Amerex Instruments, Inc.

NO.S05G-005-A

HIRAYAMA

HIRAYAMA AUTOCLAVE

HICLAVE

HRH-110

(135°C version)

OPERATION MANUAL

Serial No.

Note: This unit is equipped with Water Feed Bottle and Drain Bottle options. Some of the Installation instructions may not apply. Please see Addendum for Water Feed Bottle and Drain Bottle instructions.

IMPORTANT

●Read this manual carefully for your proper operation of Autoclave Model HRH-110.

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Issued on May 30, 2005

Introduction

Refer to Page V for Contents

- We would like to express our gratitude for your purchase of our autoclave. This manual provides general information about HIRAYAMA HICLAVE **HRH-110**, including the descriptions of how to operate it and what you should do for its routine maintenance. Your proper handling of the autoclave will provide its full performance, ensuring your regular use of it for an extended period of time.

- For optional equipment (☐Recorder; ☐Floating Sensor; ☐Water Feed Bottle; ☐Drain Bottle), refer to the Operation Manual for Option.

- First of all, please check that the product conforms to your order and has not been damaged during transportation. Should you find anything damaged or out of order with the equipment, please contact our authorized distributor in your region immediately. Also check that all the accessories listed in the Specifications Table in Chapter 5 are found in the package.

③ This manual has been carefully prepared for your handy reference. Should you discover anything wrong or missing in this manual, please contact our authorized distributor in your region.

Before Use

●Appoint a person responsible for administration of your new autoclave.

●The following marks are used in this manual. Your particular care and attention are required to these marks and the notes following them:

⚠ *WARNING:*	Precaution indicating an imminent dangerous situation which, if not avoided, could lead to death or serious injury.
⚠ *CAUTION:*	Precaution indicating a dangerous situation which, if not avoided, could lead to a moderate or minor injury.
! *IMPORTANT:*	Items you are advised to follow with special attention.
NOTE:	Additional remarks that will be of help to you when operating and handling your autoclave.

⚠ *WARNING:*

●NEVER use the autoclave to sterilize any of the following dangerous/hazardous materials or substances with acid or alkali content. Sterilization of these materials/substances can cause explosions, corrosion of the working chamber and/or chamber piping of your autoclave, and deterioration of its gaskets.

① Explosive substances:
- Nitroglycol, nitroglycerin, nitrocellulose, and other explosive nitrates
- Trinitrobenzene, trinitrotoluene, picric acid, and other nitro compounds
- Peracetic acid, methyl ethyl ketone peroxide, benzoyl peroxide, and other organic peroxides

② Ignitable substances:
- Metallic lithium, potassium, sodium, yellow phosphorous, phosphorous sulfide, and red phosphorous
- Celluloids, calcium carbide (carbide), lime phosphide, and magnesium powder
- Aluminum powder, magnesium powder, and metallic powders other than aluminum powder
- Sodium dithionite (or sodium hydrosulfite)

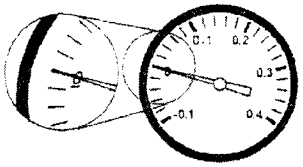
③ Oxidizing agents:
- Potassium chlorate, sodium chlorate, ammonium chlorate, and other chlorates
- Potassium perchlorate, sodium perchlorate, ammonium perchlorate, and other perchlorates
- Potassium peroxide, sodium peroxide, barium peroxide, and other inorganic peroxides
- Potassium nitrate, sodium nitrate, ammonium nitrate, and other nitrates
- Sodium chlorite and other chlorites
- Calcium hypochlorite and other hypochlorites

④ Flammable substances:
- Ethyl ether, gasoline, acetaldehyde, propylene oxide, carbon disulfide, and other substances with flash points ranging from -30°C to 0°C.
- Methanol, ethanol, xylene, pentyl acetate (or amyl acetate), and other substances with flash points ranging from 0°C to 30°C.
- Kerosene, gas oil, turpentine oil, isopentyl alcohol (or isoamyl alcohol), acetic acid, and other substances with flash points ranging from 30°C to 65°C.

⑤ Flammable gases (hydrogen, acetylene, ethylene, methane, ethane, propane, butane, and other flammable substances that are gaseous matter at a temperature of 15°C under 1 atmospheric pressure.)

●Before opening the cover of your autoclave, be sure to check that the pressure inside is below 0 MPa.

●DO NOT attempt to remodel or alter this product for any reason whatever.



Compound pressure gauge

⚠ CAUTION:

- Foreign matter such as metal fragments and liquid may enter through the vent hole of your autoclave. Operating it with such foreign matter inside could cause trouble with the autoclave, fire or electric shock.
- Do not forcibly bend, twist, tie or extend its power cable. Do not put heavy objects on the cable. A damaged cable or exposed wire could cause fire or electric shock.
- Absolutely avoid connecting the power cable to a power supply out of the rated voltage range. Connection to such a power supply could cause fire or electric shock.
- Be sure to ground the equipment before connecting its power cable to a power source.
- Absolutely avoid grounding to a gas pipe or vinyl chloride water service pipe.
- Close the cover of your autoclave chamber always after checking that there is no foreign matter adhering to its gasket. Adhered foreign matter could cause vapor leaks.
- If you want to use a waste disposal bag or other kind of bag when sterilizing, put it in a metal mesh basket and then place the basket in the chamber. Using the bag as is could cover the pipe opening, causing excessive temperatures, overpressure or dry heating of the chamber, and such.
- Be careful not to pinch your fingers when closing the chamber door.
- Do not put your face or hands close to the chamber when opening its door immediately after operation; steam will gush out from above the door.
- The door, chamber, gasket and panels of the autoclave are very hot soon after the completion of sterilizing operation. Do not touch the equipment, or you may get burned.
- Do not open the chamber door abruptly after the completion of sterilizing operation; hot water drops will splash out and you could get burned.
- Avoid leaning against the open chamber door as it may bring the equipment down.
- Do not put your hands around the door hinge; you could pinch your fingers in the door when closing/opening it.
- Put on heat insulating gloves before removing the sterilized substance from the chamber. Do not put hands into the chamber until steam has been vented.
- Some time is required for liquids to cool down. Before unloading the sterilized liquid from the chamber, be sure to check that its temperature has dropped sufficiently, or you may get burned.
- Do not throw the used battery into the flames. It could burst up.
- If the gauge display reading changes between the operation steps, turn the POWER switch off, then turn it on to resume the operation from the beginning. If the problem continues, turn the power switch off and call our authorized distributor in your region.
- Do not come up to the rear tank outlet. Steam will gush out.
- If anything is out of the way with the product (e.g., strange sounds, unusual smells, smoke emission), immediately shut the power off. After checking to see that the abnormal condition does not continue, call our authorized distributor in your region.

How to Read This Manual

●This operation manual consists of the following sections covering all the information required for proper operation of the autoclave HIRAYAMA HICLAVE HRH-110:

Chapter 1. What is the Autoclave HRH-110?

This section provides general information on the product, including its applications and features as well as the names and functions of its parts.

Chapter 2. Installation

This section explains where and how the equipment should be installed. The product incorporates precision components, so be sure to follow the instructions given in this chapter.

Chapter 3. Operation

This section illustrates how to change various set values and describes operating steps before starting the equipment and after completing automatic operation. It also provides information on the display and performance of the equipment during automatic operation.

Chapter 4. Maintenance and Servicing

This section describes how to make routine maintenance of the equipment and drain and change its tank water. The section also contains the descriptions of the safety valves incorporated in the equipment.

Chapter 5. Specifications

This section covers the dimensions, power consumption, working limits and other specifications of your new autoclave. Refer to this section as necessary.

Chapter 6. Troubleshooting

This section covers troubleshooting procedures for the product. If you encounter a problem, consult this section first.

Table of Contents

Chapter 1. What is the Autoclave HRH-110?

1. Scope of Applications

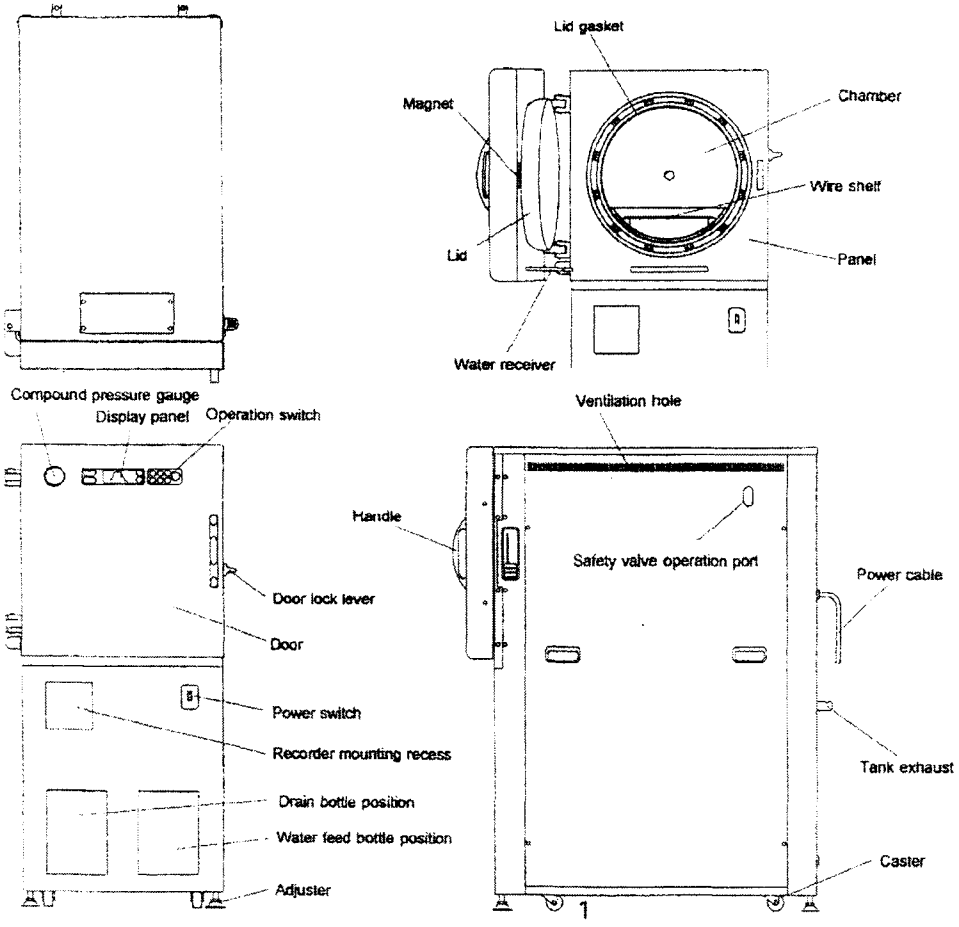
- sterilize gauzes and other pieces of cloth which require drying after being sterilized (Mode 1);
- sterilize materials which can withstand high temperatures and high pressure steam, such as tools and instruments of glass, ceramic, metal or rubber (Mode 2);
- sterilize water, reagents (solid and solution) and liquid medicines which can bear temperatures (Mode 3); and
- run additional drying after the material has been sterilized and dried (Mode 4).

2. Features

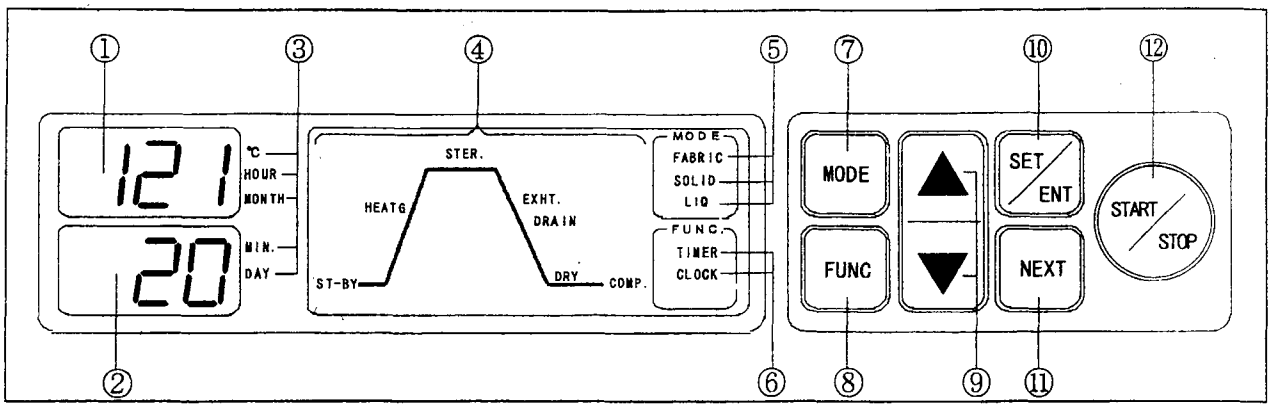
- Autoclave Model HRH-110 incorporates a timer which permits you to start its operation at any desired time within a period of one week.
- The autoclave provides a variety of operation modes, including the sterilization-drying and drying-exclusive modes.
- The autoclave is equipped with an internal vacuum pump for removing air from the chamber for solid load such as glassware, pipette tips and bags. It is also used for drying by heat and vacuum.
- Optional equipment (Recorder, Floating Sensor, Water Feed Bottle and Drain Bottle) is also available. The autoclave is designed to permit each of these optional items to be conveniently incorporated in its housing.

