

## INSTRUCTION MANUAL

**MLS-2420**  
**MLS-3020**

### Labo Autoclave

Thank you for purchasing a SANYO Autoclave.  
Please read these instructions carefully before using the unit.

After reading it, store this booklet in a safe place for future reference.

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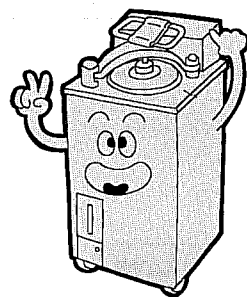
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# FEATURES

**1 Microprocessor temperature control for accurately maintained sterilizing temperature.**

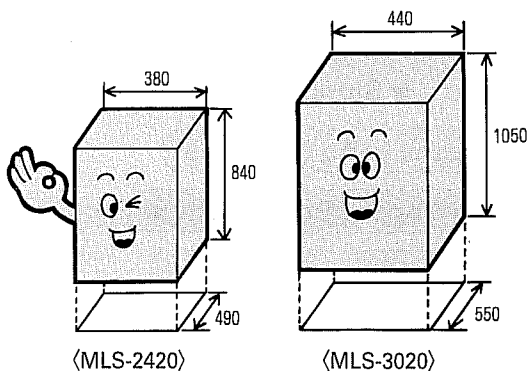
**2 Fail-safe functions to ensure safety.**

**3 Memory pattern system for one-touch operation.**



**4 Ergonomic design for ease of use.**

**5 Compact size saves space.**

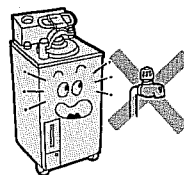


# IMPORTANT SAFEGUARDS

Follow these precautions to prevent electrical shocks, burns, fire and malfunctions.

- **Be sure to ground the unit.**

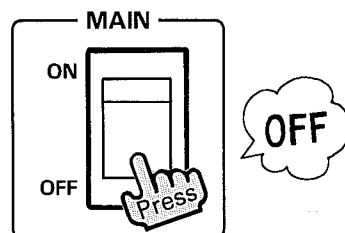
Never connect the unit's ground line to a gas pipe, telephone ground line, lightning rod or water pipe.



- **When finished using the unit for the day, or if the unit will not be used for an extended period of time, be sure to turn off the unit's power switch (MAIN) as well as the master power switch.**

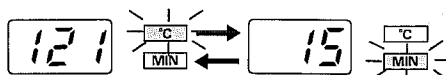
- **Should abnormal display indications appear during any of the unit's processes, turn off the unit's power switch (MAIN) and then retry the operation.**

Should the problem reoccur, turn off power and contact the dealer from whom you purchased the unit.



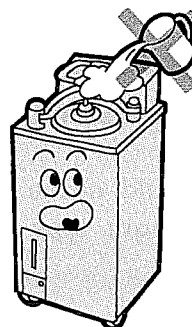
- **Should power be cut off while the unit is operating, repeat the entire operation from the beginning.**

Should power to the unit be cut off due to a power failure, the operation in progress is interrupted, the pressure in the chamber reverts to atmospheric pressure and the sterilization temperature and sterilization time switch to standby status.



- **Never pour water on the unit.**

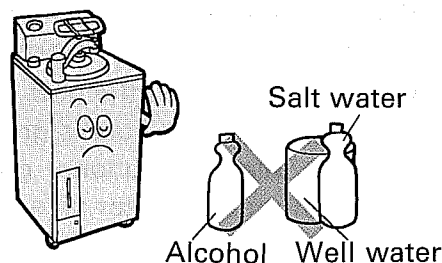
Water could leak inside and cause electrical shocks or malfunctions.



# IMPORTANT SAFEGUARDS

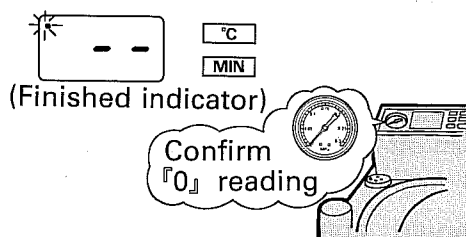
- **Use only distilled water or tap water as the unit's sterilizing water.**

Never use chemicals such as alcohol, well water or salt water. They could cause the unit to explode or result in corrosion.



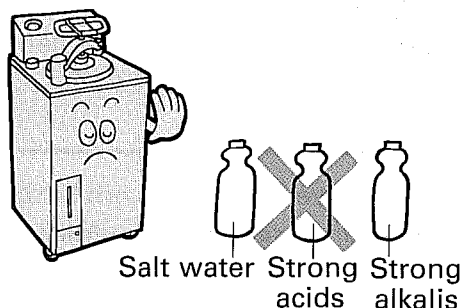
- **Never open the door while sterilization is in progress or while the pressure in the chamber is still high.**

Doing so could cause the unit to malfunction and will release steam that is extremely dangerous. Always confirm that the chamber pressure has returned to 0 MPa and the "finished" indicator is lit.



