Amerex Instruments, Inc.

HIRAYAMA

AUTOCLAVE

HA-300MD

OPERATION MANUAL

□ *WARNING*

●Read this manual Carefully and follow the instructions to use the equipment correctly.

Issued on December 24, 2003 Revised on October 12, 2007

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Introduction

Refer to Page V for Contents

- We would like to express our gratitude for your purchase of our autoclave. This manual covers the operation procedure and a simple maintenance method for the Autoclave **HA-300MD** you now own. We hope that owing to your proper handling the autoclave can demonstrate its full performance so that you will make regular use of it for a long time.

- Please check whether or not the product conforms to your order and confirm that it was not damaged during transportation. Should it be damaged or out of order, please contact our authorized distributor in your region.

Read Carefully Before Using

● In this manual, the following headings are applied to items to which great attention should be given:

□ *WARNING* : Precaution indicating an imminent dangerous situation which if not avoided may lead to death or serious injury.

▭ *CAUTION* : Precaution indicating a dangerous situation which if not avoided may lead to moderate or slight injury.

▪ *IMPORTANT* : Indicates items you are strongly advised to obey.

△ *NOTE* : Items that will aid in proper operation of the equipment.

● Never use the autoclave to sterilize any of the following hazardous materials or substances with alkali content. Sterilization of such objects can cause explosion, corrosion of the working chamber or chamber piping, and deterioration of gaskets.

List of Hazardous Materials

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

② **Ignitable substances**
- Metallic lithium, potassium, sodium, yellow phosphorous, phosphorus sulfide, and red phosphorus.
- 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

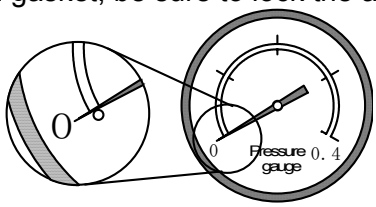
④ **Flammable substances**
- Ethyl ether, gasoline, acetaldehyde, propylene oxide, carbon disulfide, and other substances whose flash points range from -30 to 0°C.
- Methanol, ethanol, xylene, benzyl acetate (or amyl acetate), and other substances whose flash points range from 0 to 30°C.
- Kerosene,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

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

● When liquid with salt water and much salinity of salt agar etc. spills in the chamber, blowing, discharge water in the chamber and wipe up drop of water around the lid gasket beautifully. It causes the corrosion of the chamber and the piping when leaving just as it is

● Check that the pressure is below "0MPa" before opening the lid.

● After replacing the lid gasket, be sure to lock the arm fixing cap nut with the screw.



● Absolutely do not attempt to remodel or alter this product.

☐ *CAUTION*

● Foreign matter (metals, liquid) may enter through the vent hole. Operating the equipment with such foreign matter inside may cause trouble with the equipment, fire or electric shock.

● Do not forcibly bend, twist, tie or extend the power cord. Do not place heavy objects on the cord. A damaged cord or exposed wire can cause fire or electric shock.

● Never connect the power cord to a power supply other than one of the rated voltage. Connection to such a power supply can cause fire or electric shock.

● If grounded socket is unavailable, ground the equipment using a separate ground wire before connecting the power cord to the power source.

- Connect the grounding cable correctly to the Type D or higher-grade grounding terminal. Never connect the grounding wire to gas pipes or water pipes.
- When sterilizing a container with a cap, loosen the cap, or use an air-permeable cap. Otherwise, an explosion may occur.
- Close the lid after confirming that no foreign matter is adhering to the section contacting the lid gasket. Foreign matter in this section can cause vapor leak.
- The lid, chamber, gasket and panel are extremely hot after completion of the operation. Do not touch the equipment or you may get burned.
- Do not put your face or hands close to the chamber when lifting the lid immediately after completion of the operation; steam will gush out of the chamber.
- Put on heat insulating gloves before removing a substance from the chamber. Do not put hands into the chamber until the steam has been vented.
- Some time is required for liquids to cool. Be sure to check that the temperature has dropped sufficiently before unloading a liquid from the chamber or burns can result.
- Be sure to wait until the body has cooled sufficiently to start maintenance or service work, except "draining work of the chamber."
- Do not touch the drain hose during draining as it is very hot at that time.
- The heater is provided with a temperature sensor. Be careful not to damage it while cleaning.
- If any abnormality occurs (e.g. abnormal sounds, smells, smoke), immediately shut the power off. After checking to see that the abnormal condition does not continue, call our authorized distributor in your region.
- If any abnormality in display occurs, turn the POWER switch off then on again. If the problem continues, turn the power switch off and call our authorized distributor in your region.
- When using a waste processing bag or other kind of bag and sterilizing, put the bag in the wire basket and then place it into the chamber. Using the bag “as is” can cause excessive temperature, excessive pressure, boil dry, etc.
- Do not contact the mouth of the container which is placed in the chamber with the inner surface of the lid. If the mouth of the container is closed by the lid inner surface, gas or liquid will gush out of the container when opening the lid
- Be careful not to pinch your hands when closing the lid.
- Do not touch the lid or lid cover when opening or closing the lid.
- If the liquid surface which is placed in the chamber is covered with oil, etc, the liquid may gush out when taking out or carrying. Be sure to check that the temperature has dropped sufficiently before unloading the liquid from the chamber or it may cause burns.
- Do not unload the exhaust bottle or drain the chamber when the chamber is under pressure. Boiling water or steam may gush out and it may cause burns.
- Do not remove the exhaust bottle before water in the bottle has sufficiently cooled down.

How to Read this Manual

- This operation manual consists of the following sections covering the information required for proper operation of the Autoclave **HA-300MD**.

Chapter 1. What is the Autoclave HA-300MD？

This section describes the uses and features of the product and the names and functions of its parts.

Chapter 2. Installation :

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

Chapter 3. Operation Procedure :

This section illustrates how to change various set values, and describes operations before starting the equipment and after operation. This section also covers the display and performance of the equipment during operation.

Chapter 4. Maintenance and Service :

This section explains the methods for draining water from the reservoir bottle, cleaning the body of the equipment, and parts replacement.

Chapter 5. Specifications

This section includes dimensions, power consumption and working range of the product. Refer to this section as is required.

Chapter 6. Troubleshooting

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

Appendix

This section contains the list of major spare parts. Please refer to this section when necessary.