3. Names and Functions of Component Parts

● Outside View of Body



●Display Panel and Control Switch Panel in Detail



①Digital display (Temperature, time of day, and error display)

The set value of temperature, current time and the pre-selected time of operation startup are displayed in this window while the equipment is on standby, and the temperature in the chamber during operation.

When a problem occurs, resulting in the detection of an error, the detected error is indicated on the panel.

②Digital display (Run time, and time of day)

The set run time of autoclave (sterilizing duration), current time and the pre-selected time of operation startup are displayed in this window while the equipment is on standby, and the remaining time to complete sterilization or drying during operation.

③Indicator of units (℃, HOUR, MONTH, MIN., DAY)

The unit corresponding to the value/numeral appearing in the digital display window ① or ② lights up.

④Cycle display (ST-BY, HEATG, STER., EXHT., DRAIN, DRY, COMP.)

All the steps included in the selected type of operation mode (cycle) illuminate, and the working step of the cycle blinks.

⑤Mode display (FABRIC, SOLID, LIQ)

The selected mode lights up.

⑥Function display (TIMER, CLOCK)

The TIMER pilot lamp lights up and remains lit while you are setting the startup timer or checking the preset time on the timer, and starts to blink when you finish setting the timer. The CLOCK pilot lamp lights up when you check or change the time, and starts to blink when the backup battery has gone dead.

⑦MODE switch

This switch is used to select the type of operation mode (cycle). Also use the switch when you need to check the preset temperature or run time during operation.

⑧FUNC switch

This switch is used to set a value for each function and check the preset value.

⑨Add/Reduce Value switches (▲, ▼)

Used to increase or decrease the set values.

⑩SET/ENT switch

Used to change a set value.

⑪NEXT switch

Used to select the item for which you wish to change the setting.

⑫START/STOP switch

Used to start or stop operation.

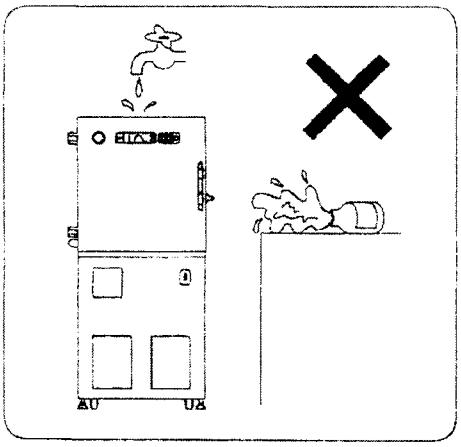
Chapter 2. Installation

IMPORTANT:

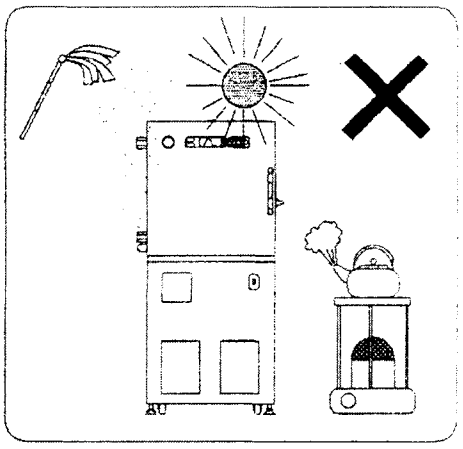
- If the equipment is to be installed in a place 800 meters or higher above the sea level, that is, in a mountainous area where the atmospheric pressure is low, special specifications are required. Make sure to contact our authorized distributor in your region. Do not use the equipment before changing the specifications.
- When transporting your autoclave, be sure to close its door and slide the door operating lever to the "lock" end (lower end) to prevent the door from opening. Then disconnect its power cable.
- When transporting your autoclave, do not hold it by the door handle, otherwise the door may become difficult to close.
- After moving the autoclave, be sure to level it using the level vial enclosed in the package, otherwise it could cause dry heating of the chamber or insufficient drying of the substance.

1. Conditions for Installation

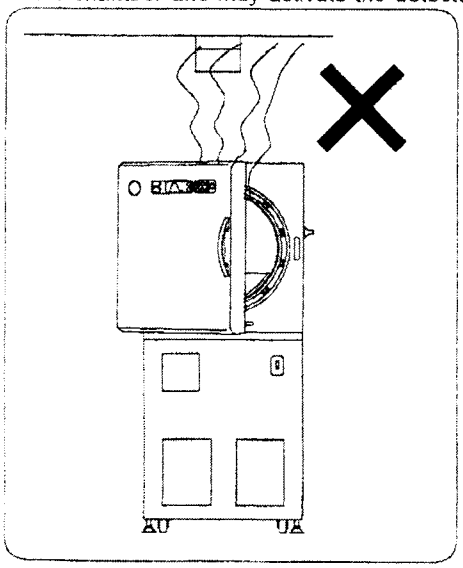
①Avoid installing the equipment in a place where it may be exposed to water or chemicals, or where corrosive and explosive gases may be produced nearby.



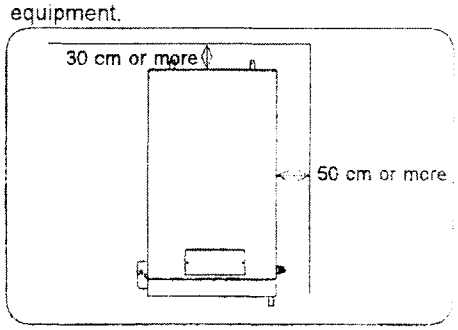
②Avoid placing the equipment in a place exposed to high humidity, direct sunlight or much dust.



③Avoid placing the equipment right under a fire detector. When you open the chamber door immediately after operation, steam comes out of the chamber and may activate the detector.



④For the purpose of maintenance, provide a clearance of at least 50 cm on the right side and 30 cm or more on the rear side of the equipment.



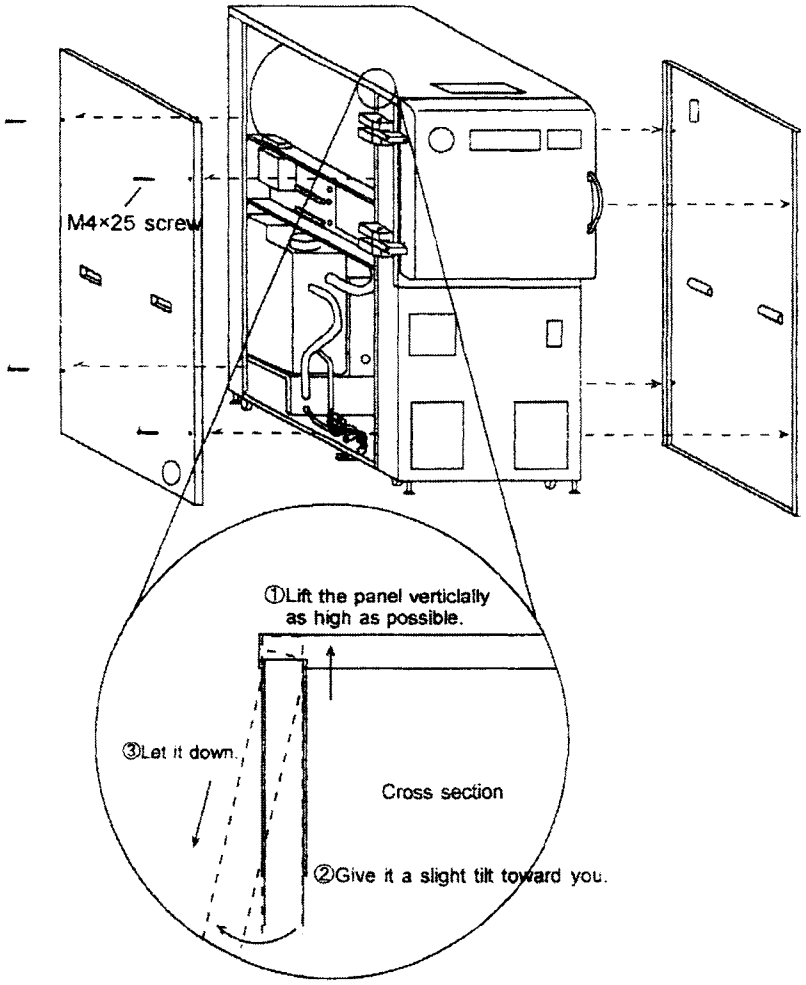
⑤Avoid installing the equipment with its tank exhaust coming near outlets or electrical appliances as steam comes out of the exhaust.
⑥Avoid an installation place which is subject to impacts or vibration.
⑦Install your autoclave in a level, firm place.
⑧Avoid placing your autoclave in a place which is subjected to a room temperature of 5℃ or below and 35℃ or above.

2. How to Install Your Autoclave

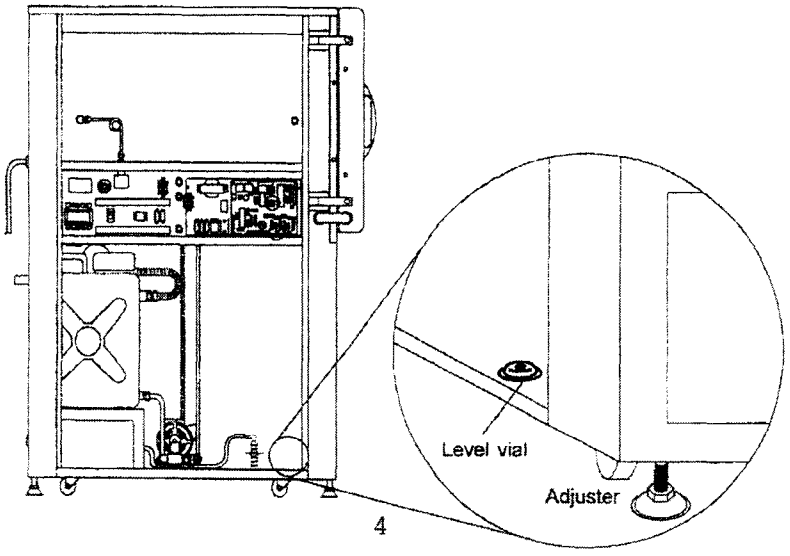
①First, check to make sure the autoclave is level.

> ! *IMPORTANT:*
>
> ● Setting of the autoclave in correct way is very important. If not, it may cause over heating of the chamber or insufficient drying of the substance.

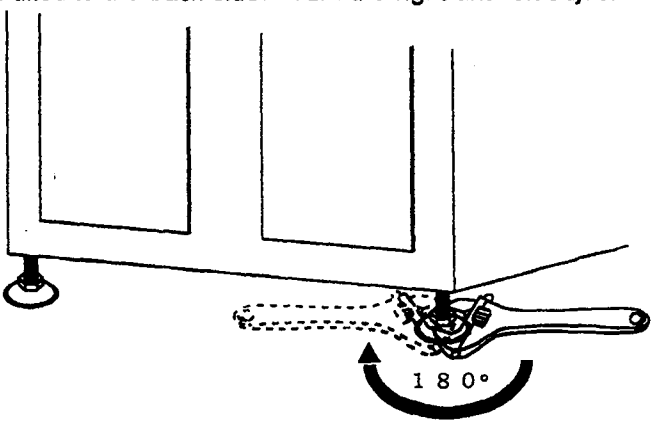
a. Remove either the left-side or the right-side panel.



b. Using the level vial and the adjusters, make sure that the autoclave is level.



②After the equipment is leveled, turn each of the two front adjusters by 180 degrees clockwise ten times so that the equipment is tilted to the back side. Turn the right and left adjusters evenly.

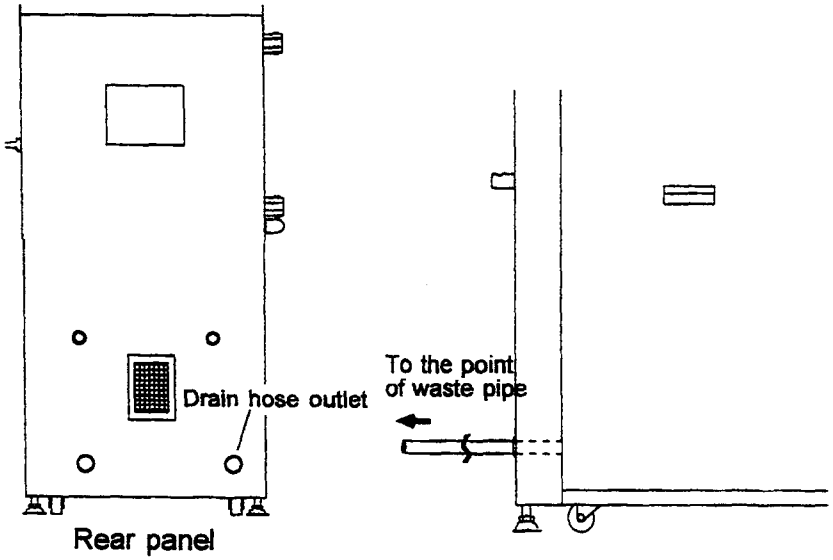


③Replace the side panels in their respective places.