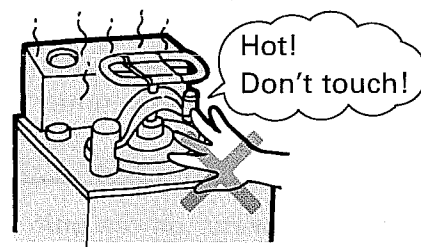
- **Never use the unit to sterilize cultures or chemical solutions containing elements (salt, strong acids, strong alkalis) that could cause the inside of the chamber (made of stainless steel) to corrode.**

Corrosion can cause the unit to malfunction prematurely. Also, when finished using the unit for the day, discard all left over sterilizing water, wipe the inside of the chamber clean and allow it to dry.



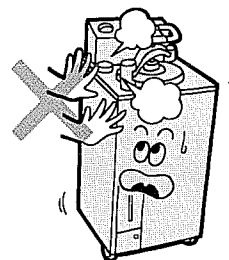
- **Do not touch the chamber, door or arm while sterilization is in progress or immediately afterward.**

They become very hot and could cause burns.



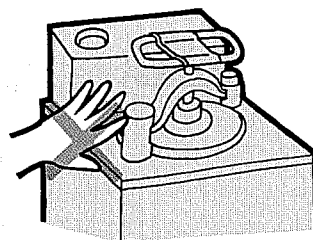
- **Do not shake the unit while it is operating.**

Doing so could cause steam to issue from the weight type pressure safety valve.



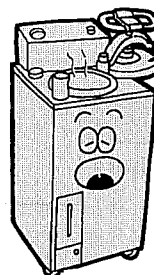
- **Do not bring your face or hands near the pressure safety valve while the unit is operating.**

It could be extremely dangerous should steam suddenly issue from the valve.



- **When using the unit continuously, allow five minutes between cycles for cooling off.**

If a new sterilization cycle is begin immediately after the previous one has finished, the unit may not be able to generate sufficient saturated steam. After the "finished" buzzer has sounded, remove the sterilized items and leave the door open for five minutes or more to allow the unit to cool off before starting the next sterilizing cycle.

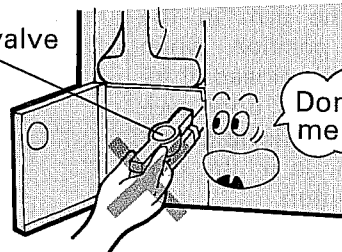


5 minutes to cool off

- **Never open the drain valve while sterilization is in progress or while the pressure in the chamber is still high.**

Doing so will cause hot, pressurized steam and water to issue from the valve and is extremely dangerous. Also, since the sterilizing water is quite hot immediately after sterilization finishes, allow plenty of time for it to cool down before discarding old water.

Drain valve

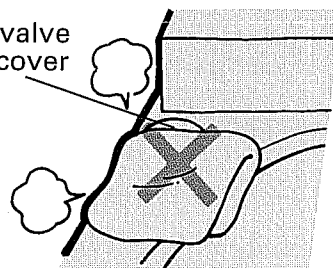


Don't open me!

- **Never place objects on top of the safety valve or block its opening.**

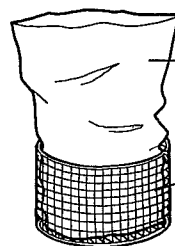
Doing so could cause the pressure safety valve to malfunction.

Safety valve cover



- **When placing items in a bag for sterilization, always put the bag in a stainless steel basket before inserting it into the autoclave.**

If bags are put directly into the chamber, they could block the sensor and interfere with accurate heat control.



Bag

Stainless steel basket

# NAMES AND FUNCTIONS OF PARTS

## Main unit

### Pressure safety valve

This is a safety valve to allow steam to escape from the chamber should the internal pressure rise too high.

### Safety valve cover

### Chamber

Items are placed in here to be sterilized.

### Handle

The handle is used to seal the chamber door. Turn clockwise to close and counterclockwise to open.

### Arm

### Arm stopper

Stops the arm in the correct position when the door is closed. It incorporates a door switch for confirming that the door is in the correct position.

### Door

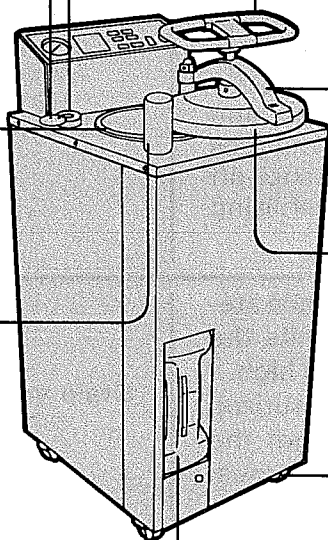
The door seals the chamber. It is equipped on the underside with a silicon rubber packing.

### Caster

Equipped with a clocking mechanism.

### Exhaust tank.

When the air and steam in the chamber is expelled as exhaust, it collects in this tank, where it reverts to water.



※The MLS-3020 is used as the basis for this instruction manual.

### **Packing**

This packing fits into the exhaust tank inlet opening, which is where the exhaust hose connects to the exhaust tank, to keep it airtight.

