must be plugged into a dedicated circuit protected by branch circuit breaker.**
-  **Use a dedicated power source as indicated on the rating label attached to the unit.** A multiple-tap may cause fire resulting from abnormal heating.
-  **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.
-  **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.
-  **Check the settings when restarting operation after a power failure or after turning the power off.** The settings may have changed as a result of stopping the unit. Stored items inside the unit may be adversely affected when operation is resumed if the settings have changed.
-  **To ensure the safety of the service engineer, submit a safety check sheet with the required items filled out.** This is provided as the photocopyable “Safety Check Sheet” at the end of these operating instructions.
-  **Use designated parts for parts replacement.** Using an incorrect part may cause fire.
-  **Do not give strong shock or vibration during movement or use.** The piping may be damaged, causing a fire.
-  **Flammable and explosive product.** 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.
-  **Flammable and explosive product.** Dispose of properly in accordance with federal or local regulations. Flammable refrigerant used.
-  **To prevent frostbite, wear protective gloves when handling frozen items in the chamber.** Too much frost may cause chamber temperature rise resulting from incomplete door close.
-  **Clean the filter about every once a month.** A dusty filter may cause poor cooling performance.
-  **Please remove the frost on the air intake.** When removing, please use the accessory’s stick for air intake port cleaning.

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 an earth.
	This symbol means "ON" for a power switch.
	This symbol means "OFF" for a power switch.

SAFETY ENVIRONMENTAL CONDITIONS

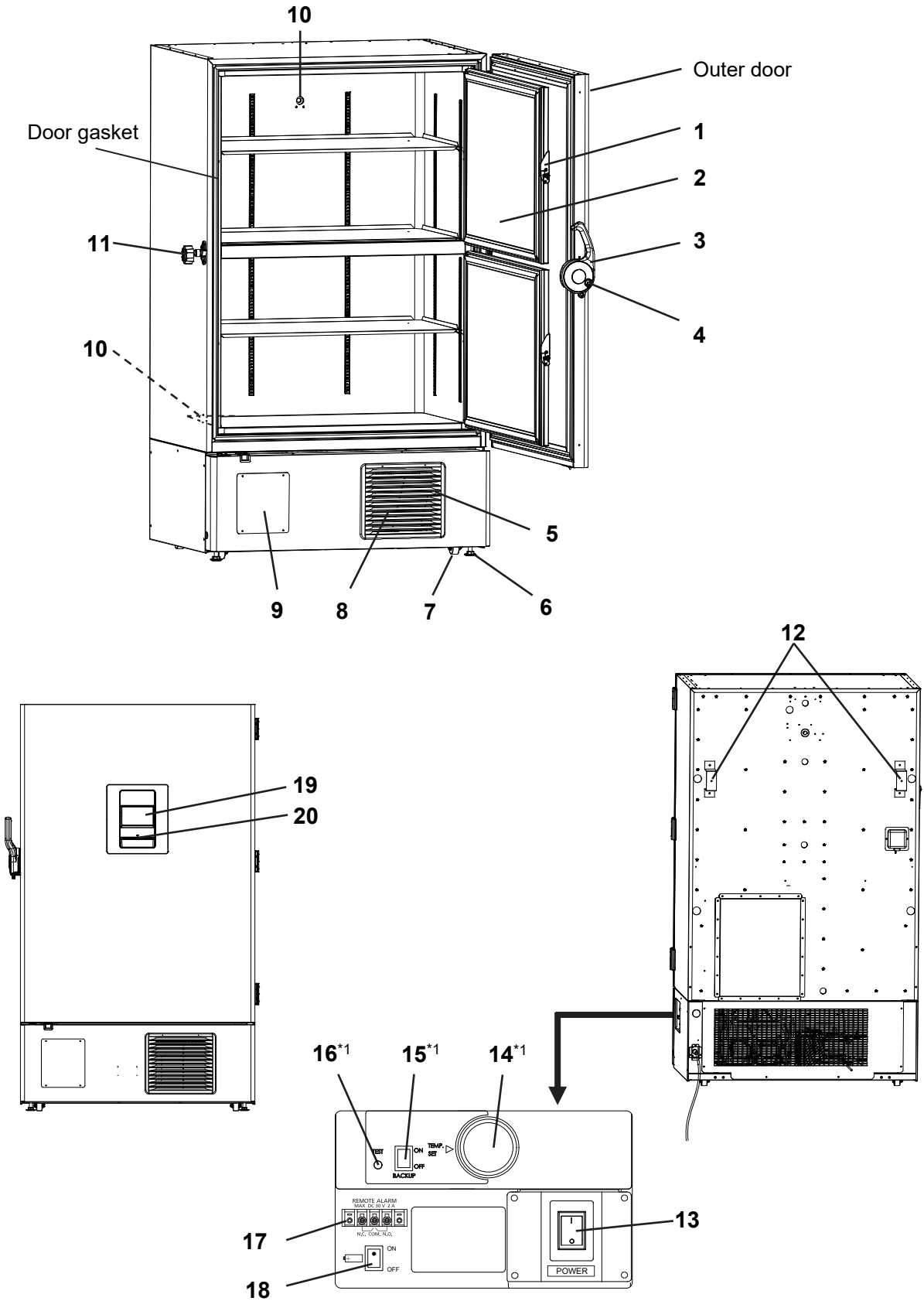
This equipment is designed to be safe at least under the following conditions (based on the IEC 61010-1):

- 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.

FREEZER COMPONENTS

Main body



*1 : When an optional backup cooling kit is installed.

FREEZER COMPONENTS

- 1. Inner door latch:** When the inner door is closed, it should be locked by this latch.
- 2. Inner door:** The operation of the inner door should be quick to minimize the temperature rise in the chamber. Lock the inner door latch completely when the inner door is closed. The inner door can be removed for cleaning or defrosting [page 51].
- 3. Outer door latch:** When closing the outer door, push the latch until the latch is locked in place. Provision has been made for use of an additional padlock (not included).
- 4. Key slot:** The outer door can be locked using the accessory key and the lock system on the outer door latch [page 13].
- 5. Air intake vent (grille):** Do not block this vent to keep the proper cooling performance.
- 6. Leveling feet:** These are screw bolts used to install and fix the unit. Adjust the height of the leveling feet by turning the screw bolts until 2 front casters are away from the floor [page 16].
- 7. Caster:** Four casters are provided to facilitate moving of the freezer. For the installation, adjust the leveling feet so that the front 2 casters cannot contact the floor.
- 8. Condenser filter (behind the grille):** Prevents the dust from accumulating on the condenser. A dusty condenser filter may cause failure of the freezer. Clean the condenser filter once a month [page 50].
- 9. Space for temperature recorder:** Optional temperature recorder can be mounted here so that the chamber temperature can be recorded automatically [page 60].
- 10. Access ports (rear and bottom):** Used to route the sensor/cable of measuring equipment, the sensor of a temperature recorder (optional), or the nozzle of a back-up cooling kit (optional) into the chamber.
- 11. Air intake port (Manual):** The pressure difference between inside and outside of the chamber can be manually adjusted to open the outer door smoothly [page 14].
- 12. Fixtures (on back side):** For securing the unit to a wall with a strong rope or chain [page 16].
- 13. Power switch:** Power switch of the freezer unit. (ON="I", OFF="O")
- 14. Temperature setting knob (TEMP. SET)*:** Used to set the injection start temperature of the backup cooling kit [page 57].
- 15. Backup power switch (BACK UP)*:** Power switch of the backup cooling kit [page 57].
- 16. Backup test switch (TEST)*:** Used to confirm that the backup cooling kit can inject liquid CO₂ [page 57].
- 17. Remote alarm terminals:** An external remote alarm device (separately available) can be connected to these terminals. The alarm is relayed to an operator in a remote location when the unit is unattended [page 14].
- 18. 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 in order to protect the battery.
- 19. LCD touch panel:** See pages 12 - 13.
- 20. USB port:** USB flash drive is inserted here when exporting operation logs and alarm logs [pages 35 - 42].
Note: USB flash drives with capacity of 32 GB or less that employ the FAT16/FAT32 file system are supported. USB flash drives that require passwords cannot be used. Do not insert devices other than USB flash drives into the USB port.

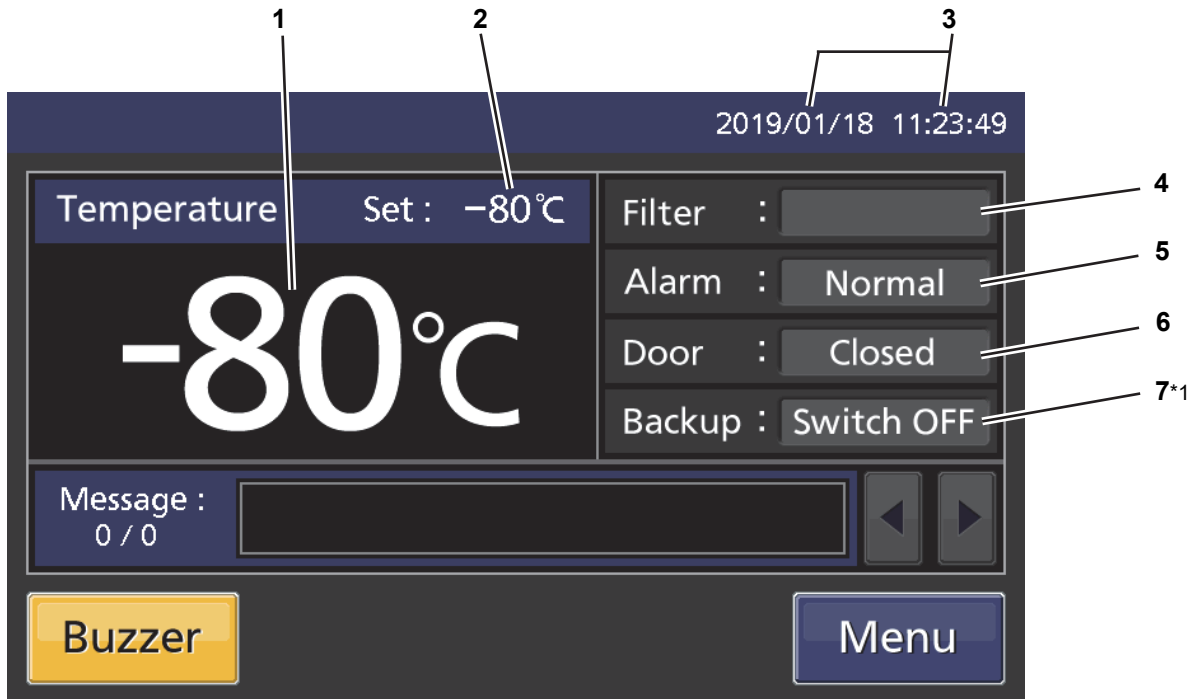
* When an optional backup cooling kit is installed.

FREEZER COMPONENTS

LCD touch panel

When the power switch is turned ON, the following screen (called as Top screen) will appear.

Note: It takes approximately 20 seconds until the Top screen is displayed.



1. Current temperature display field: The current chamber temperature is displayed.

Note: Value rounded to the nearest integer is displayed.

2. Temperature setpoint display field: The set value of chamber temperature is displayed. Default setting: -80 °C.

3. Current date/time display field: Current date and time is displayed here. The date and time has been temporarily set at the factory. For details about setting the data and time, refer to page 43.

4. Filter alarm indicator: This indicator is lit when the excessive dust is accumulated on the condenser filter. When this indicator is lit, clean the condenser filter by following the procedure in page 50.

5. Alarm display field: [pages 46 - 47]

Normal condition: "Normal" is displayed.

Alarm-activated, buzzer-delayed: "Alarm" is displayed alternately in normal and reverse video.

Alarm-activated, buzzer-sounding: "Warning" is displayed alternately in normal and reverse video.

6. Door (opening/closing) display field:

Open: "Open" is displayed alternately in normal and reverse video.

Close: "Closed" is displayed.

7. Backup display field: (displayed only when the optional backup cooling kit is installed)

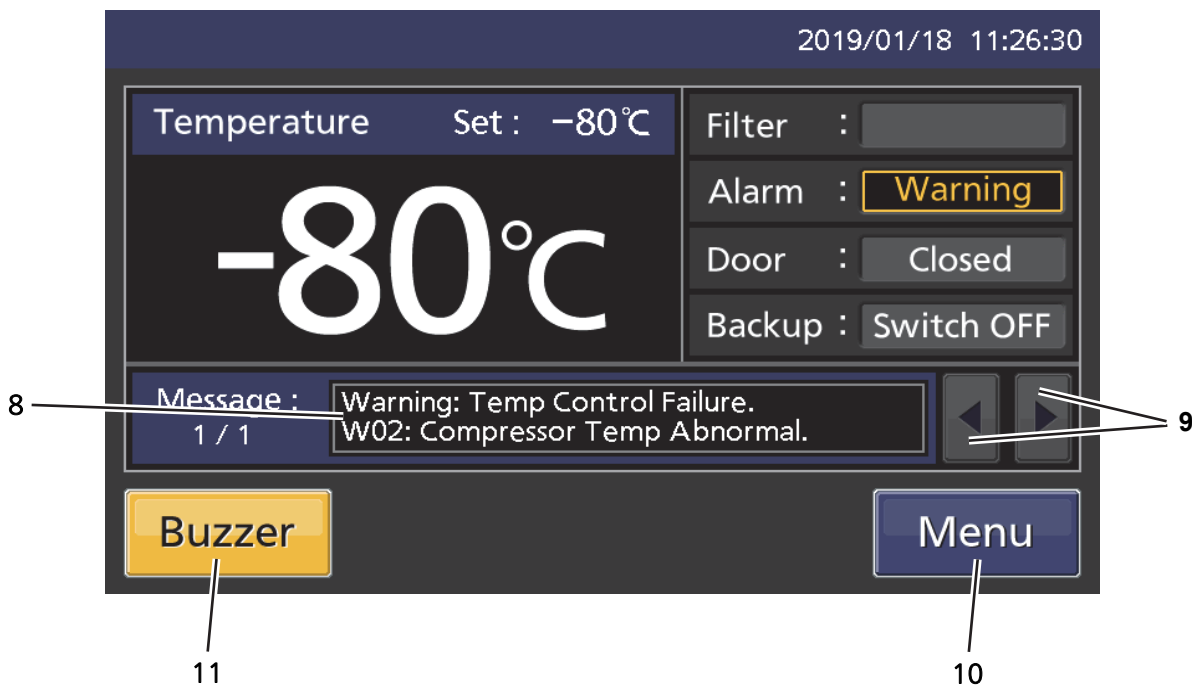
ON/OFF status of the backup power switch is displayed [page 57].

ON: "Switch ON" is displayed.

OFF: "Switch OFF" is displayed.

*1: When an optional backup cooling kit is installed.

FREEZER COMPONENTS



8. Message display field: The information of the operation monitor system, the alarm, or the status is displayed in the event of failure [pages 46 -47].

9. Message select keys: When there are multiple messages concerning to the alarms, the status or the information of the operation monitor system, pressing these keys can switch to another message.

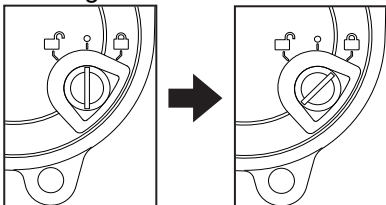
10. Menu key: Pressing this key displays the Menu screen where you can configure various settings [page 20].


11. Buzzer key: Pressing this key stops the buzzer sound. However, when the ring back is ON, the buzzer will sound again if the preset amount of time has elapsed after this key was pressed and the alarm state still continues [pages 29 - 30 and 48].

Locking/unlocking the outer door

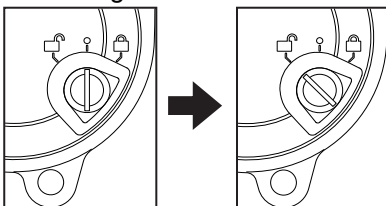
The outer door can be locked using the accessory key and the lock system on the outer door latch.


1. Locking the door



Insert the key into the key slot and turn it 45 degrees clockwise (to the position marked with ). After the door is locked, turn the key back to the first position and take it out of the lock system.

2. Unlocking the door



Insert the key into the key slot and turn it 45 degrees counterclockwise (to the position marked with ). After the door is unlocked, turn the key back to the first position and take it out of the lock system.

