SANYO

INSTRUCTION MANUAL

MCO-175

CO_2 Incubator

Note:

1. **No part of this manual may be reproduced in any form without the expressed written permission of SANYO.**

2. **The contents of this manual are subject to change without notice.**

3. **Please contact SANYO if any point in this manual is unclear or if there are any inaccuracies.**

CONTENTS

PRECAUTIONS FOR SAFE OPERATION

It is imperative that the user complies with this manual as it contains important safety advice.

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

Precautions are illustrated in the following way:

⚠WARNING

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

⚠CAUTION

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

Symbol shows;

△ this symbol means caution.

⃠ this symbol means an action is prohibited.

● this symbol means an instruction must be followed.

Be sure to keep this manual in a place accessible to users of this unit.

PRECAUTIONS FOR SAFE OPERATION

⚠WARNING

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

Only qualified engineers or service personnel should install the unit. The installation by unqualified personnel may cause electric shock or fire.

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

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

Never install the unit in a flammable or volatile location. This may cause explosion or fire.

Never install the unit where acid or corrosive gases are present as current leakage or electric shock may result due to corrosion.

Use a dedicated power source as indicated on the rating label attached to the unit.

Remove dust from the power supply plug before inserting in a power source. A dusty plug or improper insertion may pose a hazard.

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

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

Check the gas type and ensure that it is fit for the purpose. Make sure that all pipes are connected correctly and are not liable to become disconnected. Ensure that the gas pressure is set at the specified value. Improper connection of the gas pipe or use of incorrect gas pressure may result in leakage of CO_2 gas. Elevated level of CO_2 gas can be hazardous to health and may lead to asphyxiation and risk of death.

Do not insert metal objects such as a pin or a wire into any vent, gap or any outlet for inner air circulation. This may cause electric shock or injury by accidental contact with moving parts.

Never store volatile or flammable substances in this unit. This may cause explosion or fire.

PRECAUTIONS FOR SAFE OPERATION

⚠WARNING

As with any equipment that uses CO_2 gas, there is a likelihood of oxygen depletion in the vicinity of the equipment. It is important that you assess the work site to ensure there is suitable and sufficient ventilation. If restricted ventilation is suspected, then other methods of ensuring a safe environment must be considered. These may include atmosphere monitoring and warning devices.

Ventilate a room air occasionally when using CO_2 gas for control. The gas density will increase in an enclosed small room and high level of gas density is harmful for human. In addition, avoid inhaling the chamber air directly when opening the door if CO_2 gas is used.
Si l'appareil est utilisé dans un evdroit restreint, le niveau de la densité CO_2 de l'air peut s'élever et peut être nocif aux humains. Évitez d'aspirer l'air provenant de l'intérieur de l'appareil quand vous ouverz la porte.

Use this unit in safe area when treating the poison, harmful or radiate articles. Improper use may cause bad effect on your health or environment.

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

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

Never splash water directly onto the unit as this may cause electric shock or short circuit.

Never disassemble, repair, or modify the unit yourself. Any such work carried out by an unauthorized person may result in fire or injury due to a malfunction.

Disconnect the power supply plug if there is something wrong with the unit. Continued abnormal operation may cause electric shock or fire.

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

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

Prepare a safety check sheet when you request any repair or maintenance for the safety of service personnel.

PRECAUTIONS FOR SAFE OPERATION

⚠CAUTION

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

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.

Fix the tray supports and trays securely. Incomplete installation may cause injury or damage.

When removing the plug from the power supply outlet, grip the power supply plug, not the cord. Pulling the cord may result in electric shock or fire by short circuit.

Never damage or break the power supply plug or cord. Do not use the supply plug if its cord is loose. This may cause fire or electric shock.

Do not touch any electrical parts such as the power supply plug or any switches with a wet hand. This may cause electric shock.

Do not put a container with water or heavy articles on the unit. It may cause injury if the articles fall. Current leakage or electric shock may be resulted form the deterioration of insulation by spilled water.

Do not climb onto the unit or do not put articles on the unit. This may cause injury by tipping or damage to the unit.

Never lean or press on the glass. Intentional force may cause injury if the glass breaks.

Do not lean on the door. This may cause injury, current leakage, or electric shock if the unit tips over or door drops out.

Disconnect the power supply plug before moving the unit. Take care not to damage the power cord. A damaged cord may cause electric shock or fire.

Empty the humidifying pan completely before moving the unit. Spilled or splashed water may cause current leakage or electric shock.

Be careful not to tip over the unit during movement to prevent damage or injury.

Disconnect the power plug when the unit is not used for long periods.

Do not put the packing plastic bag within reach of children as suffocation may result

CAUTIONS FOR USAGE

1. 5°C higher than the ambient temperature

The chamber temperature must be at least 5°C higher than the ambient temperature. For example, the chamber temperature is set to 37°C, the ambient temperature must be less than 32°C. Keep the ambient temperature in adequate range.

2. Do not subject to direct air flow

Do not allow the air for air conditioning to hit the unit or door directly. Direct hit may cause condensation or contamination.

3. Allow adequate space between the cultures

When storing cultures in the chamber, keep the Petri dishes or bottles containing the cultures sufficiently apart from each other to allow adequate air circulation. Inadequate space may result in uneven temperature distribution and CO_2 concentration in the chamber.

4. Connect a pressure regulator to the gas cylinder

A pressure regulator must be installed when connecting the CO_2 gas cylinder to this unit. This work should be done by a qualified personnel. A regulator rated at 25MPa on the primary side and 0.2MPa on the secondary side is recommended. Also, use CO_2 gas having a high level of purity.

5. Always keep the chamber clean

The Petri dishes or bottles for culturing may cause contamination in the chamber. Clean the containers before storing them in the chamber.