### **Exhaust hose**

Conveys steam and air from the chamber to the exhaust tank.

### **Exhaust tank**

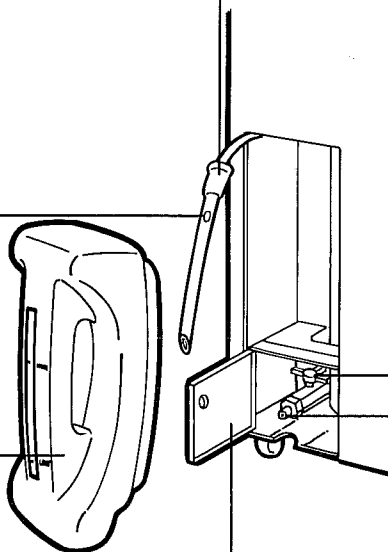
### **Drain valve**

This manual valve is used to drain sterilizing water from the chamber.

### **Drain opening**

For draining sterilizing water from the chamber.

### **Drain opening cover**



# NAMES AND FUNCTIONS OF PARTS

## Control panel

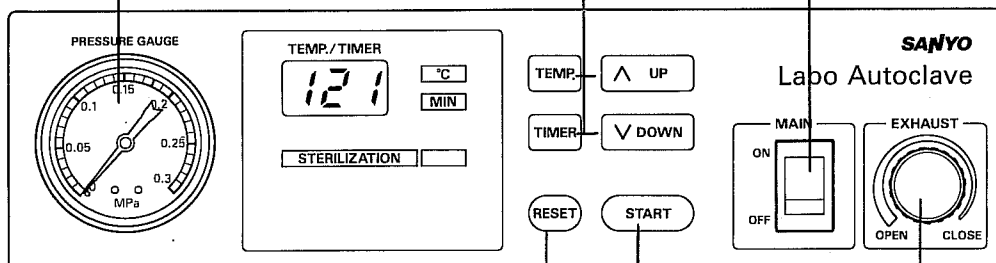
### Pressure gauge

Indicates the pressure within the chamber.

### Setting buttons (TEMP·TIMER·UP·VDOWN)

Used for setting and displaying the sterilization temperature and sterilization time, and for displaying the remaining sterilization time. (Refer to page 12 for detailed instructions.)

### Power switch (MAIN)



### RESET button

Cancels operation. Pressing this button for about one second during operation causes a beep to sound and switches the unit to stand-by status.

### START button

Starts sterilization.

### Exhaust knob

This knob is used to release the air inside the chamber. Turn clockwise to close and counterclockwise to open. Close the knob before starting sterilization.



### Digital indicator lamp

Displays the sterilization temperature and sterilization time settings alternately when the unit is in standby status. Displays the internal chamber temperature during sterilization and while the unit is cooling after sterilization is finished.

A "finished" indicator lights after cooling is complete and the unit is in the completion process.

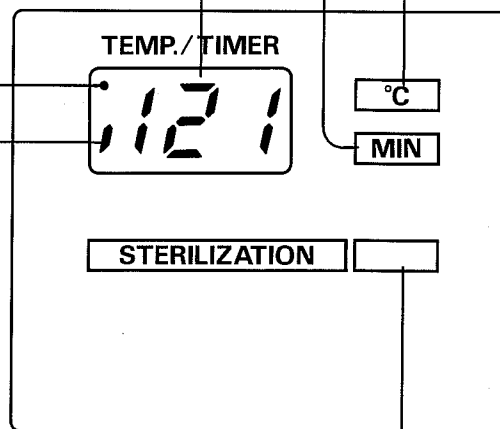
Pressing the **TEMP.** button causes the indicator to display the temperature setting, and pressing the **TIMER** button causes it to display the time setting. These operations may be performed in any of the unit's operating modes.

### Time indicator lamp

This lamp lights when the digital indicator lamp is displaying time information.

### Temperature indicator lamp

This lamp lights when the digital indicator lamp is displaying temperature information.



### Door closed confirmation lamp

Lights when the door is in the properly closed position.

### Timer operation segments

Flashes when the sterilization timer is operating.

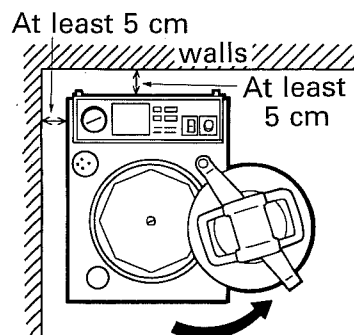
### Sterilization lamp

Flashes during sterilization.

# PREPARATION FOR USE

## Installation

- Make sure to install the unit on a flat, sturdy surface. Look all four casters.
- Note that the display indications will be difficult to read if the unit is located in direct sunlight.
- Avoid locations where the unit could be exposed to air containing large amounts of moisture, salt or sulfur, as these could adversely affect the unit.
- The door opens out in a counterclockwise direction. Make sure to allow sufficient clearance from impediments (walls, posts, etc.) when positioning the unit.
- Allow at least 5 cm of free space between the back and left sides of the unit and the nearest wall. Placing the unit too close to the wall will cause heat to build up inside the unit and could cause it to malfunction.