Notes:

- After locking/unlocking the door, be sure to take the key out of the key slot and store and manage it in a safe place.
- If the key is lost, contact our sales representative or agent and provide the number stamped in the metal near the key slot.

FREEZER COMPONENTS

Remote alarm terminals

The alarm condition of this unit can be transferred to a remote location by connecting an external alarm device to the remote alarm terminals. For the type and behavior of remote alarm output, refer to pages 46 - 47.

The terminals for the remote alarm are provided at the right side of the unit (see the right figure). The alarm is output from these terminals. Contact capacity is DC 30 V, 2 A.

Table.1 shows the terminal status and the behavior of the remote alarm when the Buzzer key is pressed.

Notes:

- For the door alarm, remote alarm function does not activate [page 47].
- It is recommended to use standard signal and interface cables with a maximum length of 30 meters.

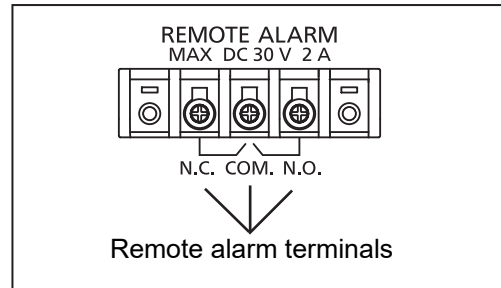


Table 1 Terminal status and behavior of remote alarm when Buzzer key is pressed

Remote Alarm setting [pages 29 – 30]	Connecting terminal	Normal condition	Abnormal condition (Including in the case of power outage and when power plug is pulled out.)	
				When Buzzer key is pressed
ON: Not linked with Buzzer key	COM.-N.C.	Close	Open	Open (still abnormal)
	COM.-N.O.	Open	Close	Close (still abnormal)
OFF: Linked with Buzzer key	COM.-N.C.	Close	Open	Close (Return to normal)
	COM.-N.O.	Open	Close	Open (Return to normal)

Air intake port (Manual)

Normally, the pressure difference between inside and outside of the chamber is automatically adjusted for the smooth opening of the outer door.

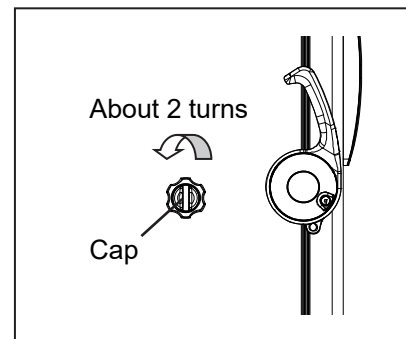
However, when the door is heavy and difficult to open, follow the procedure below.

1. Turn the cap on the left side counterclockwise about two turns (or remove the cap).
2. Allow about twenty seconds before opening the outer door.
3. Close (or replace) the cap after the door operation is completed.

Note:

To check for the frost accumulation inside the air intake port, remove the cap on the air intake port.

If excessive frost has built up in the air intake port, remove with a "Stick for air intake port cleaning" [page 49].



⚠ CAUTION

For removing the frost in the air intake port, do not use a tool with sharp edge such as a knife or a screw driver.

INSTALLATION SITE

This unit must be installed in a location which meets all the conditions described below.

✧If the unit is installed in a location which does not meet the conditions, its specified performance 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 reduce 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 reduce the unit's cooling performance or cause malfunctions.

■ A location away from sources of heat

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 reduce 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 a location where the ambient temperature is subject to sudden changes, stable cooling performance may not be achieved. The ambient temperature 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 the 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 %R.H. 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 reduced and result in earth faults and/or electric shock.

■ 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.

INSTALLATION

When installing the unit, follow the steps below to secure the unit properly, and also be absolutely sure to earth the unit.

✧In addition, install an earth leakage circuit breaker (on the unit's power supply side), which is mandatory under the applicable laws and regulations.

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 absolutely sure to wipe the surfaces with a cloth dipped in clean water to remove traces of the detergent. After this, be absolutely 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 levelling the unit using the levelling feet

Rotate the front levelling feet clockwise until the casters are raised 5 mm to 10 mm above the floor surface. (Fig. 1) In addition, rotate the levelling 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.

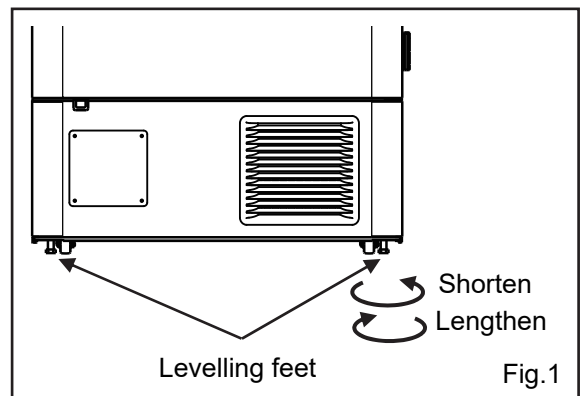


Fig.1

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).

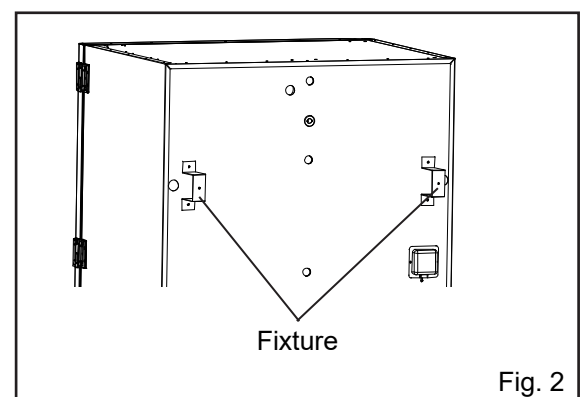


Fig. 2

INSTALLATION

4. Preventing electric shock by earthing the unit

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

This unit comes with a 3-pin plug having one earth pin. Earthing work is not required in the case of a 3-pin power outlet equipped with an earth contact.

If the power outlet is not a 3-pin outlet equipped with an earth contact, ask a qualified contractor to do the earthing work.

5. Setting up the shelves

Insert the shelf stoppers into the bores of the pilasters at the desired level and set the shelf firmly on the shelf stoppers (Fig. 3).

When using the optional inventory racks, insert the shelf stoppers into the bores at the positions of the pilasters described in "SETTING OF SHELF STOPPERS WHEN USING INVENTORY RACKS (page 58)" and set the shelves on the shelf stoppers.

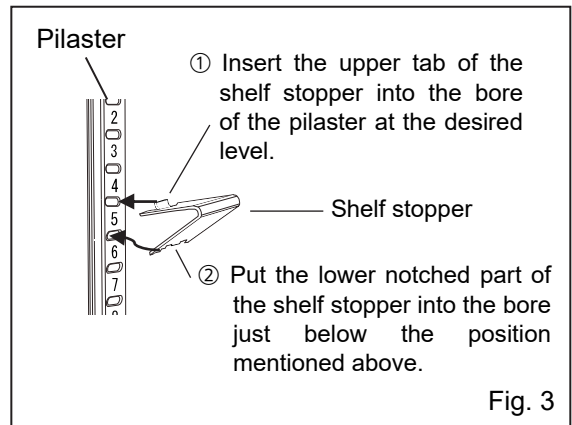


Fig. 3

6. Installing an earth leakage circuit breaker

Install an earth leakage circuit breaker (on the unit's power supply side), which is mandatory under the applicable laws and regulations.

✧ Contact our sales representative or agent to arrange the installation of an earth leakage circuit breaker.

START-UP PROCEDURE

Follow the procedure below for the initial operation of the unit and for operations of the unit after temporary stoppage for cleaning, maintenance or moving.

◇After a power failure, the unit will restart operation automatically with the same settings as before the power failure [page 19].

1. Check that the following switches are turned off: power switch, battery switch for power failure alarm, switch for the optional back-up cooling kit (if 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 turned off.

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

3. Turn on the power switch for the unit to start operation of the unit.

4. Turn on the battery switch for power failure alarm.

Note: When the battery switch for power failure alarm is OFF, the message “S20: Battery Inactive, SW may be OFF.” is displayed in the message display field. This message disappears when the battery switch for power failure alarm is turned ON.

5. Set the desired chamber temperature [pages 23 - 24].

◇The factory setting of chamber temperature is -80 °C.

6. Using the temperature display, check that the chamber temperature has cooled to the set temperature.

◇Check that the chamber temperature falls to the set temperature when the start-up after cleaning, maintenance or moving.

7. Turn on the switch of the optional back-up cooling kit (if installed).

8. Do the alarm test. Check that the buzzer sounds by pressing the Buzzer key for 5 seconds. Press the Buzzer key again to stop the buzzer and finish the alarm test.

9. Press the test switch for the optional back-up cooling kit (if installed) to check it is working.

10. Gradually place the material inside the chamber.

◇Putting a large amount of material into the chamber at one time causes the temperature to rise.

11. Set all parameters (alarm setting, log setting, etc.) as necessary.

Notes:

- When closing the outer door, push the latch until the latch is locked in place. Insufficient pushing can cause temperature rise in the chamber.
- In case 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 during a power failure.

- The power failure alarm is activated [page 46].

Press the Buzzer key to silence the buzzer sound of the power failure alarm. In case the ring back is turned ON, buzzer sounds again when a power failure still continues after ring back set time elapsed [page 30].

- LCD touch panel becomes dark [page 46].

By touching the LCD touch panel, it becomes brighter for 5 seconds.

- The High/Low Alarm can activate even during a power failure [pages 23 - 24 and 46].

When High/Low Alarm activates, an alarm message is displayed on the message display field. At this point, the buzzer and the remote alarm have activated, and "Warning" is displayed on the Alarm display field since the power failure alarm has already activated.

- The clock function does not stop.

- Operation log data and alarm log data during a power failure is saved.

Note: When the capacity of the battery for power failure alarm is flat during a power failure, subsequent operation log data and alarm log data is not saved.

Operation after recovery from power failure

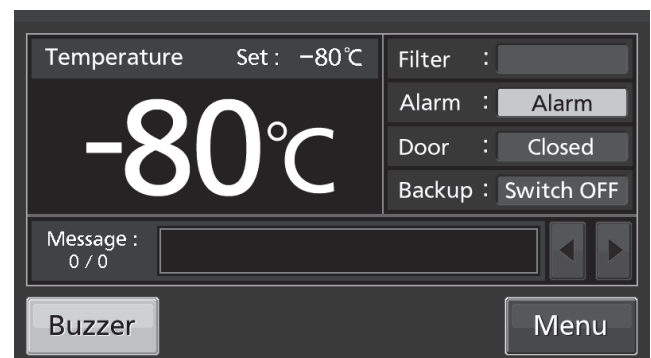
During a power failure, the setting values are stored in the nonvolatile memory. Therefore, the freezer resumes the operation using the setting values before the power failure.

Notes:

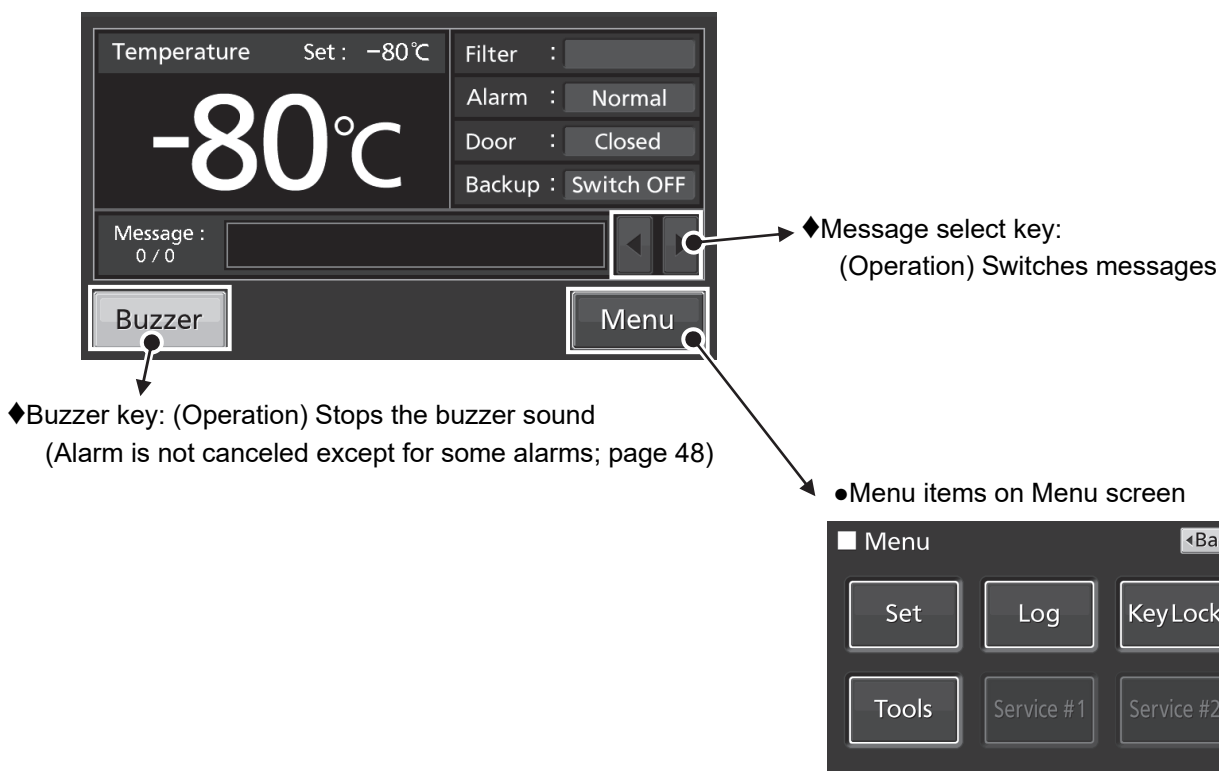
- It may take up to 1 minute until the LCD touch panel lights after recovery from a power failure.
- Since all devices will start up at the same time at the recovery from a power failure, the temporary voltage drop may have an adverse effect on the starting of the unit. To prevent this situation, set the appropriate compressor delay time for the unit [pages 24 - 25].

Although the power failure alarm is canceled at the recovery from the power failure, buzzer sounds and "Alarm" is displayed alternately in normal and reverse video in the Alarm display field in order to remind that power failure had happened [page 48]. By pressing the Buzzer key, the Alarm display field returns to "Normal" and the buzzer sound stops.

Note: You can check the previous alarms by following the procedure described in the "Displaying alarm log" [pages 38 - 39].



BASIC OPERATION ON LCD TOUCH PANEL



Menu screen		Page
◆ Set	Temp. Setting screen (Setting) Temp., High Alarm, Low Alarm	23~24
◆ Log	Log screen	
	◆ Chart	
	◆ Actual Temp. (Display) Chamber temp. log graph (can be exported)	32~34
	◆ Door Opening (Display) Door opening log graph (can be exported)	32~34
	◆ Data Export	
	◆ Actual Temp. (Export) Chamber temperature log	35~37
	◆ Door Opening (Export) Door opening log	35~37
	◆ Setting (Setting) Log interval, Unique ID	31~32
	◆ Alarm (Display) Alarm log (can be exported)	38~39
	◆ Alarm Export (Export) Alarm log	40~41
◆ Key Lock	Key Lock screen (Setting) Key lock ON/OFF, password	25~28
◆ Tools	Tools screen	
	◆ Operation Setting (Setting) Comp. delay time	24~25
	◆ Alarm Setting (Setting) Alarm delay, ring back, remote alarm etc.	29~30
	◆ DAQ Setting Do not press (unavailable)	
	◆ Date & Time (Setting) Date, time	43
	◆ Brightness/Sleep (Setting) Brightness, sleep ON/OFF etc.	44~45

BASIC PARAMETERS

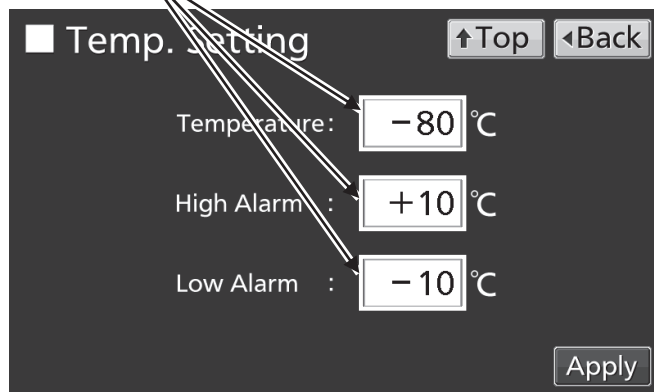
Entering numerical values and alphanumeric characters

On each screen in the LCD touch panel, it is sometimes necessary to enter numerical values or alphanumeric characters.