6. Keep the inside panels dry

To protect the inside of the unit from contamination, the inside panels should always be kept dry. If water is spilled from a humidifying pan or if the door is kept open for a long period, condensation will form on the panels, allowing germs to breed. In such a case, wipe away the water with a dry sterile gauze. Particularly, if the medium is spilled, wipe it up immediately and sterilize the area.

7. Fill the humidifying pan with sterile distilled water

Always use sterile distilled water to fill the pan. Check the water level every day and replenish the water promptly if the level is low. Note that when low temperature water is poured, the chamber temperature drops significantly. Set the pan properly so that the shorter edges are positioned in the front and back. Improper setting may cause faulty humidifying or condensation. Also, clean the pan once a month.

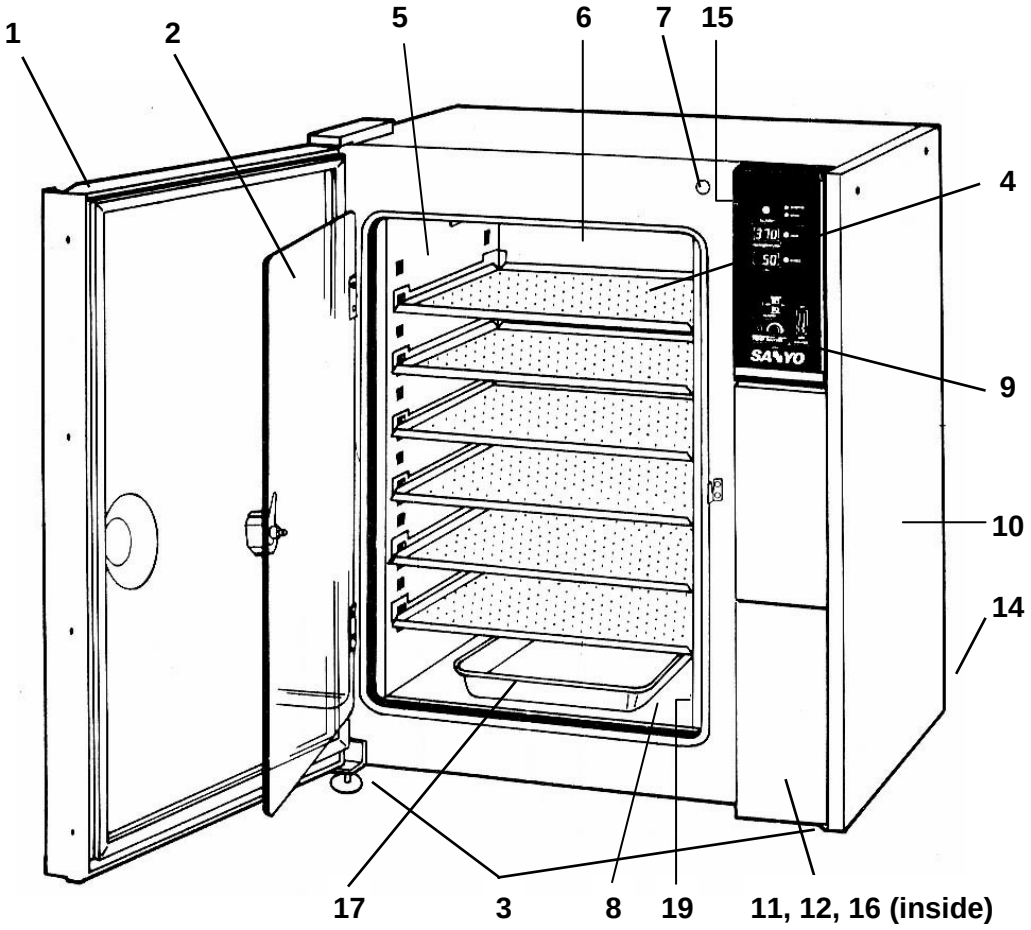
8. Always shut the inner door

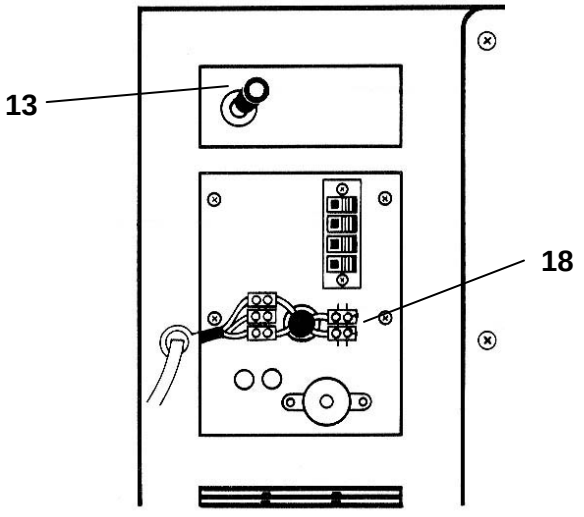
Shut the inner door completely, and then shut the door. If the inner door is not closed completely, even if the door is closed, the unit will fail to exhibit its maximum performance. And close the doors gently. Rude closing may cause spillage of medium, incomplete closing, or damage of gasket.

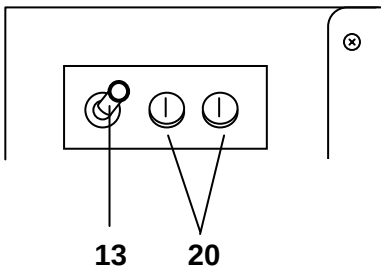
9. Stacked module

When the product is used in stacked module, make sure to fix the unit by using the optional kit (MCO-17S).

INCUBATOR COMPONENTS







< CE model >

INCUBATOR COMPONENTS

1. Outer door: Sticks to frame with magnetic packing. Door heater is installed in the door panel. The heater eliminates moisture on the inner door.

2. Inner door: Made of tempered glass. Packing adhered around the edges creates a hermetic seal. This inner door can be removed from the unit.