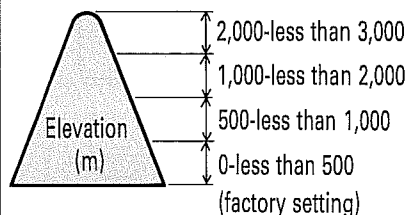


## Power supply and ground connections

- Connect the power supply cord only to an outlet equipped with a ground leakage circuit breaker.

## Settings to match elevation of installation location

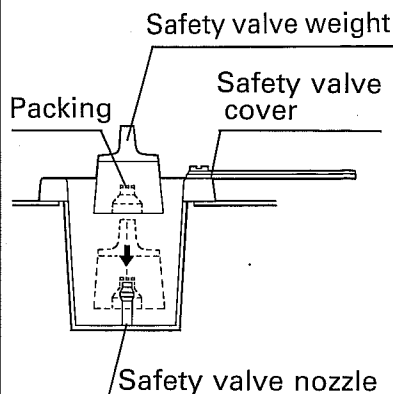
- Set the switch inside the main unit to match the elevation of the installation location. (When shipped from the factory, the unit is set for an elevation of between 0 and less than 500 m.)
  - ※ If the switch setting needs to be changed, ask your dealer to do it for you.



## Pressure safety valve set up

- ① Slide open the safety valve cover and remove the safety valve weight inside from its packing. Then push it down until it touches the safety valve nozzle.

Pushing the safety valve in too forcefully may damage the packing of the safety valve weight. This could result in steam leakage when the unit is used.
- ② After making sure that the safety valve weight is fixed in place (it should not come out if pulled gently), slide the safety valve cover closed.



# OPERATING INSTRUCTIONS

## Starting Operation

### 1. Exhaust tank set up.

- ① Remove the exhaust tank from the main unit and, from the opening at the top, fill the tank with water up to the LOW level mark.
- ② Insert the exhaust hose that is connected to the interior of the main unit into the opening at the top of the tank. Push it in securely until the packing is firmly engaged.

#### Note

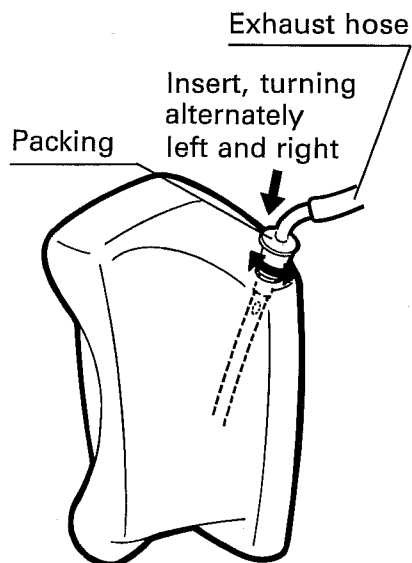
Turning the packing only one direction during insertion can cause the hose to become twisted and possibly lead to malfunctions. Turn the packing alternately to the left and right when inserting it.

- ③ Load the exhaust tank into the main unit, taking care not to bend or twist the exhaust hose.

#### Note

The amount of water in the exhaust tank increases each time sterilization is performed. When the water reaches the HIGH level mark, discard it and pour in new water up to the LOW mark.

Do not try pull the tank out of the main unit while the exhaust hose is still attached.



### 2. Pour sterilization water into the chamber.

- ① Turn the handle counterclockwise until it stops. Turn the arm counterclockwise to open the door.
- ② Close the drain valve.
- ③ Pour in water until the top edge of the water level fitting on the heater cover is covered. The sterilizing water level will be lower after each sterilizing cycle, and it should be replenished as necessary.

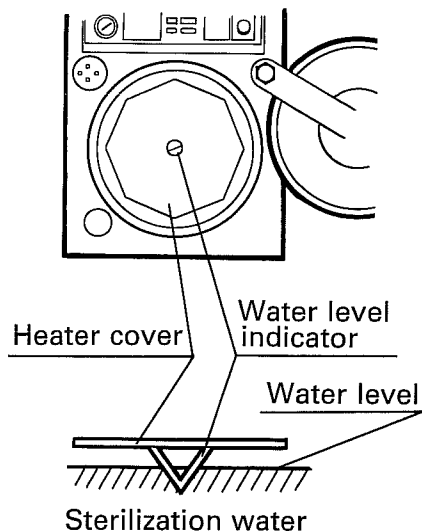
#### Supplementary note

The MLS-2420 uses approximately 1.5 liters of sterilizing water; the MLS-3020 uses approximately 2 liters.

#### Note

Distilled water is ideal for use as sterilization water. If distilled water is unavailable, tap water may be used.

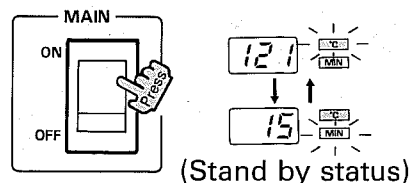
Never use well water, salt water or hard water as they can cause the inside of the chamber to corrode or mineral deposits to form.