CONTENTS

Chapter 1. What is the Autoclave HA-300MD？

1. Product Uses

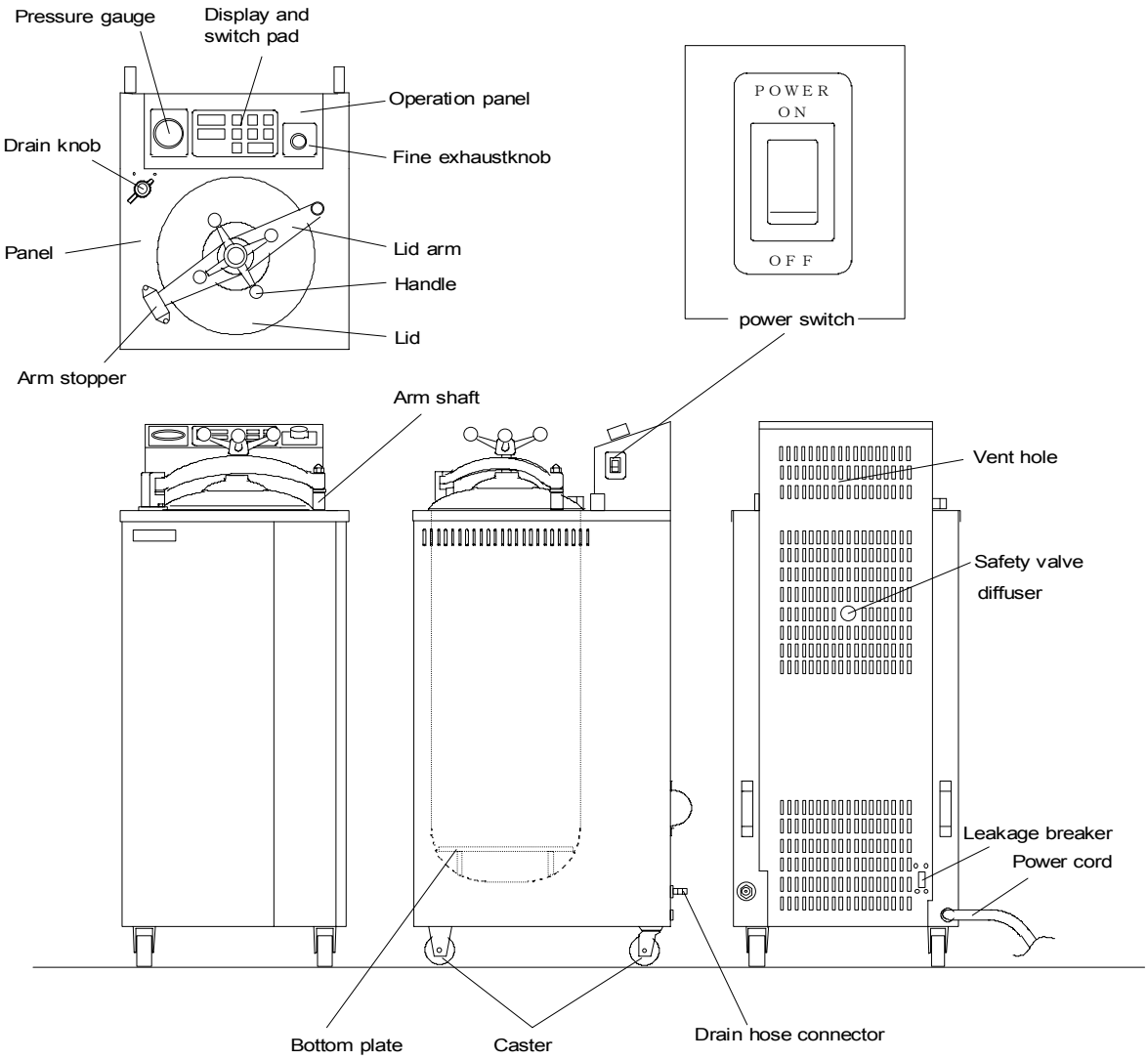
・This product is used to sterilize substances which can withstand high temperature and high pressure steam such as instruments of glass, ceramic, metal or rubber, water, media, reagents, and fibrous matters.

2. Product Features

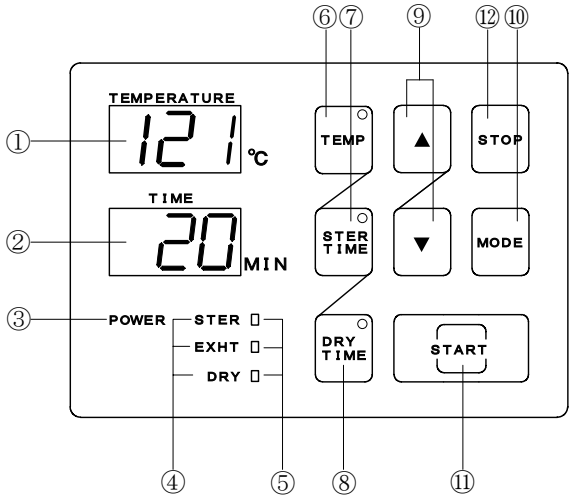
・The product is provided with a sterilization-drying stage in which you can dry fibrous objects after sterilization has been completed. The product is also capable of performing additional drying operations to complement insufficient drying in the sterilization-drying stage.

3. Name and Functions of Each Part

● External view



●Display and Operation Switches



① Digital Display (Temperature, Error)
The digital temperature display indicates the set temperature when the equipment is in the standby state, and it indicates the temperature in the working chamber during operation. If any trouble occurs in the equipment and an error is detected, the display indicates the error.

② Digital Time Display
The digital time display indicates the set time when the equipment is in the standby state, and during operation it indicates the time remaining until sterilization is completed. "▪ ▪ ▪ "is displayed when all the stages are completed.

③ Power Display (POWER)
This lights up when the power switch is turned ON.

④ Stage Display (STER, EXHT, DRY)
The lamp corresponding to the current stage lights up or flashes during operation
.

⑤ Mode Display (☐)
The lamp corresponding to the selected mode lights up.

⑥ Sterilization Temperature Setting and Check Switch (TEMP)
This switch is used to change or check a value set for sterilization temperature.

⑦ Sterilization Time Setting and Check Switch (STER TIME)
This switch is used to change or check a value set for sterilization time.

⑧ Drying Time Setting and Check Switch (DRY TIME)
This switch is used to change or check a value set for drying time.

⑨ Set Value Increase/Decrease Switches (▲ ▼)
These switches are used to increase or decrease set values.

⑩ Mode Select Switch (MODE)
This switch is used to select a mode.

⑪ Start Switch (START)
This switch is used to start operation.

⑫ Stop Switch (STOP)
This switch is used to stop operation.

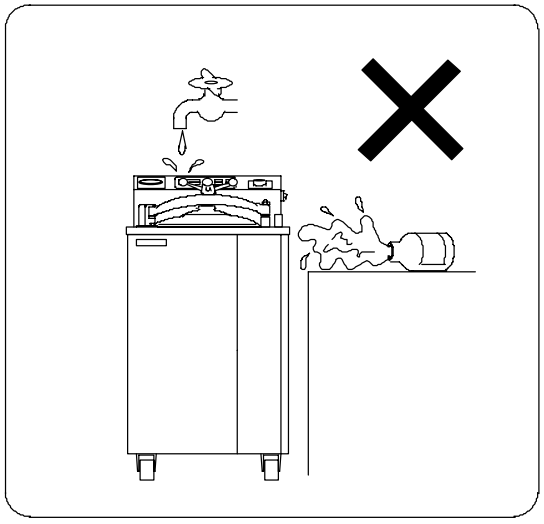
Chapter 2. Installation

CAUTION

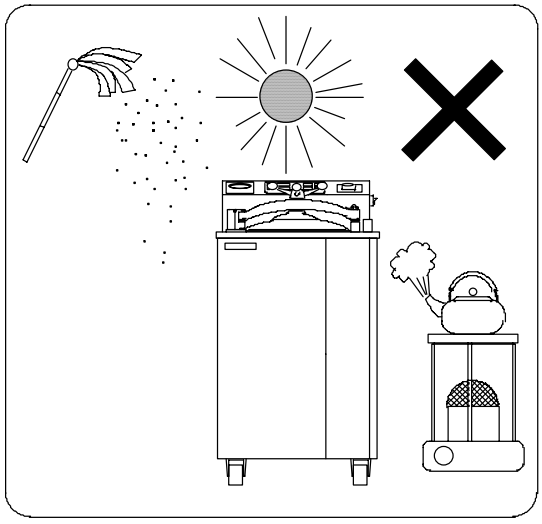
- If the equipment is installed in a place which is 800m or higher than sea level (i.e. under low pressure in mountainous areas), the settings must be changed. In this case, be sure to contact our authorized distributor in your region. Do not use the equipment before changing.
- When relocating the product, close the lid so that it will not move, and then remove the drain bottle and power cord.