3. Leveling foot: Used for leveling the unit. This is a screw type and when it is turned to clockwise, the leg becomes shorter.

4. Tray: Made of copper alloy resistant to contamination. Trays can be easily removed from the unit to be cleaned or disinfected.

5. Tray support: 6 supports can be attached to each side (right and left). They can be removed after removing trays.

6. Fan (inside the top panel): For circulating the chamber air o distribute the gas equally. The fan is removal for cleaning and disinfecting.

7. Water supplying inlet, draining outlet: Is connected to tank by stainless steel pipe. To supply water or to drain from this tap, connect the water tube provided. When not using, keep it capped.

8. Water jacket: Is used to hold water. Capacity of this stainless steel tank is about 40 liters.

9. Control panel: Equipped with temperature controller, digital thermometer, CO_2 gas controller, digital CO_2 display, warning devices (for the stoppage of electricity, temperature, CO_2 and water level), water level warning lamp, overheat warning lamp, door warning lamp and power switch.

10. Machinery compartment: Stores CO_2 sensor, humidifier, sampling pump, and high performance filter.

11. Drain pan: Is installed at the inside of tiny window. Remove water from the pan once a week.

12. Sample air outlet

13. Gas pipe connector: For connecting CO_2 gas pipe.

14. Earth terminal

15. Door switch: When the door is opened, this switch stop the CO_2 solenoid valve and the fan.

16. Water level indicator: Blocks CO_2 measurement circuit with humidified drain water. Always make sure that the water in this indicator is higher than the pipe. On primary operation, put pure or distilled water in this meter.

17. Humidifying pan: Use the sterile distilled water to fill the pan. The humidifying heater is provided at the bottom of the chamber. Install the pan properly to keep appropriate performance. See item 7 on page 6.

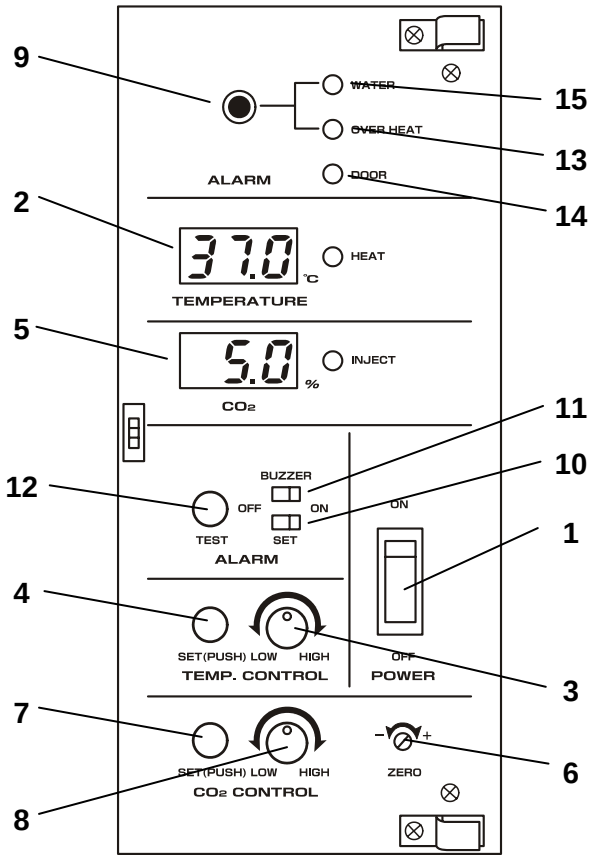
18. Remote warning terminal

19. Monitoring hole

20. Fuse (CE model only): Only service engineer can replace.

INCUBATOR COMPONENTS

Control panel



1. Power switch: This switch turns the power on and off for the whole unit.

2. Temperature control and display:

Temperature control knob: When the power is turned on, the current internal temperature of the unit is displayed on the temperature display **2**. Pushing the set temperature button **4** located to the left of the temperature control knob **3** displays the current set temperature on the temperature display **2**. With the button **4** pushed in, adjust the temperature displayed on the temperature display **2** to the desired temperature using the temperature control knob **3**. When the temperature has been selected, release the set temperature button 4 to complete temperature setting.

Note: If the temperature control knob **3** is turned, the set temperature will be changed regardless of whether the set temperature button **4** is pushed in or not. This button is used only to display the set temperature.

Temperature display: The temperature display **2** normally indicates the internal temperature of the unit. When the set temperature button 4 is pushed in, the current set temperature is displayed. If the internal temperature varies from the set temperature by more than +/- 1^{o}C, the warning function is activated and the first digit of the temperature display **2** flashes.

3. CO_2 level controller

Zero adjustment: When the power is turned on, the CO_2 level display **5** lights up. This display should be adjusted to zero the first time the machine is used and once a month thereafter, or after a long period of disuse.

Zero adjustment procedure

1) Clear the inside of the unit of CO_2 gas with a fan if it is suspected that there might be CO_2 gas still inside the unit.

2) With the power on, put sterile distilled water in the humidifying pan and humidify the inside of the unit for about eight hours.

3) Using a thin standard screwdriver, turn the zero adjustment screw **6** until the CO_2 level display **5** indicates "0".

CO_2 level control

Press the CO2 set level button **7** and adjust the CO_2 level display **5** to the desired level using the CO_2 level control knob **8**. Upon releasing the button **7**, the display **5** will gradually change to the set level. The CO_2 level in this unit is controlled by an on/off system. Therefore, the level of CO_2 will vary up to +/- 0.2% from the set level. Since, if the delivery pressure from the CO_2 cylinder is too high, the CO_2 level may fluctuate +/- 0.3% or more, this should be monitored carefully.

Note: If the CO_2 level control knob **8** is turned, the set level will be changed regardless of whether the CO_2 set level button **2** is pushed in or not.