# OPERATING INSTRUCTIONS

## 3. Turn the power switch on.

- The sterilization temperature and sterilization time appear alternately on the digital display to indicate that power is on. This condition is referred to as stand by status.



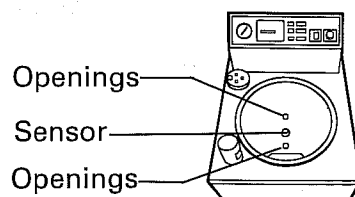
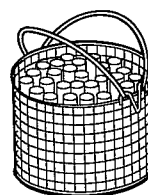
## 4. Insert items to be sterilized.

- Do not place items to be sterilized directly on top of the heater cover. Put them in a stainless steel basket or the like and place them gently into the chamber.

### Note

Be careful not to block openings inside the chamber or put pressure on sensors when placing the items to be sterilized into the chamber. Doing so could cause the unit to malfunction.

- Also refer to page 15 (Items to be Sterilized) for more information on placement of items to be sterilized.



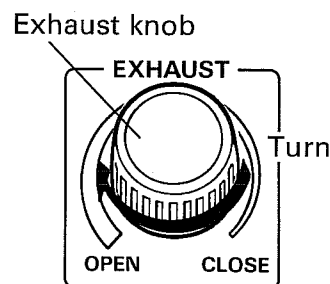
## 5. Close the exhaust knob.

- Close the exhaust knob by turning it clockwise as far as it will go.

### Note

Performing sterilizing with the exhaust knob open will cause all the water to evaporate, resulting in a dry scorch. There is also a danger that steam and hot water will be forced from the opening in the exhaust tank under high pressure and possibly cause burns.

Always check to make sure that the exhaust knob is closed before sterilizing anything.

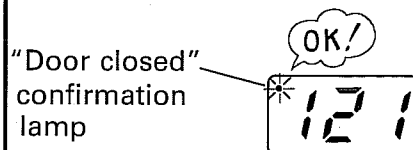
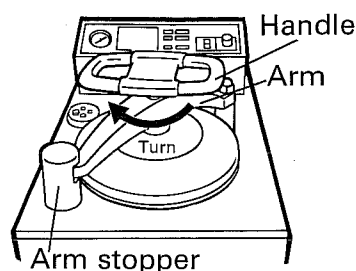


## 6. Close the door.

- Grasp the handle and turn it gently clockwise until the arm comes to rest against the arm stopper.
- Even after the "door closed" confirmation lamp lights, continue to turn the handle until it is tight.

### Notes

- ※ If you stop turning the handle as soon as the "door closed" confirmation lamp lights, there is a danger that steam may leak during the sterilization process.
- ※ The sterilization process cannot be started unless the "door closed" confirmation lamp is lit.



## 7. Set the sterilization temperature and sterilization time.

### ● Sterilization temperature setting

Follow the steps below to change the initial sterilization temperature to a new setting.

The allowable setting range is 105°C—121°C.

① Press the temperature setting **TEMP.** button.

The current sterilization temperature setting appears on the digital indicator lamp.

② While holding down the **TEMP.** button, press the **▲UP** or **▼DOWN** button to change the temperature setting.

(The sterilization temperature setting can be raised or lowered in 1°C increments. Holding down the **▲UP** or **▼DOWN** button for more than one second causes the setting to change faster.)

#### Supplementary note

Lowering the sterilization temperature setting by 2°C or more after the chamber has been heated causes the temperature indication to flash on and off.

This is not a malfunction, and the flashing will stop as soon as the temperature in the chamber drops to the new sterilization temperature setting.

### ● Sterilization time setting

Follow the steps below to change the initial sterilization time to a new setting. The allowable setting range is 1 minute - 180 minutes.

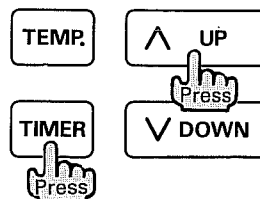
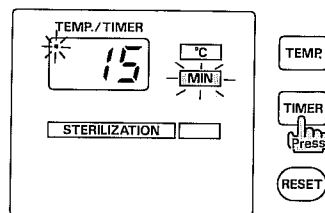
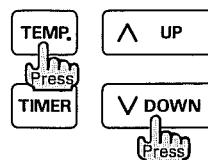
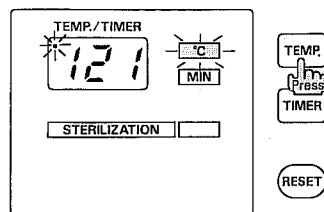
① Press the timer setting **TIMER** button. The current sterilization time setting appears on the digital indicator lamp.

② While holding down the **TIMER** button, press the **▲UP** or **▼DOWN** button to change the time setting.

(The sterilization time setting can be raised or lowered in 1-minute increments between 1 and 30 minutes and in 5-second increments between 30 and 180 minutes. Holding down the **▲UP** or **▼DOWN** button for more than one second causes the setting to change faster.)

