

INSTRUCTION MANUAL

Labo Autoclave

MLS-3750

MLS-3780



Applied to 230V units

Thank you for purchasing a Sanyo Autoclave.

- Please read this instruction manual carefully before using the product.
After reading this manual, store it in a readily accessible place along with the warranty card.
- Please pay particular attention to the "Safety Precautions" section on page 1 to 5.

Contents

Safety Precautions.....	1-5
Before Using the Unit.....	6
Name and Function of Parts.....	7-8
Explanation of Caution Label.....	9
Concerning Sterilization Items.....	10-11
Usage Instructions.....	12-22
Incase of Power Failures.....	22
Maintenance.....	23-24
• Inspection the Power Switch.....	24
Troubleshooting Guide.....	25-26
Specifications.....	27

Safety Precautions

These precautions must be heeded without fail.

- *Please read the "Safety Precautions" section carefully before using the unit. Follow them to ensure the unit is used properly.
- *These precautions must be heeded without fail as they are intended to ensure the safe use of the unit and to prevent harm to the operator or other persons as well as loss of or damage to property. The displays and significance of each category of precautions are set forth below.
- The possible consequences of failing to heed these precautionary displays or operating the unit improperly are classified into the following categories.

 Danger	: This warns of actions which could cause death or serious injury to the operator or other persons.
 Warning	: This warns of actions which could possibly cause death or serious injury to the operator or other persons.
 Caution	: This warns of actions which are likely to cause injury to the operator or other persons or loss of or damage to their property. The significance of the symbols presented in the text is as follows.

0: This symbol denotes a prohibited action which must not be performed.	 General prohibition  Touching with wet hands prohibited  Disassembly prohibited  Contact with water prohibited
●i: This symbol denotes a compulsory action which must be performed without fail.	 You must do this.  Grounding wire must be connected.

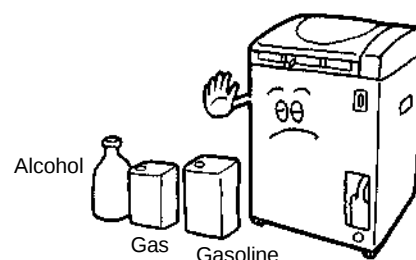
Danger

(Never put flammable items into the unit)

0

Do not place the following items inside or near the unit. They may cause an explosion or lead to early trouble in the unit.

- Explosive substances
- Ignitable substances
- Oxydizing substances
- Flammable substances
- Combustible gases



Warning

Connect the unit's power cord to its own dedicated connection outlet where no other plugs are connected.

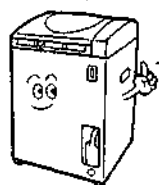


Connect the power cord to its own dedicated single-phase AC Local voltage. Failure to observe this warning can cause ignition or malfunctioning.

! Warning

Make sure the unit is properly grounded.

©



"Make sure I'm properly grounded!"

Check that the unit has been properly grounded. Be absolutely sure to connect one end of the grounding wire straight to ground and the other end to the grounding terminal.

Failure to observe this warning can cause electric shocks in the event of short-circuiting.

Do not extend the power cord.

0

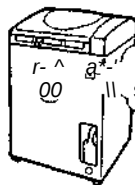


The power cord must never be spliced or plugged into an extension cord.

Failure to observe this warning can result in electric shocks or fire.

When malfunctioning has occurred, shut down operation and turn off the power.

©

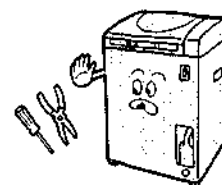


"Set my power switch to OFF!"

Should a malfunction occur (burning smell, etc.), set the power switch to the OFF position, shut off the mains power, and contact the dealer from whom you purchased the unit.

Continuing to operate the unit while it is malfunctioning may result in electric shocks or fire.

Do not modify the unit.



The unit should never be disassembled or repaired except by a certified repair technician.

Failure to observe this warning may result in a fire or malfunctioning or cause injury.

Check the unit's sterilization performance.

©



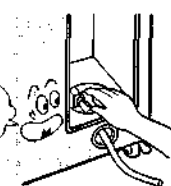
The unit's sterilization performance will vary depending on such factors as the volume and types of sterilization items, the way the items are loaded into the unit and the types of containers used. Therefore, use a sterilization indicator such as an "OK card" to check this performance.

Failure to observe this warning may cause accidents or incomplete sterilization.

Do not open the drain valve during operation.



"Don't open this valve!"



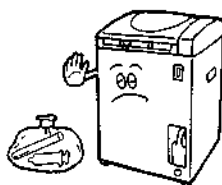
When draining off the heating water, allow at least 2 hours to elapse upon completion of operation before opening the cover.

Failure to observe this warning may cause hot water to gush out, resulting in scalding or accidents.

(The heating water is poured inside the chamber to cause the heater in the chamber to generate the steam for sterilization.)

Do not sterilize items inside containers or bags which do not allow steam to pass through

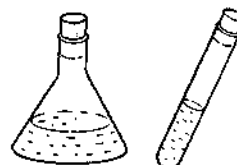
0



Failure to observe this warning may cause accidents or incomplete sterilization.

Do not use stoppers to seal up containers with sterilization items inside.

0



Either use porous caps or loosen the lids sufficiently.

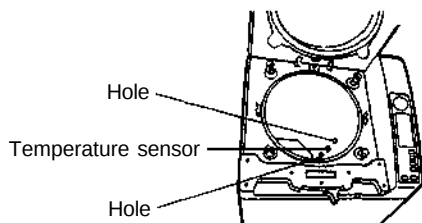
Failure to observe this warning may cause accidents or incomplete sterilization.

Safety Precautions

⚠ Warning

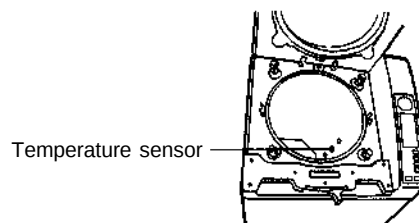
Do not allow the sterilization items to block the holes or temperature sensor inside the chamber.

0



Failure to observe this warning may make it impossible to control the unit or cause incomplete sterilization.

Do not allow the sterilization items to apply force to the temperature sensor inside the chamber.



Failure to observe this warning may make it impossible to control the unit or cause incomplete sterilization.

When sterilizing only containers such as beakers, flasks or test tubes, place them on their sides or upside down with their openings at the bottom.

©



Placing the containers right side up with their openings at the top will make it hard for the air inside to escape and for the steam to penetrate sufficiently inside, and incomplete sterilization may result.

To sterilize items in a sterilization bag, pour about 300 milliliters of water inside and keep the bag open.

0

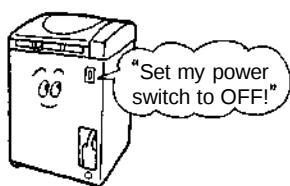


Failure to pour water inside the bag or sterilizing items in a bag whose opening has been closed may cause incomplete sterilization.

⚠ Caution

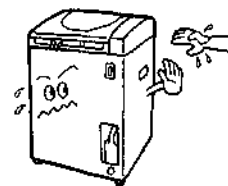
Before proceeding with maintenance, set the power switch to OFF.

©



Performing maintenance work with the power switch still at the ON setting may cause electric shocks.

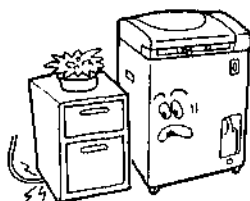
(Do not touch the power switch with wet hands.



Failure to observe this caution may cause electric shocks.

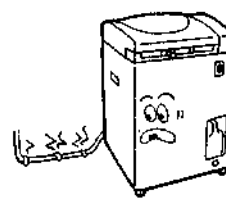
f Do not place objects on top of the power cord, j

0



Failure to observe this caution may cause the power cord to overheat and result in a fire.

(Do not use staples, etc. to secure the power cord.



Failure to observe this caution may cause the power cord to overheat and result in a fire.

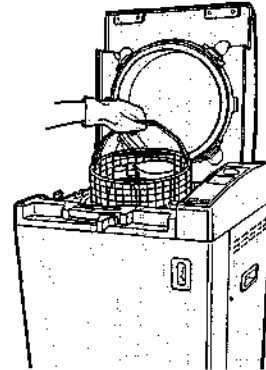
⚠ Caution

Take care not to scald yourself when removing sterilized items upon completion of operation.

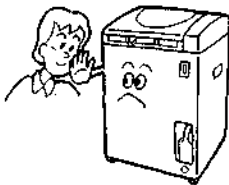


Thermally insulated gloves must be worn without fail. Bear in mind that it takes more time for the temperature of a liquid to drop.

Handling sterilized items immediately upon completion of operation may result in scalding.

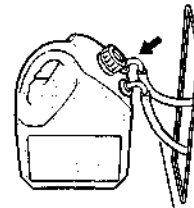


Keep your face clear of the unit when opening the cover upon completion of operation.



Hot steam will be released from the chamber which may result in scalding.

Insert the packing of the drain hose securely into the hole in the exhaust tank, and close the cap.



Failure to ensure that the packing of the drain hose has been securely inserted or that the cap is closed may cause steam to escape during operation and result in scalding.

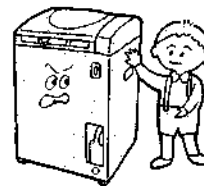
Keep clear of the safety valve vent.



Keep clear of the safety valve vent when steam is escaping from it. Set the power switch to the OFF position, shut off the mains power, and contact the dealer from whom you purchased the unit.

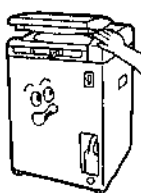
Failure to observe this caution may result in scalding.

Do not allow children to use or play with the unit.