CO_2 level display

The CO_2 level display **5** indicates the current level of CO_2 inside the unit. When the CO_2 set level button **7** is pushed, the CO_2 level display **5** indicates the level of CO_2 that has been set. This unit is equipped with a CO_2 level warning function. If the level of CO_2 in the unit differs from the set level by more than +/- 1%, first digit of the CO_2 level display **5** will flash.

4. Warning devices: When any of the following situations occur, the warning devices will be activated (i.e., the warning lamp will flash and the buzzer will sound)

1) Power is lost;

2) If the unit overheats;

3) The water level warning function is activated;

In the case of 1), 2), or 3), the warning devices are activated immediately.

4) The temperature control warning function is activated;

5) The CO_2 level control warning is activated;

In the case of 4) or 5), the warning devices are activated after about 15 minutes.

Warning lamp 9

This lamp flashes when a warning function is activated. Power for the warning devices is supplied by nickel-cadmium batteries which are recharged during normal operation.

Warning switch 10

This switch should be set to ON for the warning devices to operate. If the warning devices are not needed or desired, this switch may be set to OFF.

Buzzer switch 11

If this switch is set to OFF, the buzzer does not sound when the warning devices are activated. The warning lamp **9** will still flash, however.

Warning test switch 12

This switch is used to confirm that the warning devices are performing properly. Pushing this switch activates the warning devices.

Note:

A terminal for connecting a remote warning device (see page 15) is available. If the warning switch is set to OFF, this device also does not operate.

The overheating warning includes a self-protective function. Once a warning is issued, the warning devices continue to flash and sound even if normal conditions are restored. To reset the warning devices, turn the power off and then turn the power back on again.

Overheating warning lamp 13

This lamp lights when the temperature near the heater becomes excessive. The heater automatically shuts off when this lamp lights.

Door lamp 14

This lamp lights when the door is opened.

Water level warning lamp 15

The water level in water jacket is measured by water level sensor. If there is a shortage of water, this lamp lights up. When this happens, add water to the water jacket up to this lamp goes off.

INSTALLATION

Installation site

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

Note: The ambient temperature must be at least 5°C lower than the set temperature.

1. A location not subjected to direct sunlight or direct air flow from an air conditioner

2. A location with clean air and adequate ventilation (Small and sealed room is not recommended.)

> ⚠ **WARNING**
> **If the unit is used in a small confined room, the CO_2 density level in the air could rise and may be harmful to humans.**
> **Si l'appareil est utilisé dans un evdroit restreint, le niveau de la densite CO_2 de l'air peut s'élever et peut être nocif aux humains. Evitez d'aspirer l'air provenant de l'inérieur de l'appareil quand vous ouverz la porte.**

3. A location away from heat generating sources

4. A location with a sturdy and level floor

> ⚠ **WARNING**
> **Install the unit on a sturdy floor.** If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.
> **Select a level and sturdy floor for installation.** This precaution will prevent the unit from tipping. Improper installation may result in water spillage or injury from the unit tipping over.

5. A location without flammable or corrosive gas

> ⚠ **WARNING**
> **Never install the unit in a flammable or volatile location.** This may cause explosion or fire.
> **Never install the unit where acid or corrosive gases are present** as current leakage or electric shock may result due to corrosion.

6. A location not prone to high humidity

> ⚠ **WARNING**
> **Do not use the unit outdoors.** Current leakage or electric shock may result if the unit is exposed to rain water.
> **Never install the unit in a humid place or a place where it is likely to be splashed by water.** Deterioration of the insulation may result which could cause current leakage or electric shock.

INSTALLATION

Prevent contamination

To prevent contamination of the chamber, select an appropriate location for installation as well as the complete disinfection of the chamber components.

1. Avoid hot and humid location

Avoid location with high temperature and/or humidity as the presence of bacteria in the air is greater than in normal environment.

2. Avoid drafty location and location with many passers-by

Avoid locations near doors, air conditioners, fans, etc., where slight breezes can facilitate the entry of bacteria into the chamber.

3. Installation in a sterile room

To get the cultivation more efficiently, install the unit in a sterile room.

4. Use clean containers

The contamination is mainly caused by the containers such as Petri dishes or bottles stored in the chamber. Always keep the containers clean.

Installation

1. Remove the packaging materials and tapes

Remove all transportation packaging materials and tapes. Open the doors and ventilate the unit. If the outside panels are dirty, clean them with a neutral detergent and wipe it up with a wet cloth.

2. Adjust the leveling feet

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

3. Fix the unit

Two fixtures are attached to the rear of the frame. Fix the frame to the wall with these hooks and rope or chain.

4. Ground (earth)

⚠WARNING

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

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

BEFORE COMMENCING OPERATION

Connection of CO_2 gas cylinder

⚠WARNING

Check the gas type and ensure that it is fit for the purpose. Make sure that all pipes are connected correctly and are not liable to become disconnected. Ensure that the gas pressure is set at the specified value. Improper connection of the gas pipe or use of incorrect gas pressure may result in leakage of CO_2 gas. Elevated level of CO_2 gas can be hazardous to health and may lead to asphyxiation and risk of death.

Use a liquefied CO_2 gas cylinder, not a siphon (dip tube) type. The CO_2 gas should be 99.5% or more pure.

Install a pressure regulator on the cylinder. Use a regulator rated at 25MPa on the primary side and 0.2MPa on the secondary side. Use the following procedure to attach the incubator to the cylinder:

1. Using the gas tube provided, connect the pressure regulator to the CO_2 inlet located at the rear left hand side of the CO_2 incubator.