1. Installation instructions

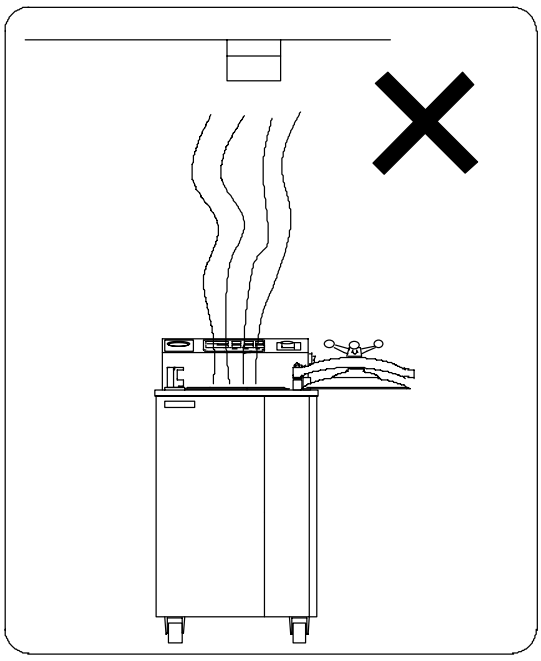
①Avoid installing the equipment in a place where its body may be exposed to water or chemicals, or where corrosive and explosive gases may be produced nearby.



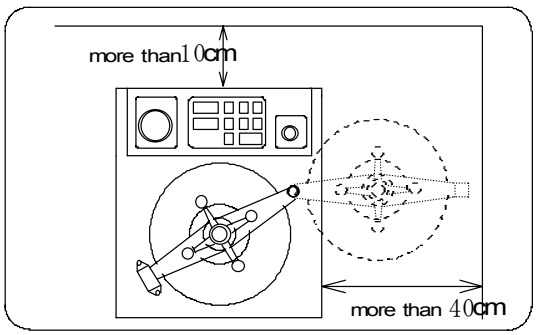
②Avoid installing the equipment in a place where is exposed to high humidity, direct sunlight or much dust.



③Avoid placing the equipment directly under a fire detector. If you open the lid immediately after completion of operation, steam comes out of the chamber, and may be activate the detector.



④Arrange the equipment with a clearance of 40cm or wider on the right side and 10 cm or wider on the rear side to prevent the vent hole from being blocked



⑤Avoid an installation place which is subject to impact or vibration.

⑥Place the unit in a level, firm place.

⑦Avoid installing in a place where the temperature falls below 5℃ or exceeds 35℃.

2. Installation Procedure

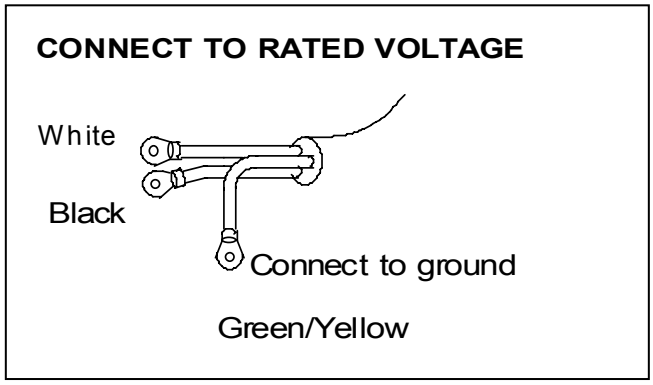
① Connect the power cord to the rated power supply.

・Be sure to ground the earth wire

CAUTION

- Do not forcibly bend, twist, tie, or extend the power cord. Do not place heavy objects on the cord. A damaged cord or exposed wire may cause fire or electric shock.
- Never connect the power cord to a power supply with a voltage other than the rated voltage. Connection to such a power supply may cause fire or electric shock.
- If not plugging the sterilizer into a grounded socket, ground the equipment separately before connecting it to the power source.
- Never ground to a gas pipe or vinyl chloride water service pipe.

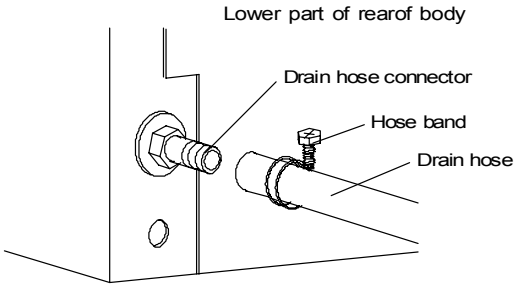
・Connect to the rated power source and ground the green/yellow earth wire.



②Connect the drain hose

(1) Fit the attached drain hose onto the drain hose connector, located at the rear of the body, and firmly secure it with the hose band.

(2) Guide the end of the drain hose into a drain, or into the large carboy (supplied).