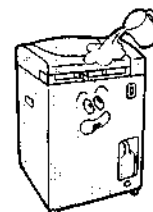
Failure to observe this caution may result in scalding, electric shocks or injury.

(Do not touch the hinge part of the cover,)



You may catch your fingers or hand or otherwise injure yourself.

Do not spill water onto the unit.

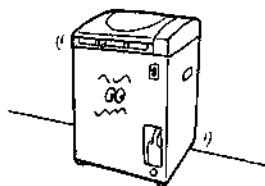


Failure to observe this caution may cause the electrically conductive parts to short-circuit, resulting in electric shocks or a fire.

Safety Precautions

⚠ Caution

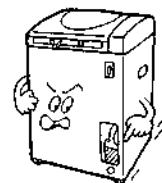
(DO not tip the unit or allow it to topple over.



Failure to observe this caution may cause the water inside the chamber to spill, resulting in scalding or electric shocks.

Do not move the unit while the exhaust tank still has water inside it.

0



When the unit is to be moved, the water still inside the exhaust tank must be disposed of without fail.

Failure to observe this caution may cause the water inside the exhaust tank to spill, resulting in scalding or an accident.

Take hold of the grips and carry the unit when it is to be moved.

©

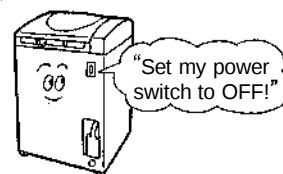


Allowing the unit to topple over inadvertently may result in injury or an accident.

Always use the lifter when lifting the unit to prevent personnel injury or equipment damage.

Set the power switch to OFF when trouble is indicated by a process display.

©

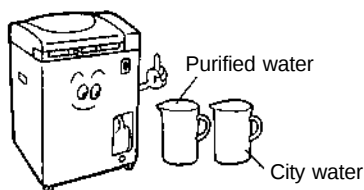


When an operation is re-tried but the same mode is re-established, set the power switch to the OFF position, and contact the dealer from whom you purchased the unit.

Continuing to operate the unit while it is malfunctioning may result in electric shocks or fire.

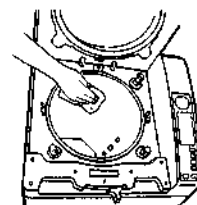
Usage Precautions

Use purified or city water for the heating water.



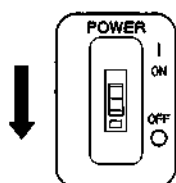
Use of well water, saline water, etc. may cause trouble.

The inside of the chamber must be cleaned out when cultures generating sulfide or chlorine gases have been sterilized.



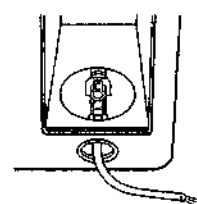
Failure to observe this caution may give rise to corrosion which in turn may cause early trouble in the unit.

Set the power switch to OFF after the unit has been used for the day.



Similarly, if the unit is not going to be used for an extended period of time, the power switch must be set to OFF and the mains power shut off without fail.

Drain off the heating water after the unit has been used for the day.



Using the same heating water over and over again can cause corrosion in the chamber and blockages in the pipe.

Before Using the Unit

Installation

- Make absolutely sure that the unit is installed on a level, steady surface. Lock all four casters (by pushing down the ON side of the levers).
- Ensure that the rear exhaust tank and tank's mounting fixture are attached to the unit's rear panel without fail.
- Do not move the unit by holding onto the control panel.
When the unit is to be moved, release the casters (by pushing down the OFF side of the levers), and firmly support it while moving the unit. To navigate ramps, etc., take hold of the unit's grips and watch your step while moving the unit.
- Avoid installing the unit in the following locations as they may give rise to trouble.
 - Places exposed to direct sunlight
 - Places where water may drip or be splashed onto the unit
 - Places subject to heavy concentrations of dust
 - Places inclined at an angle (installing the unit at an inclined angle may cause a failure in detecting heating without water)
 - Places exposed to air containing salt, sulfur, etc.
- Leave a clearance of at least 10 cm behind the unit and at least 5 cm on the right side. Placing the unit right up against a wall may cause the heat to be trapped inside the unit, resulting in trouble.
- Avoid installing the unit in a location with a power outlet or electrical equipment since steam is discharged from the rear exhaust tank at the back of the unit.
- The unit's boiling point must be set to match the altitude of the locality where the unit is installed. This setting is 100°C when the unit is purchased. Ask your dealer about the setting if the unit is to be installed at an altitude above 500 meters.

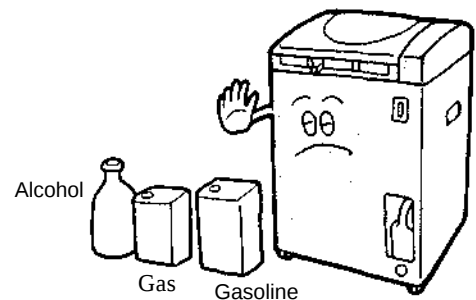
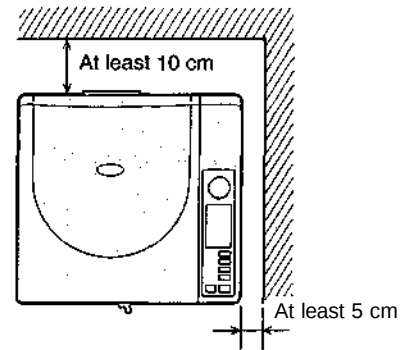
Danger

Do not place the following items near the unit.

- Explosive substances
- Ignitable substances
- Oxidizing substances
- Flammable substances
- Combustible gases

• Statement of the range of environmental conditions

- indoor use
- altitude up to 2000m
- temperature 5°C to 40°C
- maximum relative humidity 85%
- mains supply voltage fluctuations not to exceed $\pm 10\%$ of the nominal voltage
- transient overvoltages : insulation categorie II
- pollution degree 2
- do not exert vibration to the product.



Power supply and ground connections

- **The unit's power cord must be connected to its own dedicated and properly wired connection outlet where no other plugs are connected.**

For 120V units :

MLS-3750 ;

The unit should be connected to an appropriate receptacle that is rated 16.7 or greater.

For 220V units

The 220V versions of the MLS-3750 / 3780 Autoclave are shipped without a plug on the power cord. Use the power-plug when the products is set. The protective grounding conductor of power supply cord must be connected to the contacting member of an attachment plug.

rating ;

		MLS-3750	MLS-3780
Power cord	Wire size	AWG14	
	Type	SJT	
Plug		250VAC, 10A or greater	250VAC, 20A or greater

For 230V units ;

The 230V versions of the MLS-3750 / 3780 Autoclave are shipped without a plug on the power cord. Use the power-plug which is applied IEC60309 when the products is set. The protective grounding conductor of power supply cord must be connected to the contacting member of an attachment plug.