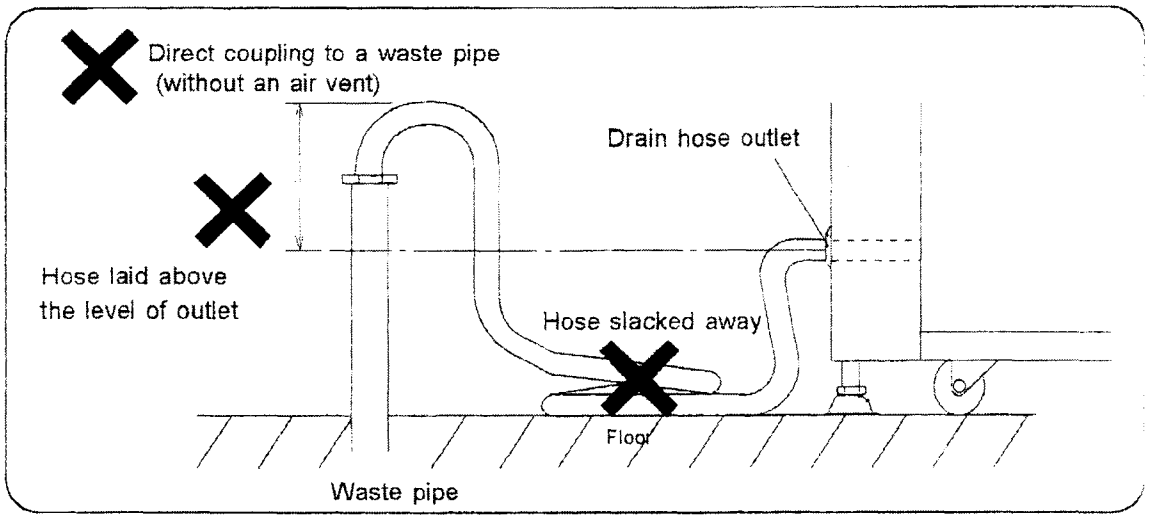
④Conduct the head of the drain hose out of the equipment rear panel to the point of waste pipe. N/A. See Addendum for Drain Bottle instructions and then proceed to step 5.

! IMPORTANT:

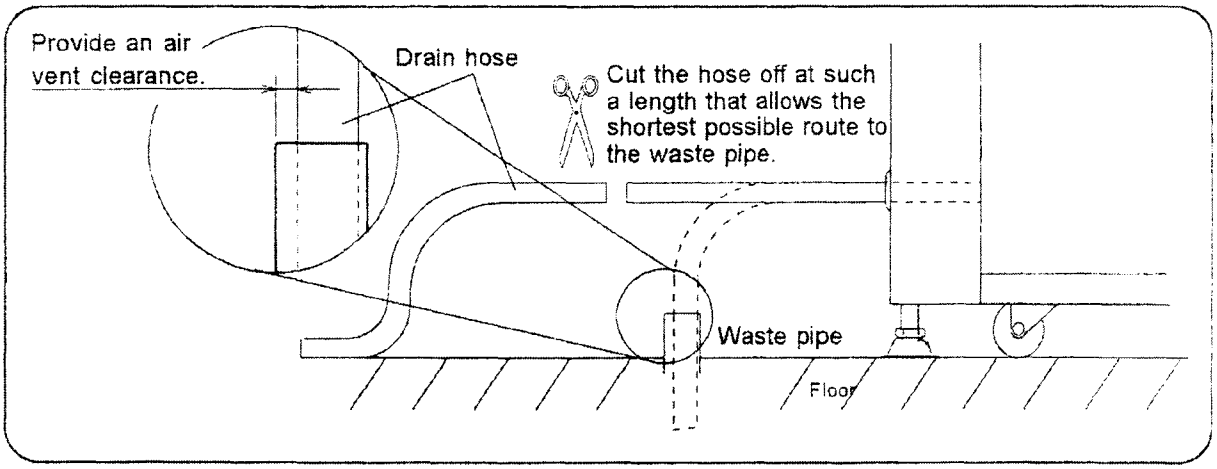
- Do not bring the drain hose over the level of its outlet located on the rear panel of the casing. Cut the hose off at an appropriate length; the hose should be laid without slack and in such a way that it takes the shortest possible route to the point of waste pipe. Do not use an extension for the hose as it may obstruct drainage.
- If you need to connect the drain hose directly to the waste pipe, be sure to provide an air vent, otherwise the hose is subjected to back pressure, leading to possible obstruction of drainage.
- Do not drag the drain hose out of its outlet located on the rear panel of the casing.

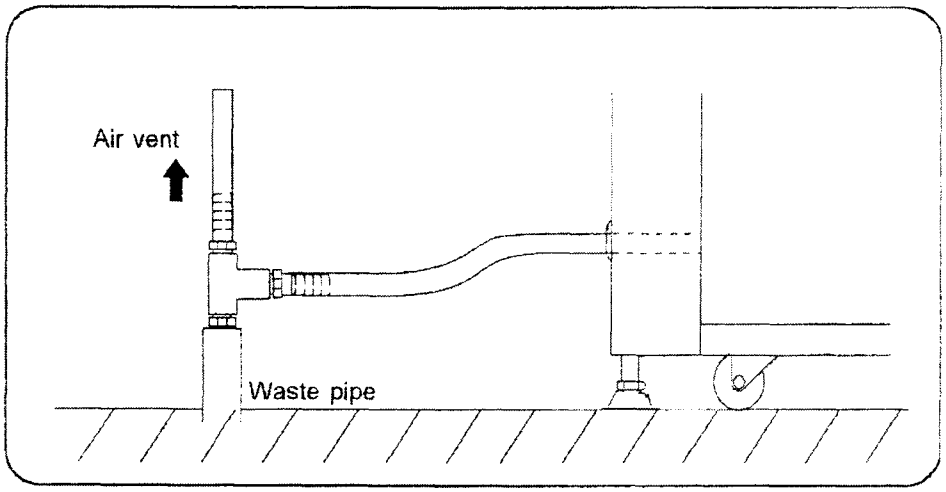


· Avoid laying the drain hose as illustrated below:



· Lay the drain hose as shown below when it is to be directly coupled to a waste pipe. Be sure to provide an air vent.





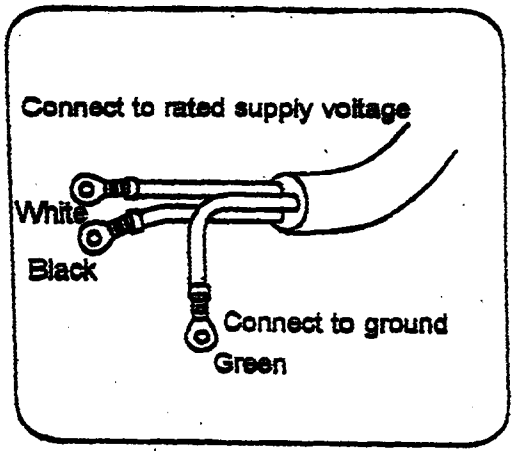
⑤Connect the power cable to a rated power source.

- Ground the earth wire without fail.

⚠ CAUTION:

- Do not forcibly bend, twist, tie or extend the power cable. Do not put heavy objects on the cable. A damaged cable or exposed wire could cause fire or electric shock.
- Absolutely avoid connecting the power cable to a power supply out of the rated voltage range. Connection to such a power supply could cause fire or electric shock.
- Be sure to ground the earth wire of your autoclave before connecting it to a power source.
- Absolutely avoid grounding to a gas pipe or vinyl chloride water service pipe.

- Connect the power cable to a power unit carrying a current of 15 amps or more (220 VAC) or 14 amps or more (230/240 VAC), and ground the green earth wire without fail. If the circuit breaker of the power unit is rated at 15 amps (220 VAC) or 14 amps (230/240 VAC), the breaker may be activated depending on its mounting angle or the level of ambient temperature.



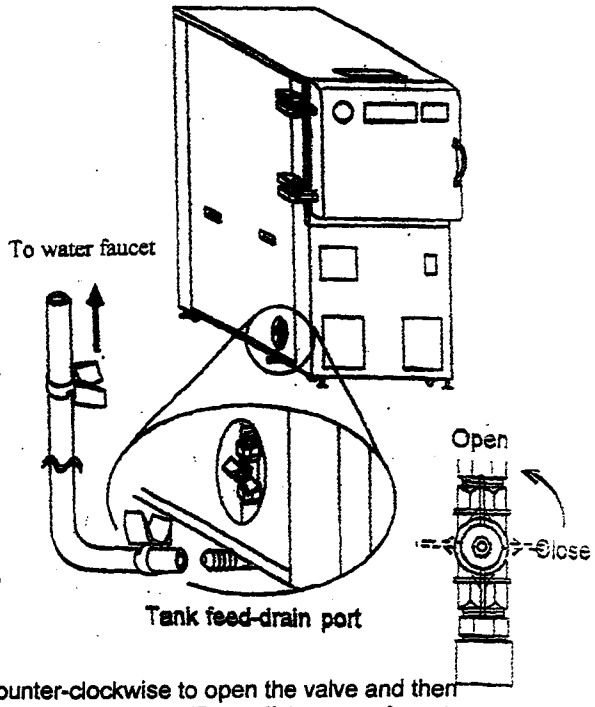
⑥Turn the POWER switch on. Since the vacuum pump and cooling tanks are empty when you receive the equipment, the error message "Er0" appears on the display panel together with alarm bleeps.

Note: Alarm is also given when water level in the tank is Lower than that specified.

⑦Referring to Chapter 3 titled "Operation," open the equipment door and take out the accessories inside. Note: Alarm sounds will disappear when you open the door.

⑧Close the door and brin_ its lever down to the lower end to lock the door.
Note: Alarm resumes bleeping.

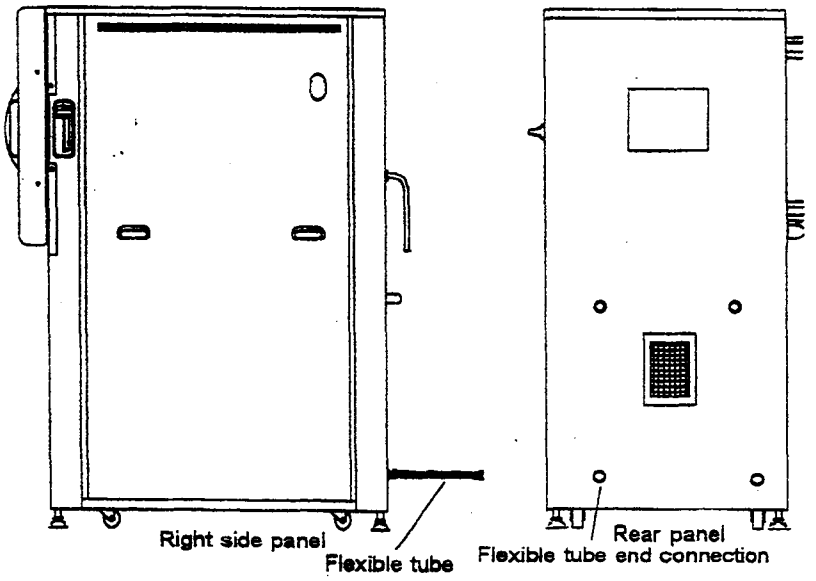
⑨ Connect one end of the blue hose (included) to the tank feed-drain port and the other end to a water faucet. Securely fasten the hose with the hose clamps which also are in included.



⑩ Turn the yellow T-valve (above the tank feed-drain port) counter-clockwise to open the valve and then turn on the water faucet to begin filling the vacuum pump and cooling tanks, Turn off the water faucet when you hear the alarm bleeps and see the Er0 error message on the display panel disappear which indicates that the tanks are sufficiently filled.

⑪Close the water cock and knob and remove the hose. Connect either end of the flexible tube (included in the set of accessories) to the port located in the lower part of the rear panel of the casing, and the other end of the tube to a water tap (choose a tap that allows connection of a flexible tube).

N/A. See Addendum for Water Feed Bottle instructions. After filling the Water Feed Bottle installation is complete. Proceed to Chapter 3. Operation



※Keep the tank water hose in storage after removed as it should be used again when draining the tank.

⑫Check for the leak from pipings by conducting trial operation.

● Required Water Pressure

Check that the working water pressure is within a range between 0.1 MPa and 0.3 MPa. If the working water pressure does not reach 0.1 MPa, the water feed error ("E r B") may appear on the display panel. In this case, the preset value for water feed must be changed. Follow the steps below.

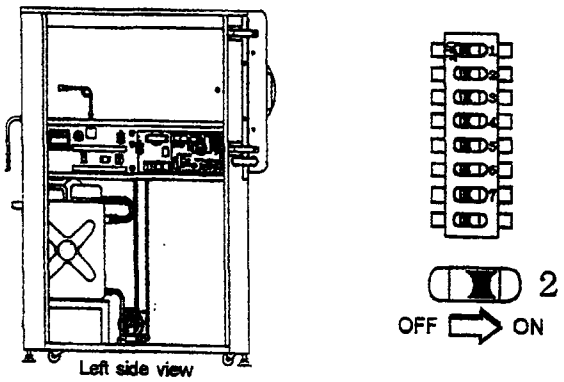
When the working water pressure exceeds 0.3 MPa, use a pressure reducing valve to control the pressure to the level not higher than 0.3 MPa.

How to change the setting for working water pressure:

①Turn the source power off, then remove the left side panel of the casing.