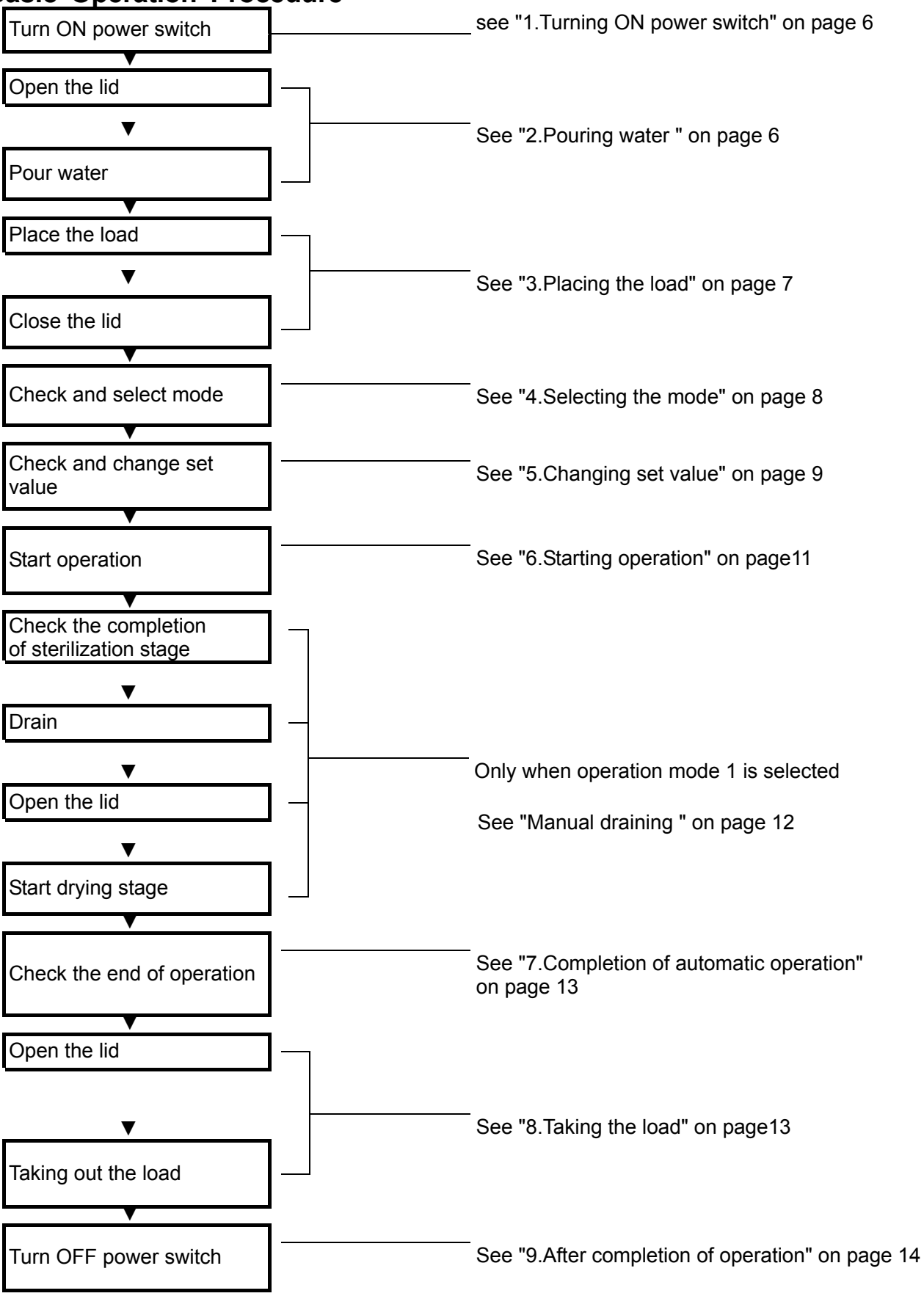


③ Check to see that the drain knob on the body is set to the CLOSE position.

④ Turn ON the earth-leakage circuit breaker, located at the lower part of the rear of the body.

Chapter 3. Operation Procedure

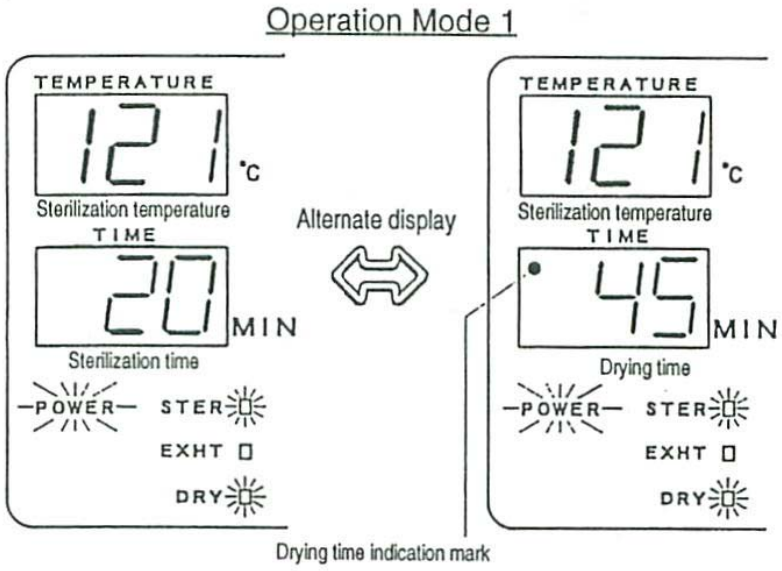
Basic Operation Procedure



1. Turning ON Power Switch

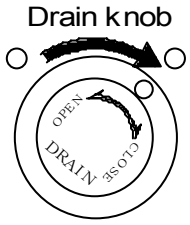
① Turn On the power switch on the right side of the body.

- The power display (POWER) and the mode display light up, and the set values appear on the temperature and time displays.

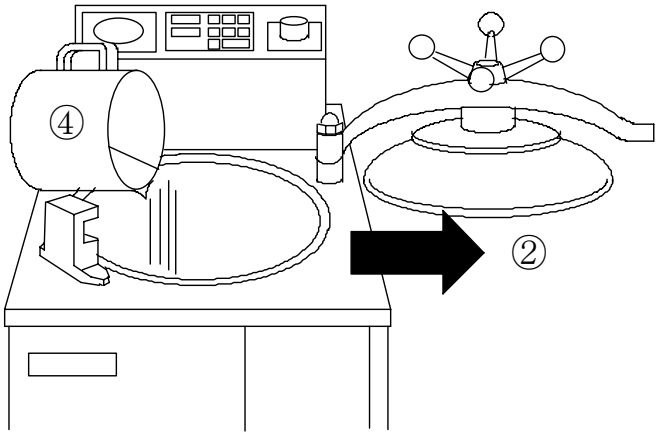


2. Pouring water

① Turn the handle counterclockwise to completely raise the lid.
② Slide the lid sideways until it is in the position shown in the figure below
③ Check to see that the drain knob is in the CLOSE position.
④ Pour 2.5 liters of water through the opening in the working chamber.



- The working chamber should be filled with 20 liters of water or less.
- It is unnecessary to add water in the additional drying mode operation.



3. Placing the load

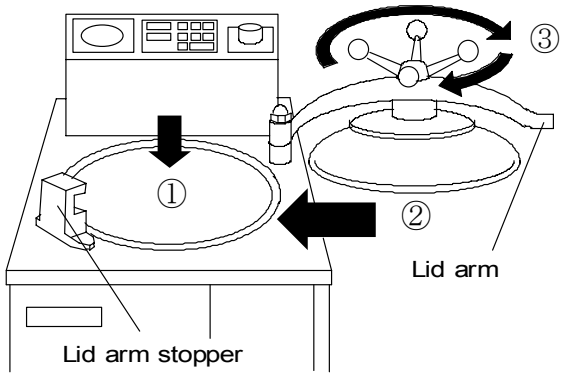
□ CAUTION

- Before closing the lid, check to see that there are no foreign matters in the area where the chamber and the lid gasket come into contact with each other. Any foreign matters in the area may cause steam leakage.

- IMPORTANT

- If the equipment is put in another operations, allow a time interval of 15 minutes or more between operations.
- Do not use the equipment to sterilize an agar medium. This may cause clogging in the piping.