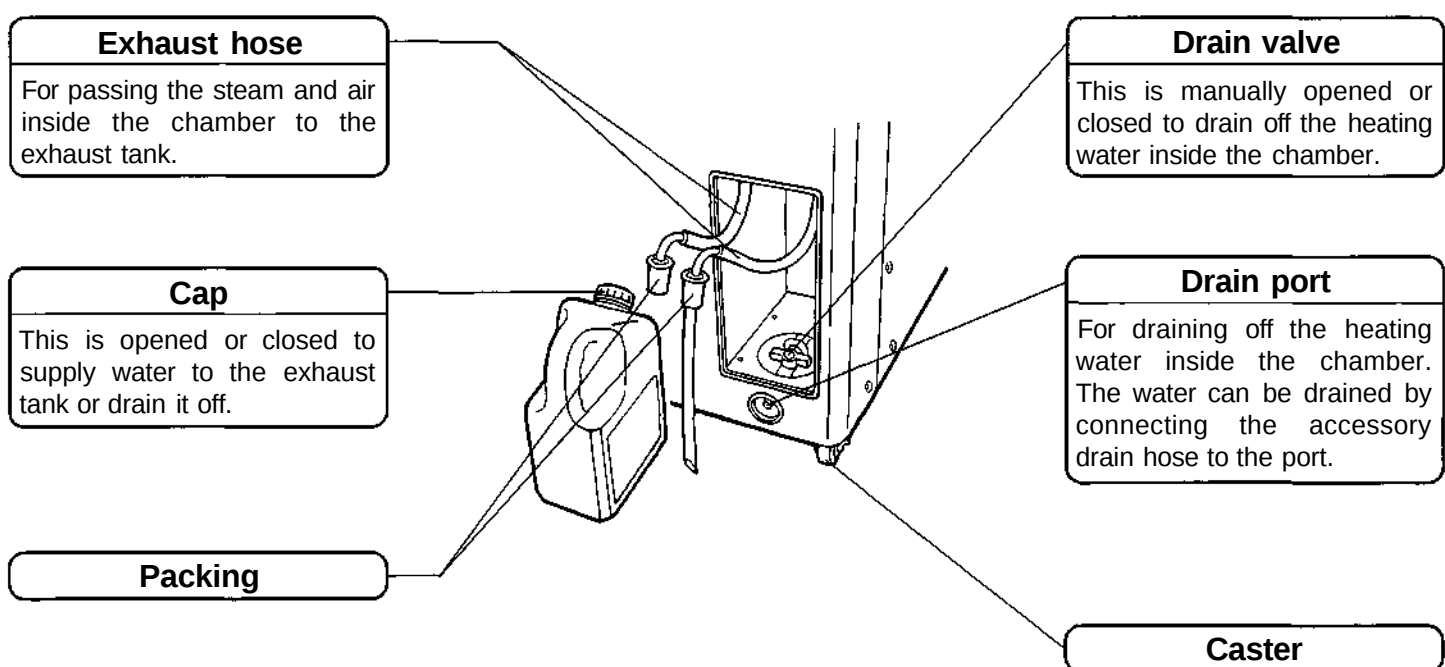
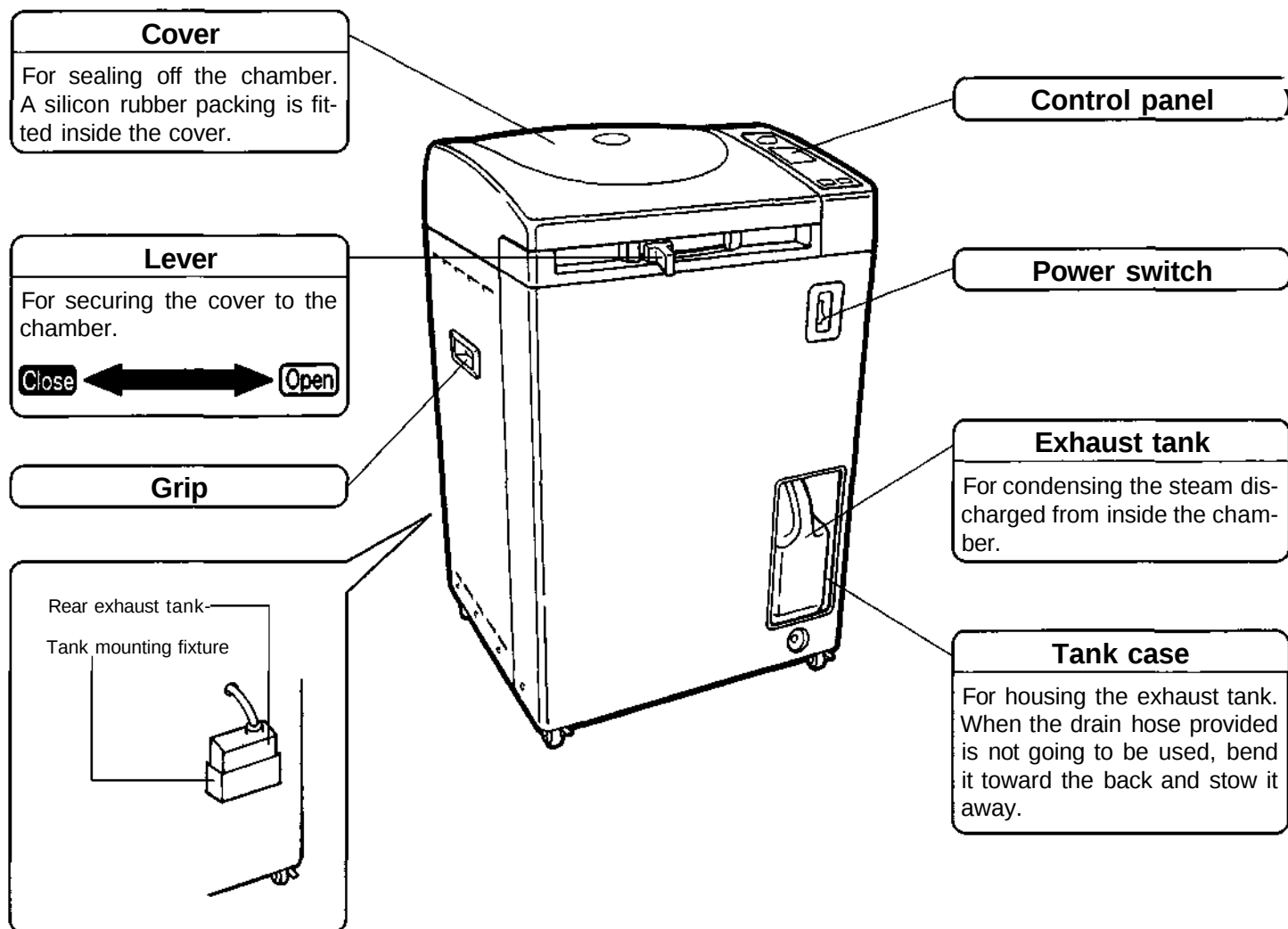
rating ;

		MLS-3750	MLS-3780
Power cord	Wire size	AWG14	
	Type	SJT	
Plug		250VAC, 10A or greater	250VAC, 20A or greater

- **The unit must be connected straight to ground.**

The green / yellow conductor of the power cord is the grounding wire. You must ask your dealer or a qualified electrician to do the grounding work involved.

Names and Functions of the Parts



Control Panel

Pressure gauge
For indicating the pressure inside the chamber.

OBJECT TEMP, button
When the object temperature sensor available as an optional accessory is installed and this button is pressed, the lamp lights, and the sterilization timer is controlled by the temperature of the sterilization items.

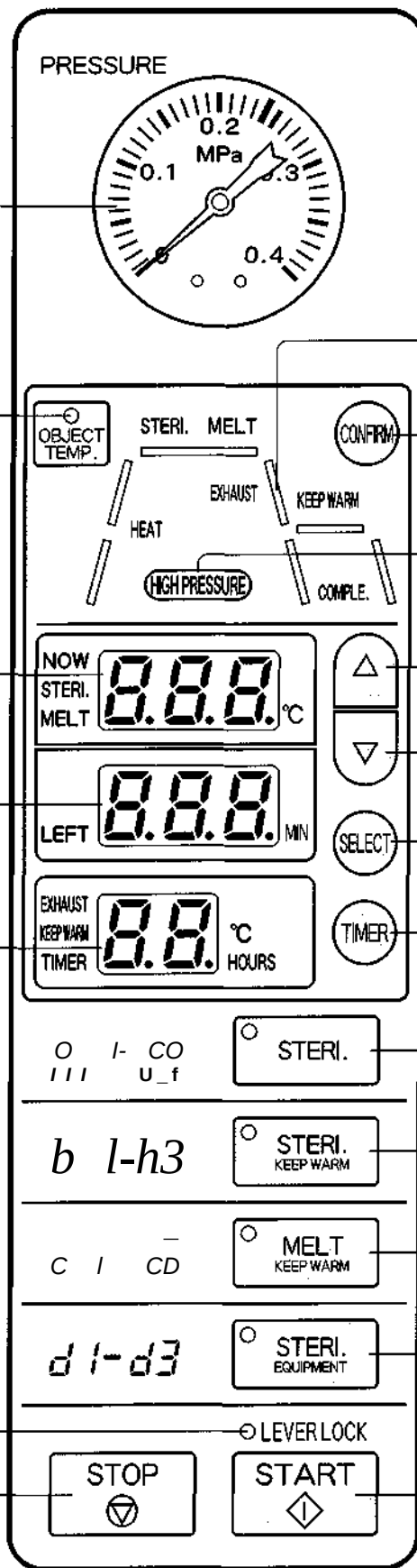
Digital display I
For indicating the current temperature, sterilizing setting temperature and melting setting temperature.

Digital display II
For indicating the set time, remaining time, elapsed time (in minutes), cautionary messages and error messages.

Digital display III
For indicating the cycle/program, exhaust setting temperature and programming time.

LEVER LOCK lamp
This lights when the lever's lock mechanism is activated after operation has commenced.

STOP button
For stopping operation and canceling the programming and keep warm status.



Process display lamps
For indicating the nature of the process now under way. The current process is indicated by a flashing bar symbol.

CONFIRM button
While this is held down, the settings of the operation underway appear on digital displays I, II and III.

HIGH PRESSURE lamp
Lights when a high pressure status is attained inside the chamber.

Up and down buttons
For setting and changing the sterilizing temperature, sterilizing time, melting temperature, melting time, keep warm temperature, exhaust temperature, and programming time.

SELECT button
For changing and entering the settings.

TIMER button
For setting the time which is to elapse until operation starts.

Cycle/program selector buttons
For selecting any of 3 programs for any of 4 cycles (12 possible selections) from the memory.

START button
For starting operation and programming.

Explanation of Caution Label

•»Label, 1;

This caution label explains burning hazard with touching the chamber door, sterilizing items, if the unit is operation or immediately afterward.

•»Label, 2 and 6;

To avoid the malfunction of the unit in accordance with chamber corrosion, this label explains the ban of contents use which is able to corrode stainless steel, and explains how to open the cover.

•»Label, 3;