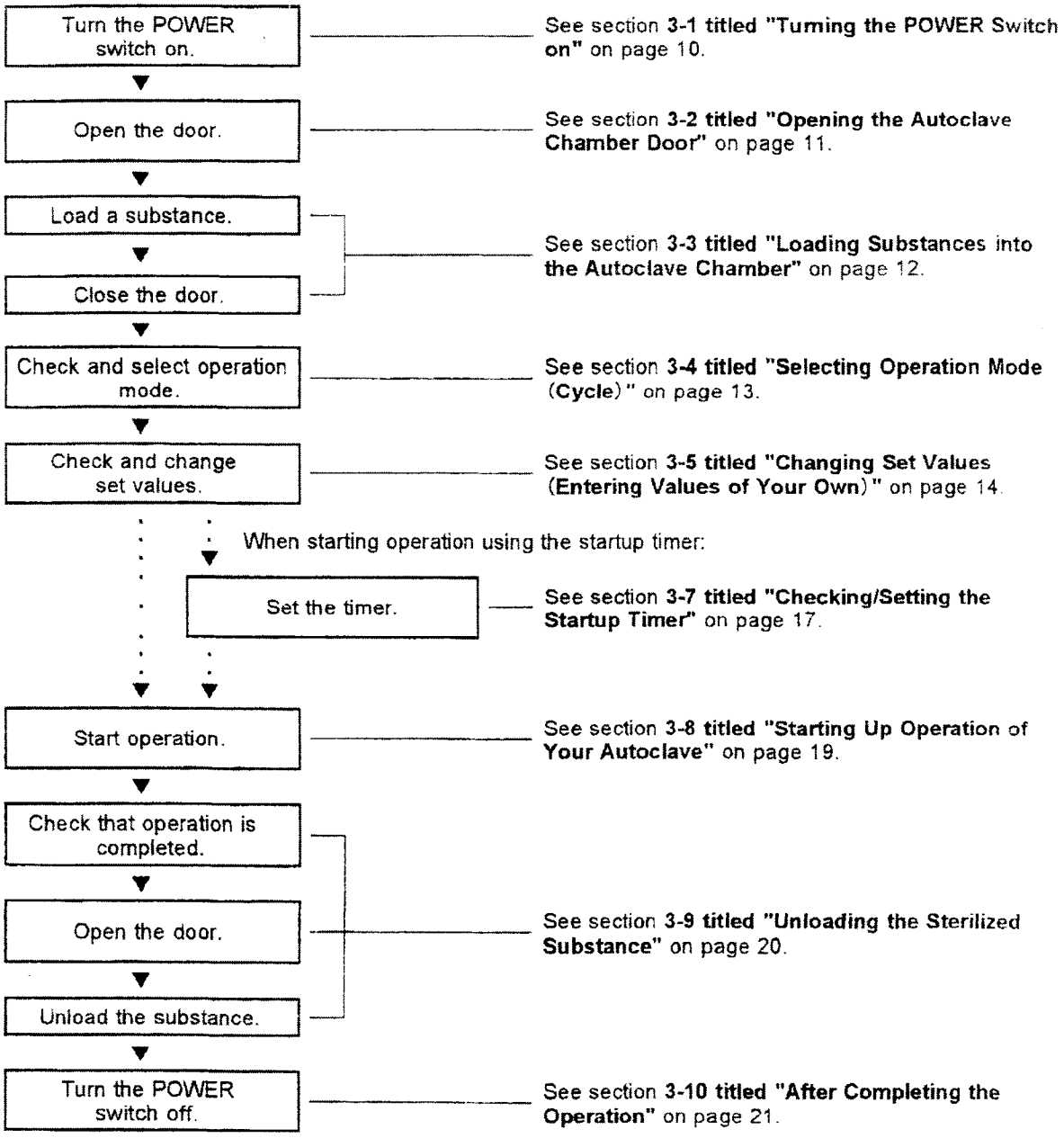
②Slide switch 2 of DIP switch case S1 located on the printed circuit board toward the ON side (see the illustration below). You can use a ball-point pen to slide the switch.

③Turn the source power on and the equipment POWER switch on. Conduct a test run to see that no error is detected.



Chapter 3. Operation

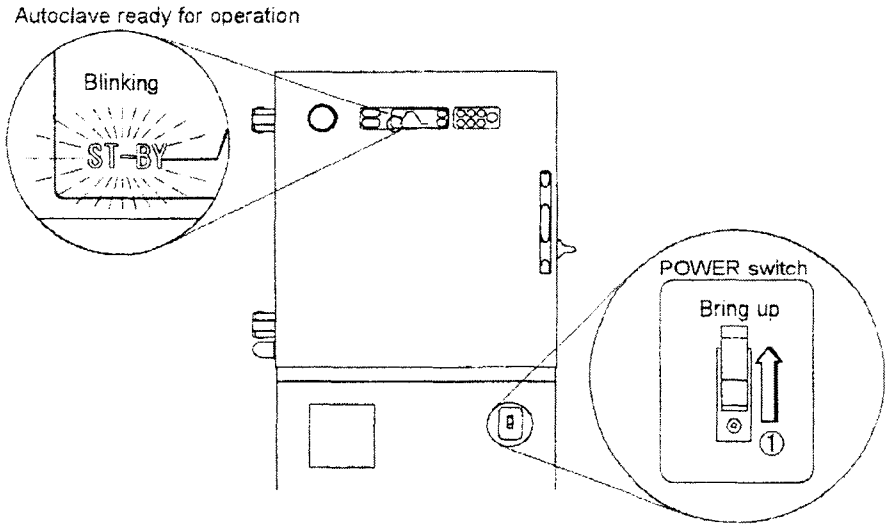
Basic Operating Procedure



1. Turning the POWER Switch on.

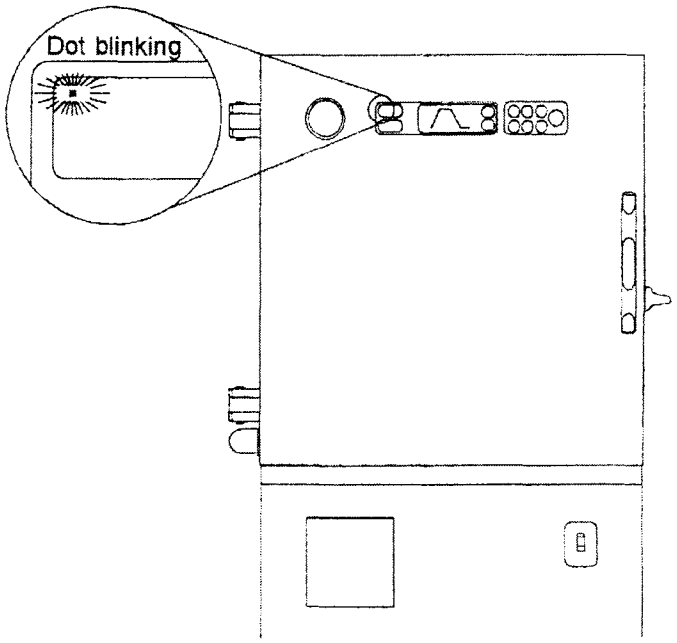
①Turn on the POWER switch located in the lower part of the front panel of the casing.

- When the door operating lever is positioned at the "lock" end (lower end), the preset values appear in the digital display panel windows and the ST-BY lamp on the cycle display panel starts to blink, showing that the autoclave is ready for operation.
  When the lever is positioned at an "unlock" point (any points other than the lower end), the error message "d o r" and the temperature in the chamber appear alternately on the digital display panel.



△NOTE:

- If you leave the autoclave control switches unoperated for 30 minutes, the display panels black out except for a dot blinking at the temperature display zone. To reset the display, press any of the control switches.



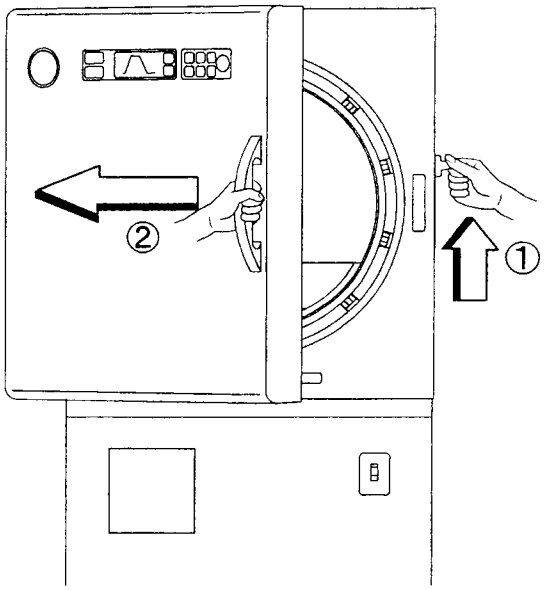
2. Opening the Autoclave Chamber Door

IMPORTANT

●Make sure to turn the POWER switch on before operating the door lever.

①Slide the door operating lever to the "unlock" end (upper end).

②Hold the door handle and open the door.



3. Loading Substances into the Autoclave Chamber

⚠ CAUTION:

- Be careful not to pinch your fingers when closing the chamber door.
- Close the chamber door always after checking that there is no foreign matter adhering to the chamber cover gasket. Adhered foreign matter could cause vapor leaks.
- If you want to use a waste disposal bag or other kind of bag for sterilizing operation, put it in a metal mesh basket and then place the basket in the chamber. Using the bag as is could cover the pipe opening, causing excessive temperatures, overpressure or dry heating of the chamber, and so on.

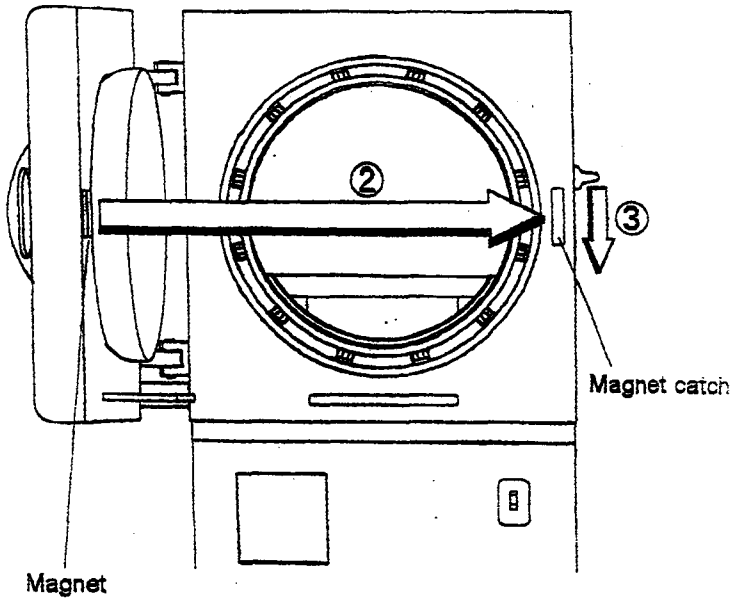
(!) IMPORTANT:

- Leave the chamber door open for at least 15 minutes between one operation and another when small quantities of liquids are sterilized in series (e.g., liquids in test tubes). Check to see that the temperature in the chamber is 50°C or below before resuming the operation.
- This autoclave may not be suitable for heat sensitive culture media, such as BGLB. These media may be discolored and become unserviceable.
- When sterilizing chemicals or other liquids, pay attention to the liquid volume in relation to the container. A conical flask (Erlenmeyer flask) can contain up to 3 liters of water but limit the volume of liquid to be poured in the flask to approximately 2/3 of the said capacity in order to prevent the liquid from boiling over, which could sometimes occur during cooling depending on the exhaust pattern. The volume should still be reduced to about 1/2 if a test tube is used for sterilizing operation.
- Make sure to use a dedicated can for sterilization of liquid, otherwise the liquid may boil over, causing the equipment piping to clog up, the situation which could lead to a failure of the equipment.
- Do not use a round basket having a diameter of 27 cm and above.
- When using a waste disposal bag for sterilizing operation, leave a part of the bag open, taking care not to allow it getting into contact with the inner face of the chamber. Using the bag completely closed could cause insufficient sterilization.
- Keep the container cap loose during sterilization or use a container that can draw a draft, otherwise insufficient sterilization could result or the container could burst up.
- Be sure to use a metal mesh holder for loading small substances.

①Place the substance to be sterilized into the chamber.

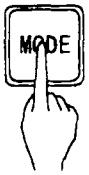
②Press the door until the magnet is attracted to the magnet catch.

③Slide the door operating lever to the "lock" end (lower end).



4. Selecting Operation Mode (Cycle)

● The following operation modes are stored in the microcomputer memory of your autoclave. Choose a desired mode according to the need.



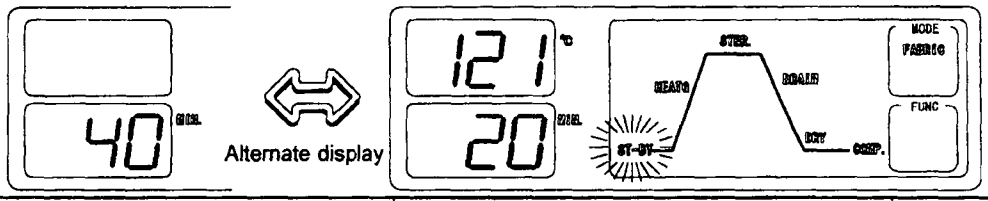
①Press the MODE pushbutton switch.