2. Set the CO_2 pressure on the secondary side to 0.03MPa. Excessive pressure may cause disconnection of internal pipes inside the CO_2 incubator which will result in leakage of CO_2 gas into the atmosphere. **Elevated level of CO_2 gas can be hazardous to health and may lead to asphyxiation and risk of death.**

3. Check that no gas is leaking at any point where the pipe connects with the CO_2 regulator or the CO_2 incubator.

Note:

The incubator, including the gas supply pipes and services must be examined at frequent intervals to ensure they are sage. Ensure that items such as pipes are replaced if there is any sign of deterioration.

Sterilizing of chamber and attachments

Before first start-up of the unit, the chamber and internal attachments should be cleaned and sterilized as follows.

1. Remove the all attachments and accessories in the chamber by following the procedure on page 20.

2. Clean the all attachments (including sensors inside the top plate) and accessories with neutral detergent and then wash out the detergent with distilled water

3. Wipe the attachments and accessories with a gauze containing alcohol for sterilization and then wipe off with a dry gauze.

4. Wipe the inside wall with a gauze containing alcohol for sterilization and then wipe off with a dry gauze.

5. Replace all attachments and accessories in the chamber.

6. Fill the humidifying pan with the sterile distilled water.

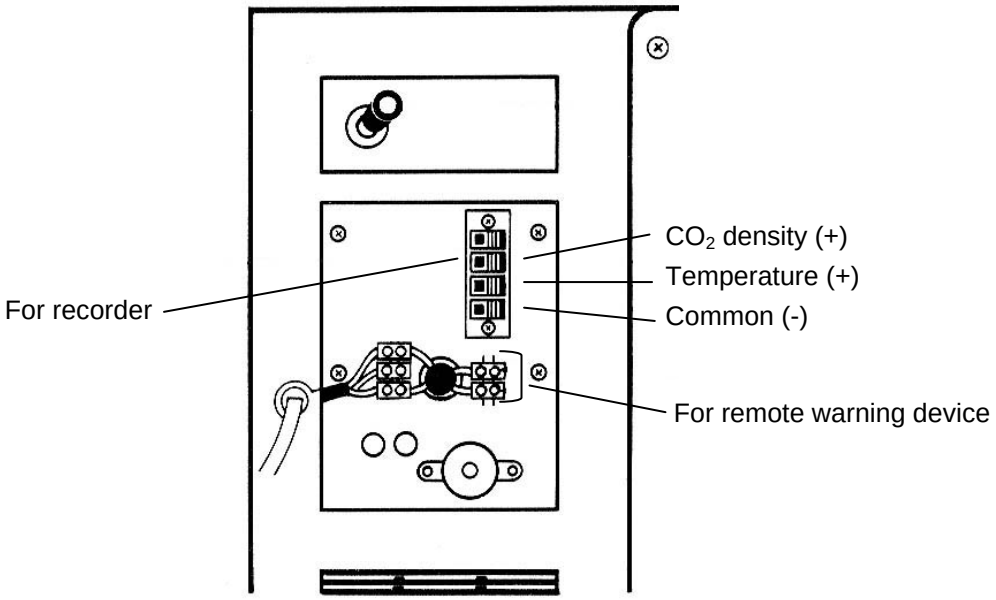
Note:

Do not clean the inside of the unit with a solution of disodium chlorate or other halogen-based solution because this may cause rust.

TERMINALS

Terminal for remote warning and remote recorder

The remote warning terminal and remote recorder terminals are located in the box found at the top right inside the rear panel. Remove the screws holding the rear panel cover, and make connections to the terminals inside the panel, taking care to connect the wires correctly.



[Remote warning terminal]

The remote alarm terminal is a contact output.

Normal	:	OPEN
Abnormal	:	CLOSE
Contact capacity	:	DC 24V, 1A

When the power switch is OFF or the power failure condition, the contact output is close.

[Remote recorder terminal]

The output from the remote recorder terminals are each 0 to 100mV. This means that the output is as follows for each control element:

Temperature: 0 to 100^{o}C; 1mV/^{o}C

CO2 density: 0 to 20%; 5mV/%

When attaching an optional recorder in accordance with the instruction item “Temperature recorder”, connect the last three of the recorder’s six terminals to these remote recorder terminals.

TEMPERATUR RECORDER (Optional)

When attaching an optional recorder, do the following:

1. Connect the harness (recorder connecting cords) supplied with the incubator to the recorder (option).

2. Open the machinery compartment's cover by removing the two screws.

3. Open the cover in the center of the control panel; remove the screws in the cover and remove it. The use metal shears to cut away the sheet metal in the recorder mounting position.

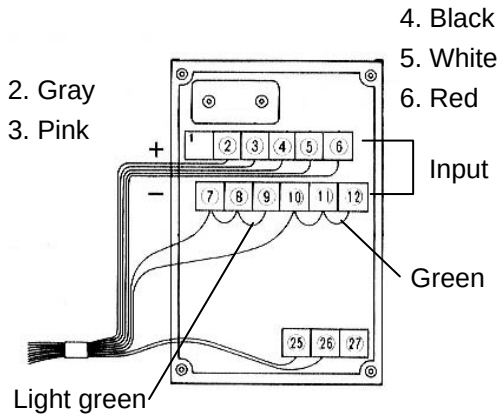
4. Insert the recorder from the front, using the accessory mounting fixtures to fasten the recorder firmly to the control panel.

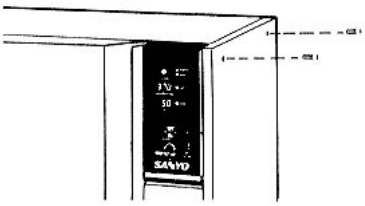
5. As shown in the illustration, disconnect and remove the wiring joint and the connector indicated by the arrow from the rear of the recorder. Then, to this part connect the other end of the wiring bundle which was connected to the recorder in step 1.