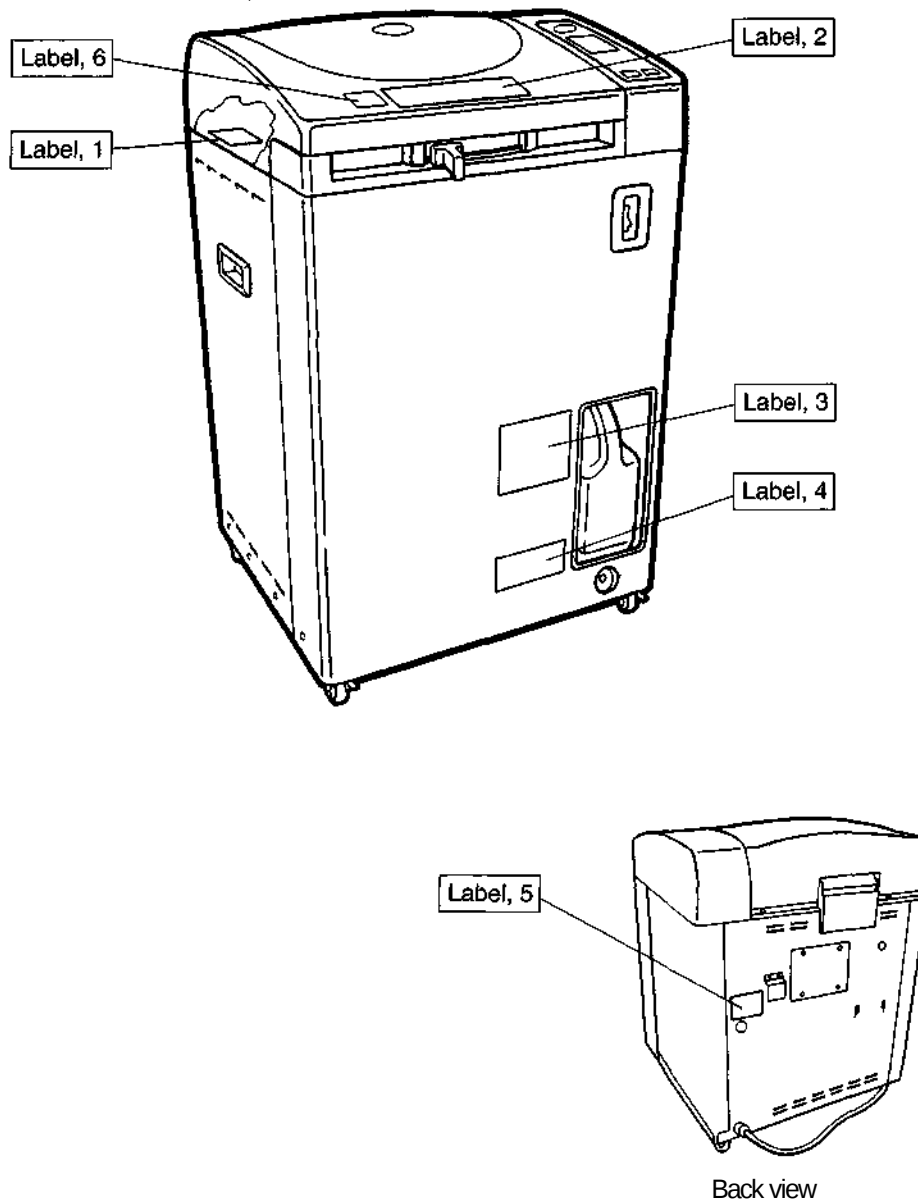
This label explains usage of Drain tank and its caution.

•»Label, 4;

This label explains cautions of water draining from the drain valve.

•»Label, 5;

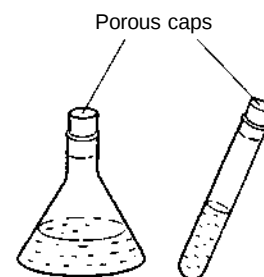
This label explains burning hazard in accordance with issuing high temperature boiling water from safety valve.



Concerning Sterilization Items

⚠ Warning

- Do not place the sterilization items inside containers or bags which will not allow steam to pass through.
- ¹ Do not use stoppers to seal up containers which have sterilization items inside. Either use porous caps or loosen the lids sufficiently.
- ¹ Do not allow the sterilization items to block the holes or temperature sensor inside the chamber.



Sterilizing and melting cultures and other liquids

• Capacity of culture to capacity of container

Pour in the liquid while taking care not to exceed the container's rated amount. Quantities exceeding the rated amount may boil over.

• When sterilizing large quantities of cultures, etc.

The time when the whole culture reaches the sterilizing temperature is reached after a **delay time** subsequent to the time when the temperature inside the chamber has reached the sterilizing temperature. Refer to the table below, and add the sterilizing time and delay time to arrive at the sterilizing setting time which is to be used.

Sterilizing setting time = Sterilizing time + delay time

Amount of liquid	Delay time
Agar media 500 ml in 1,000 ml flask x 1	11 minutes
Agar media 500 ml in 1,000 ml flask X 8	7 minutes
Agar media 250 ml in 500 ml flask x 1	11 minutes
Agar media 250 ml in 500 ml flask x 14	7 minutes

- ¹ When the culture is to be sterilized in a small quantity, the temperature inside the chamber rises more quickly and the delay time is increased.

What we recommend:

An "Object temperature sensor" which detects the temperature of the sterilization items and controls the sterilization timer is available as an optional accessory. Even after this sensor has been installed, control can still be switched over to the unit's sensor by pressing the OBJECT TEMP, button ON and back by pressing it OFF. Use the optional sensor to make the sterilization even more dependable. For details, contact your dealer.

• When using plastic containers for sterilization

Increase the sterilizing setting time even more. Otherwise, incomplete sterilization may result since these containers are poor conductors of heat.

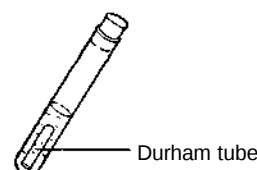
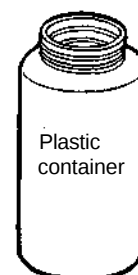
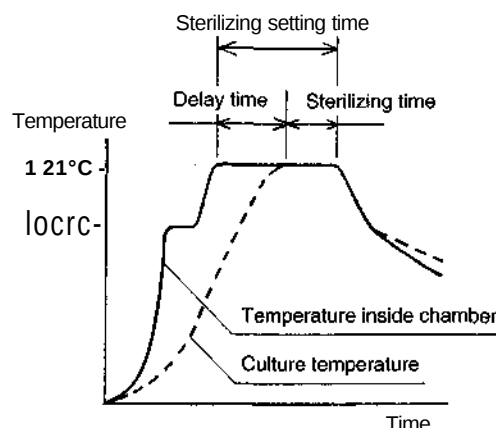
• When melting general agar media in solid form

Refer to the table below, and set the melting time (per flask).

Capacity	Melting temperature	Melting time
2L	100°C	60 minutes
1L		45 minutes

• When testing a Durham tube

The residual air inside the Durham tube can be expelled by setting the exhaust temperature to the appropriate level.

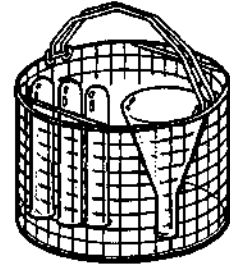


Concerning Sterilization Items

Sterilizing equipment, etc.

Warning

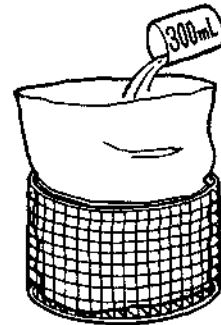
When sterilizing only containers such as beakers, flasks or test tubes, place them on their sides or upside down with their openings at the bottom. Placing the containers right side up with their openings at the top will make it hard for the air inside to escape and for the steam to penetrate sufficiently inside, and incomplete sterilization may result.



Sterilizing as part of waste material processing

Warning

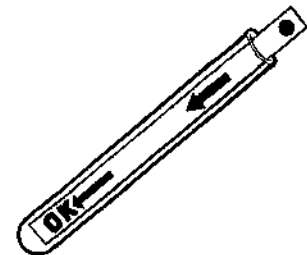
When sterilizing items in a sterilization bag, pour about 300 milliliters of water inside and keep the bag open. Failure to pour water inside the bag or sterilizing items in a bag whose opening has been closed may cause incomplete sterilization.



Checking the sterilization performance

Warning

Check the sterilization performance. This performance varies depending on such factors as the volume and types of sterilization items, the way the items are loaded into the unit and the types of containers used. Be absolutely sure, therefore, to check the sterilization effects using a sterilization indicator such as an "OK card." Such an indicator is an effective way of preventing incomplete sterilization and accidents.



Sterilizing items in containers with a large capacity (10 liters or more) and very small opening

Advisory note

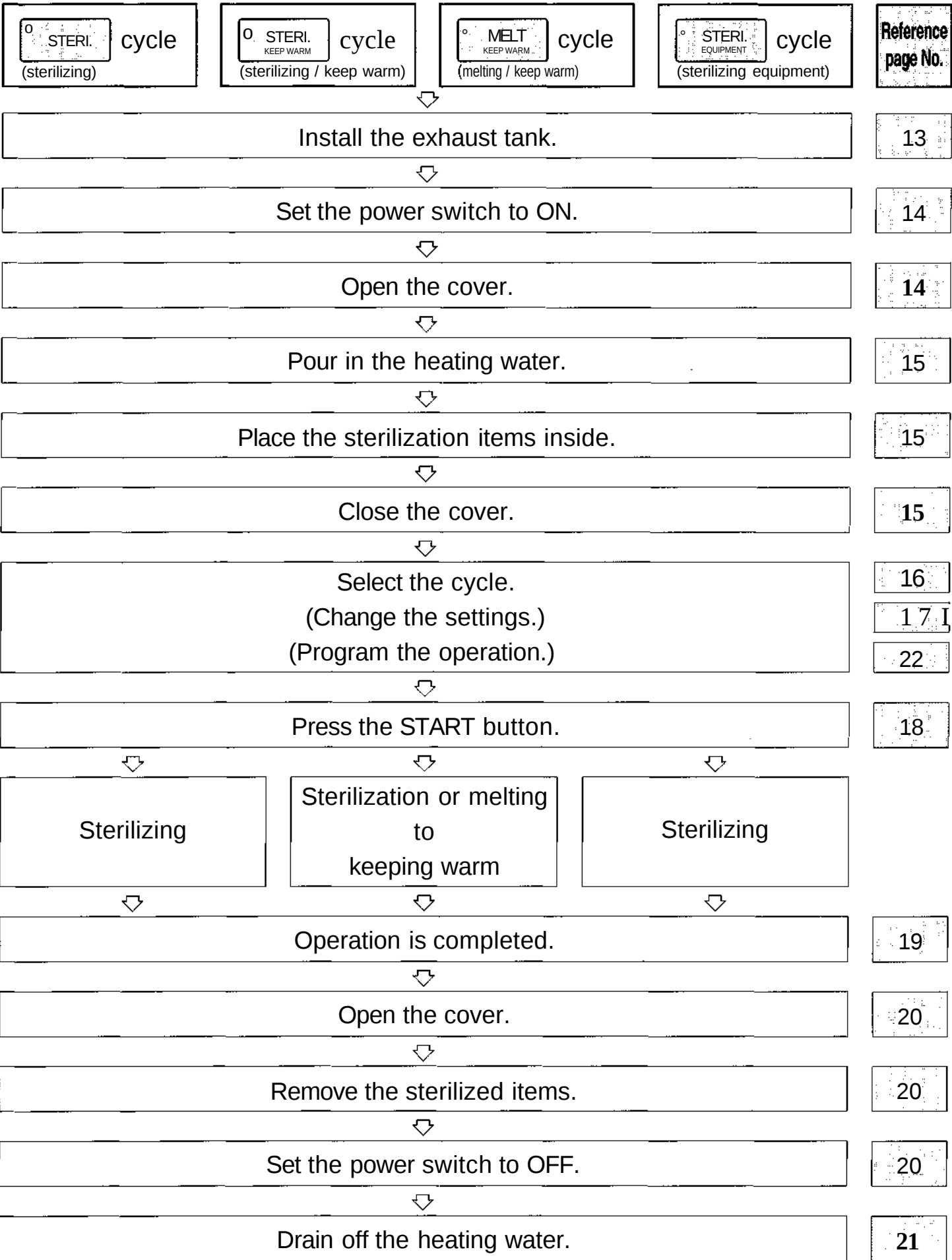
When placing a liquid inside a container with a large capacity (10 liters or more) and a very small opening for sterilization, fill the container to at least 50% of its capacity.