#### Note

The sterilization temperature and sterilization time setting remain in memory as long as the unit is used continuously. If the power is turned off, however, the settings are lost and return to the initial values when the unit is powered on again.



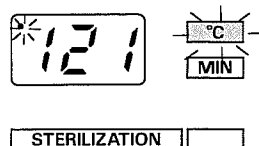


## 10. When sterilization finishes

- The buzzer sounds a beep and the **STERILIZATION** lamp goes out to indicate that sterilization is finished. The digital indicator lamp displays the temperature inside the chamber.
- When sterilizing instruments only and if you are in a hurry to remove them, turn the exhaust knob counterclockwise. After allowing the steam to escape, be sure to close the exhaust knob by turning it clockwise.

### Note

Do not open the exhaust knob when sterilizing cultures, chemicals or other items that could boil over. Opening the exhaust knob or turning off the power switch could cause the contents of the containers to splatter on the walls of the chamber, possibly leading to malfunctions because of clogged pipes and valves.

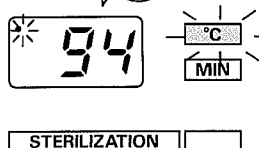
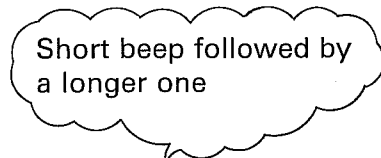


## 11. Returning to atmospheric pressure

- A short beep sounds followed by a longer one to indicate that the pressure inside the chamber is the same as the pressure outside. The items inside the chamber are still hot, so wait until the "finished" buzzer sounds and the "finished" indicator lights before removing.

### Note

The temperature shown at right is when the buzzer will generally sound. At different elevations the buzzer may sound at slightly different temperatures. This is not a malfunction.

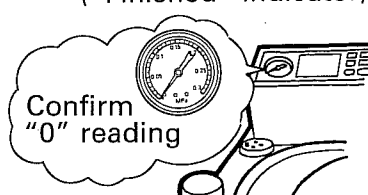
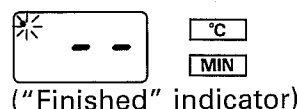


## 12. Completion

- Ten long beeps sound in succession and the "finished" indicator on the digital indicator lamp light to show that it is safe to open the door and remove the contents of the unit. (A short beep sounds when the door is opened.)

### Note

Always confirm that the chamber pressure is 0 MPa before opening the door. In interior of the chamber is hot, so be careful not to burn yourself.

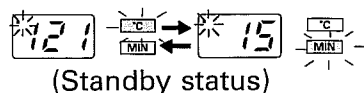
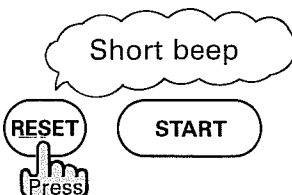


## Stopping Operation

- Press and hold down the **RESET** button. Short beeps sound at approximately 1-second intervals and the unit switches to stand by status.

### Note

Always confirm that the chamber pressure is 0 MPa before opening the door.



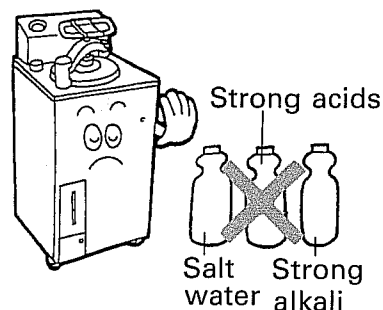
# ITEMS TO BE STERILIZED

## Precautions when sterilizing liquids such as cultures and chemicals

- Sterilizing small amounts of culture or other liquids in large containers can cause the pressure inside the chamber to rise to abnormally high levels and trigger the pressure safety valve. As a general rule, fill containers at least 80 percent full with culture, etc.
- When sterilizing large quantities of culture or other liquids, there may be a delay between when the interior of the chamber reaches the sterilization temperature and when the liquid in the containers reaches that temperature. Set the timer to a longer sterilization time when sterilizing such items.

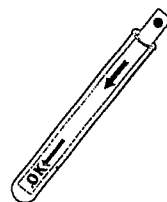
**Timer setting = sterilization time + delay time**

- Never use the unit to sterilize cultures or chemical solutions containing elements (salt water, strong acids, strong alkalis) that could cause the inside of the chamber (made of stainless steel) to corrode. Corrosion could cause the unit to malfunction prematurely.



## Checking sterilization performance

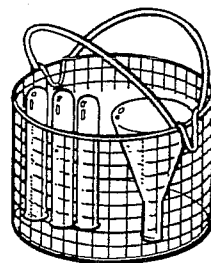
- Sterilization performance can vary depending on the type of items being sterilized, their quantity, how they are loaded into the autoclave and the containers used to hold them. Therefore, be sure to use a sterilization indicator such as an "OK card" to confirm sterilization performance.



## Sterilizing glass containers

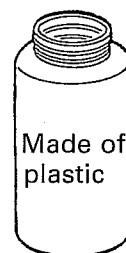
- When sterilizing glass containers such as beakers, triangular flasks and test tubes alone, place the containers with their mouths facing down or on their sides.