- Each time you press the button, the operation mode will change from Mode 1 to Mode 4 in a cyclic sequence.

MODE	Application
1	Sterilization of gauzes and other pieces of cloth which require vacuum pump to evacuate air from the chamber and a drying after being sterilized.
2	Sterilization of materials which can withstand high temperatures, high pressure steam, and abrupt decompression during exhausting, such as tools and instruments of glass, ceramic, metal or rubber. Also uses a vacuum pump to evacuate air from chamber.
3	Sterilization of water, reagents (solid and solution) and liquid medicines which can bear high temperatures and high pressure steam.
4	Additional drying of gauzes and other pieces of cloth after they have been sterilized and dried.

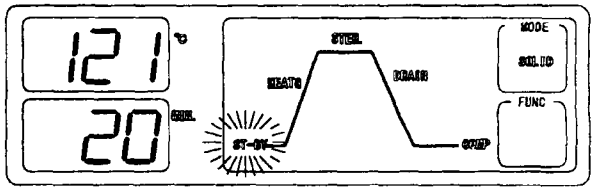
MODE 1

Cycle display	Initial set value: Sterilization temperature	Sterilizing duration	Drying duration	Exhaust pattern	MODE display
HEATG→STER. →DRAIN→DRY	121℃	20 min.	40 min.		FABRIC



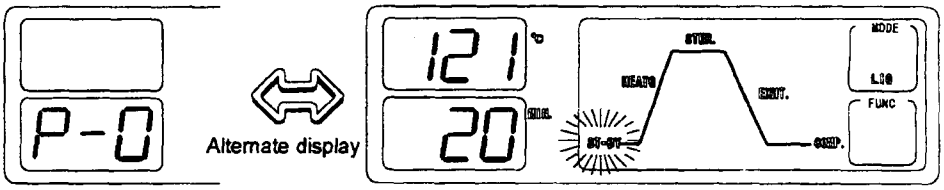
MODE 2

Cycle display	Initial set value: Sterilization temperature	Sterilizing duration	Drying duration	Exhaust pattern	MODE display
HEATG→STER. →DRAIN	121℃	20 min.			SOLID



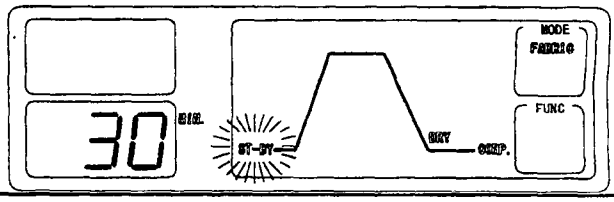
MODE 3

Cycle display	Initial set value: Sterilization temperature	Sterilizing duration	Drying duration	Exhaust pattern	MODE display
HEATG→STER. →DRAIN	121℃	20 min.		P−0	LIQ



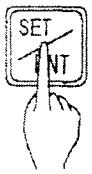
MODE 4

Cycle display	Initial set value: Sterilization temperature	Sterilizing duration	Drying duration	Exhaust pattern	MODE display
DRY			30 min.		FABRIC



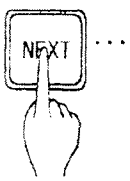
5. Changing Set Values (Entering Values of Your Own)

●Follow the steps below to change the default values (sterilization temperature, sterilizing duration, drying duration and exhaust pattern) previously set before shipping from our factory. Settings cannot be changed while the autoclave is running.



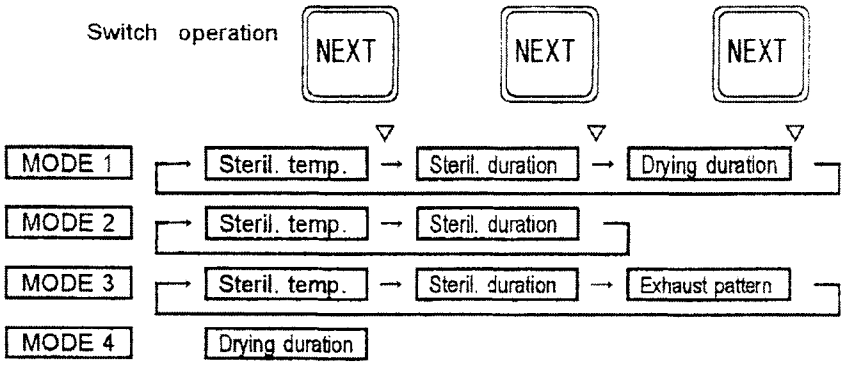
①Press the SET/ENT pushbutton switch.

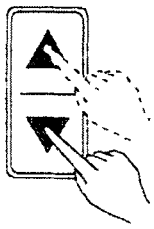
- The displayed value of the preset sterilization temperature starts to blink, indicating that the value can now be changed.



②Press the NEXT switch to select the entry item whose value you need to change.

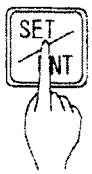
- Each time you press the button, the item to set will change in the sequence shown below:





③Use the Add/Reduce Value switches (▲,▼) to change the displayed value.

- Each time you press these switches, the displayed value increases or decreases as follows:
  Sterilization temperature: In increments/decrements of 1°C within a range of 105-123°C
  Sterilizing duration: In increments/decrements of 1 min. within a range of 1-60 min.
  Drying duration: In increments/decrements of 1 min. within a range of 1-120 min.
  Exhaust pattern: In increments/decrements of 1 unit within a range of 0-2
- If you hold the switch down, the displayed value increases or decreases in increments/decrements of 10°C/min. except for exhaust pattern. When the displayed value exceeds the upper (or lower) limit, it returns to the lower (or upper) limit.



④Press the SET/ENT switch.

- The changed value is stored and the display stops blinking. Now you have set the value.

How to cancel the changed value

●If you desire to cancel on the way the value you have changed or you are changing, press the MODE switch. The changed value will not be stored and the equipment will return to the standby state.

△NOTE:

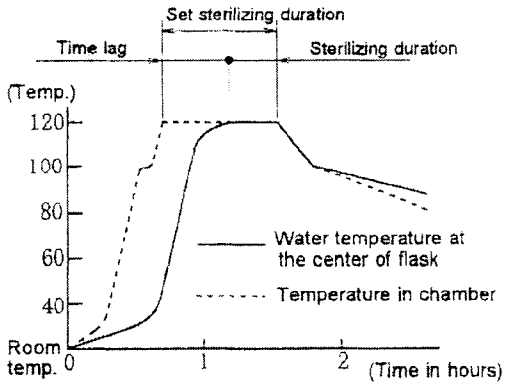
- For sterilization of liquid, set a sterilizing duration longer than desired, taking time lag into account. Use the following table as reference.

  Example: When a flask is filled with 3 liters of water, it takes nearly 25 minutes (time lag) for the water temperature in the center of the flask to reach the set sterilization temperature after the temperature in the chamber has attained the set value level. You should set a sterilizing duration 25 minutes longer than desired in consideration of this time lag. The resulting duration in this case will be 45 minutes.

  Desired sterilizing duration (20 min.) + Time lag (25 min.) = Set sterilizing duration (45 min.)

Reference Values of Time Lag (per Flask)

Liquid volume	Time lag
3 lit.	25 min.
2 lit.	23 min.
1 lit.	10 min.
500cc	7 min.



Time lag reference data

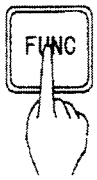
- Likewise, time lag is caused until the temperature of gauzes or other pieces of cloth reaches the set level at the center of such pieces if too many pieces are squeezed into a basket (for example, more than seven rolls of 30 cm x 10 m gauze).
  Set a sterilizing duration longer than desired in consideration of this time lag if you need to sterilize a lot of pieces at a time.
- Avoid stuffing the chamber with too many materials to sterilize. Also pay attention to the manner of loading. Too much stuff may lead to insufficient drying. Always set a longer sterilizing duration than desired.
- If steam is abruptly exhausted after sterilization of liquid, the liquid may boil over. To prevent this, change the exhaust pattern setting as necessary.
- When using test tubes for sterilizing operation, set the exhaust pattern of spontaneous cooling (P-0), otherwise the liquid could gush out.
- When a waste disposal bag is used for sterilizing operation, it takes several minutes (time lag) for the temperature at the center of the bag to reach the set sterilization temperature after the temperature in the chamber (displayed temperature value) has attained the set value level.
  If approximately 500 milliliters of water is poured in the bag, steam is generated in the bag, driving the air out. This will significantly reduce the time lag arising during temperature rise. Take this into consideration when setting the sterilizing duration. Refer to the table below for time lag data.

(When a large number of 15 mm dia. X 100 mm test tubes are placed in a waste disposal bag)

Reference Values of Time Lag in the Bag

Water in bag	Time lag
Not poured	20 minutes
Poured	Some minutes

6. Checking/Correcting the Clock Time



①With the equipment on standby, press the FUNC switch twice consecutively.

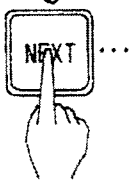
- The CLOCK pilot lamp lights up, and the current date and time (time, day, month and year) appears on the digital display panels.

②Check to see that the displayed date and time are correct.

- If the time and date are correct, press the MODE switch. (Reset to the standby state)
- If the time and/or date are incorrect, go to step ③.

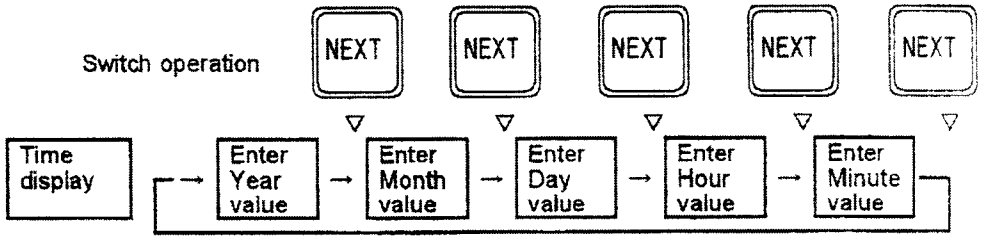
③Press the SET/ENT switch.

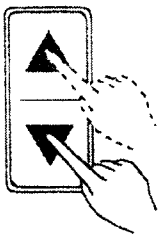
- The last two digits of the year start blinking to display "YEAR", indicating that the clock is ready for correction of the year.



④Press the NEXT switch to select the entry item whose value you need to change.

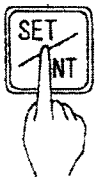
- Each time you press the button, the item to set will change in the sequence shown below:





⑤Use the Add/Reduce Value switches (▲,▼) to change the displayed value.

- Each time you press these switches, the displayed value increases or decreases as follows:
  - Year: In increments/decrements of 1 year within a range of 00-99
  - Month: In increments/decrements of 1 month within a range of 1-12
  - Day: In increments/decrements of 1 day within a range of 1-31
  - Hour: In increments/decrements of 1 hour within a range of 0-23
  - Minute: In increments/decrements of 1 minute within a range of 0-59
- If you hold the switch down, the displayed value increases or decreases in increments/decrements of 10. When the displayed value exceeds the upper (or lower) limit, it returns to the lower (or upper) limit.



⑥Press the SET/ENT switch.

- The corrected date and time are stored and the equipment returns to the standby position.

How to cancel clock corrections

- If you desire to cancel on the way the corrections you have entered, press the MODE switch. The changed date/time will not be stored and the equipment will return to the standby state.

△ NOTE:

- The clock continues working by means of the built-in backup battery even after the power switch is turned off and when power interruption occurs. When the backup battery has run down, the CLOCK display starts to blink. In this case, call our authorized distributor in your region.

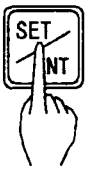
7. Checking/Setting the Delay-Start Timer

(!) *IMPORTANT:*

●An incorrect clock gives rise to an improper setting of the delay-start timer, leading to malfunctions of the equipment. Be sure to check the clock time and correct it, if necessary, before setting the delay-start timer.

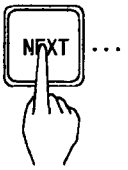
①With the equipment on standby, press the FUNC switch once.

- The TIMER pilot lamp lights up, and the default value for the delay-start timer (initial set value of operation delay-start time) appears on the digital display panel.



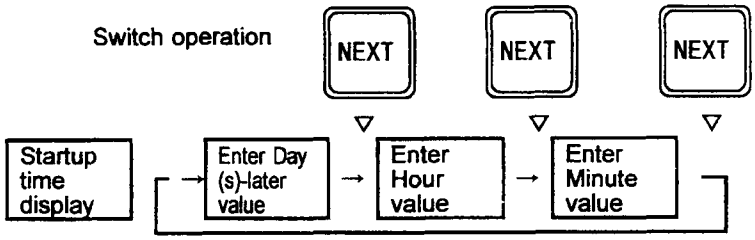
②Press the SET/ENT switch.

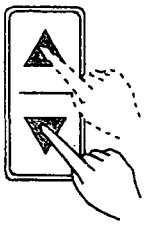
- The day(s)-later display starts blinking, indicating that it is ready for change.



③Press the NEXT switch to select the item whose value you need to change.

- Each time you press the button, the item to set will change in the sequence shown below:





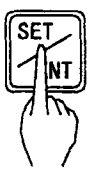
④Use the Add/Reduce Value switches (▲,▼) to change the displayed value.