① Place the substance to be sterilized into the working chamber.
② Slide the lid sideways until the arm hits the arm stopper.
 ・Step ③ below is unnecessary in the additional drying mode operation.
③ Slowly turn the handle clockwise until it is tight, then turn it an additional 3/4 or one turn.
 ・The life of the gasket is usually two to three years. Note that tightening the handle too tight will reduce the life of the gasket



△ NOTE

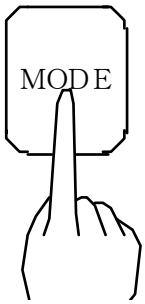
- When sterilizing cloth (such as gauze), do not place too much of it in the cast. When the cast is overly full, incomplete sterilization and/or drying may result.
- When sterilizing a deep, empty container, lay it on its side in the working chamber so that steam will permeate it. If it is placed in an upright position it may be insufficiently sterilized.
- When using a waste disposable bag during sterilization, place the bag in a wire mesh basket
- If a waste disposal bag is used during sterilization, widen the opening of the bag to an extent that the opening will not be in contact with the inside surface of the working chamber. If the bag is closed, insufficient sterilization may result; if it is open too wide, steam will not circulate within the working chamber, which also will lead to insufficient sterilization.
- Do not pile specimens on top of one another. When the chamber is overly full, steam fails to penetrate to all points, resulting in incomplete sterilization.
- When sterilizing liquids such as chemicals and mediums, pay attention to the quantity of the liquid in relation to its container. For an Erlenmeyer flask, the amount of chemical should be approx. 3/4 of the capacity of the container; for a test tube, the appropriate quantity of chemical is approx. half of the capacity of the container. Too much chemical may result in overflow from the container during the heating or cooling process.
- When sterilizing a container with a cap, loosen the cap, or use an air-permeable cap. Otherwise, an explosion may occur.

4. Selecting the mode (stage)

● The following modes are programmed in the microcomputer. Select a mode suitable for your purpose.

① Press the mode select (MODE) switch.

・Each time the switch is pressed the mode will change from MODE 1 to MODE 2,3 4,1--- in sequence



Mode	Application
1	Sterilizing gauze, cloth etc. then drying them.
2	Sterilization of instruments of glass, ceramic, metal or rubber that withstand high temperature, high pressure steam and rapid pressure decrease during the exhaust stage.
3	Sterilization of liquid, such as water, medium, reagent, that withstand high temperature and high pressure steam.
4	Additional drying operation to be performed as required after the completion of the Mode 1 operation.

Mode	Stage	Initial set value			Mode display
		Sterilization temp.	Sterilization time	Drying time	
1	Sterilization →Manual draining → Drying	121℃	20 min.	45 min.	STER ☐ EXHT DRY ☐
2	Sterilization → Exhaust	121℃	20 min.		STER ☐ EXHT ☐ DRY
3	Sterilization → Natural cooling	121℃	20 min.		STER ☐ EXHT DRY
4	Additional drying			45 min.	STER EXHT DRY ☐

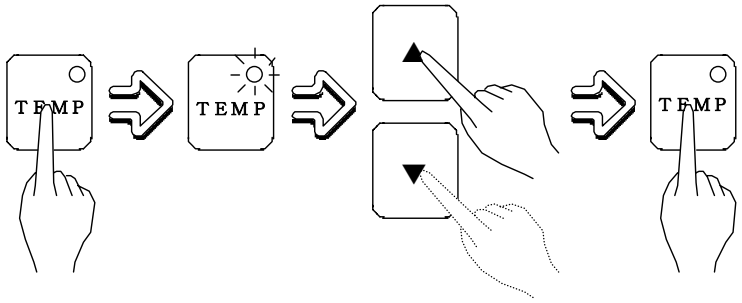
5. Changing the set values (Registering values by customer)

● Changing Sterilization Temperature

① Press the sterilization temperature setting and check (TEMP) switch.
・The red lamp at the upper right of the switch lights up, and the sterilization temperature display starts to blink. It is now possible to change the setting.

② Change the displayed value using the set value increase/decrease (▲ ▼) switches.
・Each time the switch is pressed, the displayed value increases or decreases in increments of 1℃ within the range of 105℃ - 126℃
・If the switch is kept pressed, the displayed value increases or decreases in increments of 10℃. When the displayed value exceeds the upper limit (lower limit), it returns to the lower limit (upper limit).

③ Press the sterilization temperature setting and check the (TEMP) switch again.
・The changed value is stored, the red lamp goes off and the sterilization temperature display returns from blinking to steady. The setting change is completed.

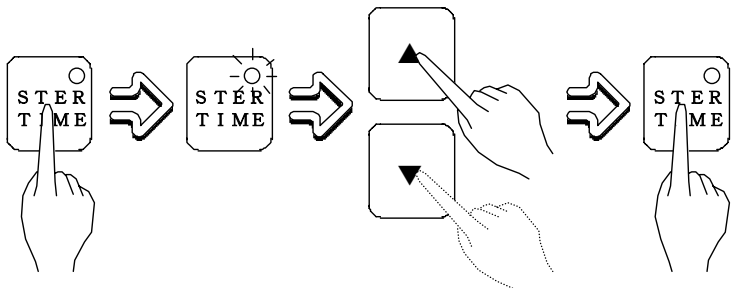


● Changing Sterilization Time

① Press the sterilization time setting and check (STER TIME) switch.
・The red lamp at the upper right of the switch lights up, and the sterilization time display starts to blink. It is now possible to change the setting.

② Change the displayed value using the set value increase/decrease (▲ ▼) switches.
・Each time the switch is pressed, the displayed value increases or decreases in increments of 1 minute within the range of 1 - 999 min.
・If the switch is kept pressed, the displayed value increases or decreases in increments of 10 minutes. When the displayed value exceeds the upper limit (lower limit), it returns to the lower limit (upper limit).

③ Press the sterilization time setting and check the (TEMP) switch again.
・The changed value is stored, the red lamp goes off and the sterilization time display returns from blinking to steady. The setting change is completed.

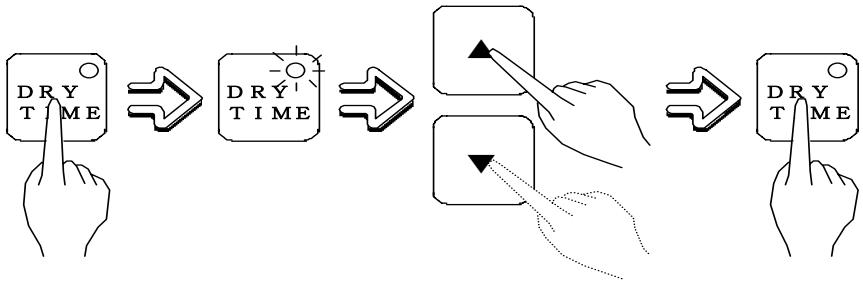


● Changing Drying Time

① Press the drying time setting and check (DRY TIME) switch.
- The red lamp at the upper right of the switch lights up, and the drying time display starts to blink. It is now possible to change the setting.

② Change the displayed value using the set value increase/decrease (▲ ▼) switches.
- Each time the switch is pressed, the displayed value increases or decreases in increments of 1 minute within the range of 1 - 120 min.
- If the switch is kept pressed, the displayed value increases or decreases in increments of 10 minutes. When the displayed value exceeds the upper limit (lower limit), it returns to the lower limit (upper limit).

③ Press the drying time setting and check the (TEMP) switch again.
- The changed value is stored, the red lamp goes off and the drying time display returns from blinking to steady. The setting change is completed.



△ *NOTE*

● Registering Values by User
The mode, temperatures and time set by the user are sustained by a microcomputer after the power switch has been turned OFF. However, if the earth-leakage circuit breaker is turned OFF, or if the power supply is shut off due to service interruption or an instantaneous power interruption, those set values return to the initial set values for the operation mode 1. Set your desired values again before using the equipment.