Placing glass containers upright makes it harder for the steam to reach the bottom and can result in incomplete sterilization. If glass containers must be placed upright in the autoclave, put a small amount of water into each of them before beginning the sterilization procedure.



## Sterilizing items made of plastic containers

- Set the sterilization time a little longer than usual when using plastic containers. Plastic containers convey heat slowly and can result in incomplete sterilization if sufficient time is not allowed.





# IN CASE OF POWER FAILURE

- All indicators go out if the power fails or is temporarily interrupted. Also, the sterilization temperature and sterilization time settings are erased.
- The above is also the case if the unit is unplugged or the power switch is turned off.

## When power is restored

The unit returns to initial setting status when power is restored. The digital indicator lamp displays the sterilization temperature and sterilization time settings alternately. (Refer to section 3 on page 11.)

## Checking items to be sterilized

- Confirm that the pressure gauge reads "0" and open the door.
- Liquids such as cultures can splatter if power is interrupted during the sterilization process. Remove the items to be sterilized and check for spilled liquids.

If any culture had spilled, wipe the inside of the chamber clean. Should any malfunction occur afterward, contact the dealer from whom you purchased the unit.

## Using the unit for the first time after a power failure

Load the items to be sterilized into the autoclave and restart the sterilization process as described in "Operating Instructions" (pages 10 through 14).

The sterilization temperature and sterilization time settings will have returned to their initial values. If different settings are required, the values will have to be changed as appropriate.

# MAINTENANCE AND CARE

- Always turn off the power switch and allow the unit to cool before cleaning it.
- Be careful not to scratch yourself on the unit's protrusions.

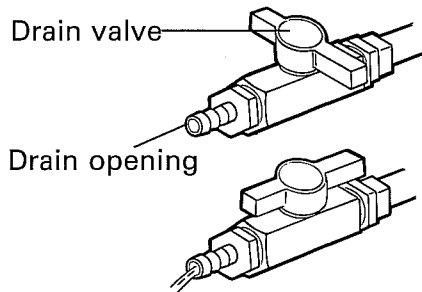
## Supplying and draining sterilization water

After each sterilization cycle, replenish the sterilization water at was used up. Be sure to drain away the left over sterilization water at the end of each day. After draining the water, be sure to close the drain valve.

### Note

The sterilization water is hot immediately after sterilization finishes. Wait until it cools before draining it.

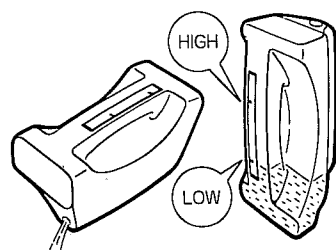
If a hose is connected to the drain opening, it should be made of heat resistant material.



## Replacing the water in the exhaust tank

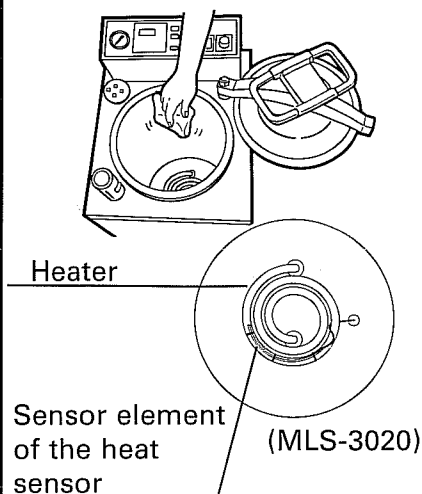
Before using the unit, check the water in the exhaust tank. If it has reached the 「HIGH」 level mark, discard it and add new water up to the 「LOW」 level mark.

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



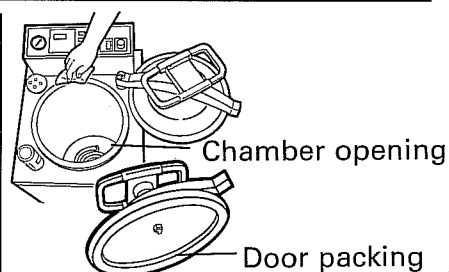
## If the main unit or the chamber interior become dirty

- To remove dirt from the main unit, wipe it with a soft cloth that has been moistened with water or neutral detergent and then thoroughly wrung out. Never use solvents such as paint thinner or benzine as they may mar the paint's finish.
- Wipe the interior of the chamber clean using a soft cloth that has been moistened with water. If the chamber is very dirty, it can be cleaned using a soft cloth that has been moistened with neutral detergent, and then rinsed with water.
- Clean the bottom of the chamber thoroughly using a brush with a handle or similar implement. Be careful not to rub too forcefully to avoid damaging the sensor element of the heat sensor mounted on the heater.
- Drain off the water used to rinse the chamber through the drain opening.



## Cleaning the door packing and chamber opening

Should the door packing or chamber opening become dirty, steam leakage can result. They should therefore be wiped carefully with a moist cloth each day before using the unit.



# TROUBLESHOOTING GUIDE

Check the following points if the unit seems to be malfunctioning.