- Each time you press these switches, the displayed value increases or decreases as follows:
  Day(s)-later: In increments/decrements of 1 day within a range of 0-6 days
  Hour: In increments/decrements of 1 hour within a range of 0-23 hours
  Minute: In increments/decrements of 1 minute within a range of 0-59 minutes
- If you hold the switch down, the displayed value increases or decreases in increments/decrements of 10. When the displayed value exceeds the upper (or lower) limit, it returns to the lower (or upper) limit.

Examples of setting:

If you desire to start operation at 11:30 p.m. today, you should make the following entry:
Day(s)-later = 0; Hour = 23; Minute = 30

If you desire to start operation at 5:00 a.m. the day after tomorrow, you should make the following entry:
Day(s)-later = 2; Hour = 5; Minute = 0



⑤Press the SET/ENT switch.

- The entered delay-start time is stored and the equipment returns to the standby position with the TIMER display on. (If you enter a time before the current time, an electronic alarm sounds and the display of the entered day(s)-later starts blinking. In this case, check the time you have set and correct the values as necessary.

How to cancel the set value for delay-start timer

- If you desire to cancel on the way the value you are entering, press the MODE switch. The entered value will not be stored and the equipment will return to the standby state.

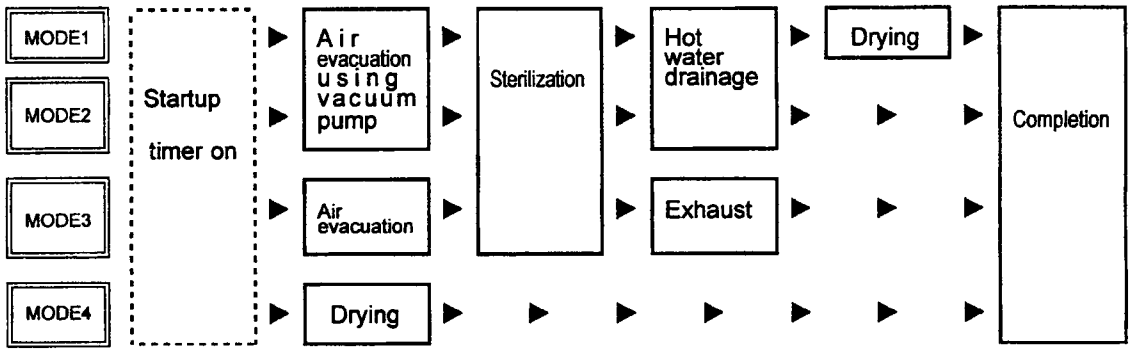
△ *NOTE:*

- Operation will not start at the set time unless the START/STOP switch is pressed, even when you have completed to set the delay-start timer.
- To cancel the time set on the delay-start timer, turn the equipment power switch off, and the set time value will be ignored.
- Each setting for the delay-start timer is effective for one operation only.
- If operation is shut down before the time set on the delay-start timer, that time setting remains effective.

8. Starting Up Operation of Your Autoclave

①Press the START/STOP switch.

- The door operating lever is locked, and the chamber door cannot be opened. Then the following cycle operations are performed automatically according to the mode you select. For details of each specific mode, see section 3-14 titled "Operation of Cycles" on page 21.



Checking the set startup time during the cycle of startup timer on

- Press the FUNC switch to check the startup time set on the timer during the cycle of startup timer on. While you are holding the switch down, the set time remains on the display. The set time cannot be changed in this cycle.
- After the cycle of startup timer on is over, the set time value is reset and reads "0 day(s)-later, 00 hour, 00 min."

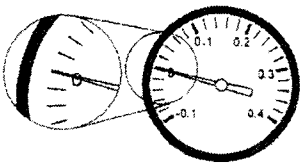
Checking set values during operation

- Press the MODE switch to check the set values for temperature, run time (duration) and exhaust pattern during operation. While you are holding the switch down, the set values remain on the display. The set values cannot be changed during operation.

9. Unloading the Sterilized Substance

⚠ WARNING:

- Do not open the chamber door until you check and verify that the gauge for the pressure in the chamber reads "0 MPa."



Compound pressure gauge

⚠ CAUTION:

- Keep your face and hands away from the chamber when opening its door immediately after operation; steam will gush out of the opening of the chamber.
- The chamber, chamber cover and its gasket and panels of the autoclave are very hot soon after the completion of sterilizing operation. Do not touch the equipment, or you could get burned.
- It takes a relatively long time for liquids to cool down. Before unloading the sterilized liquid from the chamber, be sure to check that its temperature has dropped sufficiently, or you may get burned.
- Put on heat insulating gloves before removing the sterilized substance from the chamber. Do not put your hands into the chamber until steam has been vented.
- Do not open the chamber door abruptly after the completion of sterilizing operation; hot water drops will splash out and you could get burned.

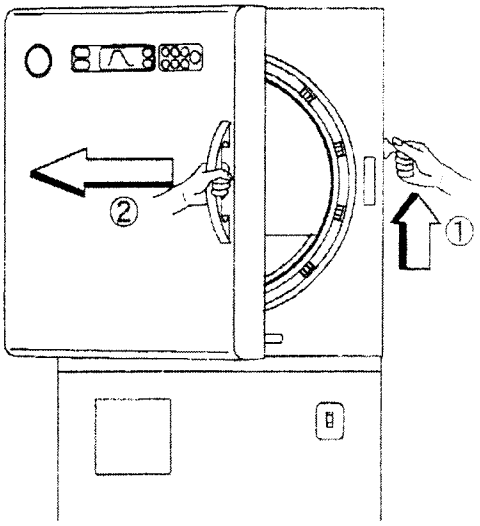
! IMPORTANT:

- If brine water and other liquids containing much salt boil over in the chamber, wipe off these water drops completely. If their residues are left in the chamber, it will cause corrosion of the chamber and piping of your autoclave.

①Slide the door operating lever to the "unlock" side (upper end).

②Hold the door handle and open the door slowly.

③Unload the sterilized substance.



⚠ NOTE:

- If you leave the autoclave control switches unoperated for 30 minutes, the display panels black out except for a dot blinking at the temperature display zone. To reset the equipment to the completion state, press any of the control switches.

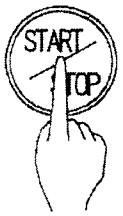
10. After Completing the Operation

①Turn the equipment POWER switch off after finishing the routine operation every day.

11. How to Interrupt Operation

△NOTE:

●If operation is interrupted during sterilization of liquid, the liquid may boil over in the chamber because of an abrupt exhaust.



①Press the START/STOP switch.

- The ongoing automatic cycle is interrupted, and the equipment returns to the standby state (the state before operation).
- If you need to unload the sterilized substance out of the chamber, follow the instructions given in section 3-9 ("Unloading the Sterilized Substance"). The chamber door can be unlocked when the chamber temperature drops to 97°C and below for Modes 1 and 2 and 79°C and below for Mode 3, and the pressure drops to 0 MPa.

12. If Power Supply Is Cut Off during Operation

●If power supply is cut off due to power failure or the like, operation of the equipment is interrupted. When power supply is restored, the equipment will be back on standby (the state before operation). Repeat the operation from the beginning.

△NOTE:

●If power supply is cut off due to power failure and the line, the door operating lever of the equipment is locked for safety. To open/close the door, follow the instructions given in section 3-9 ("Unloading the Sterilized Substance").

13. Auto Cutoff System

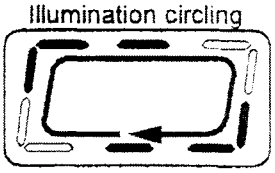
●In order to save power consumption, this equipment is equipped with an auto cutoff system. The system blacks out all the display panels except for a dot blinking at the temperature display zone, and cuts power off (the equipment POWER switch remains on) if you leave its control switches unoperated for 30 minutes. To return the equipment to the state before cutoff, press any of the control switches.
Note that the door operating lever is locked while power is cut off. Be sure to press any control switch and check that power is back (the displays will light up) before attempting to close the door.

14. Operation of Cycles

■Water Feed Cycle·····Modes 1, 2 and 3

- The ST-BY lamp stops blinking to remain lit, and the HEATG lamp goes out to start blinking. At the same time, the temperature in the chamber appears on the digital display panel.
- The vacuum pump draws the chamber air and feeds the specified level of water into the chamber.

■Startup Timer On Cycle·····Common to all the modes (when the startup timer has been set)



- The digital display section remains illuminated in a circular way until the time set on the startup timer (preset time of operation startup) reaches.
- When the time set on the startup timer reaches, the TIMER lamp goes out and operation proceeds to the next cycle.

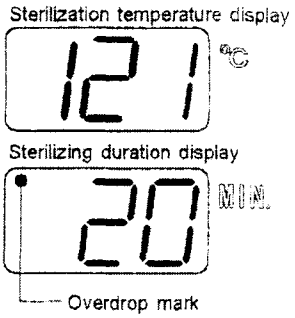
■Air Evacuation Cycle·····Modes 1, 2 and 3

- When the inside pressure of the chamber returns to the level of atmospheric pressure due to steam generation, the vacuum pump restarts to evacuate the chamber except in Mode 3 in which the pressurized venting is performed instead of the evacuation by vacuum pump.
- Temperature rises until the set sterilization temperature (pressure) is attained.
- After the set sterilization temperature is attained, the HEATG lamp stops blinking to remain lit and operation proceeds to the next cycle.

■Pressurized Venting Cycle·····MODE 3

- When the inside pressure of the chamber returns to the level of atmospheric pressure due to steam generation, the solenoid valve opens to vent the air out of the chamber.
- Temperature rises until the set sterilization temperature (pressure) is attained.
- After the set sterilization temperature is attained, the HEATG lamp stops blinking to remain lit and operation proceeds to the next cycle.

■Sterilization Cycle·····MODE 1、2、3



- The STER. lamp goes out and starts blinking. Upon activation of the sterilization timer, the set sterilizing duration appears on the digital display panel.
- Temperature (Pressure) is maintained constant during sterilizing operation.
- If the temperature in the chamber drops 1°C or more from the set value due to any trouble, the overdrop mark appears on the digital display panel and the operation of the sterilization timer is interrupted. When the set temperature is regained, the timer restarts operation.
- The digital timer displays the remaining time during the sterilization cycle. To check the set duration, see the **"Checking set values during operation"** section on page 19.
- When the set sterilizing duration is over, the STER. lamp stops blinking to remain lit and operation proceeds to the next cycle.

NOTE:

- In sterilizing petri dishes or empty containers, the air remaining in the container expands and may increase the pressure in the chamber. If the increased pressure exceeds the level of the saturated steam pressure, the solenoid valve opens to discharge the residual air out of the chamber.
- The temperature in the chamber is maintained somewhat higher than the set sterilization temperature level so that the set temperature can be maintained.

■Hot Water Drainage Cycle·····MODE 1、2

- The DRAIN lamp goes out to start blinking. At the same time, the solenoid valve fully opens to reduce the inside pressure, then the motor operated valve opens to drain hot water.
- When the drainage of hot water is finished, the DRAIN lamp stops blinking to remain lit and operation proceeds to the next cycle.

■Exhaust Cycle·····MODE 3

- The EXHT. lamp goes out to start blinking.
- If the preset exhaust pattern is "P – 1" or "P – 2" the solenoid valve is opened in rhythmical movement so that pulse exhaust is performed. If the preset exhaust pattern is "P – 0" the solenoid valve remains close and spontaneous cooling is performed.

△NOTE:

●When steam is exhausted after sterilization of liquid, the liquid may gush out. To prevent this, conduct pulse exhaust or spontaneous cooling. Change the pattern according to the substance to sterilize.

P – 0 : Spontaneous cooling
P – 1 : Pulse exhaust (in trace quantities)
P – 2 : Pulse exhaust (in small quantities)

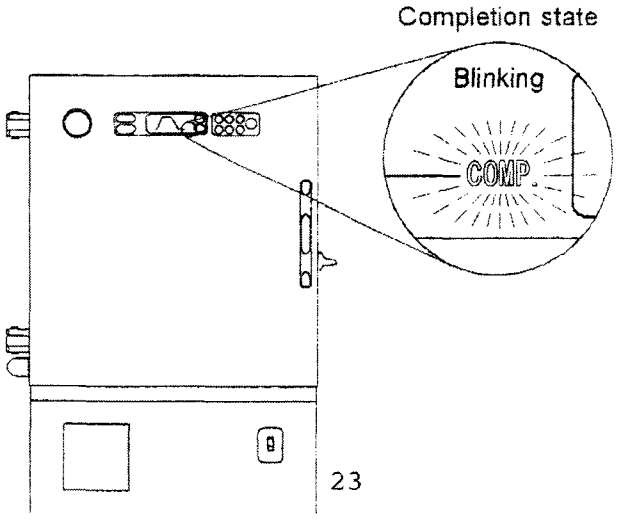
- When the pressure in the chamber falls to 0.01 MPa and below, the solenoid valve opens.
- When the temperature in the chamber falls to 79°C and below, the EXHT. lamp stops blinking to remain lit and operation proceeds to the next cycle.