•Entering numerical values:

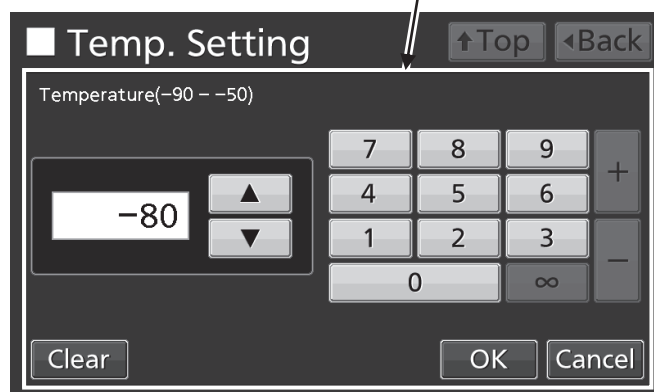
1. Touch the numeric input box to display the numeric input window.

Numeric input box



2. Press the Numeric keys or Up/Down keys to input a numerical value, and press the OK key.

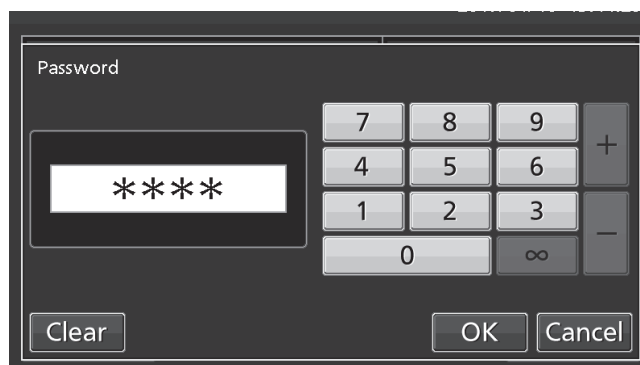
Numeric input window



•Details of keys in the numeric input window

- Numeric keys (0~9): Input numbers.
- Up/Down keys (▲/▼): Increase or decrease the numerical value displayed in the numeric input box.
- Clear key: Deletes the numerical value displayed on the numeric input box.
- Cancel key: Cancels the input to the numeric input box and closes the input window.

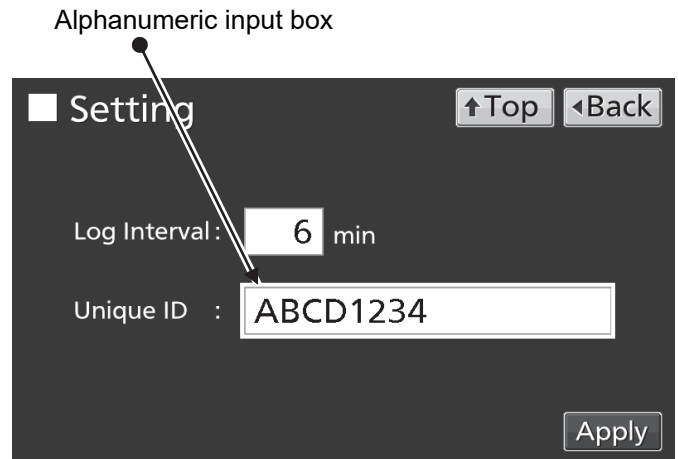
Note: In some situations, the Up/Down keys are not displayed.



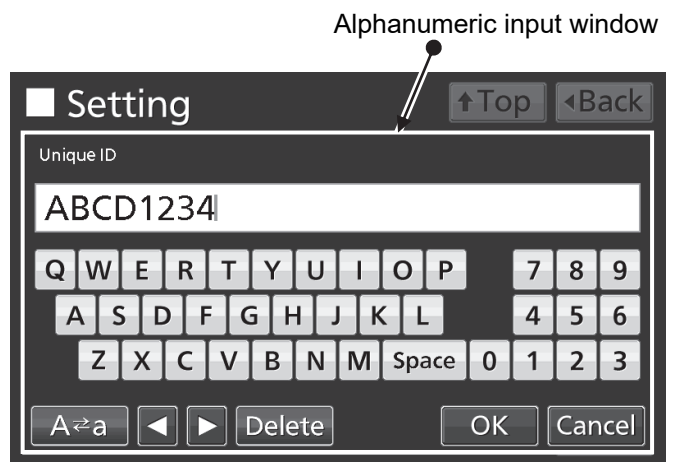
BASIC PARAMETERS

•Entering alphanumeric characters:

1. Touch the alphanumeric input box to display the alphanumeric input window.



2. Press the alphabetic keys and numeric keys to enter alphanumeric characters, and press the OK key.



•Details of keys in the alphanumeric input window

- Alphabetic keys (A~Z, Space): Inputs alphabetic characters or spaces.
- Numeric keys (0~9): Input numbers.
- UC/LC key (A↔a): Toggles between upper case and lower case.
- Left/Right keys (◀ / ▶): Move the cursor to left/right.
- Delete key: Deletes an alphanumeric character immediately to the left of the cursor.
- Cancel key: Stops inputting on the alphanumeric input box and closes the alphanumeric input window.

Note: While the alphanumeric input window is open, the Top key and the Back key are unavailable.

[Auto return function]

When there is no key operation for about 90 seconds on the screen other than the Top screen, the display automatically exits the setting mode and returns to the Top screen.

< When the sleep function is on >

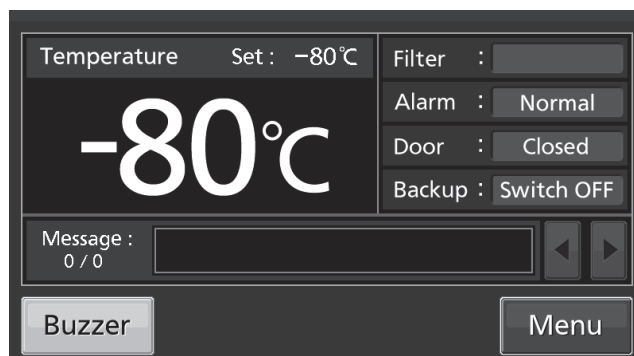
When there is no key operation for about 90 seconds without any alarm or error in the sleep state, the display automatically exits the setting mode and returns to the Top screen.

BASIC PARAMETERS

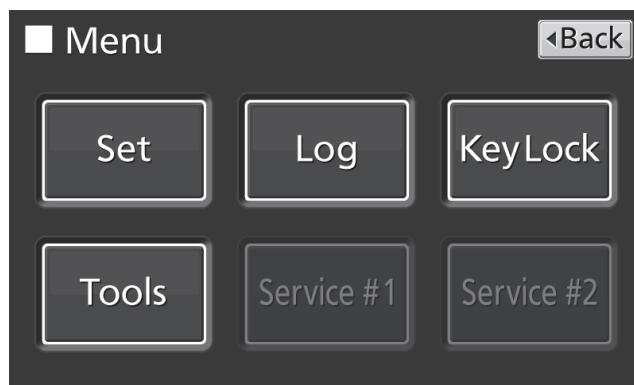
Setting Temperature, High Alarm and Low Alarm

The chamber temperature, high temperature alarm, and low temperature alarm can be set by following the procedure below. The unit starts operation using these settings after power-on.

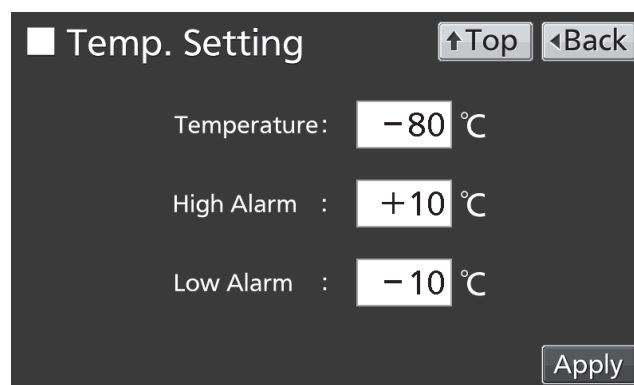
1. Press the Menu key to display the Menu screen.



2. Press the Set key to display the Temp. Setting screen.



3. Enter each parameter. Press the Apply key to save the input value. The display returns to the Menu screen.



• Each parameter setting

• Temperature: Chamber temperature setpoint.

Settable range: -90 °C to -50 °C, Control range: -86 °C to -50 °C, factory setting: -80 °C.

• High Alarm: When the chamber temperature exceeds the temperature (value set to "Temperature" + value set to "High Alarm")*, the High Alarm activates.

Settable range: +5 °C to +40 °C, factory setting: +10 °C.

• Low Alarm: When the chamber temperature falls below the temperature (value set to "Temperature" - value set to "Low Alarm")*, the Low Alarm activates.

Settable range: -40 °C to -5 °C, factory setting: -10 °C.

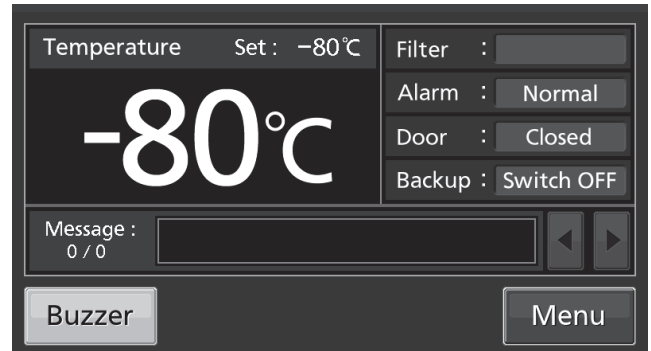
BASIC PARAMETERS

* Since the displayed chamber temperature is the value rounded to the nearest integer, the High/Low Alarm may activate when the value of the displayed chamber temperature is equal to the set alarm temperature.

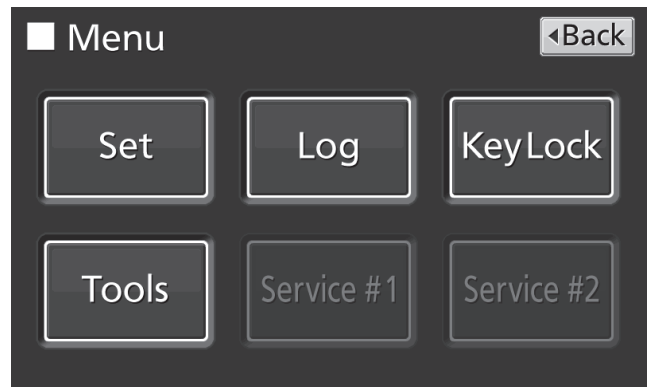
4. On the Menu screen, press the Back key to return to the Top screen.

Setting compressor delay time

1. Press the Menu key to display the Menu screen.



2. Press the Tools key to display the Tools screen.

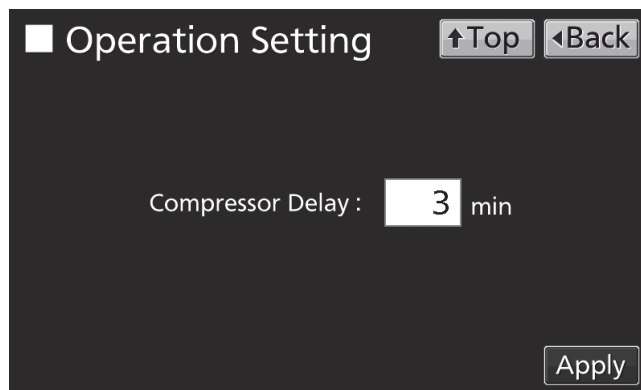


3. Press the Operation Setting key to display the Operation Setting screen.



BASIC PARAMETERS

4. Enter the parameter. Press the Apply key to save the input value and setting. The display returns to the Tools screen.



•Setting

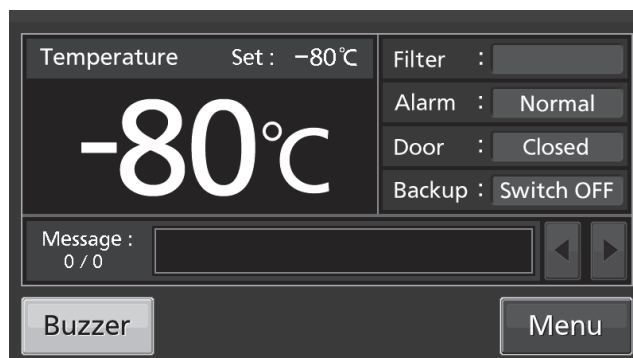
• Compressor Delay:

The time from when this unit is turned ON until when the compressor starts up. This unit requires large amount of electric power at the instant of compressor start-up. If multiple units 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, factory setting: 3 minutes.

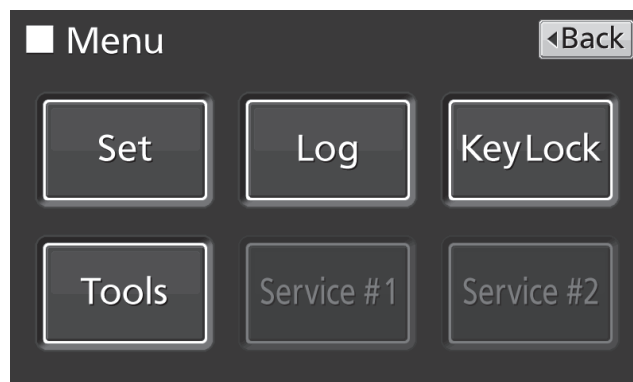
5. Press the Top key to return to the Top screen.

Setting key lock

1. Press the Menu key to display the Menu screen.



2. Press the Key Lock key to display the Key Lock screen.



BASIC PARAMETERS

3. Configure the key lock setting on the Key Lock screen.

- **Key Lock:** Hold the Key Lock slide key and slide it to the right to turn ON the key lock.
- **Password #1:** Enter the number (Max. 6 digits) to release the Key Lock.
- **Confirm Password #1:**
To prevent typing error, enter the same password as the Password #1 input box. If different password is entered, the Notice dialog box is displayed. Press the OK key and enter the correct password.
- When you press the Apply key, Key Lock turns to ON, password #1 is saved, and then the Confirm dialog box is displayed to ask if you set another password.

Yes: The Key Lock screen for setting the release password #2 will be displayed.

No: The display returns to the Menu screen. Select "No" when the password #2 is not necessary.

Note: You can set two different key lock release passwords. To release the key lock, enter either of the passwords.