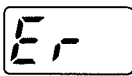
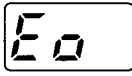
Problem	Possible cause	Remedy
<b>Power won't turn on.</b>	<ul style="list-style-type: none"> <li>● Is the power cord connected?</li> <li>● Is the circuit breaker that controls the power supply turned off?</li> <li>● Is the unit's power switch turned off?</li> <li>● Is there a power failure?</li> </ul>	<ul style="list-style-type: none"> <li>● Connect the power cord.</li> <li>● Turn on the circuit breaker that controls the power supply</li> <li>● Turn on the unit's power switch.</li> <li>● Wait for power to be restored.</li> </ul>
<b>Unit won't start.</b>	<ul style="list-style-type: none"> <li>● Is the door closed? (Is the "door closed" lamp lit?)</li> </ul>	<ul style="list-style-type: none"> <li>● Close the door. (Confirm that "door closed" lamp is lit.)</li> </ul>
<b>Unit won't heat to sterilization temperature.</b>	<ul style="list-style-type: none"> <li>● Is the exhaust knob closed?.</li> <li>● Is the drain valve closed?</li> </ul>	<ul style="list-style-type: none"> <li>● Close the exhaust knob.</li> <li>● Close the drain valve.</li> </ul>
<b>Steam leaks from pressure safety valve.</b>	<ul style="list-style-type: none"> <li>● Is the safety valve weight set up correctly?</li> <li>● Is there dirt on the packing of the safety valve weight?</li> <li>● Is the main unit tilted?</li> <li>● Are items placed in the chamber to be sterilized blocking the temperature sensor?</li> <li>● Are large containers containing very little liquid inside the chamber?</li> <li>● Have beakers or other glass containers been placed inside the chamber upright (when sterilizing glass containers only?)</li> </ul>	<ul style="list-style-type: none"> <li>● Make sure the safety valve weight is set up correctly. (Refer to page 9.)</li> <li>● Clean the dirt from the packing of the safety valve weight.</li> <li>● Make sure the main unit is level.</li> <li>● Move the items to be sterilized away from the temperature sensor.</li> <li>● Make sure containers are at least 80% full of liquid. (Refer to page 15.)</li> <li>● Place the beakers or other glass containers with their openings facing down. (Refer to page 15.)</li> </ul>
<b>Digital indicator lamp (temperature display) flashes.</b> (If the temperature inside the chamber rises 2 °C or more above the temperature setting, the temperature display and the safety circuit is triggered.)	<ul style="list-style-type: none"> <li>● Did you lower the temperature setting 2 °C or more after the chamber had heated up?</li> <li>● Other than above (temperature setting not changed after start of sterilizing process).</li> </ul>	<ul style="list-style-type: none"> <li>● This is not a malfunction. The display will stop flashing when the chamber temperature drops to the new temperature setting.</li> <li>● The temperature control circuit is malfunctioning, causing the safety circuit to be triggered. Contact the dealer from whom you purchased the unit.</li> </ul>

# TROUBLESHOOTING GUIDE

## If an error indication appears

If an error indication appears and the buzzer beeps intermittently, the unit's safety device has been triggered, halting operation. Should this occur when the unit is in use, consult the table below for points to check and corrective actions.

● To cancel the error indication: Switch off the power to turn off the error indication and buzzer. When the power is turned back on, the unit will be in stand by status. (If the "Er" indication appears, turn the power off, wait a little while and then turn the power back on.)

Error indication	Possible cause	Remedy
 (Error)  Dry scorch error.	<ul style="list-style-type: none"><li>● Is there too little sterilization water in the chamber? (See page 10.)</li><li>● Did you forget to close the exhaust knob? (See page 11.)</li><li>● Did you forget to close the drain valve?</li></ul>	<ul style="list-style-type: none"><li>● Replenish the sterilization water.</li><li>● Close the exhaust knob.</li><li>● Close the drain valve.</li></ul>
 (E.O.)  Thermistor error.		Contact the dealer from whom you purchased the unit.

# SPECIFICATIONS

Model	MLS-2420	MLS-3020
Power supply	AC local voltage, 50—60Hz	AC local voltage, 50—60Hz
Power consumption	1.5 kw	2 kw
External dimensions	380(w) × 490(D) × 840(H) mm	440(w) × 550(D) × 1,050(H) mm
Weight	Approx. 47 kg	Approx. 69 kg
Chamber dimensions	240(diameter) × 450(depth) mm	300(diameter) × 670(depth) mm
Chamber material	SUS304 (stainless steel)	
Sterilization temperature	105°C — 121°C	
Temperature gauge range	80°C — 141°C (digital display)	
Safety valve popping pressure	0.2 MPa	
Pressure gauge range	0 — 0.3 MPa	
Timer setting range	1 minute — 180 minutes	
Exhaust tank	3 L polypropylene tank	
Safety devices	Pressure safety valve, anti-dry scorch thermo-limiter, door switch	
Accessories	Vinyl cover (1) Stainless steel baskets (2)	Vinyl cover (1) Stainless steel baskets (3)