When a small amount of liquid in such a container is sterilized, the pressure during sterilization will increase, and steam may be discharged from the pressure safety valve. To sterilize a small amount, either use a container with a large capacity and a wide opening or replace with a small-capacity container suitable for the quantity of the liquid.

The water in the exhaust tank increases with each sterilizing operation. When it has risen to the HIGH (maximum) level mark, dispose of the water and fill the tank with fresh water as far as the LOW level mark.

Usage Instructions

Basic operating procedure



Usage Instructions

1. Install the exhaust tank.

(I) Remove the exhaust tank from the unit, and take off its cap.

(D) Pour in water until it reaches the LOW (minimum) level mark, and close the cap.

Caution

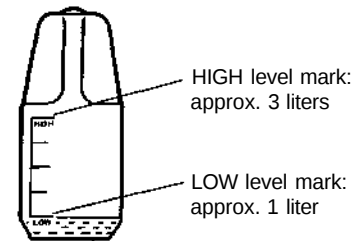
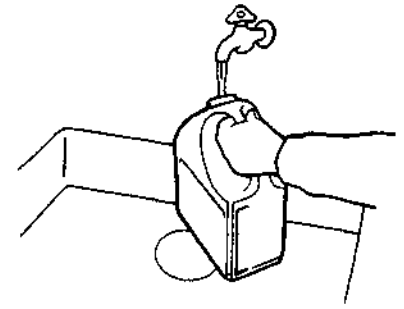
Failure to close the cap properly will cause steam to leak during operation, possibly resulting in scalding.

Memo

The water in the exhaust tank increases with each sterilizing operation. When it has risen to the HIGH (maximum) level mark, dispose of the water and fill the tank with fresh water as far as the LOW level mark.

Advisory note

Do not use force to pull the exhaust tank outside the unit while the exhaust hose is still connected. This may cause malfunctioning.



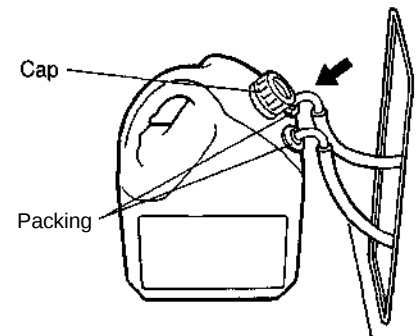
(D) Check that the exhaust hose packing is securely inserted into the hole in the exhaust tank.

Caution

When the packing has become disengaged from the hole in the exhaust tank, insert it back securely into the hole.

Advisory note

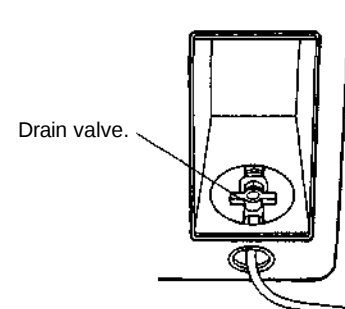
Push the packing securely into place as far as its base by turning it clockwise and counterclockwise a little at a time. If it is turned in one direction only, the exhaust hose will be twisted, possibly causing malfunctioning.



(4) Check that the drain valve is closed.

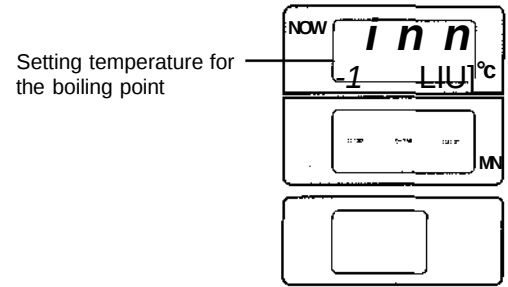
(D) Stow the exhaust tank inside the unit.

Check that the exhaust hose is not bent or twisted. If it is, it will be hard for the air inside the chamber to escape.



2. Set the power switch to ON.

- The control panel lamps light up. (The setting temperature for the boiling point appears on digital display I for the first two seconds.)

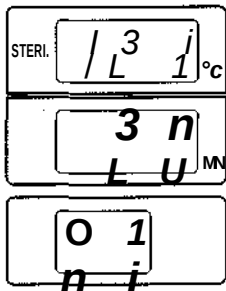


When the setting temperature for the boiling point is 100°C

Digital displays

■ When the lever has been slid to CLOSED

The settings (temperature and time) are displayed. This status is known as the **standby status**.



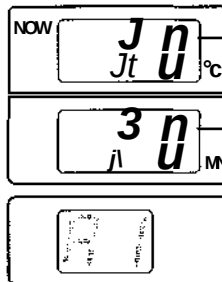
Sterilization cycle with a setting of 20 minutes at 121 °C

- To check the temperature inside the chamber



Press the up and down buttons together.

The current temperature is displayed while these buttons are held down.



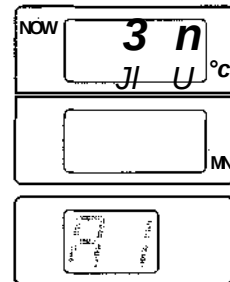
When the temperature inside the chamber is 30°C ("Lo" appears when it is under 25°C)

Temperature inside chamber

Temperature of heating water

• When the lever has been slid to OPEN

The current temperature inside the chamber (temperature of heating water) is displayed.



When the temperature inside the chamber (temperature of heating water) is 30°C

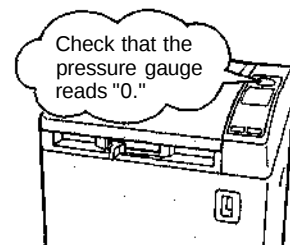
3. Open the cover.

(The cover cannot be opened unless the power switch is at the ON position.)

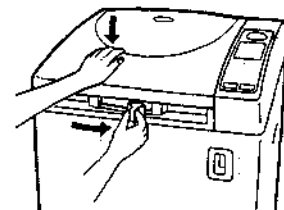
① The following points must always be verified before the cover is opened.

Trying to force the cover open may cause malfunctioning.

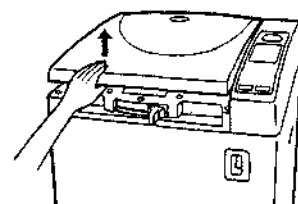
- Power switch: at the ON position
- Pressure gauge: 0 MPa reading
- LEVER LOCK lamp: off.



©Slide the lever to OPEN while pressing down on the cover.



(I)Open the cover slowly.



Usage Instructions

4. Pour in the heating water.

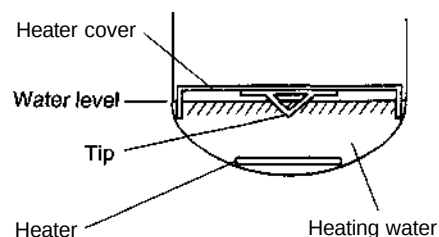
- Pour in the water until the tip of the water level bracket of the heater cover is immersed. Since the amount of heating water decreases with every sterilizing operation, check the water level prior to operation.

Memo

The heating water capacity is about 4.5 liters.

Advisory note

Purified water is best suited as the heating water. If it is not available, use city water instead.



5. Place the sterilization items inside.

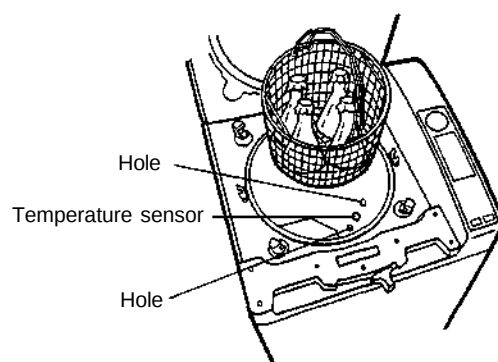
- Place the items in the accessory stainless steel basket, and place the basket gently inside the chamber.

⚠ Caution

Do not allow the sterilization items to block the holes or temperature sensor inside the chamber, and do not allow force to be applied to the temperature sensor.

Memo

Before initiating operation, check the section "Concerning the sterilization items" (see pages 10 and 11) again, and check how the items should be loaded into the unit, etc.



6. Close the cover.

- (I) Check on digital display I that the temperature inside the chamber is under 60°C.

("Lo" appears when it is under 25°C.)

Memo

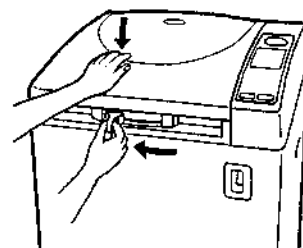
If the cover is closed when the temperature inside the chamber is over 60°C due to continuous operation, etc., the air inside the chamber will significantly expand in a short time, making it harder to open or close the cover. Wait until the temperature drops to a value below 60°C.