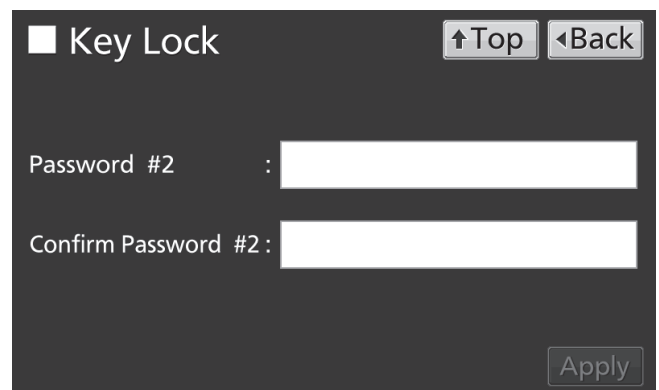
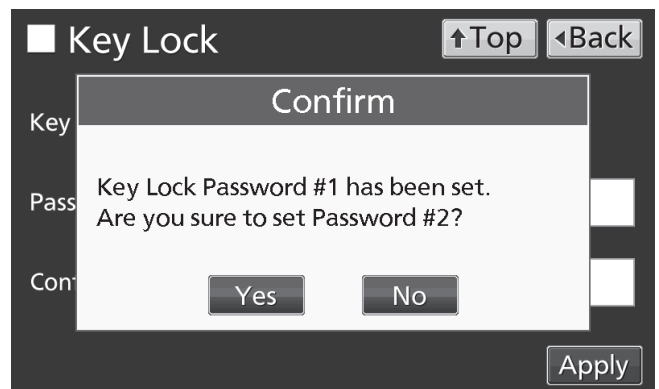
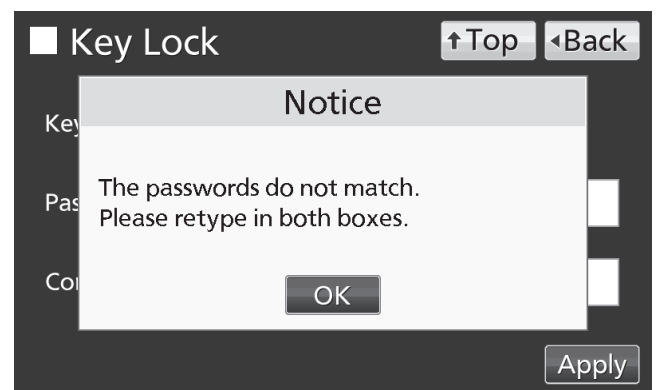
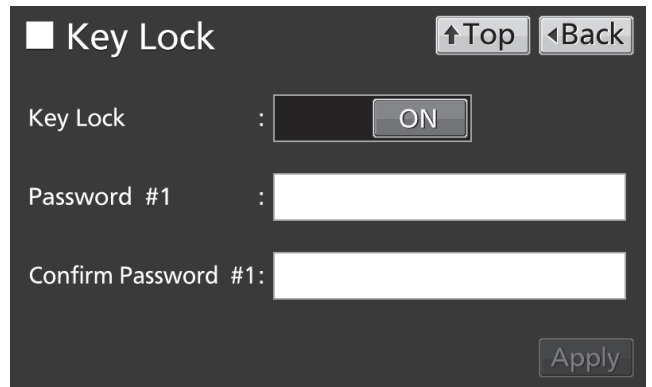
4. Set the password #2.

- **Password #2:** Enter the number (Max. 6 digits) to release the Key Lock.

Confirm Password #2:

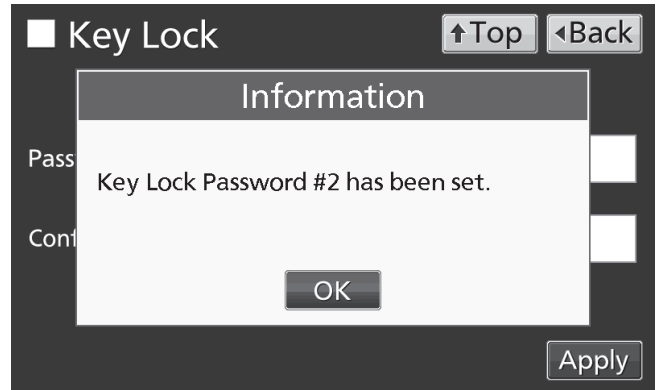
To prevent typing error, enter the same password as the Password #2 input box. If different password is entered, the Notice dialog box is displayed. Press the OK key and enter the correct password.

- When you press the Apply key, the password #2 is saved and the Information dialog box is displayed.



BASIC PARAMETERS

5. On the Information screen, press the OK key to return to the Menu screen.

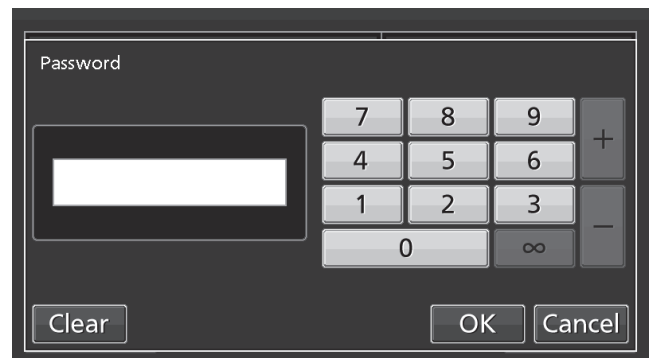


6. On the Menu screen, press the Back key to return to the Top screen.

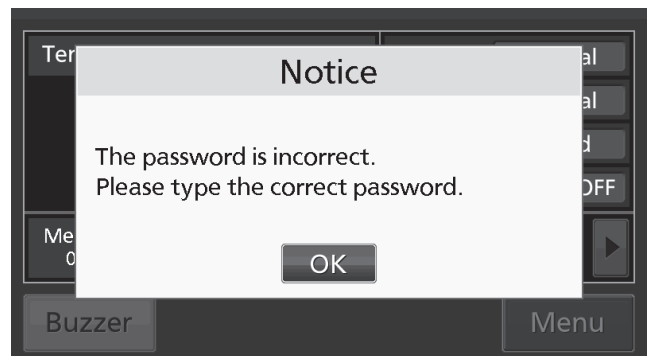
Note: Manage the key lock release password properly.

• Operation when key lock is set to "ON"

• When you press the Menu key, the Password input box is displayed, and you are prompted to enter the key lock release password. If two passwords are registered, you can release the lock by either of the passwords.



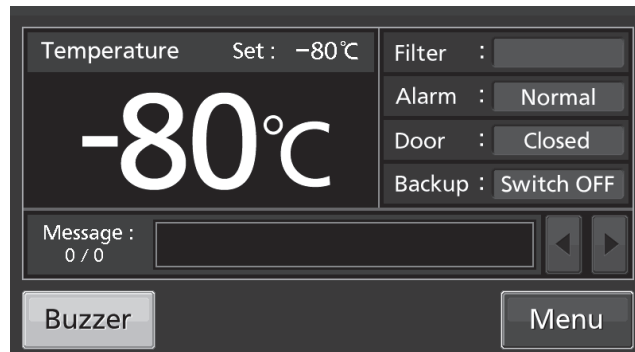
• When the password you entered is incorrect, the Notice dialog box is displayed. Press the OK key, and then enter the correct password.



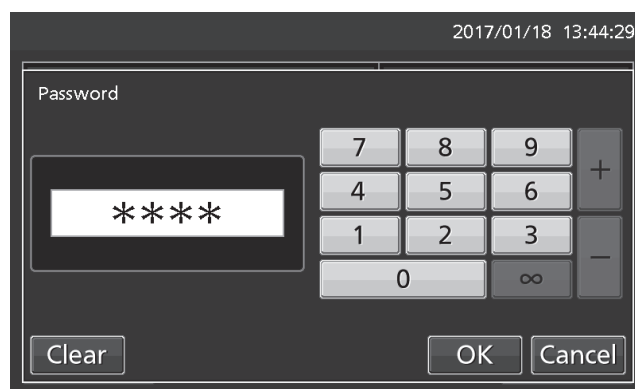
BASIC PARAMETERS

Cancelling key lock setting

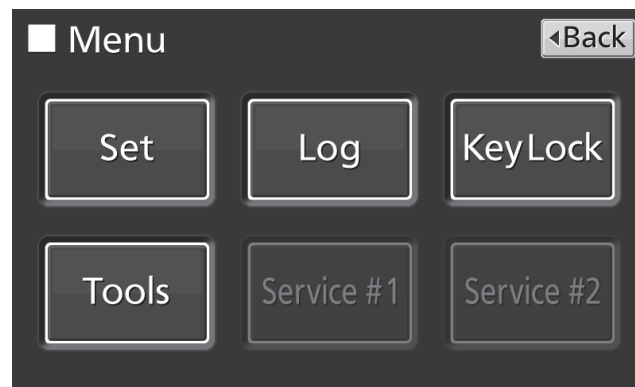
1. Press the Menu key to display the Password input window.



2. On Password input box, enter the key lock release password (#1 or #2), and press the OK key to display the Menu screen.



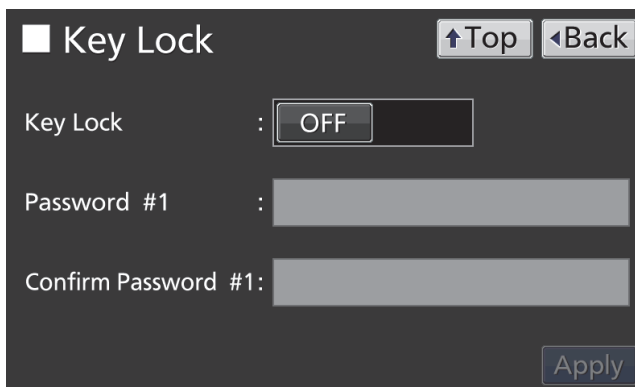
3. Press the Key Lock key to display the Key Lock screen.



4. On the Key Lock screen, hold the Key Lock slide key and slide it to the left to turn OFF the key lock. Press the Apply key to apply the setting. The display returns to the Menu screen.

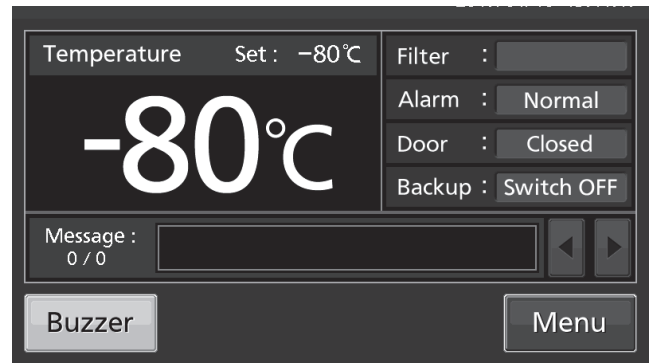
Note: The key lock release password is deleted.

5. On the Menu screen, press the Back key to return to the Top screen.

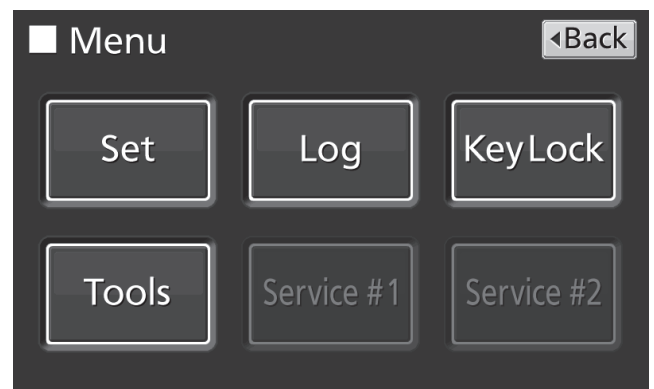


ALARM PARAMETERS

1. Press the Menu key to display the Menu screen.



2. Press the Tools key to display the Tools screen.

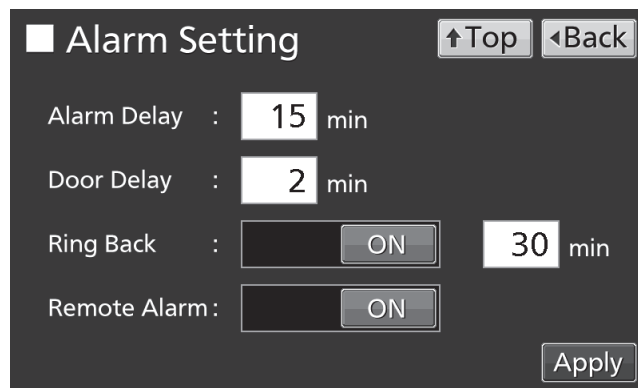


3. Press the Alarm Setting key to display the Alarm Setting screen.



ALARM PARAMETERS

4. Configure each alarm setting on the Alarm Setting screen. Press the Apply key to save the values and settings. The display returns to the Tools screen.



- Each setting
- Alarm Delay:

Alarm delay is a function that when the High Alarm or Low Alarm state occurs, instead of sounding immediately, the alarm buzzer sounds after the elapse of the set alarm delay time.

Settable range: 0 to 15 minutes, factory setting: 15 minutes.

Note: When the unit recovers from the alarm state within the set alarm delay time, the buzzer does not sound after the elapse of the alarm delay time.

- Door Delay:

Door delay is a function that when the unit is in the door alarm state, instead of sounding immediately, the alarm buzzer will sound after the elapse of set alarm delay time.

Settable range: 0 to 15 minutes, factory setting: 2 minutes.

Note: When the unit recovers from the alarm state within the set door alarm delay time, the buzzer does not sound after the elapse of the door alarm delay time.

- Ring Back:

Ring back is a function that the alarm buzzer sounds again when the alarm state still continues after the ring back set time elapsed even though the alarm buzzer was stopped by pressing the Buzzer key. The Ring Back is turned ON by holding and sliding the Ring Back slide key to the right.

Settable range: 1 to 99 minutes, factory setting: 30 minutes.

Note: For the door alarm, the alarm does not reactivate since the alarm itself is deactivated by pressing the Buzzer key [page 48].

- Remote Alarm:

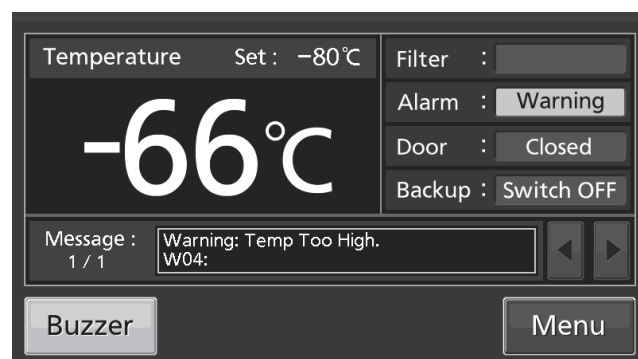
Selects behavior of the remote alarm when the Buzzer key is pressed to stop the buzzer sound of the freezer unit. When "ON" (not linked with the Buzzer key) is selected by sliding the Remote Alarm slide key to the right, the alarm indication by the remote alarm device does not stop even if the Buzzer key on the freezer unit is pressed. Factory setting: ON.

5. Press the Top key to return to the Top screen.

- During in the alarm state

• When the alarm is activating and the buzzer is sounding from the freezer unit, the buzzer sound can be stopped by pressing the Buzzer key. For the behavior of the alarm buzzer when the Buzzer key is pressed and the behavior of the ring back under each setting condition, refer to Table 2-3 on page 48.

Since the alarm state itself is not cleared by pressing the Buzzer key except for some alarms, resolve the cause of the alarm referring to pages 46 - 48.



OPERATION/ALARM LOG

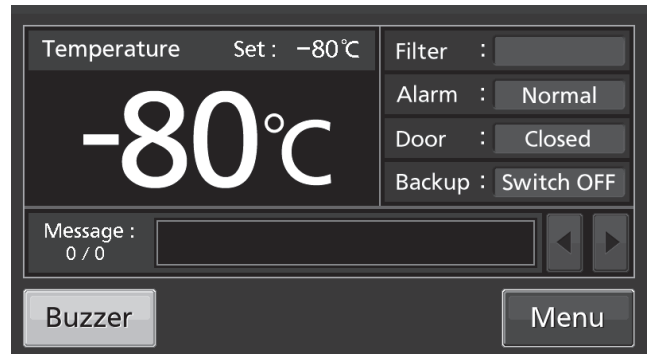
Setting log interval

The unit is equipped with a function of saving operation log data (chamber temperature and open/close state of the door).

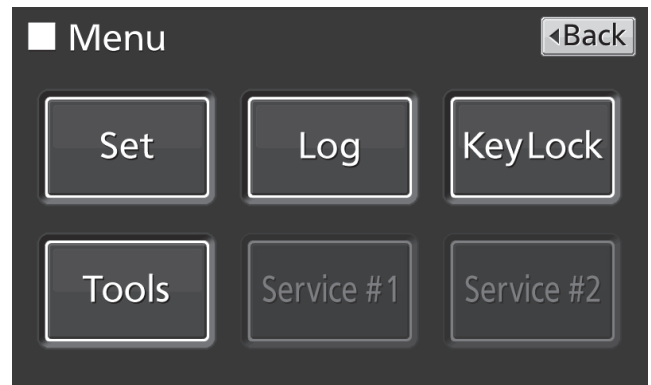
Note: When the battery switch for power failure alarm is ON, operation log is saved even during a power failure.

Follow the procedure below to set the log interval (interval of acquiring the operation log).

1. Press the Menu key to display the Menu screen.



2. Press the Log key to display the Log screen.



3. Press the Setting key to display the Setting screen.



OPERATION/ALARM LOG

4. On the Setting screen, enter the value in the Log Interval box. Press the Apply key to save the value. The display returns to the Log screen.

Settable range: 2 to 30 minutes.

Factory setting: 6 minutes.