■Drying Cycle·····MODE 1、4

- The DRY lamp goes out and starts blinking. Upon activation of the drying timer, the set drying duration appears on the digital display panel. The temperature display turns into a dashed line ("– – –").
- The vacuum pump continues working during the set duration to maintain a negative pressure inside the chamber. After the pressure falls to a given level, air is circulated within the chamber through a disinfecting filter so as to maximize the effect of dry process.
- The digital timer displays the remaining time during the drying cycle. To check the set duration, see the **"Checking set values during operation"** section on page 19.
- When the set drying duration is over, the air through the disinfecting filter flows into the chamber to return the inside pressure of the chamber to the level of atmospheric pressure.
  The DRY lamp stops blinking to remain lit and operation proceeds to the next cycle.

■Completion Cycle·····Common to all the modes

- When all cycles of each mode are complete, the electronic alarm indicates the completion of the cycles by giving three bleeps. The COMP. lamp goes out and starts blinking.



Chapter 4. Maintenance and Servicing

⚠ CAUTION:

- Make sure to start maintenance and servicing after the equipment has been completely cooled down.

1. Cleaning the Body

(!) IMPORTANT:

- Do not use benzine or thinner to clean the equipment casing. Also make sure that volatile substances such as insecticides do not come into contact with the casing as these substances may deteriorate the casing or strip its paint.

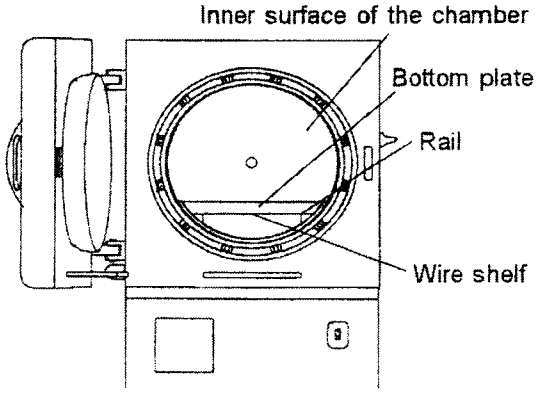
①Gently wipe stains off the casing with a soft cloth. To remove stubborn stains, wring a cloth moistened with neutral detergent diluted with water and wipe off these stains with it. Use a dry cloth to finish cleaning.

2. Cleaning the Chamber

(!) IMPORTANT:

- Absolutely avoid using abrasive powder of coarse grains to clean the bottom plate of the chamber. This type of powder may damage its plating.
- Do not use washing agent rister.

①Gently wipe off the inner surface, bottom plate, screen rack and the rail with a soft cloth. To remove stubborn stains, wring a cloth moistened with neutral detergent diluted with water and wipe off these stains with it.



3. Cleaning the Strainer

⚠ WARNING:

- Make sure to start cleaning only after the inside pressure of the chamber has dropped to 0 MPa.
- Be sure to start cleaning only after the strainer has been completely cooled down.

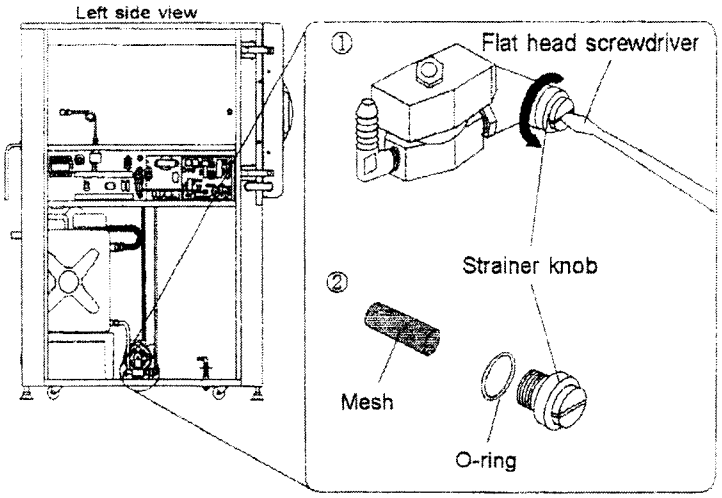
①Turn the POWER switch off and remove the left side panel of the casing. Remove the strainer knob located at the point shown in the illustration below, using a flat head screwdriver or a coin.

・Some water will spill. Wipe the spill off after cleaning is finished.

②Detach the mesh from the strainer knob.

③Wash the removed mesh with water to dust off.

④Replace the clean mesh in its place on the knob. Check that the knob has an O-ring, then replace it in the strainer.

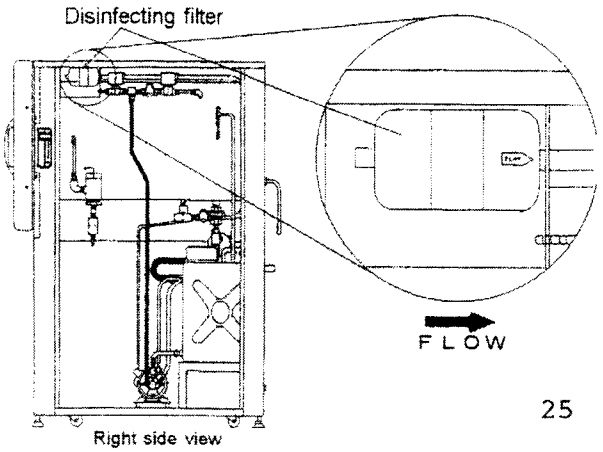


4. Replacing the Disinfecting Filter

・Replace the disinfecting filter every year with a new one. It should also be replaced if it takes too much time for the atmospheric pressure to return.

①Remove the right side panel of the casing. Replace the disinfecting filter after detaching the hose from the filter.

・Take care with the filter direction.



5. Cleaning the Air Filter

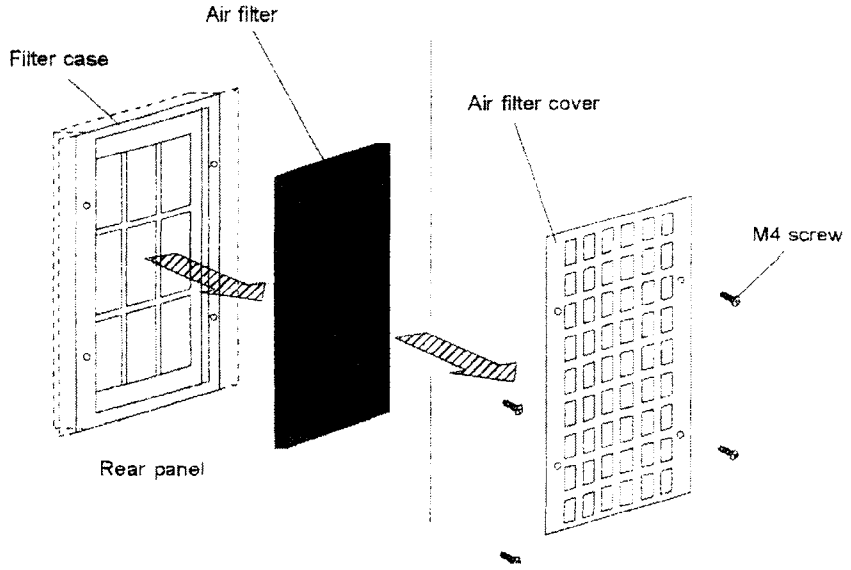
⚠ WARNING:

● Before starting cleaning, check to see that the equipment POWER switch has been turned off.

· Clean the air filter once a month.

①The air filter cover is fixed to the lower part of the rear panel with four screws. Remove the cover using a screwdriver. Take the air filter out of the case and wash it with water. If the filter is extremely contaminated, wash it using neutral detergent diluted with water.

②After washing, dewater and dry it well. Replace the filter in its place.



6. Changing the Tank Water

· Change the tank water once a month.

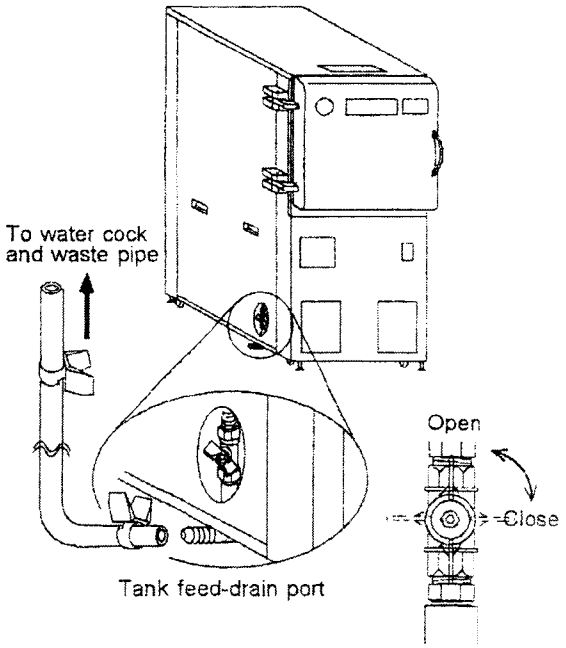
①Connect the tank water hose (included in the set of accessories) to the tank feed-drain port. Clamp the hose with the hose straps also included in the set. Bring the hose head to the point of waste pipe.

②Turn the knob to left to start drainage.

③After the tank water is drained, turn the POWER switch on to lock the door. The error number "Er0" will appear on the display panel together with alarm bleeps. These bleeps indicate that the tank is empty. Connect the hose to a water cock and start feeding water.

④Close the cock after you hear alarm bleeps while water is fed.

⑤Lock the knob and remove the hose.



Chapter 5. Specifications

Model	HRH-110
Outside dimensions	690W × 1385H × 1150D mm
Chamber dimensions	420 mm dia. X 795 mm deep (Effective capacity: 110 liters)
Rated power supply	220 VAC ±10%, single phase, 50/60 Hz (15 A and above) 230 VAC ±10%, single phase, 50/60 Hz (14 A and above) 240 VAC ±10%, single phase, 50/60 Hz (14 A and above)
Temperature/ humidity range	5-35°C; 10-85%RH (No dew condensation)
Power consumption	3.2KW (220V/14.5A 230V/13.9A 240V/13.3A)
Weight	174kg
Type of pressure vessel	Small pressure vessel
Material for chamber	Stainless steel SUS304
Sterilization temperature range	105-123°C, variable
Sterilization timer	1-60 minutes, remaining time display type
Drying timer	1-120 minutes, remaining time display type
Exhaust patterns	Three patterns, incl. spontaneous cooling
Startup timer	1 min. - 1 week, startup time setting
Maximum working pressure	0.157MPa
Thermometer	Digital display, 5-125°C
Clock	24-hour system, alternate display of date and time
Pressure gauge	Analog display, -0.1 to 0.4 MPa
Backup battery life	Approx. 5 years
Safety alarm system	Safety valve; earth leakage breaker; lack-of-water prevention device; vacuum pump breaker; Tank water short; dry heating; temperature sensor circuit burnt; overheating; overcooling; overpressure; failure of door opening lever lock
Accessories	Tank feed-drain hose, 2 m (x1) with 2 hose straps Flexible tube, 0.5 m (x1) Flexible tube nipple (x1) Wire shelf (x1) Level vial (x1) Operation manual (one copy)

Chapter 6. Troubleshooting

1. Error Detection (Alarms)

●In case of trouble, the incorporated error detector is activated to shut down power to the heater circuit and send the relevant error number to the digital display section; at the same time, an electronic alarm is given to warn the trouble. To stop the alarm, press the START/STOP switch. After confirming the displayed error number, turn the POWER switch off and take necessary corrective action, then restart the equipment. If the same trouble repeats, promptly contact our authorized distributor in your region.

Error display	Trouble	Corrective action
E r 0 (Tank water short)	· Tank water is short.	· Feed water in the tank.
E r 1 (Dry heating)	· Dry heating due to shortage of water in the chamber	· Contact our authorized distributor in your region.
	· A waste disposal bag or other kind of bag used for sterilizing operation has covered the pipe opening.	· Do not load a bag as is but use a metal mesh basket to place the bag.
	· Insufficient adjustments of adjusters	· Readjust them by referring to section 2-2 titled "How to Install Your Autoclave" in Chapter 2.
E r 2 (Temperature sensor circuit burnt)	· Temperature in the chamber below the freezing point	· Keep the room temperature within the range of 5-35°C.
	· Control temperature sensor circuit is burnt.	· Contact our authorized distributor in your region.
E r 3 (Overheat)	· Temperature in the chamber exceeding the upper limit of working temperature range by 3°C or more. · Temperatures of 5°C or more over the set level continued for 10 seconds during sterilization cycle. · Short circuit of the control temperature sensor	
E r 4 (Overdrop of temperature)	· Temperatures not reaching 102°C continued for 10 seconds during sterilization cycle.	
E r 5 (Overpressure)	· Pressure of 0.02 MPa or more over the level of the saturated steam pressure at the set temperature continued for 15 seconds.	
	· A waste disposal bag or other kind of bag used for sterilizing operation has covered the pipe opening.	· Do not load a bag as is but use a metal mesh basket to place the bag.
E r 6 (Door in trouble)	· Door operating lever moved to the "unlock" side during operation.	· Contact our authorized distributor in your region.
E r 8 (Malfunctioning of water feed)	· Chamber not filled up with water within the specified number of feeds.	· Check that the water cock is open. If the cock is properly open, contact our authorized distributor in your region. · If water is fed directly from a water tap, change the setting for working water pressure by referring to the section describing "Required Water Pressure" in Chapter 2. After taking this action, the situation still remains the same, contact our authorized distributor in your region.