- (D) Check that the cover packing and chamber opening are free from dirt and foreign matter.

Remove any dirt and foreign matter since they can cause steam to leak. (Cover packing and chamber opening => page 23)

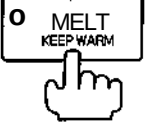
- ③ Slide the lever to CLOSED while pressing down on the cover. The setting temperature and time appear on the digital display.

Beep!



7. Press one of the cycle/program selector buttons.

- One of four cycles can be selected to suit the intended purpose of the unit's use. Each cycle has a choice of three programs, each with its own settings.
- Program settings can be changed. Make changes as needed. (* Refer to the ranges of possible changes.)
Refer to "When changing the settings" on page 17.
- The table below lists the settings which are applicable to the unit when it was purchased.

Cycle/program		Sterilizing temperature	Sterilizing time	Keep warm temperature	Exhaust temperature	Applications, functions
STERI. 	<i>R i</i>	121°C	20 min.	—	Boiling point + 0°C	For sterilizing liquids such as water, cultures and test liquids. Upon completion of the sterilization process, the sterilized items are gradually cooled naturally, and when the exhaust setting temperature is reached, the exhaust valve is opened.
	<i>RE'</i>	121°C	15 min.	—	Boiling point + 10°C	
	<i>R3</i>	121°C	15 min.	—	Boiling point + 15°C	
	Range of possible change	105°C to 135°C	1 min. to 250 min.	—	Boiling point + 0°C to 25°C	
STERI./KEEP WARM 	<i>h i</i>	121°C	20 min.	50°C	Boiling point + 0°C	For sterilizing liquids such as water, cultures and test liquids. This cycle starts with sterilization which is followed by exhaust as with the sterilizing cycle, and after this the items are kept warm at the keep warm temperature.
	<i>b2</i>	121 °C	15 min.	50°C	Boiling point + 0°C	
	<i>b3</i>	115°C	15 min.	55°C	Boiling point + 0°C	
	Range of possible change	105°C to 135°C	1 min. to 250 min.	45°C to 60°C	Boiling point + 0°C to 25°C	
MELT/KEEP WARM 	<i>- i</i>	Melting temperature: 100°C	Melting temperature: 30 min.	50°C	—	For melting cultures and then keeping them warm. • When cultures are merely to be kept warm, set the melting time to "0." • When the operation is stopped or cycle is completed, cycle will be set automatically to <i>R i</i> program.
	<i>c2</i>	Melting temperature: 100°C	Melting temperature: 10 min.	50°C	—	
	<i>c3</i>	Melting temperature: 80°C	Melting temperature: 50 min.	50°C	—	
	Range of possible change	Melting temperature: 60°C to 100°C	Melting temperature: 0 min. to 250 min. or 72 hours	45°C to 60°C	—	
STERI. EQUIPMENT 	<i>d i</i>	121°C	20 min.	—	—	For sterilizing equipment such as flasks or beakers which can withstand the sudden drops of pressure experienced at the exhaust stage. Upon completion of the sterilization process, the exhaust valve is opened at a temperature below 130°C, and the sterilized items are cooled down. • Liquids may boil over when they are sterilized.
	<i>cIE¹</i>	126°C	15 min.	—	—	
	<i>63</i>	135°C	10 min.	—	—	
	Range of possible change	105°C to 135°C	1 min. to 250 min. or 72 hours	—	—	

The exhaust temperature is the temperature at which the exhaust valve is opened upon completion of the sterilization process and the steam inside the chamber is discharged.

The setting is changed when, for instance, Durham tubes are to be used.

(The temperature indicated on the digital display is to be added to the boiling point.)

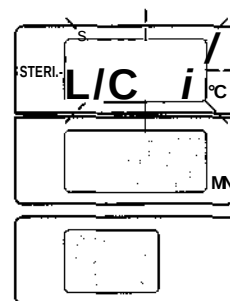
Usage Instructions

8. When changing the settings

- The settings (sterilizing temperature, sterilizing time, melting temperature, melting time, keep warm temperature and exhaust temperature) can be changed as required.

The changed settings are stored in the memory even if the unit's power switch is set to OFF. (Settings changed while operation is underway will not be stored.)

(Ranges of possible change: See page 16)



③ Press SELECT.

Beep!

This causes one of the setting items to flash. Each time this button is pressed, the setting item changes.

④ Press the [up] or [down] button to change the setting.

Memo

Each time the [up] or [down] button is pressed, the setting is incremented or decremented by 1. When either button is held down, the setting is rapidly incremented or decremented until the maximum or minimum value is reached, at which time no further change is registered.

Beep!

⑤ Press SELECT again to cause the next setting item to flash.

Press the [up] or [down] button to change the setting.

/ Repeat the process of pressing SELECT and \ the [up] or [down] button to change the setting. \

With a setting item which is to remain unchanged, simply press SELECT.

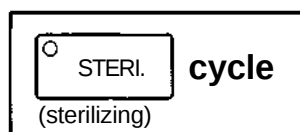
⑥ Finally, press SELECT.

When this button is entered, a prolonged beep is heard, and the program changes are stored in the memory.

- * If the flashing status is left standing for about a minute, the changes will not be updated, and the standby status will be established.

(Standby status: See page 14)

Each time SELECT is pressed, the setting items flash one by one in the following sequence.



Sterilizing temperature

<?

Sterilizing time

<?

Exhaust temperature



Sterilizing temperature

<?

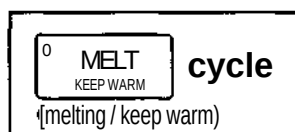
Sterilizing time

O

Keep warm temperature

O

Exhaust temperature



Melting temperature

^>

Melting time

O

Keep warm temperature



Sterilizing temperature

Sterilizing time

9. Press



- When the process is started after select any cycle of STERI., STERI. KEEP WARM or STERI. EQUIPMENT.
- When the setting time is over the sterilization time in table below.

®Press

Beep.beep!

Process will be started.

- When the setting time is under the sterilization time in table below.

®Press

Beep!

Setting temperature and time in digital display are flashing.
Confirm setting condition.

(DPress

Beep!

Process will be started.

| Sterilization temperature (°C) | Sterilization time (min) |
|--------------------------------|--------------------------|
| 115 | min. 30 |
| 121 | min. 20 |
| 126 | min. 15 |
| 132 | min. 5 |
| 135 | min. 3 |

- When the process is started after select the cycle of MELT/KEEP WARM.

®Press

Beep!

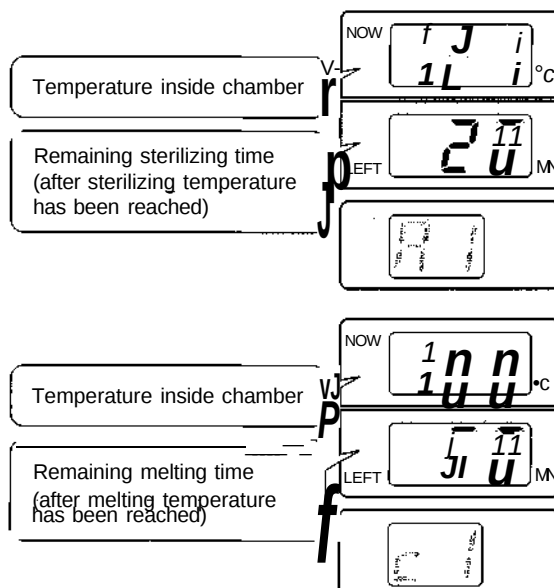
Setting temperature and time in digital display are flashing.
Confirm setting condition.

(DPress

Beep.beep!

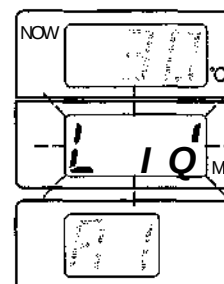
Process will be started.

- When the temperature inside the chamber reaches the sterilization or melting temperature setting, the temperature inside the chamber indicate in the digital display I and remaining sterilizing or melting time indicate in the digital display II.



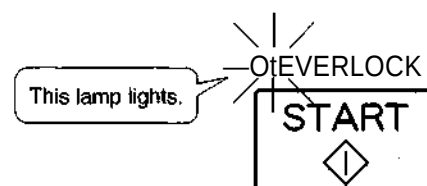
Usage Instructions

- When the lever is not slid all the way to CLOSED, "Lid" (cautionary message) appears on digital display II. Slide the lever again to CLOSED, confirm that a beep is heard, and then press START.



When the lever is not completely loosened

- When the lever's lock mechanism is activated after start, the LEVER LOCK lamp lights. The cover cannot be opened while this lamp is lighted.



To stop operation

See page 21.

To check the settings during operation

Press CONFIRM.

The settings are displayed while this button is held down.

To change the settings during operation

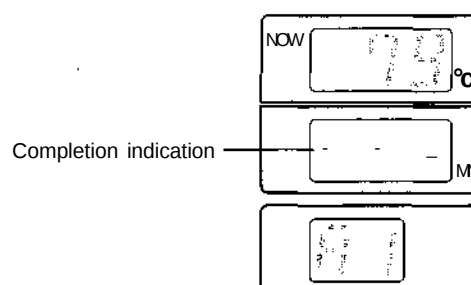
The sterilizing time, melting time, keep warm temperature and exhaust temperature settings can be changed even while operation is underway. However, the changes made will not be stored in the memory.

When changing the settings: See page 17.

10. Operation is now completed.

• Sterilizing cycle or sterilizing equipment cycle

A succession of prolonged beeps are heard, and the completion indication appears on digital display II.