Notes:

- Only an even number can be entered. When an odd number is entered in the box and the OK key is pressed, the number changes to an even number which is smaller than the original number by one.
- For Unique ID, 8-digit alphanumeric characters can be registered [page 37].
- Relation between log recording interval and the estimated amount of data that can be saved
 - Log interval = every 2 minutes: Approx. 46 days
 - Log interval = every 6 minutes: Approx. 135 days
 - Log interval = every 30 minutes: Approx. 664 daysWhen saving the amount of data more than the above, oldest data is overwritten with new data.

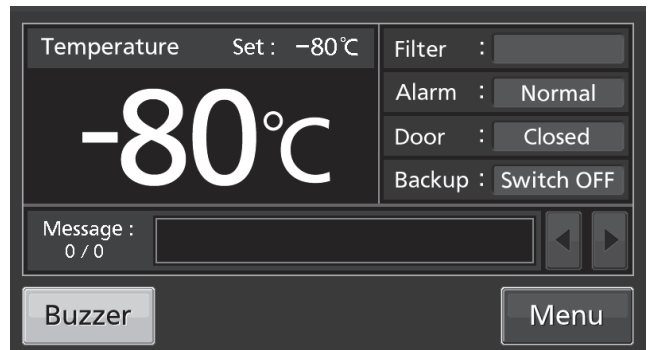


5. Press the Top key to return to the Top screen.

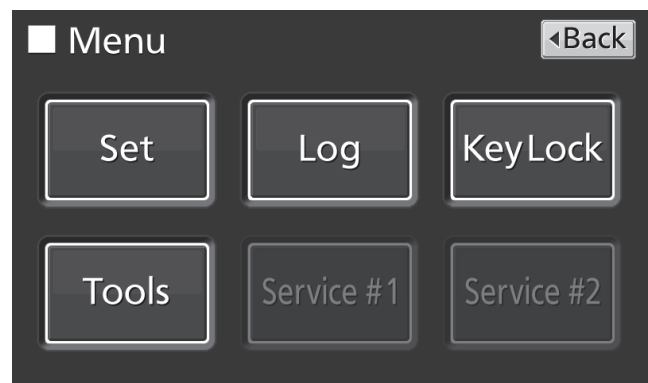
Displaying operation log

Operation log saved in the freezer can be displayed graphically on the LCD touch panel.

1. Press the Menu key to display the Menu screen.



2. Press the Log key to display the Log screen.

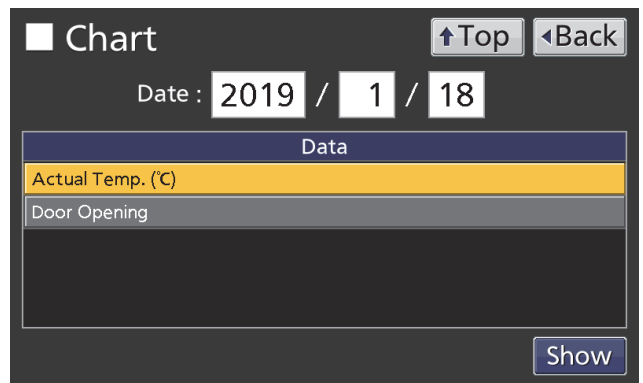


OPERATION/ALARM LOG

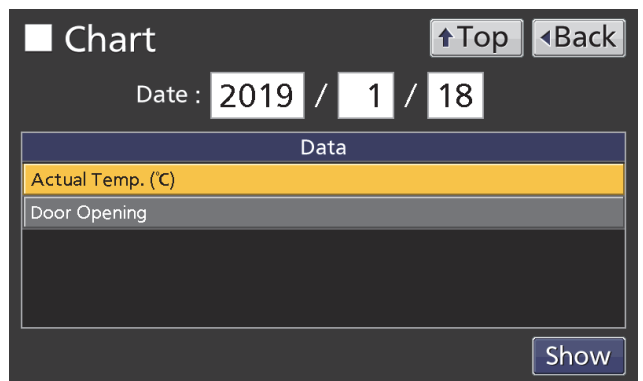
3. Press the Chart key to display the Chart screen.



4. On the Chart screen, enter the date (year / month / day) of the operation log you want to display graphically.



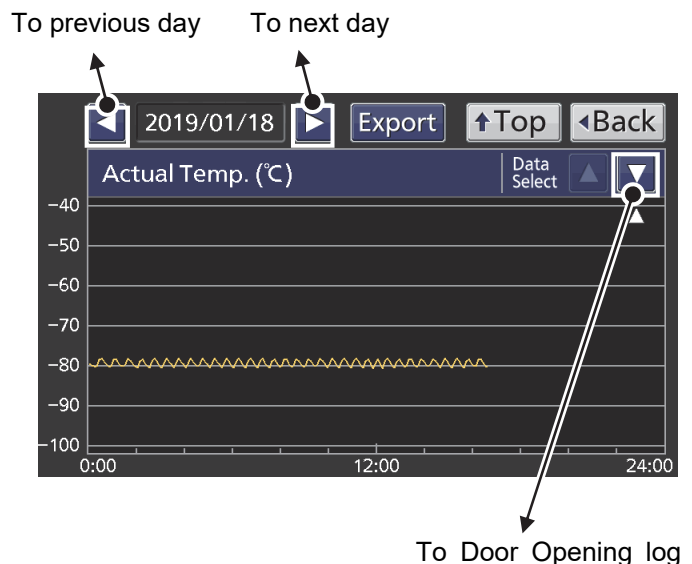
5. On the Chart screen, select the item to display graphically and then, press the Show key. The graph of each operation log is displayed.



- Actual Temp.:
Log graph of chamber temperature
(Go to step 6)
- Door Opening:
Log graph of outer door opening/closing status
(Go to step 7)

6. Actual Temp. log graph is displayed.

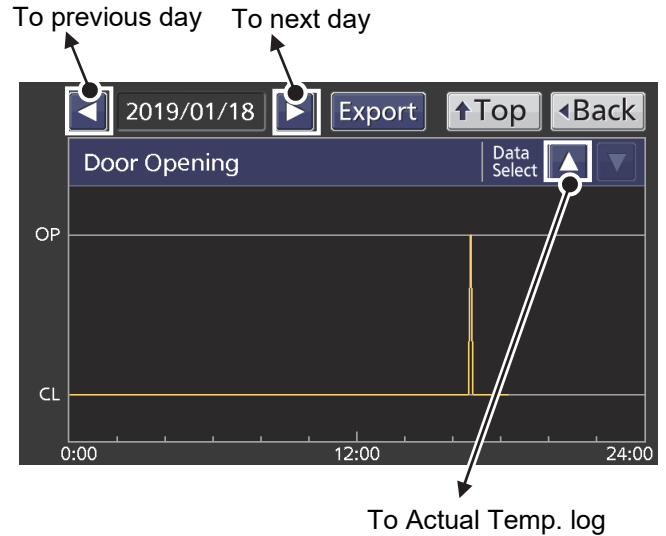
- Press the Back key to return to the Chart screen.
- Press the Top key to return to the Top screen.



OPERATION/ALARM LOG

7. Door Opening log graph is displayed.

- Press the Back key to return to the Chart screen.
- Press the Top key to return to the Top screen.

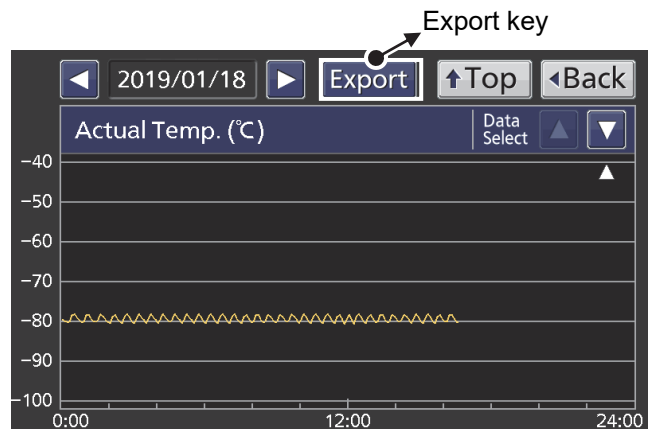


• On the Chart screen in step 6 or 7, log data can be exported in CSV format to a USB flash drive inserted into the USB port.

8. To export the log data, insert a USB flash drive into the USB port.

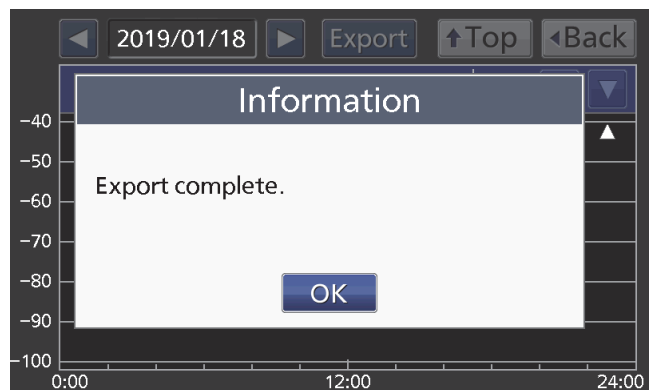
Note: USB flash drives with capacity of 32 GB or less that employ the FAT16/FAT32 file system are supported. USB flash drives that require passwords cannot be used. Do not insert devices other than USB flash drives into the USB port.

9. Press the Export key.



10. When the export completes, the Information dialog box is displayed. Press the OK key. When the export does not complete successfully or for details about export file name, refer to page 37.

11. Press the Top key to return to the Top screen.



OPERATION/ALARM LOG

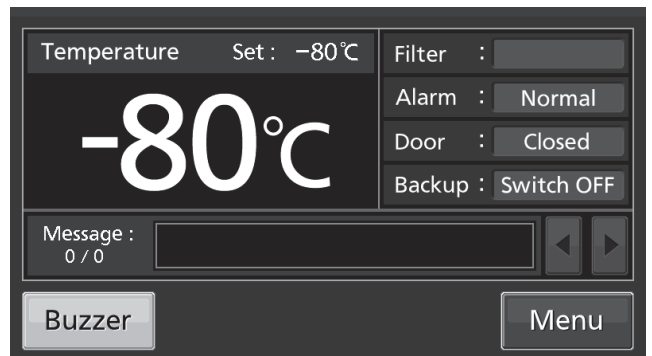
Exporting operation log

Operation log data saved in the freezer can be exported in CSV format to a USB flash drive inserted into the USB port.

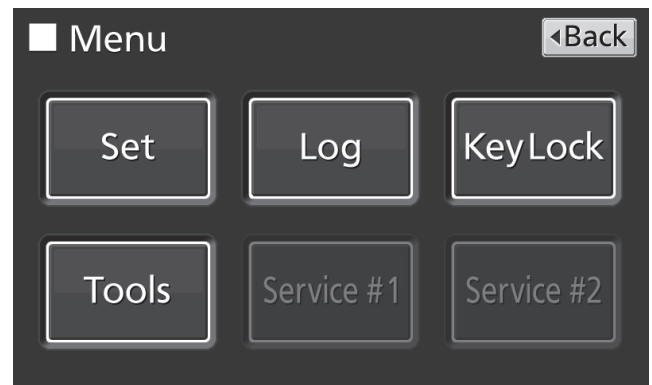
1. Insert a USB flash drive into the USB port.

Note: USB flash drives with capacity of 32 GB or less that employ the FAT16/FAT32 file system are supported. USB flash drives that require passwords cannot be used. Do not insert devices other than USB flash drives into the USB port.

2. Press the Menu key to display the Menu screen.



3. Press the Log key to display the Log screen.



4. Press the Data Export key to display the Export screen.



OPERATION/ALARM LOG

5. On the Export screen, select the time period of the operation logs you want to export.

- To export the saved operation log data over the entire period, press the All radio button.

- To export the operation log data of a specified date, press 1 Day radio button and enter the date (year / month / day) of the operation log data you want to export.

Note: The error of about 1 minute may be observed within a month. Refer to page 43 for setting the time.

6. On the Export screen, select the type of operation log data you want to export.

- To export all types of the operation log data, press the All Ch key.

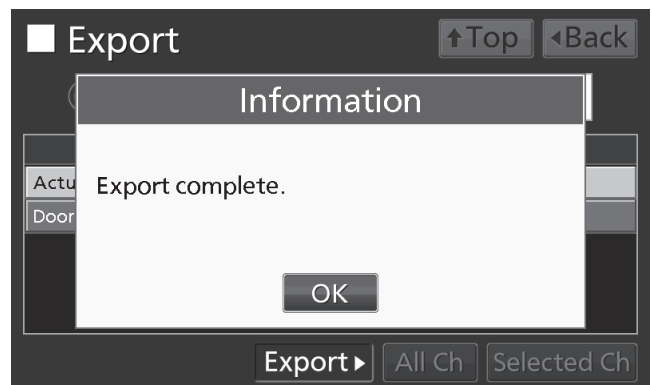
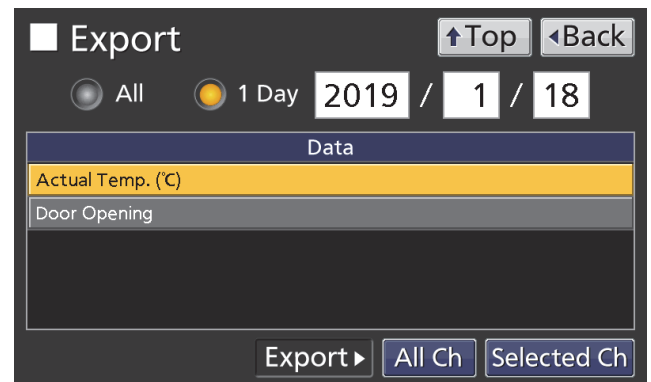
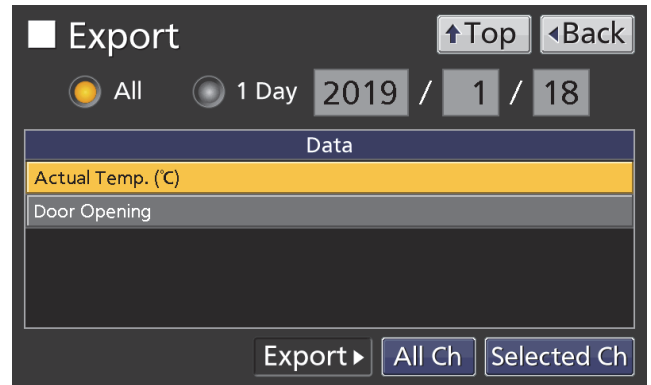
- To export only one operation log data type you want to export, select the operation log data to export, and then press the Selected Ch key.

- Actual Temp.: Log data for chamber temperature

- Door Opening: Log data for outer door opening/closing status

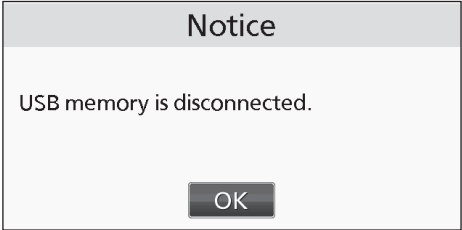
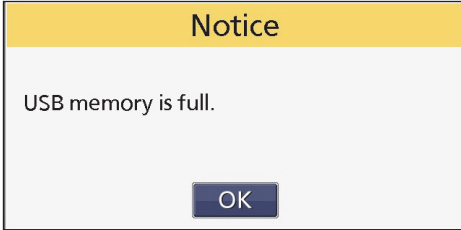
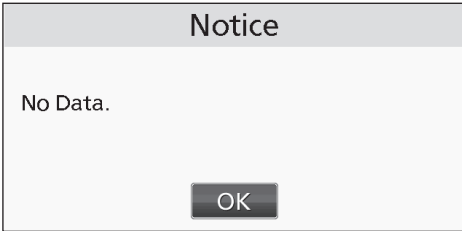
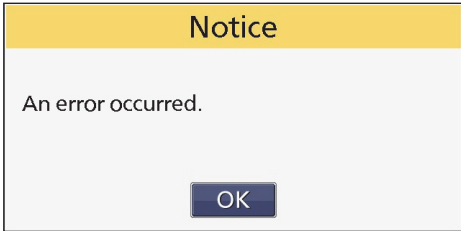
7. When the export completes, the Information dialog box is displayed. Press the OK key.

Note: The operation log data saved in the unit is not deleted even after the export of operation log data.



OPERATION/ALARM LOG

Note: When an export error occurs, any of the following notices will appear.