Error display	Trouble	Corrective action
E r 9 (Failure of sterilizing heater)	· Temperature in the chamber not reaching the set level after 4 hours of operation.	· Reduce the volume of the loaded substances for sterilization and restart operation from the beginning.
E r A (Failure of vacuum pump)	· Vacuum pump locked	· Contact our authorized distributor in your region.
E r L (Failure of door operating lever lock)	· Door operating lever unlocked during operation	
E r P (Failure of air vent)	· Pressure not going lower than the specified vacuum pressure level within a given period of time	

2. Early Troubleshooting

Symptom	Cause	Remedy/Action
Display remains off after power is turned on.	●Check the plug and outlet first: ①The power cable plug is insufficiently tightened. ②Disconnection in the power cable ③Defect of the display	①Retighten any loose parts. ②③ Contact our authorized distributor in your region.
No air exhausted from the working chamber.	①Defective solenoid valve ②Vacuum pump failed. ③Air leak	① - ③ Contact our authorized distributor in your region.
Pressure gauge readings remain low.	①Defective safety valve ②Defective compound pressure gauge ③Disconnection in the heater ④Defective solenoid valve ⑤Steam leak	① - ⑤ Contact our authorized distributor in your region.
Steam leakage from door gasket	①Deterioration of door gasket ②Improper installation of door gasket ③Foreign matter entered the gasket	①② Contact our authorized distributor in your region. ③Remove the foreign matter.
Door operating lever cannot slide.	①Temperature in the working chamber exceeding 98°C in Modes 1 and 2 or exceeding 80°C in Mode 3, or the pressure exceeding 0.01 MPa. ②The POWER switch is off.	①Wait until the temperature in the chamber falls below 97°C (Modes 1 and 2) or 79°C (Mode 3) and the pressure is reduced to 0 MPa. ②Turn the POWER switch on.
Door cannot be opened/closed.	①The door operating lever not slid completely to the "unlock" side.	①Slide the lever completely to the "unlock" end.
Displayed temperature exceeds the set value and exhaust is repeated frequently during sterilization cycle.	①Defect in the heater circuit	①Contact our authorized distributor in your region.
Insufficient drying	①Adjusters improperly adjusted. ②Too much stuff in the basket ③The set drying duration too short	①Readjust them by referring to section 2-2 titled "How to Install Your Autoclave" in Chapter 2. ②Reduce the stuff. ③Increase the drying duration.
Safety valve activated.	①Defective safety valve ②Defect in the heater circuit ③Defective power board	① - ③ Contact our authorized distributor in your region.

●This table of early troubleshooting provides the causes and remedies of simple problems. If you cannot fix or repair the problem, contact our authorized distributor in your region. When contacting our distributor, provide the following information:

①Model and serial number of your autoclave
②Defective point(s) and symptom(s), and error number if applicable
③Number of day in operation (Date of purchase)
④Working conditions, including substances being sterilized.

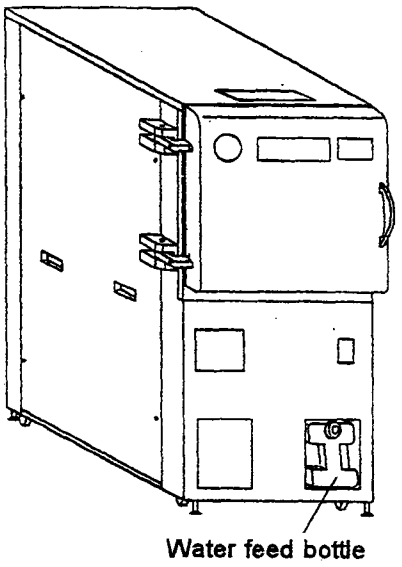
Addendum. Water Feed Bottle

1. General Information

[1] Application

- This bottle is used to feed water to your autoclave when it is installed at a place not equipped with water supply facilities.

[2] Front View



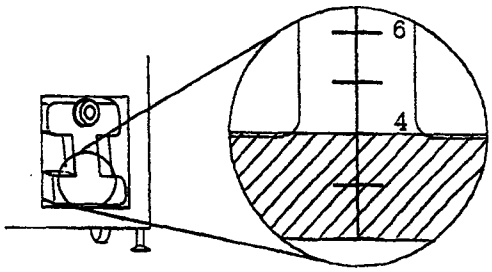
2. Handling

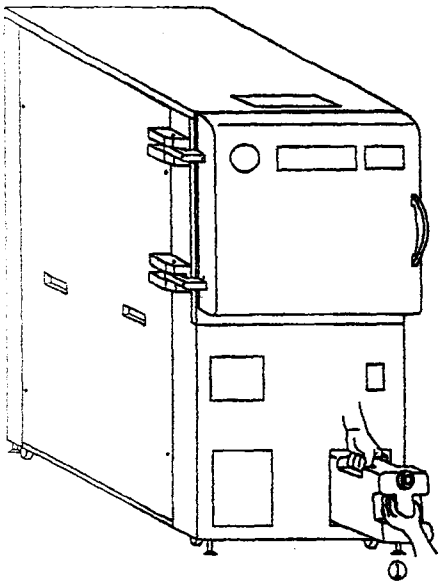
(!) *IMPORTANT:*

- Check the water level in the bottle without fail before each operation.
- Do not remove the bottle during operation.
- Be sure to tighten the bottle cap, otherwise water leak may occur.

[1] How to Feed Water

- When the water level in the bottle is 4 liters or less (below WATER LEVEL seal), fill it up with water following the steps below. If water is short, it may cause an error and stop operation.

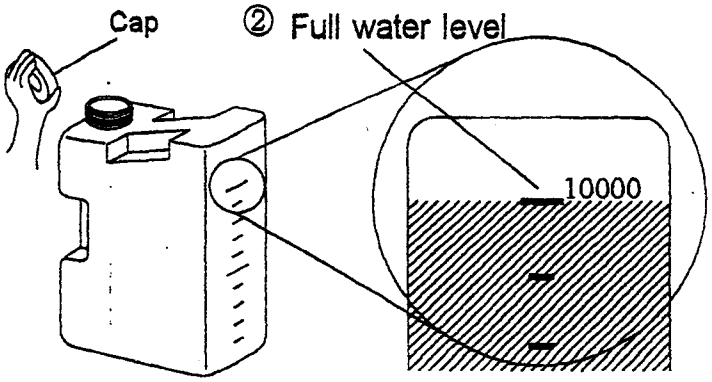


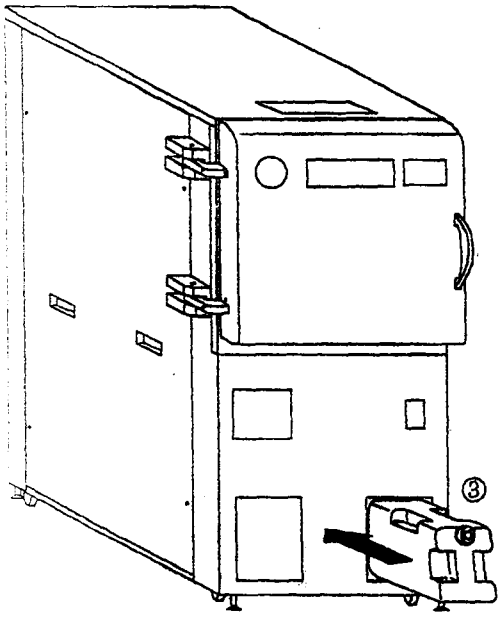


①Draw the water feed bottle toward you and take it out of the recess.

- Take care not to slant the bottle.

②Put the bottle with its cap upside. Remove the cap and feed water to the bottle up to the level 10000 (10 liters).





③Close the cap. Return the bottle in its place.

- Push the bottle in to the back of the recess to the full; otherwise errors may occur during operation.
- Be careful not to slant the bottle when carrying the equipment from one site to another as water may leak from the top air vent (located on the top of the cap) or from the rear connection end.

3. Error Detection (Alarms)

●When the autoclave is equipped with the water feed bottle, the following error is added to the standard list of errors:

Error display	Trouble	Corrective action
E r E (Water feed bottle in trouble)	• Water feed bottle getting out of place	• Check that the bottle has been fully inserted to the back of the recess. If it is properly inserted, contact our authorized distributor in your region.

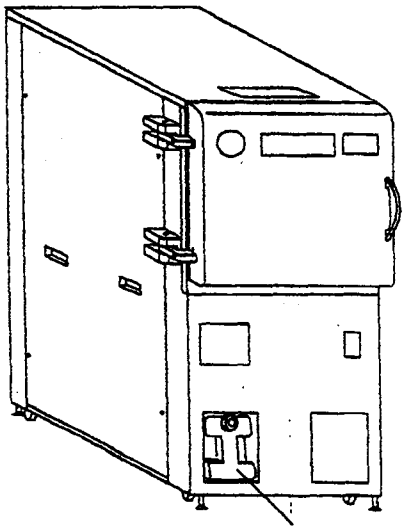
Addendum. Drain Bottle

1. General Information

[1] Application

- This bottle is used to drain water from your autoclave when it is installed at a place not equipped with waste water facilities.

[2] Front View



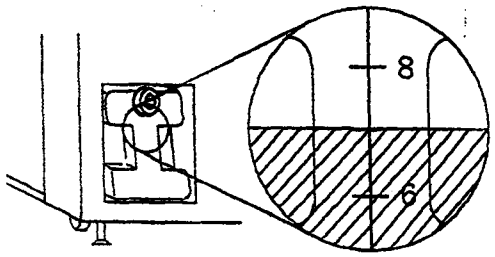
2. Handling

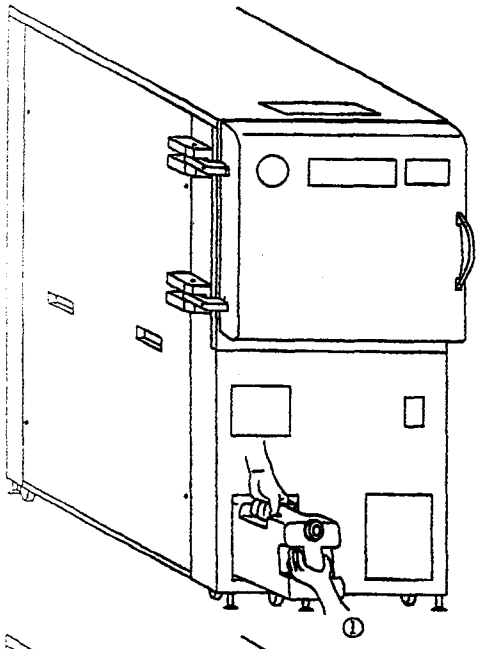
(!) *IMPORTANT:*

- Be sure to check the water level in the drain bottle before each operation.
- Do not remove the bottle during operation.
- Be sure to tighten the bottle cap, otherwise water leak may occur.
- Do not remove the drain bottle immediately after completion of sterilizing operation of liquids. In the liquid mode, hot water is drained upon completion of the cycle.
- Do not close the chamber door when the drain bottle has been removed as water may leak due to the effect of the residual pressure.

[1] How to Drain Water

- When the water level in the drain bottle is 7 liters or more (above WATER LEVEL seal), discharge water following the steps below. If water volume exceeds the level of 10 liters, water overflows from the top of the cap.

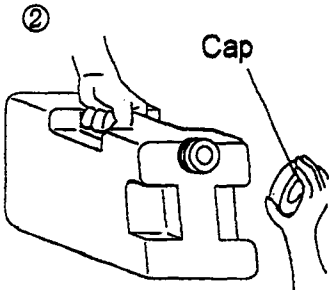


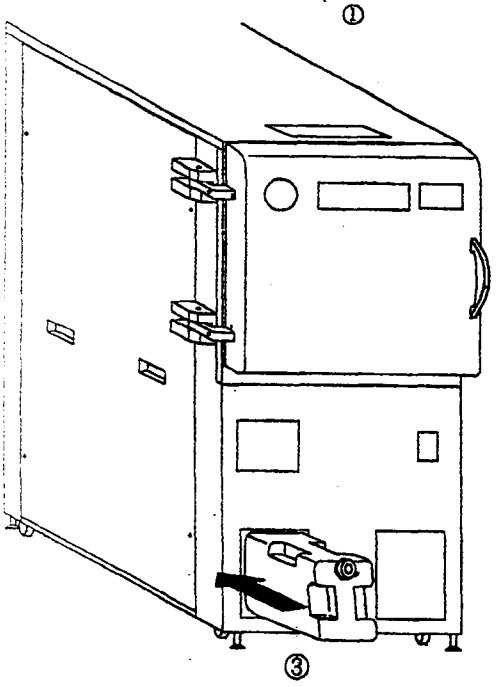


①Draw the drain bottle toward you and take it out of the recess.

- Take care not to slant the bottle.

②Open the cap and discharge water.





③Close the cap. Return the bottle in its place.

- Push the bottle in to the back of the recess to the full; otherwise errors may occur during operation.
- Be careful not to slant the bottle when carrying the equipment from one site to another as water may leak from the top air vent (located on the top of the cap) or from the rear connection end.

3. Error Detection (Alarms)

●When the autoclave is equipped with the drain bottle, the following error is added to the standard list of errors:

Error display	Trouble	Corrective action
E r E (Drain bottle in trouble)	· Drain bottle getting out of place	· Check that the bottle has been fully inserted to the back of the recess. If it is properly inserted, contact our authorized distributor in your region.