• Sterilizing • keep warm cycle or melting • keep warm cycle

When the keep warm stage is reached, a prolonged beep is heard, and the KEEP WARM bar sign among the process display lamps flashes.

After the keep warm time has continued for 72 hours, operation is completed, a succession of prolonged beeps are heard, and the completion indication appears on digital display II.

11. Open the cover.

① Be absolutely sure to check out the following points before opening the cover.

Trying to force the cover open may cause malfunctioning.

- Pressure gauge: 0 MPa reading
- LEVER LOCK lamp: off.
(If this lamp is lighted, it means that the inside of the chamber is still hot or still in the high pressure status: the lever cannot be slid in this status.)

② Slide the lever to OPEN while pressing down on the cover.

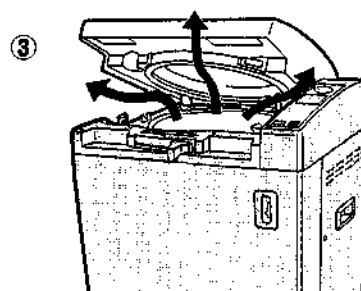
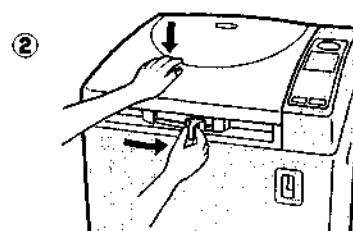
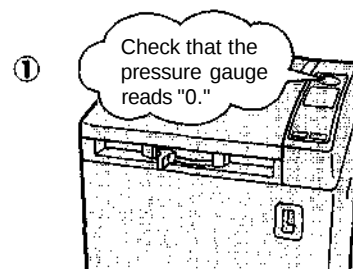
③ Wait for all the steam to escape.

Caution

When the cover is opened, steam will be released. Wait for all the steam to escape. Keep your face clear of the steam during this time.

④ Open the cover slowly.

Opening the cover suddenly may damage the containers with the sterilized items or spill the cultures.



12. Remove the sterilized items.

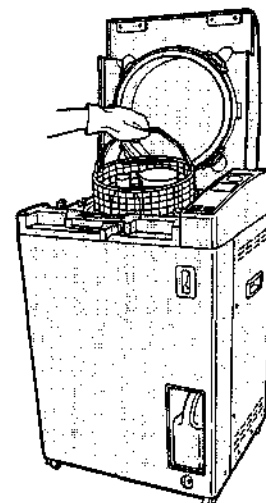
- Remove the sterilized items after the steam inside the chamber has been released.

Caution

When removing the sterilized items, wear thermally insulated gloves, etc. and take care not to scald yourself.

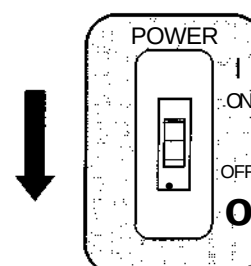
When removing sterilized items (melted items) during the keep warm stage

- To suspend the keep warm operation, keep pressing STOP until two beeps are heard. Operation is now suspended.
If STOP is not pressed, the items will be kept warm continuously with no changes in the conditions for 72 hours.
- To continue the keep warm operation, change the melting time setting to "0" in the MELT/KEEP WARM cycle, and press START.



13. Set the power switch to OFF.

- Set the power switch to OFF after the unit has been used for the day.



Usage Instructions

14. Drain off the heating water.

Ⓐ Open the cover.

Ⓐ Open the drain valve.

Ⓐ After draining the water, make absolutely sure that the drain valve is closed.

Warning

Before draining off the heating water, allow at least 2 hours to elapse upon completion of operation, open the cover, and then proceed.

Advisory note

Using the same heating water over and over again can cause corrosion in the chamber and blockages in the pipe.



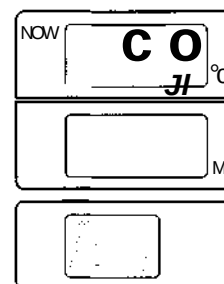
When using the unit continuously

- Before using the unit, check on digital display I that the temperature inside the chamber is under 60°C.

Memo

If the cover is closed when the temperature inside the chamber is high due to continuous operation, etc., the air inside the chamber will rapidly expand, making it harder to open or close the cover. Wait until the temperature drops below 60°C.

- When checking the current temperature inside the chamber in the standby status, press the [up] and [down] buttons together. (See page 14)



When the temperature inside the chamber is 59°C

To stop operation at any time

Ⓐ Keep pressing STOP until two beeps are heard.

Ⓐ Verify the following points before opening the cover.

- Pressure gauge: 0 MPa reading
- LEVER LOCK lamp: off.
(If this lamp is lighted, it means that the inside of the chamber is still hot or still in the high pressure status: the lever cannot be slid in this status.)

To open the cover immediately

- Reduce the pressure inside the chamber by forcibly releasing the air.
(When liquids have been sterilized and any of the liquids have boiled over, clean the inside of the chamber.)
Inside of the chamber: See page 24

Ⓐ Press STOP while [up] is held down.

Ⓐ To stop the exhaust, press STOP again.

Caution

The inside of the chamber is very hot. When removing the sterilized items, wear thermally insulated gloves, etc. and take care not to scald yourself.



When programming an operation

(D)Press the TIMER button.

"Timer" lights on the digital display.

(D)Press [up] or [down] to set the time.

Operation can be set to commence after 1 to 99 hours.

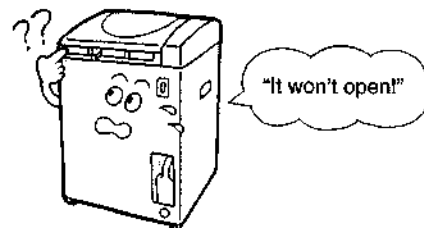
(D)Press START.

"Timer" flashes on the digital display, and the timer starts. The number of hours remaining until operation is programmed to start appears on digital display III in 1-hour increments.

* Press STOP to clear the programmed operation.

Incase of Power Failures

- When the power fails, all the control panel displays will be cleared.
- When the power has failed or the power switch has been set to OFF, the safety mechanism is activated and the lever is locked, making it impossible to open the cover.



When using the unit after the power is restored

- After the power has been restored, the control panel displays are set to the standby status.

(!)Verify the following points before opening the cover.

- Pressure gauge: down to the 0 MPa reading
- LEVER LOCK lamp: off.
(If this lamp is lighted, the inside of the chamber is still hot or still in the high pressure status: the lever cannot be slid in this status.)



(D)Remove the sterilized items.

When liquids have been sterilized and any of the liquids have boiled over, clean the inside of the chamber.

(Inside of the chamber: See page 24)

Caution

When removing the sterilized items, wear thermally insulated gloves, etc. and take care not to scald yourself.

(D)Check the sterilization using the sterilization indicator.

The items may not be completely sterilized.

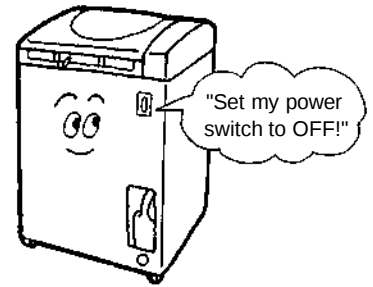
(D)Repeat the operation if the items have not been completely sterilized.

[What to do when] Maintenance

Caution

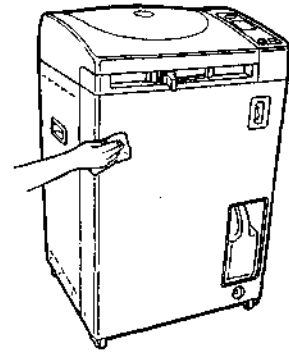
Before proceeding with maintenance, be absolutely sure to set the power switch to OFF.

- ¹ Do not use paint thinners, benzine, etc. because these substances will damage the unit's finish.



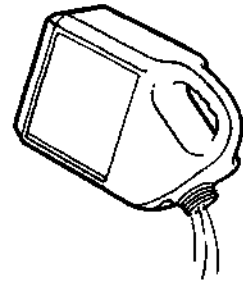
Unit

Moisten a soft cloth with water or neutral detergent, wring it out well, and use it to remove the dirt.



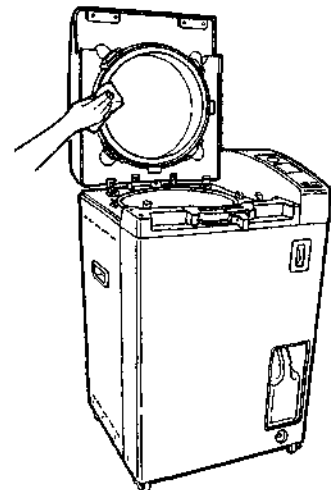
Exhaust tank

If the inside of the exhaust tank is dirty, pour in a mixture of neutral detergent and warm water, shake well to remove the dirt, and then rinse out the tank thoroughly with water.



Cover packing and chamber opening

Wipe carefully using a soft cloth moistened with water. Dirt and foreign matter on these parts may cause to steam to leak.



Inside the chamber

Inside the chamber

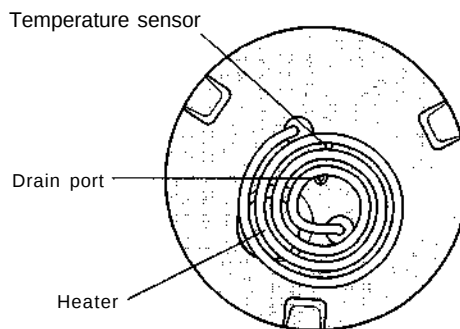
- Moisten a soft cloth with water and wipe. If all the dirt fails to be removed, moisten a nylon brush with some neutral detergent, brush thoroughly, and then rinse out with water.
- When liquids have been sterilized and any of the liquids have boiled over, rinse out the inside of the chamber.