<ul style="list-style-type: none"> •USB flash drive is not inserted into the USB port. •USB flash drive is not inserted properly. <p>Solution: Press the OK key, and then insert a USB flash drive properly into the USB port.</p> 	<ul style="list-style-type: none"> •There is not enough free space in the USB flash drive. •The USB flash drive is not formatted in FAT16 or FAT32 format. <p>Solution: Press the OK key, and then check the capacity and format type of the USB flash drive.</p> 
<ul style="list-style-type: none"> •The specified log data does not exist. <p>Solution: Press the OK key and specify the data again.</p> 	<ul style="list-style-type: none"> • The export operation was unsuccessful. <p>Solution: Press the OK key, and specify the data again.</p> 

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

Notes:

- "log" folder is created in the USB flash drive and the export file is saved in the folder in CSV format. The export file name consists of 8-digit date (year, month, day) and type of operation log data.

Example) When exporting all types of data with "All" (from Jan. 1st, 2019 to Oct. 1st, 2019) selected for time period:

20190101-20191001_AllCh.csv

20190101-20191001_Door.csv

Example) When exporting Actual Temp. log data with "1 Day" (Jan. 1st, 2019) selected for time period:

20190101_Temp.csv

◇If the file names are duplicated, a sequential number such as "-1" is added to the end of the file name which is output later.

- If you open the exported file, a product name (MDF-DU901VH) is shown at the beginning of the file. When an Unique ID is registered [page 32], the product name and the Unique ID (8-digit) are shown.

Example) When "RoomA001" has been registered as the Unique ID for MDF-DU901VH:

MDF-DU901VH, RoomA001

9. Press the Top key to return to the Top screen.

OPERATION/ALARM LOG

Displaying alarm log

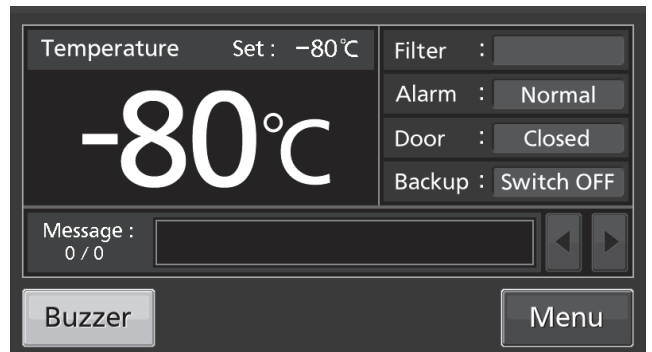
The unit is equipped with a function of saving alarm log data (Max. 256 logs).

Notes:

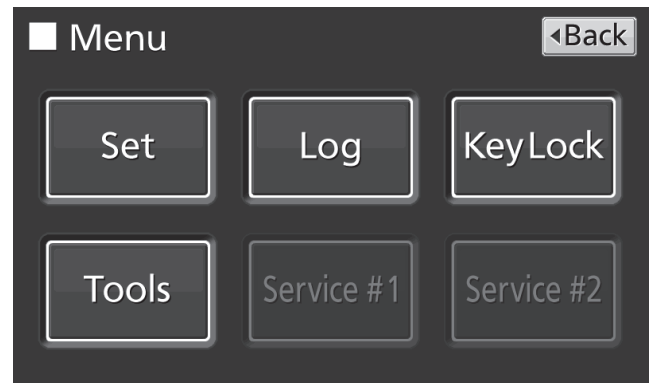
- When saving alarm logs of more than 256, the oldest alarm logs are overwritten.
- When the battery switch for power failure alarm is ON, operation log is saved even during a power failure.

Alarm log saved in the freezer can be displayed on the LCD touch panel.

1. Press the Menu key to display the Menu screen.



2. Press the Log key to display the Log screen.



3. Press the Alarm key to display the Alarm screen.

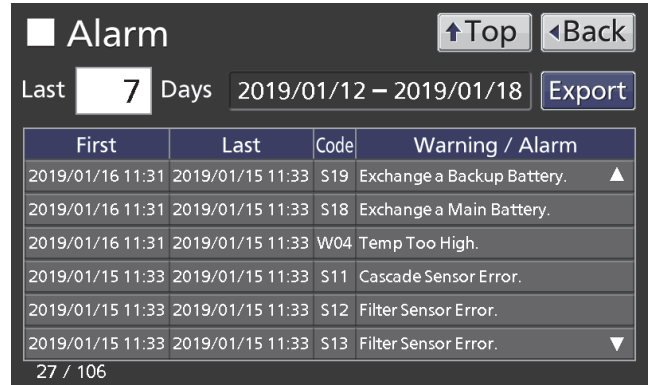


OPERATION/ALARM LOG

4. On the Alarm screen, the last 7 days' alarm logs (including current day) are displayed.

Note: When the number of applicable alarm logs is 7 or more, you can scroll up or down the logs one by one by pressing the mark (▲) or (▼) on the top or bottom log to see the hidden alarm logs.

- Press the Back key to return to the Log screen.
- Press the Top key to return to the Top screen.

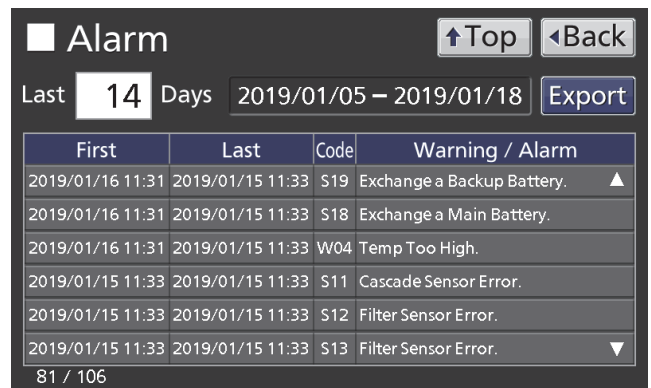


5. On the Alarm screen, by entering the number of days into the "Last XX Days" input box, alarm logs recorded during the specified days (including current day) are displayed.

Settable range: 1 to 45 days.

Note: The error of about 1 minute may be observed within a month. Refer to page 43 for setting the time.

- Press the Back key to return to the Log screen.
- Press the Top key to return to the Top screen.

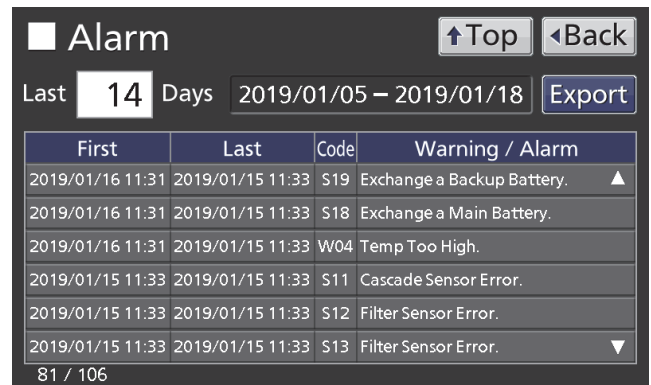


• On the Alarm screen shown in step 4 or 5, alarm log data can be exported in CSV format to a USB flash drive inserted into the USB port.

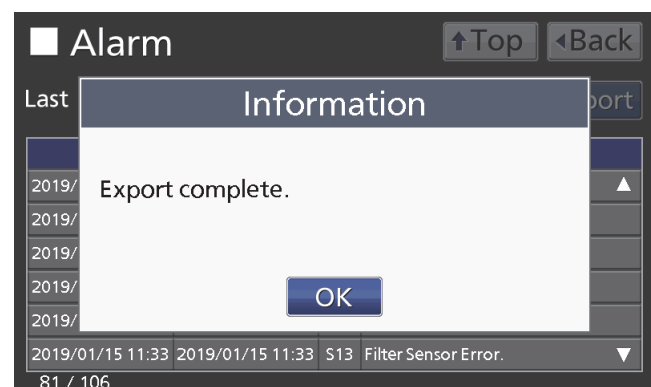
6. Insert a USB flash drive into the USB port.

Note: USB flash drives with capacity of 32 GB or less that employ the FAT16/FAT32 file system are supported. USB flash drives that require passwords cannot be used. Do not insert devices other than USB flash drives into the USB port.

7. Press the Export key.



8. When the export completes, the Information dialog box is displayed. Press the OK key. When the export does not complete successfully or for details about export file name, refer to page 42.



9. Press the Top key to return to the Top screen.

OPERATION/ALARM LOG

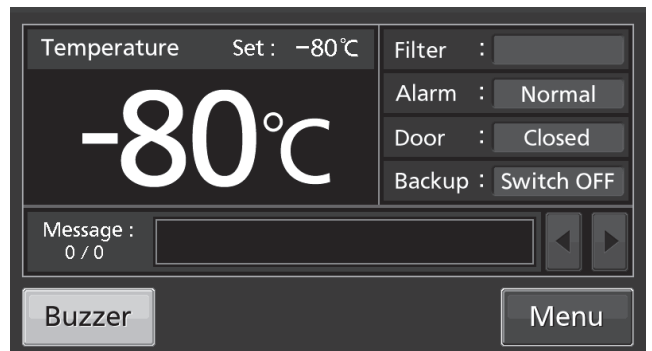
Exporting alarm log

Alarm log data saved in the freezer can be exported in CSV format to a USB flash drive inserted in the USB port.

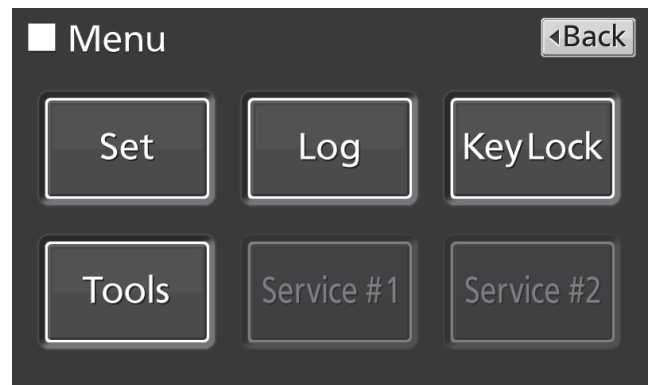
1. Insert a USB flash drive in the USB port.

Note: USB flash drives with capacity of 32 GB or less that employ the FAT16/FAT32 file system are supported. USB flash drives that require passwords cannot be used. Do not insert devices other than USB flash drives into the USB port.

2. Press the Menu key to display the Menu screen.



3. Press the Log key to display the Log screen.



4. Press the Alarm Export key to display the Alarm Export screen.



OPERATION/ALARM LOG

5. On the Alarm Export screen, select the time period of the alarm logs you want to export.

- To export the saved alarm log data over the entire period, press the All radio button.
- To export the alarm log data for the specified days (the latest period including current day), press the Last XX Days radio button and enter the number of days.

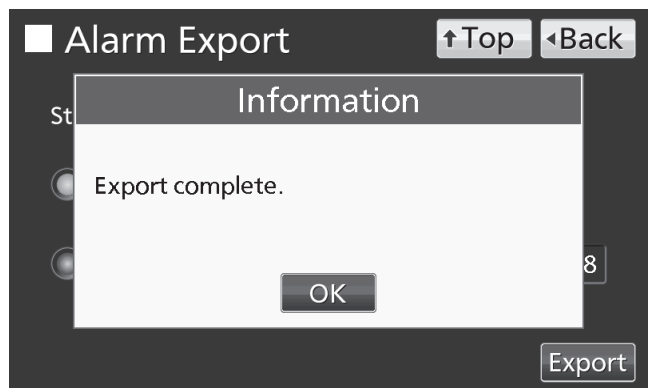
Settable range: 1 to 45 days.

Note: The error of about 1 minute may be observed within a month. Refer to page 43 for setting the time.

6. Press the Export key.

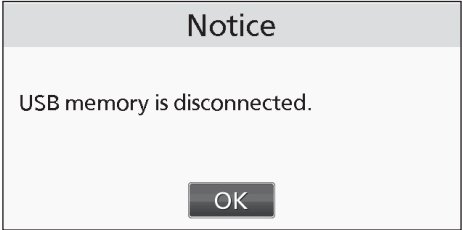
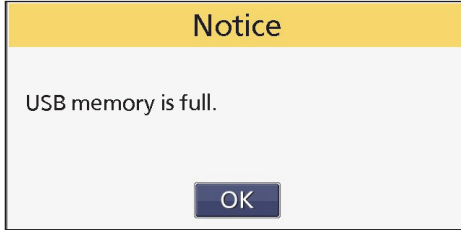
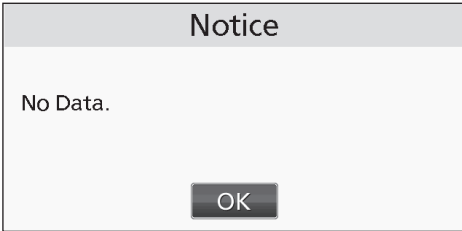
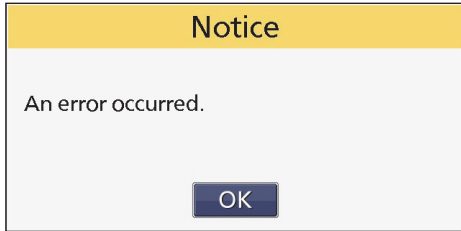
7. When the export of the alarm log data completes, the Information dialog box is displayed. Press the OK key.

Note: The alarm log data saved in the unit is not deleted even after the export of the alarm log data.



OPERATION/ALARM LOG

Note: When an export error occurs, any of the following notices will appear.

<ul style="list-style-type: none">•USB flash drive is not inserted into the USB port.•USB flash drive is not inserted properly. <p>Solution: Press the OK key, and then insert a USB flash drive properly into the USB port.</p>  <p>The dialog box has a grey header with the word "Notice". The main area contains the text "USB memory is disconnected." and a dark grey button with the text "OK" at the bottom.</p>	<ul style="list-style-type: none">•There is not enough free space in the USB flash drive.•The USB flash drive is not formatted in FAT16 or FAT32 format. <p>Solution: Press the OK key, and then check the capacity and format type of the USB flash drive.</p>  <p>The dialog box has a yellow header with the word "Notice". The main area contains the text "USB memory is full." and a dark grey button with the text "OK" at the bottom.</p>
<ul style="list-style-type: none">•The specified log data does not exist. <p>Solution: Press the OK key and specify the data again.</p>  <p>The dialog box has a grey header with the word "Notice". The main area contains the text "No Data." and a dark grey button with the text "OK" at the bottom.</p>	<ul style="list-style-type: none">• The export operation was unsuccessful. <p>Solution: Press the OK key, and specify the data again.</p>  <p>The dialog box has a yellow header with the word "Notice". The main area contains the text "An error occurred." and a dark grey button with the text "OK" at the bottom.</p>

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

Note: "log" folder is created in the USB flash drive and the export file is saved in the folder in CSV format.

The export file name consists of the first date (8 digits) + the last date (8 digits) of the export period + AlarmLog.

Example) When exporting alarm log data for 7 days on January 7, 2019;

20190101-20190107_AlarmLog.csv

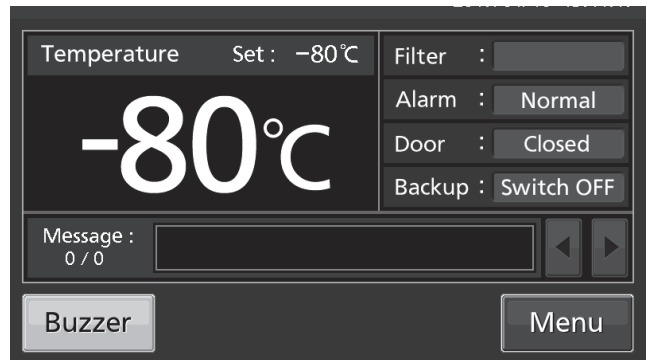
◇If the file names are duplicated, a sequential number such as "-1" is added to the end of the file name that is output later.