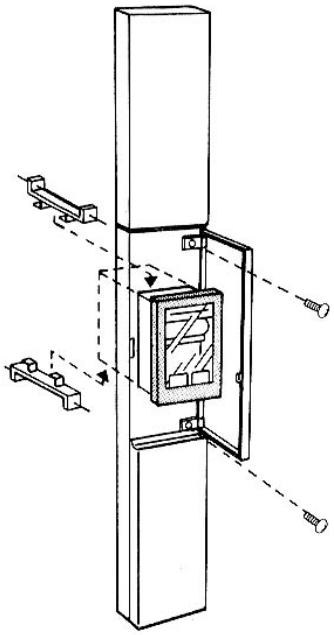
6. Replace the screws in the cover in their former location, then replace the machinery compartment's cover with its original screws.

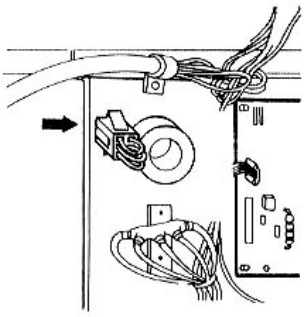
7. The recorder's second terminal indicates carbon dioxide density, and the third one indicates temperature. The recorder terminals on the rear part of the frame are used respectively as the recorder's 4th, 5th, and 6th terminals.

8. When using in stacked module, the remote recorder terminal for the chamber to which a recorder is attached operates as an input terminal to the recorder. On the other hand, the remote recorder terminal for the chamber without a recorder operates as a signal output terminal as noted in the section "Terminals" on page 15. As a result, it can be connected to the remote recorder terminal of the chamber which has a recorder, thus allowing the recording of data from both chambers.









START-UP OF THE UNIT

Following shows the procedure for starting-up the unit.

1. Fill water jacket with about 3 liters of city water and 37 liters of pure water. Regulate the level of water exactly by looking at the water level warning lamp.

2. Put pure water in the water level indicator with a filler, up to the level where the pipe is covered. (See page 20)

3. Connect the power, and turn the power on.

4. Set the temperature as desired (e.g. 37^{o}C). Leave the unit as it is for 4 to 8 hours, then check to make sure that the internal temperature is at the temperature set previously.

5. Make sure that the CO_2 level display shows 0%.

6. When the CO_2 level display is not 0%, adjust by turning the ZERO adjusting screw.

7. When zero adjustment is complete, set the CO_2 gas level to the desired level.

8. Please ensure that the CO_2 level is within +/- 0.2% of the level that was set in step 10.

9. If the CO_2 is at the proper level, place the culture material in the unit and begin incubation.

ROUTINE MAINTENANCE

⚠WARNING

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

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

Sterilizing of chamber and attachments

When the chamber of the unit is contaminated, the chamber and internal attachments should be cleaned and sterilized as follows.

1. Remove the all attachments and accessories in the chamber by following the procedure on page 19.

2. Clean the all attachments (including sensors inside the top panel) and accessories with neutral detergent and then wash out the detergent with distilled water.

3. Wipe the attachments and accessories with a gauze containing alcohol for sterilization and then wipe off with a dray gauze.

4. Wipe the inside wall with a gauze containing alcohol for sterilization and then wipe off with a dray gauze.

5. Replace all attachments and accessories in the chamber.

6. Fill the humidifying pan with the sterile distilled water.

Note:
Do not clean the inside of the unit with a solution of disodium chlorate or other halogen-based solution because this may cause rust.