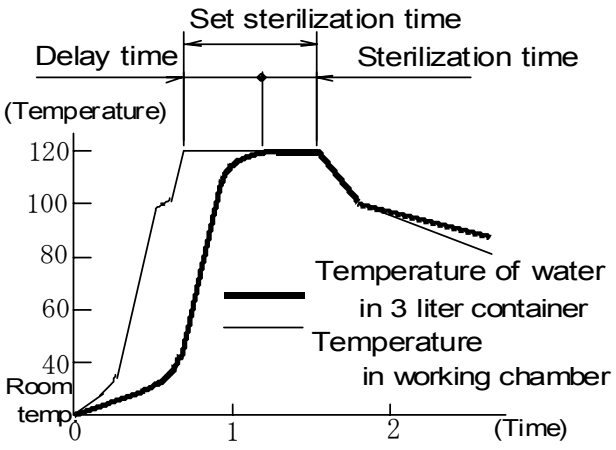
● For sterilization of liquid, set a sterilization time longer than usual, taking delay time into account and referring to the table below.

Example) In case there is 3 liters of water in a flask, it takes nearly 30 minutes (delay time) for temperature of water in the container to reach a set sterilization temperature after temperature in the chamber reaches the set value. You should set a sterilization time 30 minutes longer than usual to cope with this delay of time.

Set sterilization time (50 minutes)
= Delay time (30 minutes) + Sterilization time (20 minutes)

HA-300MD Reference Values of Delay Time (per Flask)

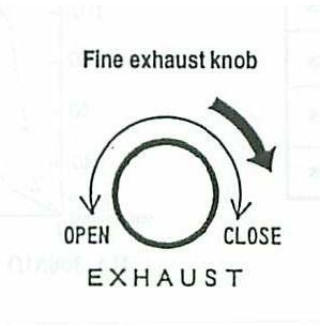
Liquid Volume	Delay Time
3 liters	30 minutes
2 liters	25 minutes
1 liter	20 minutes
500 cc	15 minutes

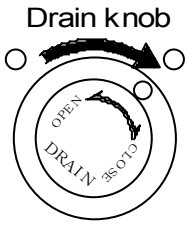


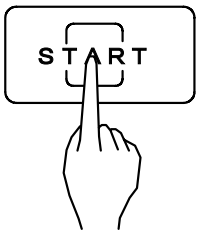
Delay Time Reference Data

6. Starting operation

① Check to see that both the fine exhaust knob and the drain knob are securely set to the CLOSE position.



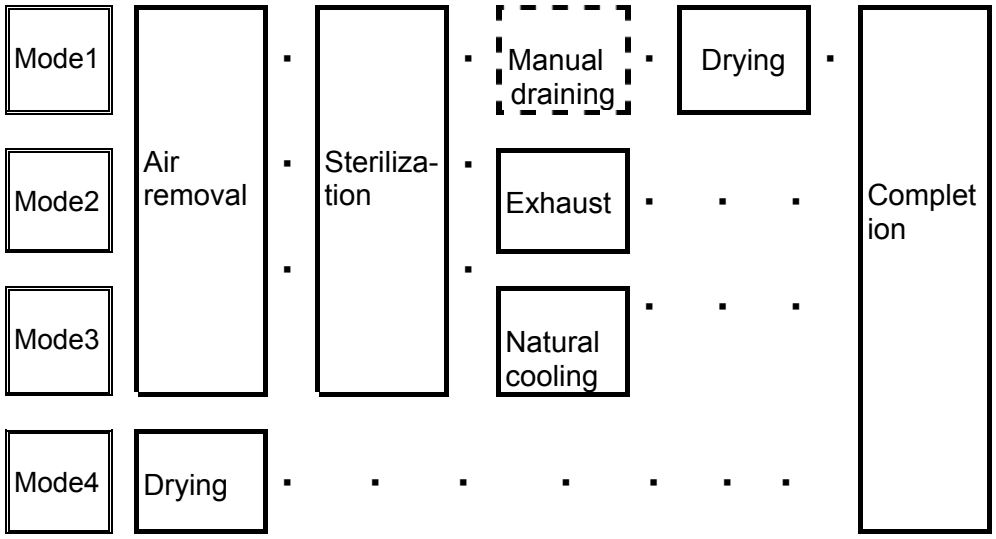




② Press the START switch.

・Thereafter, one of the following stages is automatically performed depending on the selected operation mode. For details on each specific stage, see "12. Operation of each stage" on page 15

・In operation mode 1, the water (boiling water) must be manually discharged from the chamber immediately after the completion of the sterilization stage. See " Manual Draining" on page 12 for details.



Checking set values during operation

● When checking the set values for temperature and time during operation, press the corresponding setting and check switch,(TEMP, STER TIME, DRY TIME).
While the switch is kept pressed, the set value flashes. (Set values are not changeable)

Manual Draining

● When the sterilization stage is completed in operation mode1, the exhaust display(EXHT) starts blinking and a continuous beeping alarm sounds. In this case, discharge water (boiling water) from the chamber in accordance with the procedure described below, and then start a drying stage.

CAUTION

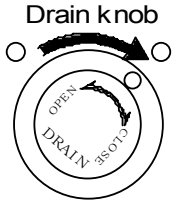
● The lid, chamber, gasket and panel are extremely hot after completion of the operation. Do not touch the equipment or you may get burned.

● Do not touch the drain hose during draining as it is very hot at that time.

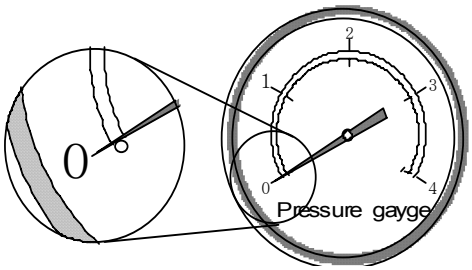
● Do not put your face or hands close to the chamber when lifting the lid immediately after completion of the operation; steam will gush out of the chamber.

① Turn the drain knob to the OPEN position

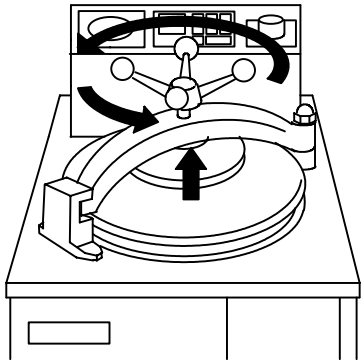
- Water (boiling water) is discharged from the chamber through the drain hose.
- After draining is complete, turn the drain knob to the CLOSE position to prevent water from flowing backward into the working chamber.



② Check to see that the chamber pressure has dropped to “0 MPa”.



③ Slowly turn the handle counter clock wise to raise the lid. Note: There is no need to swivel lid open to the right.

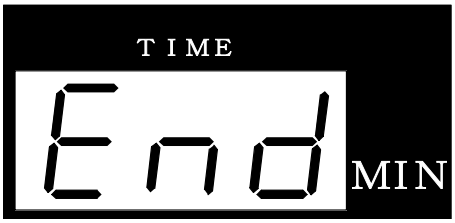


④ Press the START switch.

- The beeping alarm cease, and a drying stage starts.

7. Completion of automatic operation

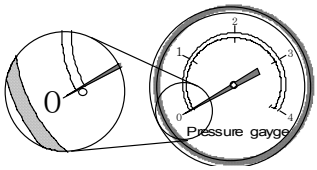
● When all the stages in the operation mode are completed, the alarm beeps three times, and "▪ ▪ ▪ " is shown on the time display, indicating that all the stages have been completed.