9. Press the Top key to return to the Top screen.

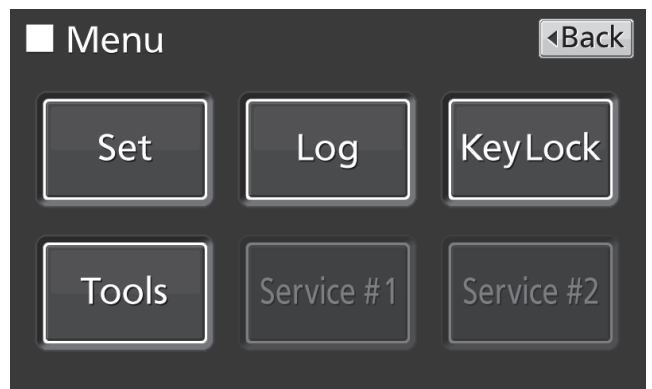
OTHER PARAMETERS

Setting date and time

1. Press the Menu key to display the Menu screen.



2. Press the Tools key to display the Tools screen.



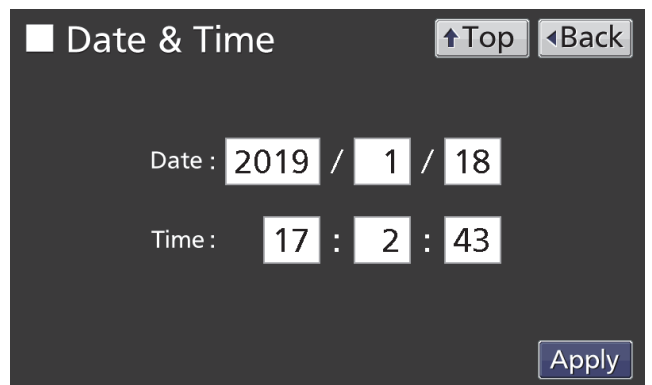
3. Press the Date & Time key to display the Date & Time screen.



4. On the Date & Time screen, enter the current date and time. Press the Apply key to save the values. The display returns to the Tools screen.

Notes:

- The time is expressed using a 24-hour clock.
- It is recommended to set the time periodically since the error of about 1 minute may be observed within a month.

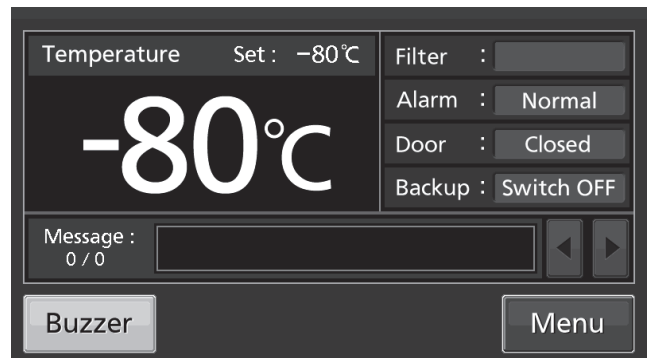


5. Press the Top key to return to the Top screen.

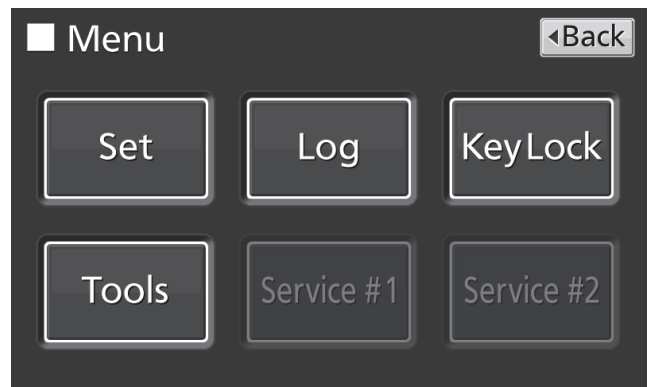
OTHER PARAMETERS

Setting brightness and sleep

1. Press the Menu key to display the Menu screen.



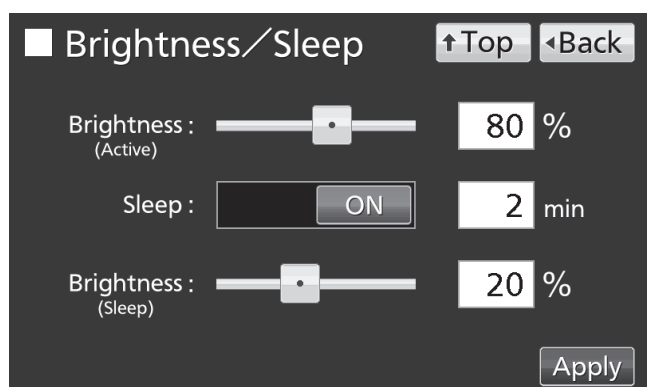
2. Press the Tools key to display the Tools screen.



3. Press the Brightness/Sleep key to display the Brightness/Sleep screen.



4. On the Brightness/Sleep screen, configure each setting of brightness and sleep. Press the Apply key to save the values and apply the settings. The display returns to the Tools screen.



OTHER PARAMETERS

- Each setting

- Brightness (Active):

Brightness of the LCD touch panel in normal state. You can set the value using the slide bar or entering the value directly into the input box. Settable range: 50 to 100, factory setting: 80.

- Sleep:

Sleep is a function that decreases the brightness of LCD touch panel to save electricity when there is no key operation.

Hold the Sleep slide key and slide it to the right to turn ON the Sleep function. Then, enter the time period from the last key operation to the time the Sleep state starts. Settable range: 1 to 5 minutes, factory setting: 2 minutes.

Note: In the Sleep state, key operations are not available. By touching the LCD touch panel, the Sleep state is released and the LCD touch panel returns to the usual state. Under this condition, key operations are available.

- Brightness (Sleep):

Brightness of the LCD touch panel in the Sleep state. You can set the value using the slide bar or entering the value directly into the input box. Settable range: 0 to 50, factory setting: 20.

5. Press the Top key to return to the Top screen.

ALARMS AND SELF-DIAGNOSIS

Warning: The cooling performance has been significantly degraded. Thus, the chamber temperature may get considerably higher. Take some measures to protect the stored items immediately (e.g. transferring the stored items to another freezer or placing dry ice wrapped in newspaper in the chamber) except when the cause is clear and the chamber temperature can be recovered soon.
Turn off the power switch and contact our sales representative or agent.

LCD touch panel Message display field	Situation	Buzzer	Remote alarm	Alarm & safety
Warning: Temp Control Failure. W01: Power Failure.	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	ON	Power failure alarm
Warning: Temp Control Failure. *1 W02: Compressor Temp Abnormal.	When the fan motor for cooling the compressor fails or when the ambient temperature is out of the usable environment condition.			Compressor Temp Abnormality *1
Warning: Temp Too High. W04	The chamber temperature has exceeded the temp. setpoint + the value set for High Alarm.			High Alarm
Warning: Temp Too Low. W05	The chamber temperature has fallen below the temp. setpoint - the value set for Low Alarm.			Low Alarm
Warning: Temp Control Failure. W06: Compressor 'H' Control Failure.	Compressor control failure due to communication failure with H side inverter			Communication error
Warning: Temp Control Failure. W07: Compressor 'L' Control Failure.	Compressor control failure due to communication failure with L side inverter			Communication error
Warning: Temp Control Failure. *3 W08: Temperature Controller Failure.	Communication between LCD touch panel and control substrate is unstable.		—	Communication error
Warning: Temp Control Failure. *2 W09: Temperature Sensor Error.	The thermal sensor has been disconnected.		ON	Temperature Sensor disconnected *2
Warning: Temp Control Failure. *2 W10: Temperature Sensor Error.	The thermal sensor has short-circuited.			Temperature Sensor short-circuited *2
Warning: Temp Control Failure. W15: Cascade Temp Abnormal.	The temperature of the cascade increased during high temperature alarm operation.			Cascade temperature Abnormality

*1: The compressor stops in the case of W02.

*2: The compressor runs continuously in the case of W09 or W10.

If the above two situations (W02 and W09/W10) occur at the same time, stopping of the compressor has a higher priority over running continuously.

*3: In the case of W08, chamber temperature is not displayed. Moreover, the LCD touch panel cannot be operated.

Alarm: Cooling performance may degrade and the chamber temperature may rise. When the temperature change is temporary resulting from user operation, wait for the recovery of chamber temperature. For other cases, if this status continues, failure or chamber temperature rise may occur. Take some measures to protect the stored items immediately (e.g. transferring the stored items to another freezer or placing dry ice wrapped in newspaper in the chamber).
Contact our sales representative or agent.

LCD touch panel Message display field	Situation	Buzzer	Remote alarm	Alarm & safety
Alarm: Temp Too High. A04	The chamber temperature has exceeded the temp. setpoint + the set value of High Alarm.	—	—	High Alarm
Alarm: Temp Too Low. A05	The chamber temperature has fallen below the temp. setpoint. - the set value of Low Alarm.	—	—	Low Alarm

ALARMS AND SELF-DIAGNOSIS

Status: 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.

LCD touch panel	Situation	Buzzer	Remote alarm	Alarm & safety	
Message display field					
Status: Temp Control Risk. *4 S01: Cooling Circuits Overload.	The chamber temp. has not reached the temp. setpoint for approx. 5 days or more.	—	—	Overload operation *4	
Status: Temp Under Control. *5 S02: Ambient Temp Abnormal.	The ambient temp. is over 35 °C or lower than 0 °C.			Abnormal ambient temperature *5	
Status: Temp Under Control. S10: Cascade Sensor Error.	The cascade sensor has been disconnected.			Cascade Sensor disconnected	
Status: Temp Under Control. S11: Cascade Sensor Error.	The cascade sensor has been short-circuited.			Cascade Sensor short-circuited	
Status: Temp Under Control. S12: Filter Sensor Error.	The filter sensor has been disconnected.			Filter Sensor disconnected	
Status: Temp Under Control. S13: Filter Sensor Error.	The filter sensor has been short-circuited.			Filter Sensor short-circuited	
Status: Temp Under Control. S14: Ambient Temp Sensor Error.	The ambient temp. sensor has been disconnected.			Ambient Temp Sensor disconnected	
Status: Temp Under Control. S15: Ambient Temp Sensor Error.	The ambient temp. sensor has been short-circuited.			Ambient Temp Sensor short-circuited	
Status: Temp Under Control. S16: Main Battery Charging Failure.	The battery voltage does not increase after a certain period of time.			Battery for power failure alarm	
Status: Temp Under Control. S17: Backup Battery Charging Failure.				Battery for backup cooling kit Charging Failure	
Status: Temp Under Control. S18: Exchange a Main Battery.	Total operation time has exceeded about 3 years.			Battery for power failure alarm replacement	
Status: Temp Under Control. S19: Exchange a Backup Battery.	Total ON time of the back up cooling kit has exceeded about 3 years.			Battery for backup cooling kit replacement	
Status: Temp Under Control. S20: Battery Inactive, SW may be OFF.	The battery switch for power failure alarm is OFF.			Check for battery switch for power failure alarm	
Door Open.	The door is open.			Intermittent tone (After door delay time has elapsed.)	Door alarm

*4: In the case of S01, check the following:

- (1) There are too many items stored in the chamber at a time.
- (2) The door is frequently opened or the door gasket is damaged.
- (3) The chamber temperature should be set to -80 °C or higher.

*5: In the case of S02, check the air conditioning at the installation site.

The ambient temperature should be 5 °C to 30 °C.

ALARMS AND SELF-DIAGNOSIS

•Table 2 and 3 show the behavior of the alarm (buzzer) and Ring Back function when the Buzzer key is pressed.

Table 2 In the cases other than the door alarm and communication error

Remote Alarm setting	Ring Back setting	Buzzer from unit		Remote Alarm	
		When Buzzer key is pressed	When the Ring Back set time passes	When Buzzer key is pressed	When the Ring Back set time passes
ON: Not linked with Buzzer key	ON	OFF (Alarm is not canceled)	ON	ON	ON (Under continuation)
	OFF		OFF		
OFF: Linked with Buzzer key	ON		ON	OFF (Alarm is not canceled)	ON
	OFF		OFF		OFF

Note: Resolve the cause of the alarm with reference to pages 46 - 47 because the alarm itself is not deactivated by pressing Buzzer key.

Table 3 In the cases of the door alarm.

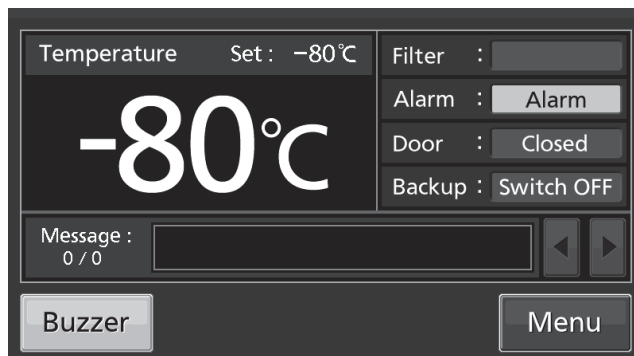
Remote Alarm setting	Ring Back setting	Buzzer from unit		Remote Alarm setting
		When pressing Buzzer key	When the Ring Back set time passes	
ON: Not linked with Buzzer key	ON	OFF (Alarm is canceled)	OFF (Alarm is already canceled)	OFF
	OFF			
OFF: Linked with Buzzer key	ON			
	OFF			

•Table 4 shows the situation after the unit gets out of High/Low Alarm condition without user intervention and after recovery from a power failure.

Table 4 The situation after the High/Low Alarm is resolved and after recovery from a power failure

Alarm	LCD touch panel		Buzzer	Remote alarm	Safety operation
	Message display field	Alarm display field			
High Alarm Low Alarm	—	“Alarm” is displayed alternately in normal and reverse video	Intermittent tone	—	—
Power failure alarm	—	“Alarm” is displayed alternately in normal and reverse video	Intermittent tone	—	—

Note: By pressing the Buzzer key, the alarm display field returns to “Normal” and the buzzer stops.



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, an acid, a thinner, laundry soap, a 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.
- 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.
- Clean the inside of the inner door to remove the frost and ice at least once a month.
- In order to maintain the unit's intended level of performance, make sure to return the accessories that have been removed for cleaning to their original positions.

Cleaning the air intake port (Manual)

When frost and ice is formed in/around the air intake port, clean it as shown below.

Condition	Solution
Frost and ice is formed in the air intake port.	Remove the frost by poking the stick for air intake port cleaning (accessory) into the air intake port.
The outer door cannot be opened even if the cap on the air intake port is removed.	Remove the frost by poking the stick for air intake port cleaning (accessory) into the air intake port.
Frost and ice is formed in the chamber.	Remove the frost and ice inside the chamber using the scraper (accessory).

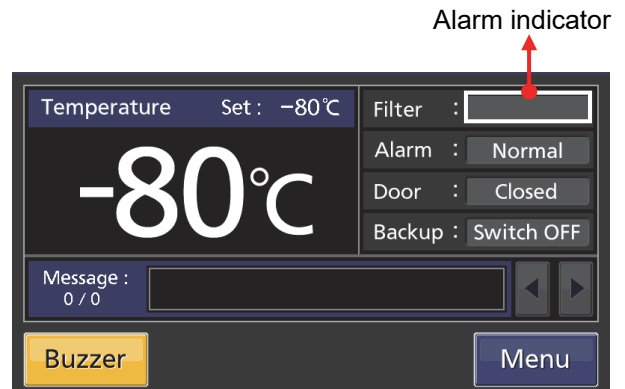
WARNING

When removing the frost in the air intake port, do not use a tool with sharp edge such as a knife or a screw driver.

ROUTINE MAINTENANCE

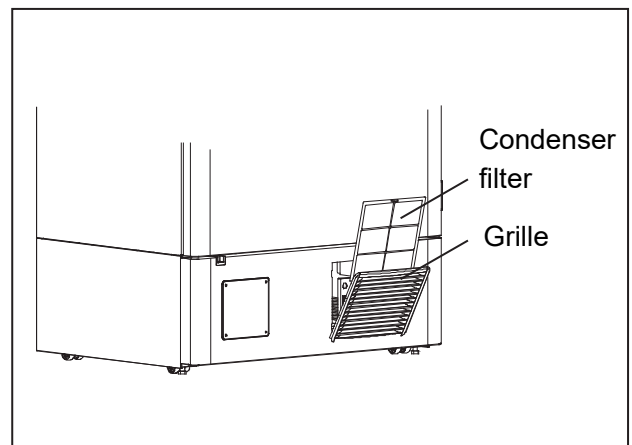
Cleaning the condenser filter

This unit is provided with the filter alarm indicator on the LCD touch panel. Clean the condenser filter when this indicator is lit. Clean the condenser filter once a month even if the filter alarm indicator is not on. A dusty condenser filter may cause shorter compressor life as well as the poor cooling.