Cleaning of outside

1. Clean the unit once a month. Regular cleaning keeps the unit looking new.

2. Use a dry cloth to wipe off small amounts of dirt on the outside. If the unit is very dirty, use a neutral detergent.

3. After cleaning, wipe away the cleaner completely with a cloth washed in clean water.

4. Never pour water onto or into the unit. Water can cause the electric shock or short circuit.

ROUTINE MAINTENANCE

Removal of attachments

1. Close the tap of the gas cylinder and turn off the power.

2. Open the outer door. Then open the inner door slightly and lift to remove it. See Fig. 1

3. Pull out the humidifying pan and trays. See Fig. 2

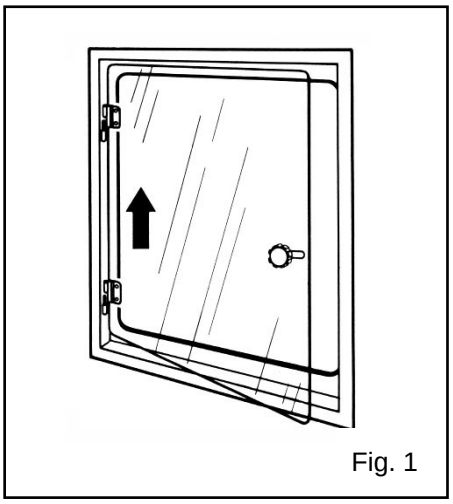


Fig. 1

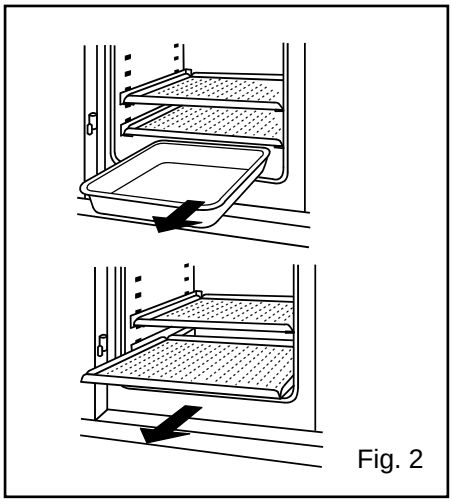
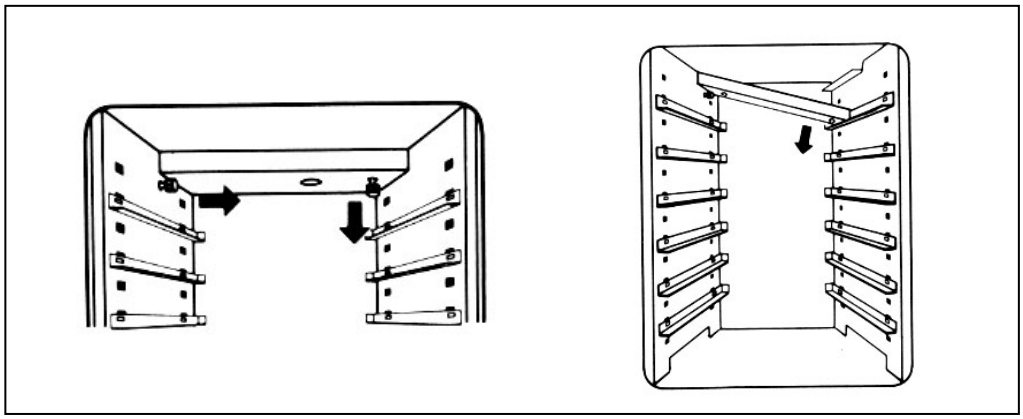
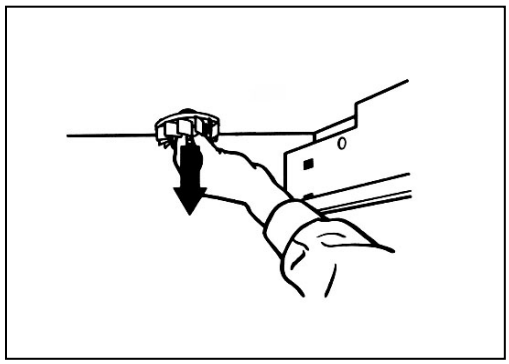


Fig. 2

4. To remove the right and left panel and the top panel, first remove the screw on the left side as shown in the illustration. Then remove the right side screw on the top panel and pull down to remove.

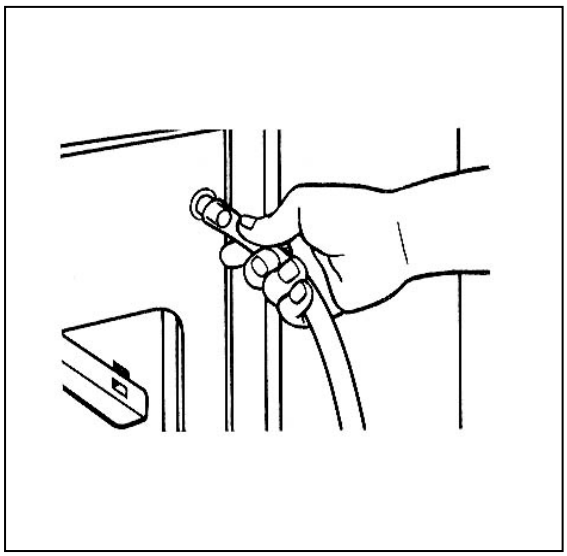


5. Pull the spring in the center of the fan downwards and remove it as shown in the diagram. Pull the fan down with a hand and remove it also.



SUPPLYING WATER

Supplying water to water jacket and draining tank



1. Supply about 40 liters of water in water jacket.

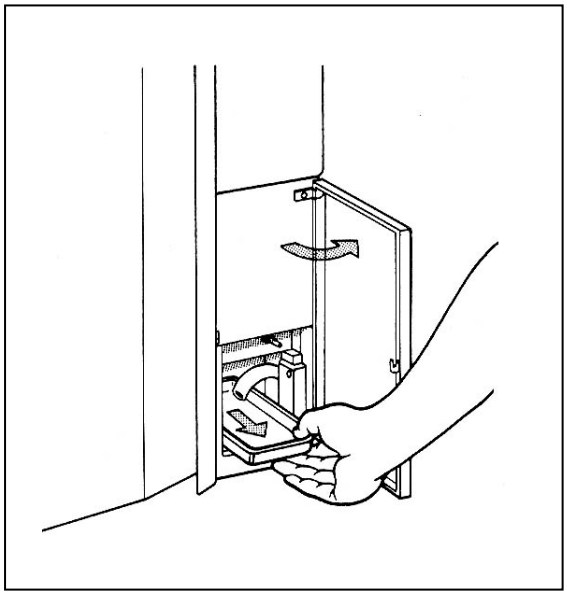
2. Water supplying inlet and draining outlet of the water jacket are common tap. To drain, connect attached water tube to the tap and siphon out. Drain water into a container (e.g. a bucket). A stainless steel pipe is installed at the bottom of the tank.

3. Connect the tap of the water tank and a faucet with the attached water tube. Supply water directly to tank. When not using the tap, keep it capped.

Note:

Sanyo recommends that you add MCO-100C (optional) to the water jacket with 0.5 to 1% of total amount of water. By this agent, algae or stains are not produced, enhances anticorrosion and rust proof qualities.

Supplying water to humidifying pan and draining water from drain pan



1. Humidifying pan

Put either pure water or distilled water in the stainless steel humidifying pan and place the pan inside the unit on the bottom. Add water once a week.

2. Drain pan

Open the door below the control panel and remove the pan. Empty the water once a week. In addition, when first using the unit, or using the unit after a long period with no operation, fill the water level indicator with pure or distilled water, using the filler provided. Caution must be exercised, because if the water does not close off the pipe underneath, proper control of the level of CO_2 gas in the unit might not be possible.

TROUBLESHOOTING

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

If the alarm function operates
If the alarm function and the buzzer operates, check the cause using the following procedure.

[At the beginning of operation]
1. The problem is due to a lack of power supply.
2. The breaker is open. Check whether the digital indication is lighting up or not.
3. The water level is down. Check the water level or over-heat warning lamp.
4. The temperature in the box is not at the desired temperature. Check it by pushing button.
5. The CO_2 in the box is not at the desired density.
a. Check whether the cock of the CO_2 cylinder opens.
b. Check whether the second pressure of the pressure regulator is adjusted to about 0.03MPa.
c. Check whether the connection of CO_2 cylinder and pressure regulator (with vinyl tube) is secure.