8. Taking out the load

▪ *WARNING*

● When a liquid with much salt, such as salt water and a salt culture medium, boils over in the chamber, the water in the chamber should be discharged, and wipe off the water dropped around the lid gasket finely. If it is neglected, the corrosion of a chamber and piping will be caused
● Check to see that the chamber pressure has dropped to 0 MPa.



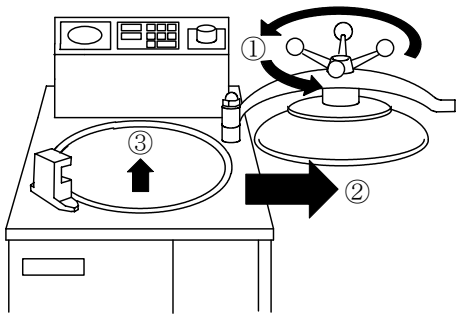
□ *CAUTION*

● Do not put your face or hands close to the working chamber when lifting the lid after operations are completed, steam will gush out of the opening of the chamber
● After operation is over, the lid, chamber and panel are very hot. To protect yourself from burns, do not touch with bare hands
● It takes a lot of time for the liquid to cool. Be sure to check that the temperature has dropped sufficiently before unloading the liquid from the chamber, or you may get burned
● Put on heat insulation gloves when taking a load out of the chamber after the steam has been vented.

① Turn the handle counterclockwise to completely raise up the lid

② Slide the lid sideways until it is brought into the position shown in the right figure

③ Take the load out of the working chamber



9. After completion of operation

① Turn OFF the power switch after the completion of the day's work.

- *IMPORTANT*

- To prevent clogging of the piping, change water within the working chamber once daily, referring to "Draining Chamber" on page 18

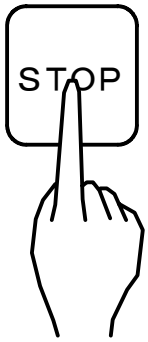
△ *NOTE*

- If the equipment is to be out of use for a long time, turn OFF the earth-leakage circuit breaker

10. To interrupt operation

△ *NOTE*

- If operation is interrupted during the sterilization of liquid, the liquid may overflow into the chamber



① Press the STOP switch

- The ongoing process will be interrupted, and the equipment returns to the standby state.
- When taking the load out of the chamber, follow the instructions described in "8.Taking out the load".

11. If power supply is cut off during operation

- If the power supply is cut off due to power failure or the like, operation is interrupted. When power supply is restored, the equipment will be back in the standby state (state before operation). In this case, repeat operations from the beginning.

△ *NOTE*

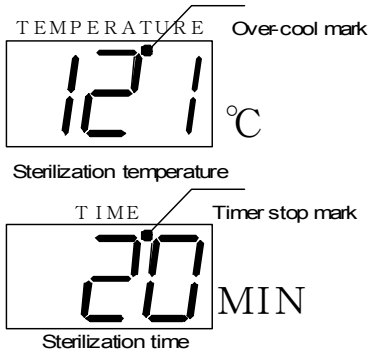
- If the power supply is shut off due to service interruption or the like, and the equipment returns to the standby state after recovering, the set values for mode, temperature and time are reset to the initial set values of mode 1.

12. Operation of each stage

■Air removal stage……Mode 1,2 and 3

- The sterilization (STER) display starts blinking, and the temperature in the chamber appears on the digital temperature display.
- If air remains in the chamber, the temperature distribution in a chamber will become less uniform, and will become the hindrance of a temperature rise (sterilization). To cope with this, a microcomputer controlled automatic exhaust valve releases almost 100% of the air
- Temperature rises until a set sterilization temperature (pressure) is reached
- When the preset sterilization temperature is reached, the operation proceeds to the next step

■Sterilization stage……Mode 1,2 and 3



- The sterilization (STER) display lights up, and the sterilization timer is actuated and the preset sterilization time is simultaneously displayed
- A constant temperature (pressure) is maintained during the set sterilization time period
- If the temperature in the chamber drops 1℃or more from the set value due to any trouble, the temperature over-drop mark appears on the digital display, and the digital timer operation is interrupted. When the set temperature is regained, the timer restarts operation
- The digital timer displays the remaining time during the sterilization stage. Refer to "Checking set values during operation" on page 11 for the method of checking the set time during operation.
- When the preset sterilization time is over, the (STER) display is turned off and operation goes to the next stage.

△ *NOTE*

● When sterilizing petri dishes or empty containers, the air remaining in the container expands and the pressure within the chamber may increase extraordinarily If the pressure in the chamber exceeds 0.165 MPa, the solenoid-controlled valve opens to discharge the air remaining in the chamber

■Drying stage……Mode 1 and 4

- The drying (DRY) display lights up, and "---" is shown on the temperature display and the preset drying time appears in digital form on the time display
- When the preset drying time is over, the drying (DRY) display is turned off, and the operation goes to the next stage.

■Exhaust stage……Mode 2

- The exhaust (EXHT) display lights up, and the solenoid-controlled valve opens to discharge steam from the chamber
- When the temperature in the chamber cools to 97℃, the exhaust (EXHT) display goes out, and the operation proceeds to the next step

■Natural cooling stage……Mode 3

・The inside of the chamber is allowed to naturally cool down until it reaches to 97℃.

■Completion of operation……Common to all modes

・When all the stages in the operation mode are completed, the beeping alarm sounds three times and "End" is shown on the time display, indicating that all stages have been completed.

Chapter 4. Maintenance and Service

CAUTION

- Be sure to wait until the body has cooled sufficiently to start maintenance or service work except "draining chamber"

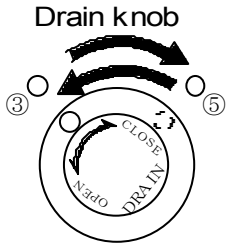
1. Draining chamber

- If the equipment is to be out of operation for a long time, then be sure to drain the chamber to prevent the piping from being clogged

CAUTION

- Do not touch the drain hose during draining as it is very hot at that time.

① Start operation in accordance with the procedure for ordinary operation
② When the pressure in the working chamber starts to increase, turn OFF the POWER switch
③ Turn the drain knob to the OPEN position
④ Check to see that the pressure in the working chamber has dropped to 0 MPa.
⑤ Turn the drain knob to the CLOSE position



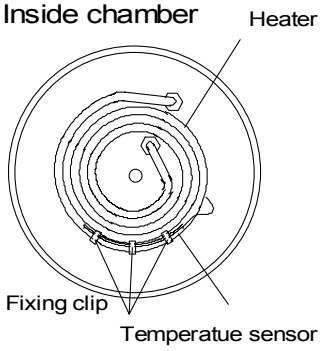
2. Cleaning chamber

CAUTION

- The heater is provided with a temperature sensor, be careful not to damage it while cleaning.

① Take out the bottom plate to see if the bottom of chamber or the surface of the heater is dirty. After draining the chamber, clean them with a soft brush or the like while sprinkling water with the drain valve open.

② If the temperature sensor is separated from the fixing clips, reinstall it.