Clean the condenser filter by following the procedure below.

1. Open the grille by pulling it to you as shown in the figure.
2. Take out the condenser filter.
3. Wash the condenser filter with water.
4. Replace the condenser filter and the grille. (Set the handle of the condenser filter at the front.)
5. Check that the filter alarm indicator is turned off if the filter alarm indicator was ON.



WARNING

Do not touch the condenser directly when the filter is removed for cleaning. This may cause injury by hot surface.

ROUTINE MAINTENANCE

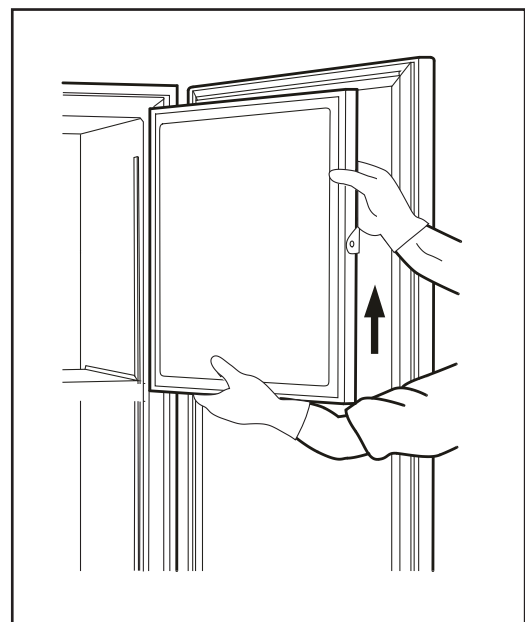
Defrosting the chamber

Frost may accumulate at the upper part in the chamber, around the upper inner part of the inner door, or around the air intake port (Auto). Excessive accumulation of frost is likely to create gaps between the door and the door gasket, which can degrade the cooling performance. Remove the frost from the chamber and the inner door with the scraper included with the unit. Use the following procedure for defrosting when excessive frost builds up in the chamber.

Note:

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

1. Turn off the switch for the back-up cooling kit (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. Open the outer door and inner door. Remove the inner door by lifting up as shown in the figure.
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, replace the inner door and start up the unit by following the procedure on page 18.
9. Check that the chamber temperature reaches the set temperature and then replace the contents.



⚠ WARNING

Always wear gloves when mounting and/or removing the inner door to prevent injury.

CALIBRATION

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

- Perform a temperature calibration at least once a year.

For temperature calibration, contact our sales representative or agent.

REPLACEMENT OF CONSUMABLE PARTS

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 “S18: Exchange a Main Battery.” is displayed in the message display field.

- ◇The replacement of the battery for power failure alarm is a paid service.
- ◇The alarm function (message display, sound of buzzer and remote alarm) will not operate 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 “W01: Power Failure” and activates buzzer sounds.

WARNING

The replacement of the battery for power failure alarm should be executed by a qualified engineer or service personnel only. ➤ The replacement of the battery for power failure alarm 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 backup cooling kit

Replace the battery for backup cooling kit about every 3 years. Contact our sales representative or agent for the replacement of battery when “S19: Exchange a Backup Battery.” is displayed in the message display field.

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

WARNING

The replacement of the battery for backup cooling kit should be executed by a qualified engineer or service personnel only. ➤ The replacement of the battery for backup cooling kit 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.

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.

Problem	Cause/Solution
Nothing operates even when the power supply plug is plugged in.	<ul style="list-style-type: none"> ■ 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 on the supply circuit is activated. ■ The fuse on the supply circuit is blown.
The compressor does not operate at all when turning ON the power switch. (LCD touch panel is turned ON)	<ul style="list-style-type: none"> ■ The capacity of power supply is not sufficient. When the capacity of power supply is not sufficient to start the compressor, compressor may not start.
The alarm is activated during operation	<ul style="list-style-type: none"> ■ The chamber temperature setting has been changed. ■ The door has been kept open for a long time. ■ Containers with a high temperature (load) have been put in the chamber. <p>* In the above cases, the alarm is canceled after a while.</p>
	<ul style="list-style-type: none"> ■ 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 on the supply circuit is activated. ■ The fuse on the supply circuit is blown.
	<ul style="list-style-type: none"> ■ If the LCD touch panel cannot be operated, turn the power off and then turn it on again.
No key operation is available	<ul style="list-style-type: none"> ■ The key lock has been set to ON. <p>→ Set the key lock to OFF.</p>
During the setting operation, the display returns to the Top screen	<ul style="list-style-type: none"> ■ The display will automatically return from each setting screen to the Top screen after 90 seconds if no key is operated (auto-return function).
Excessive noise	<ul style="list-style-type: none"> ■ The floor is not stable. ■ The installation site is not level. ■ The freezer is tilted. ■ The cabinet is touching the surrounding wall.

TROUBLESHOOTING

Problem	Cause/Solution
The chamber does not get cold enough	<ul style="list-style-type: none"> ■ Warm material has been put in the chamber. ■ There is a large amount of frost built 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 -50 °C, the temperature control range that ensures the cooling performance of this freezer is between -86 °C to -50 °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 instruction manual. ■ The ventilation around the unit is blocked. ■ The grille (air intake vent) is blocked. ■ The condenser filter is clogged. ■ 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 door gasket is damaged. → If it is damaged, contact our sales representative or agent for replacement. ■ A foreign substance is located between door gaskets.
The exterior of the freezer is wet with water droplets.	<ul style="list-style-type: none"> ■ When hot humid weather continues or depending on the installation site, the exterior of the freezer may be wet with water droplet. 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.	<ul style="list-style-type: none"> ■ Due to the characteristics of the cooling circuit, the sound of motor or flowing refrigerant may be heard during operation. Especially a few hours after starting the operation, the sound of compressor or flowing refrigerant may be loud, however it is a normal operation.
Data cannot be exported to the USB flash drive.	<ul style="list-style-type: none"> ■ 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.

Note:

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

DISPOSAL OF UNIT

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

WARNING

If the unit is to be stored unused in an unsupervised area for an extended period, **ensure that children do not have access to the unit and the freezer doors cannot be closed completely.** The disposal of the unit should be accomplished by appropriate personnel. **Always remove doors** to prevent accidents such as suffocation.

Recycle of battery



Pb

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



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

OPTIONAL COMPONENTS

Temperature recorder

The chamber temperature can be recorded and checked by installing the optional temperature recorder MTR-85H or MTR-G85C.

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

Main specifications of temperature recorder		
	MTR-85H	MTR-G85C
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

✧For the installation of temperature recorder MTR-85H, the optional recorder fixing MDF-S3085 and recorder sensor cover MTR-DU700SF are required.

✧For the installation of temperature recorder MTR-G85C, the optional recorder sensor cover MTR-DU700SF is required.

Small inner doors

For MDF-DU901VH, small inner door (MDF-9ID) are available as an optional component.
For the installation, contact our sales representative or agent.

Notes:

✧The cooling performance described on page 60 cannot be guaranteed when the small inner doors are installed.

When the small inner doors are installed, the lowest achievable temperature at the center of the chamber is approximately -82 °C (ambient temperature; 30 °C, no load).

✧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 (-82 °C). Depending on the actual use conditions, there may be a case where the chamber temperature does not reach the lowest achievable temperature (-82 °C).

✧When the small inner door (MDF-9ID) are attached, you cannot use the inventory racks (IR-224U).

Inventory rack

Optional inventory racks (IR-220U, IR-224U) are useful to store important items in the chamber effectively.
When these racks are used, the location of the shelves should be changed.

✧Contact our sales representative or agent to arrange purchase of inventory racks.

OPTIONAL COMPONENTS

Back-up cooling kit

When the unit stops operation in the event of a power failure, the optional backup cooling kit MDF-UB7 and the liquid CO₂ cylinder can prevent the chamber temperature from rising for a few hours by injecting liquid CO₂ into the chamber.

↪ Contact our sales representative or agent for the purchase of backup cooling kit.

WARNING

As with any equipment that uses CO₂ 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 kit can be set using the temperature setting knob [page 11]. Since the control method of injection is ON/OFF type, the actual injection start temperature deviates from the set injection start temperature.

Notes:

- Set the injection start temperature of the backup cooling kit to at least 10 °C higher than the freezer chamber temperature. Otherwise, the liquid CO₂ may be injected continuously into the chamber consuming the liquid CO₂ in the cylinder wastefully.
- When the injection start temperature of the backup cooling kit 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.

Behavior of the backup cooling kit

Backup power switch [Page 11]	Backup display field [Page 12]	Condition of the backup cooling kit	Chamber temperature	Liquid CO ₂
ON	Switch ON	Ready to inject	Lower than the injection start temperature.	No injection
			Equal to or higher than the injection start temperature.	Injection starts
OFF	Switch OFF	Not ready to inject (Not ready to activate the backup test switch)	Lower than the injection start temperature	No injection
			Equal to or higher than the injection start temperature.	

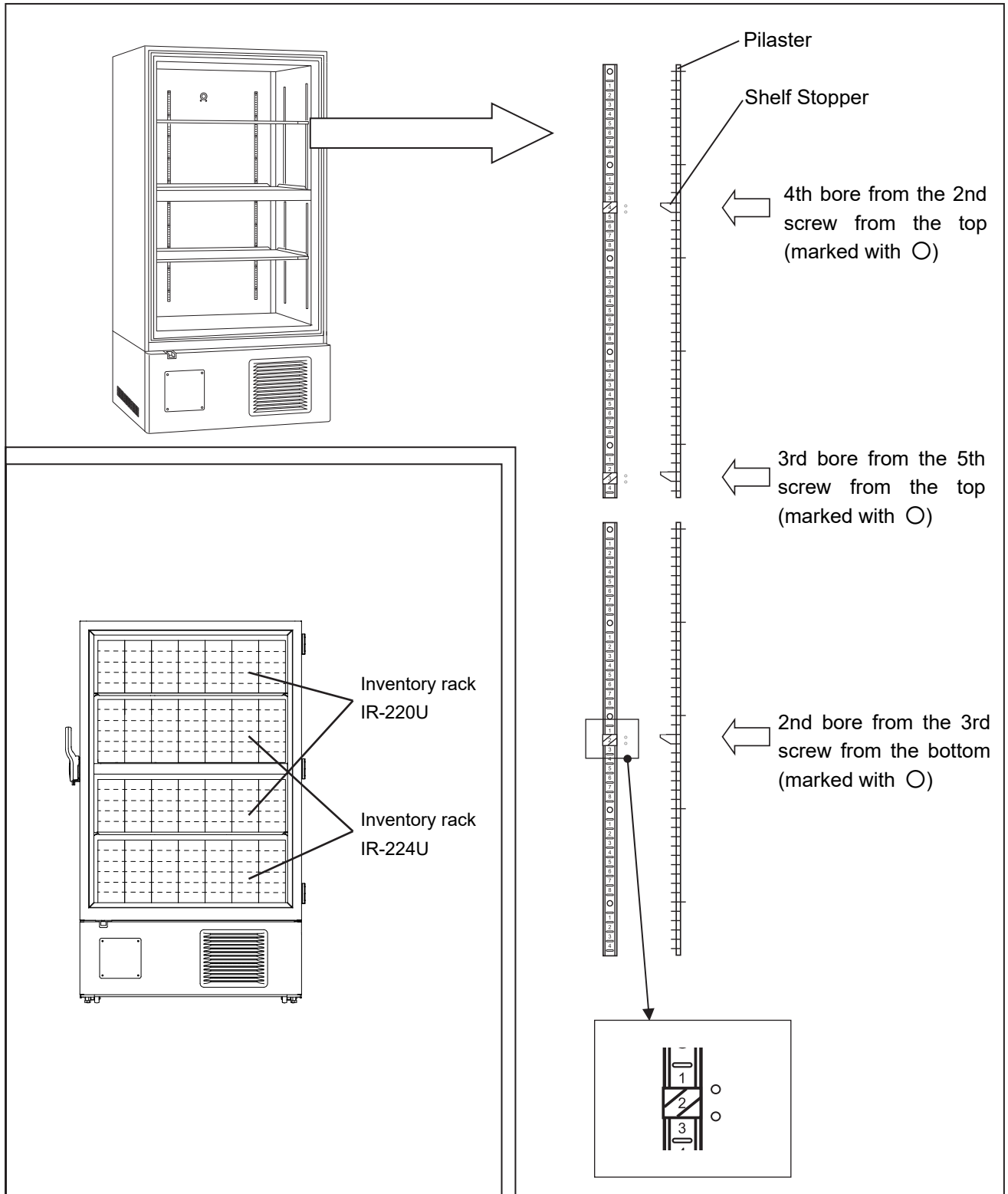
- Duration of backup cooling:

MDF-DU901VH: Approx. 8 hours

(ambient temp.: 30 °C, set temp.: -70 °C, no load, liquid CO₂ gas cylinder of 30 kg)

SETTING OF SHELF STOPPERS WHEN USING INVENTORY RACKS

Optional inventory racks (IR-220U, IR-224U) are available for effectively storing frozen samples in the chamber. For using the inventory racks, make sure to set the shelf stoppers at the positions shown in the following figure. When inserting the inventory rack into the chamber, be careful not to bump the rack against the door gasket and the chamber walls. If they are damaged, the cooling performance of the freezer may deteriorate.



Note: Be careful not to drop the shelf onto your foot.

SPECIFICATIONS

Product name	Ultra-Low Temperature Freezer MDF-DU901VH
External dimensions	W1,150 mm x D870 mm x H1,993 mm
Internal dimensions	W1,010 mm x D600 mm x H1,400 mm
Effective capacity	845 L
Exterior	Painted steel
Interior	Painted steel
Outer door	Painted steel
Inner door	2 doors
Shelf	Stainless steel, 3 shelves (adjustable) Inner dimension; W988 mm x D533 mm Load; Max. 50 kg/shelf
Access port	Inner diameter: 17 mm, 2 locations (back x 1, bottom x 1)
Insulation	Rigid polyurethane foamed-in place + Vacuum insulation panel
Compressor	High stage side; Hermetic type, Output; 1,000 W Low stage side; Hermetic type, Output; 1,000 W
Evaporator	High stage side; Cascade type, Low stage side; Tube on sheet type
Condenser	High stage side; Fin and tube type, Low stage side; Shell and tube type
Refrigerant	High stage side; R-290, Low stage side; R-170
Temperature controller	Microcomputer control system
Temperature display	LCD Digital display
Thermal sensor	Platinum resistance (Pt 1,000 Ω)
Alarm	High Alarm, Low Alarm, Power failure alarm, Door alarm, Filter alarm
Remote alarm contact	Allowable contact capacity: DC 30 V, 2 A *1
Battery	Lead storage battery, DC 6 V, 7,000 mAh, Auto-recharge
Weight	328 kg
Accessories	1 set of keys, 1 scraper, 1 stick for air intake port cleaning, 18 shelf stoppers
Optional component	Temperature recorder (MTR-85H, MTR-G85C) Recorder fixing (MDF-S3085); For MTR-85H Recorder sensor cover (MTR-DU700SF) Backup cooling kit (MDF-UB7); For Liquid CO ₂ Small inner door (MDF-9ID) Inventory rack (IR-220U, IR-224U) Interface board (MTR-L03) *1; For LAN Interface board (MTR-480) *1; For RS-232C/RS-485

*1: It is recommended to use standard signal and interface cables with a maximum length of 30 meters.

Notes:

- Design or specifications are subject to change without notice.
- Refer to the updated catalogue when ordering an optional component.

PERFORMANCE

Product name	Ultra-Low Temperature Freezer MDF-DU901VH
Model number	MDF-DU901VH-PK
Cooling performance	-86 °C at the center of the chamber (ambient temperature; 30 °C, no load) *1
Temperature settable range	-90 °C to -50 °C
Temperature control range	-86 °C to -50 °C (ambient temperature; 30 °C, no load)
Rated voltage	AC 220 V
Rated frequency	60 Hz
Rated power consumption	595 W (Max. 930W)
Noise level	52 dB [A] (background noise; 20 dB)
Maximum pressure	1,860 kPa
Heat emission	Max. 3,348 kJ/h
Usable environment condition	Temperature; 5 °C to 30 °C Humidity; 80 %R.H. or lower

* 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 CHECK SHEET



CAUTION

Please 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.

MEMO

MEMO

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