[During operation]
1. Check if there are any power source problems
2. Check the water level or over-heat warning lamp.
3. The set temperature has been changed.
4. The door has been left open for a long while.
5. Any cool article has been put in the box.
In the case of 3, 4 or 5, leave the unit as it is. The warning function will stop working automatically.
6. The set CO_2 has been changed.
7. The CO_2 cylinder has become empty. Check the first pressure gauge of the CO_2 cylinder once a month. Change CO_2 cylinder when the first pressure falls under 4.8MPa.

If the chamber temperature is not equal to the set temperature
1. The temperature in the vicinity is too high. The ambient temperature must always be at least 5^{o}C less than the set temperature.
2. The outer door was closed while the inner door was left open.

If the gas density does not coincide with the set value
1. The secondary pressure is not set to 0.03MPa.
2. The gas tube is clogged.

If the chamber humidity does not rise
1. The humidifying pan is not filled with sterile distilled water.
2. The humidifying pan is not placed in proper direction. The shorter sides are positioned front and back.

If the warning function does not work
1. Check whether the cad-nica cell is well-charged or not. If not, operate the unit for about 3 hours. When the cad-nica cell is discharged completely, it takes about 2 days to recharge completely.

ENVIRONMENTAL CONDITIONS

This equipment is designed to be safe at least under the following conditions (based on the IEC-1010-1):

1. Indoor use;

2. Altitude up to 2000 m;

3. Ambient temperature 5^{o}C to 40^{o}C

4. Maximum relative humidity 80% for temperature up to 31^{o}C decreasing linearly to 50% relative humidity at 40^{o}C;

5. Mains supply voltage fluctuations not to exceed ±10% of the nominal voltage;

6. Other supply voltage fluctuations as stated by the manufacturer;

7. Transient overvoltages according to Installation Categories (Overvoltage Categories) II; For mains supply the minimum and normal category is II;

8. Pollution degree 2 in accordance with IEC 664.

DISPOSAL OF UNIT

⚠WARNING

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

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

SPECIFICATIONS

Name	CO_2 Incubator
Model	MCO-175
External dimensions	W770 x D620 x H900 (mm)
Internal dimensions	W490 x D505x H690 (mm)
Interior volume	170 L
Tray dimensions	W450 x D450x H10 (mm)
Exterior	Backed-on acrylic finish on galvanized steel
Interior	Stainless steel (SUS-304)
Outer door	Backed-on acrylic finish on galvanized steel
Inner door	Tempered glass
Trays	Stainless steel (SUS-304)
Insulation	Rigid polyurethane foamed-in place (CFC-FREE)
Volume of water jacket	40 L
Fan	Turbo fan, Outer diameter 80 (mm)
Fan motor	2 polarities, Output 1W
Sampling pump	Diaphragm pump
Heating system	Water jacket
Humidifying system	Natural evaporation with humidifying pan
Temperature controller	PID control (sensor; Pt 100 ohm)
Temperature display	Digital display
CO_2 controller	ON-OFF control system (sensor; thermal conductivity type)
CO_2 density display	Digital display
Air circulation	Forced draft
Air filter	0.3 μm, Efficiency; 99.97%
Alarm	Temperature alarm, CO_2 density alarm, Upper limit temperature alarm, Door alarm
Remote alarm contact	DC 24V/1A
Output of recorder terminal	0 to 100 mV (temperature, CO_2 density)
CO_2 connecting inlet	4 to 6 mm diameter tube
Accessories	6 trays, 6 sets of tray support, 1 gas tube, 1 water tube 1 humidifying pan, 1 drain pan, 1 filler
Weight	108 kg
Option	Recorder, CO_2 pressure regulator, Stainless steel tray, Water preservative agent (MCO-100C)

Note: Design or specifications will be subject to change without notice.

PERFORMANCE

Model	MCO-175
Usable environment condition	Temperature; 0°C to 35°C, Humidity; equal or less than 80% R.H.
Temperature control range	Ambient temperature +5°C to 50°C (ambient temperature; 5°C to 35°C)
Temperature distribution	± 0.2°C * (ambient temperature; 20°C, setting; 37°C, 5%, no load)
Temperature variation	± 0.1°C (ambient temperature; 20°C, setting; 37°C, 5%, no load)
CO_2 control range	0 to 20%
CO_2 variation	± 0.15% (ambient temperature; 20°C, setting; 37°C, 5%, no load)
Chamber humidity	95 ± 5% R.H.
Power consumption	312 W
Maximum heat emission	1125 kJ/h
Noise level	33 dB (A scale)

Note :The unit with CE mark complies with EC directives 89/336/EEC, 93/68/EEC and 73/23/EEC.

* It is based on our measuring method.

⚠ CAUTION

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

Safety check sheet

1. Refrigerator contents : ☐Yes ☐No
   Risk of infection: ☐Yes ☐No
   Risk of toxicity: ☐Yes ☐No
   Risk from radioactive sources: ☐Yes ☐No

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

2. Contamination of the unit
   Unit interior ☐Yes ☐No
   No contamination ☐Yes ☐No
   Decontaminated ☐Yes ☐No
   Contaminated ☐Yes ☐No
   Others:

3. Instructions for safe repair/maintenance of the unit
   a) The unit is safe to work on ☐Yes ☐No
   b) There is some danger (see below) ☐Yes ☐No
   Procedure to be adhered to in order to reduce safety risk indicated in b) below.

Date :
Signature :
Address, Division :
Telephone :

Product name :	Model :	Serial number :	Date of Installation :
CO_2 incubator	MCO-175		

Please decontaminate the unit yourself before calling the service engineer.

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