#Bottom area of the inside of the chamber

- Remove the heater cover, and use a brush with handle, etc. to wash the bottom area carefully so as not to damage the temperature sensor.

Memo-

Open the drain valve to drain off the water used for rinsing. Then make absolutely sure that the drain valve is closed.



(Bird's eye view of bottom area of inside of chamber)

Inspecting the power switch

- The power switch comes with an earth leakage breaker function. Inspect this function once a month.

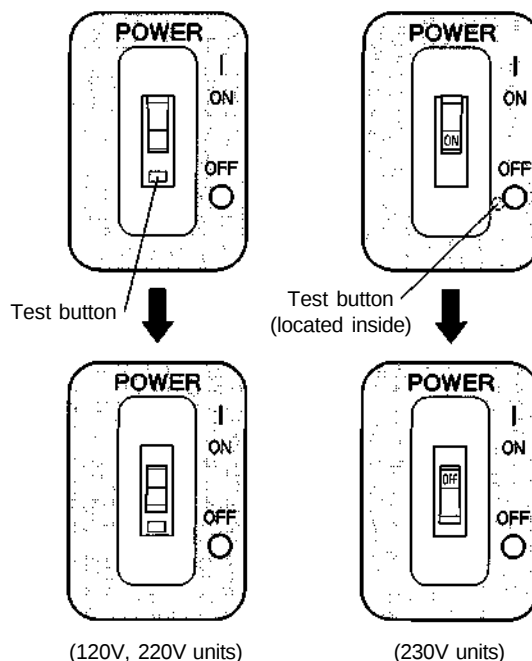
Caution

Do not touch the power switch with wet hands.

(1) Set the power switch to ON.

(2) Push the test button of the power switch using a thin rod.

The safety mechanism is working properly if the power switch is automatically set to OFF.



Troubleshooting Guide

If the unit malfunctions during use, check out the following points and take the suggested remedial action.

Before requesting service

| Problem | Item to check | Remedy | See page |
|---|---|---|----------|
| No power. | • Has the power of the dedicated connection outlet been turned on? | • Turn on the dedicated connection outlet's power. | — |
| | • Is there a power failure in progress? | • Wait until the power is restored. | — |
| Cover won't close. | • Is the lever at the OPEN position? | • Slide the lever to the OPEN position. | • 7 |
| | • Is the temperature inside the chamber under 60°C? | • Wait until the temperature drops below 60°C. | 15 |
| Operation won't start. | • Is the power switch at ON? | • Set the power switch to ON. | 14 |
| | • After the cover was closed, was the lever slid toward CLOSED until a beep was heard? | • Slide the lever firmly to the CLOSED position. | 15 |
| | • Is "Timer" lighted on the digital display? | • Press the STOP button to release the programmed operation. | 22 |
| Temperature fails to rise during heating process.
(Sterilizing temperature is not reached.) | • Has the wrong cycle been selected? (Has the melting cycle been set?) | • Select the correct cycle. | 16 |
| | • Has the boiling point been set to match the altitude? Check the boiling point temperature setting. | • If the boiling point has not been set to match the altitude, contact your dealer. | 6- 14 |
| Steam is leaking from the safety valve vent.
(The pressure applied during sterilization is abnormally high.) | • Is the temperature sensor inside the chamber blocked by the sterilization items? | • Stop operation, and place the items being sterilized at a distance from the temperature sensor. | 15 |
| | • Are liquids in small quantities being sterilized in large-capacity (over 10 liters) containers with small openings? | • Fill the containers to at least 50% of their capacity or transfer the liquids to containers with wide openings. | 11 |
| | • Are beakers or other containers being sterilized with their openings pointed upward. (For sterilization of containers only) | • Place the containers so that their openings are upside down or place the containers on their sides. | 11 |
| Cover won't open.
(Lever fails to slide to OPEN.) | • Is the power switch at ON? | • Set the power switch to ON. | 14 |
| | • Is there a power failure in progress? | • Wait until the power is restored. | 22 |
| | • Is the inside of the chamber still hot or still in the high pressure status? (The LEVER LOCK lamp is lighted.) | • Wait until the LEVER LOCK lamp goes off. | 14-20 |

The following case does not indicate a failure.

| Problem | Description |
|---|--|
| Steam is escaping from the rear exhaust tank. | • Steam is meant to escape when the steam which is generated by the heating process is released. |

When cautionary or error messages are indicated on the digital displays

- When a cautionary message flashes during operation, check out the following points and take the suggested remedial action.

| Cautionary message | Significance | Remedy | See page |
|--------------------|--|---|----------|
| <i>L d</i> | The lever has not been slid all the way to CLOSED. | Close the cover, and then slide the lever firmly to CLOSED until a beep is heard. | 19 |
| <i>Hot</i> | When the START button was pressed, the temperature inside the chamber was 5°C or more above the temperature setting. | Press the START button after the temperature inside the chamber has dropped. | — |

- When an error has occurred during operation, an error message flashes, the buzzer sounds intermittently, the safety mechanism will be activated, and the operation is shut down automatically. Check out the following points and take the suggested remedial action.

- To release an error message: Keep pressing STOP or set the power switch to OFF.

| Error message | Significance | Remedy | See page |
|---------------------------|---|---|----------|
| <i>E i</i>
<i>E c'</i> | Temperature sensor has malfunctioned. | Contact your dealer. | — |
| <i>E 3</i> | Overheating prevention device inside chamber has been activated. | | |
| <i>E 'I</i> | Temperature of the object temperature sensor (optional accessory) is abnormally high. | | |
| <i>E 5</i> | Low level of heating water or no water at all. | Pour more heating water into the chamber. | 15 |
| <i>E 8</i> | The lever's lock mechanism cannot be released. | Contact your dealer. | — |
| <i>E 1</i> | The lever's lock mechanism fails to be activated. | | |
| <i>E 8</i> | The pressure is abnormally high. | <ul style="list-style-type: none"> Pull out the exhaust tank, and straighten out the exhaust hole. Keep the sterilization bag open. Pour 300 milliliters of water into the sterilization bag. Contact your dealer, and ask for the boiling point to be set to match the altitude. | 13 |
| | • The exhaust hose is bent. | | 11 |
| | • The opening of the sterilization bag is closed. | | 11 |
| | • No water has been poured into the sterilization bag. | | 6 |
| <i>E 3</i> | The boiling point setting is too low, preventing the pressure from rising properly. | Contact your dealer. | — |
| <i>E 10</i> | The control mechanism has malfunctioned. | | |

If none of the symptoms described above are applicable, contact your dealer.

Specifications

| Product designation | | Labo autoclave (high-pressure steam sterilizer) | |
|---------------------------------|-------------|---|--|
| Model designation | | MLS-3750 | MLS-3780 |
| Power supply | | 120V units: 120VAC (50/60HZ), 16.7A
220V units: 220VAC (50/60Hz), 9.1 A
230V units: 230VAC (50/60Hz), 8.7A | 220V units: 220VAC (50/60Hz), 18.2A
230V units: 230VAC (50/60Hz), 17.4A |
| Power consumption | | 2kW | 4kW |
| External dimensions | | 600(W) X 560(D) X 754(H) mm | 600(W) X 560(D) X 979(H) mm |
| Weight | | 63kg | 220V units: 74kg, 230V units: 82kg |
| Internal capacity | | 59L | 83L |
| Effective internal capacity | | 50L | 75L |
| Chamber dimensions | | 370 (diameter) x 415(D)
(effective depth including cover: 480) mm | 370 (diameter) X 640(D)
(effective depth including cover: 705) mm |
| Chamber material | | SUS304 (austenitic stainless steel) | |
| Max/Min Operating pressure | | 0-240kPa (0-34.8psi, 0-2.4bar) | |
| Max/Min Operating temperature | | 10-137.9°C (50-280.2° F) | |
| Sterilizing temperature | | 105°C-135°C | |
| Melting temperature | | 60°C-100°C | |
| Keep warm temperature | | 45°C - 60°C | |
| Thermometer | | Thermistor, digital display (25°C - 141°C) | |
| Safety valve releasing pressure | | 240kPa (34.8psi, 2.4bar) | |
| Pressure gauge range | | 0-0.4 MPa (0-43.5psi, 0-4bar) | |
| Timer | Sterilizing | 1 to 250 min., 72-hour setting possible for sterilizing equipment cycle | |
| | Melting | 0 to 250 min., 72-hour setting possible | |
| | Keep warm | Auto off after 72 hours | |
| | Timer | Operation start after 1 to 99 hours | |
| Exhaust tank | | 4-liter polypropylene tank | |
| Warning and safety functions | | Pressure safety valve, overheating prevention device, dry-scorch prevention, cover interlock, excessive pressure prevention, earth leakage breaker | |
| Sound pressure level | | max 70dB(A) | |
| Accessories | | Stainless-steel baskets (2), drain hose (1) | Stainless-steel baskets (3), drain hose (1) |
| Optional accessories | | Cooling fan, object temperature sensor, external temperature sensor
* For further information on the model numbers, prices, delivery dates, etc. of these and other optional accessories, contact your dealer. | |

^Specifications are subject to change without notice due to improvements.

If something unusual should happen during operation

Stop using the unit immediately, and ask your dealer to inspect and repair it. It is dangerous for the customer to attempt to disassemble and repair the unit. Special technology is required for repair.

Questions concerning after-sales service

Direct any questions or queries concerning repair service or the unit itself to your dealer or to the manufacturer's customer service representative.

Customer service representative

- SANYO Gallenkamp B. V.
Address ;Rudonk 18,4824AJ,Brda,The Netherlands.
- SANYO Gallenkamp PLC
Address; Monarch Way, Belton Park, Loughborouh, Leics, LE11
5XG,United Kingdom.