3. Cleaning body

- *IMPORTANT*

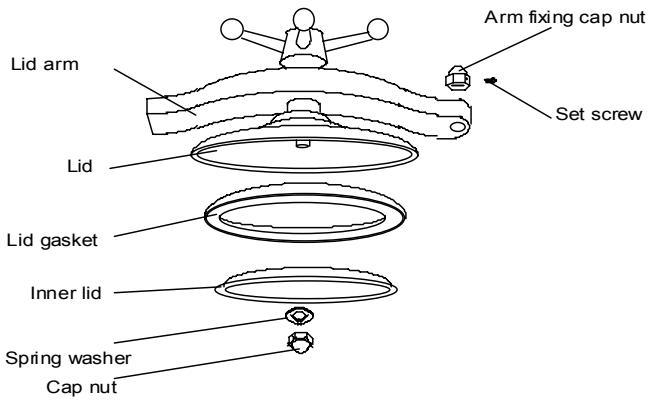
● Do not use benzene or thinner to clean the body. Also make sure that the volatile substances such as insecticides do not come into contact with the body as these substances may deteriorate the body or strip its paint

① Gently wipe stains from the body with a soft cloth. To remove stubborn stains, wring a cloth moistened with neutral detergent diluted with water, and wipe off the stains with it. Wipe off any moisture with a dry cloth

4. Replacing lid gasket

● When the end of the lid gasket becomes discolored and whitened, replace the gasket in accordance with the following procedure. It may cause steam leakage

① Remove the set screw.
② Remove the arm fixing cap nut.
③ Pull the lid arm together with the lid out of the arm shaft on the body.
④ Turn the lid upward, and remove the cap nut and the spring washer.
⑤ Remove the lid gasket together with the inner lid.
⑥ Remove the lid gasket from the inner lid, and fit a new lid gasket Into the inner lid.
⑦ Bring the inner lid with the lid gasket fit therein into tight contact with the lid as it was before.
⑧ Install the spring washer, and tighten the cap nut.
⑨ Secure the arm on the arm shaft on the body as it was before.



- *WARNING*

● After replacing the lid gasket, be sure to lock the arm fixing cap nut with the set screw

5. List of consumable parts

Parts name	Specifications
Lid gasket	For HA-300MD

Chapter 5. Specifications

Model	HA-300MD
Overall dimension (mm)	440W × 1070H × 520D
Effective chamber size (mm)	300(Dia.)×670(depth) (Effective capacity 47 liters)
Rated power supply	AC120V±10% 1Φ 50/60Hz (17A or more) AC220V±10% 1Φ 50/60Hz (10A or more) AC230V±10% 1Φ 50/60Hz (9A or more) AC240V±10% 1Φ 50/60Hz (9A or more)
Temperature and humidity condition	5 ~ 35℃, 10 ~ 85%RH (No condensing)
Power consumption	2.0 KW
Weight	70 kg
Type of pressure vessel	Small sized pressure vessel
Material of chamber	Stainless steel (SUS304)
Setting range of sterilization temperature	105 ~ 126℃ Variable
Sterilization timer	1 ~ 999 min. Remaining time displayed (with continuous operation function)
Drying timer	1 ~ 120 min. Remaining time displayed
Maximum working pressure	0.186 MPa
Thermometer	Digital display 5 ~ 130℃
Pressure gauge	Analog display 0 ~ 0.4 MPa
Safety alarm devices	Pressure safety valve, electric leakage breaker, lack of water prevention device, ERROR indications-- Heating with lack of water, sensor wire breakage, excess heat, over cool, excess pressure,
Supplied accessories	Bottom plate (1 piece) Drain hose (1 piece) Operation manual (1 copy)

Chapter 6. Troubleshooting

1. Error Detection (Alarms)

● Should any malfunction occur in the autoclave, the error detection circuit will be triggered to assure safety. Once the circuit is activated, an error number appears on the digital display and the electronic alarm sounds, indicating the problem. To stop the alarm sound, press the STOP switch. If an alarm occurs, check the error number and turn off the power switch.

Error Number	Problem	Remedy
E 1 (Lack-of-water alarm)	・Lack-of-water	・Check to see that the pressure is at 0 MPa and then open the lid. After the heater has been cooled, pour in a sufficient quantity of water, and repeat operations from the beginning.
E 2 (Temperature sensor wire breakage)	・Temperature sensor wire breakage	・Contact our authorized distributor in your region.
E 3 (Over- temperature alarm)	・Temperature in the working chamber exceeded 131℃ and more. ・A temperature +5℃ or more above the set temperature continued for 10 seconds during sterilization.	
E 4 (Over- cool alarm)	・A temperature of 102℃ or less continued for 10 seconds during sterilization.	
E 5 (Over- pressure alarm)	・When chamber pressure of 0.165MPa or more continued for 15 seconds.	
E 9 (Sterilization heater trouble alarm)	・Temperature in the working chamber has not reached a set sterilization temperature after 3 hours has elapsed from operation start-up.	・Reduce the quantity of objects to be sterilized and repeat operations from the beginning.

2. Early Troubleshooting

Symptom	Cause	Remedy
Display remains off after power is turned on.	●Check the plug and outlet first. ①The plug is not properly inserted or is insufficiently tightened. ②Disconnection in the power cord. ③Defect in the DISPLAY. ④The leakage breaker is "OFF."	①Properly insert the plug and retighten any loose parts. ② and ③ Contact our authorized distributor in your region. ④Turn "ON" the leakage breaker.
No air exhausted from the chamber.	①Defective automatic exhaust valve.	①Contact our authorized distributor in your region.
Pressure gauge reading remains low.	①Defective safety valve. ②Defective pressure gauge. ③Disconnection in the heater. ④Defective automatic exhaust valve ⑤Steam leakage.	①-④Replace the defective part (Contact our authorized distributor in your region). ⑤For steam leakage from piping, retighten or seal the joints.
Steam leakage from lid gasket	①Deterioration of lid gasket ②Improperly installed lid gasket. ③Foreign matter under the gasket.	①Replace the lid gasket. ②Press on the gasket to remove any unevenness. ③Remove the foreign matter.
Water leakage from the bottom of the body.	①Deterioration of the heater seal packing due to boil-dry or other problem.	①Contact our authorized distributor in your region.
Water is not discharged when the drain knob is set to OPEN position	①Clogging in the pipe	①Contact our authorized distributor in your region.
Insufficient drying	①The preset drying time is short ②The chamber is overly full ③Disconnection in the drying heater ④Defect n the drying temperature control	①Set a larger value for drying time ②Reduce the number of objects in the chamber to improve air flow. ③and ④ Contact our authorized distributor in your region.

● This table of early troubleshooting describes the causes and remedies of simple problems.
If you are unable to fix or repair the problem, contact our authorized distributor in your region and provide the following information.
(Please show the warranty to our service staff visiting your place.)

① Model and serial number of the autoclave.
② Defective point(s) and symptom(s) (error number if applicable).
③ Number of days of operation (date of purchase).
④ Operating conditions (including substances being sterilized).

Appendix

1. List of major spare parts

Part name	Specifications	Code
Lid gasket	For HA-300MD	306680
Sterilization heater	For HA-300MD	308709
Safety valve	For HA-300MD(0.186MPa)	608242
Bottom plate	For HA-300MD	308032
Pressure gauge	For HA-300MD(0～0.4MPa)	307006
Excess pressure prevention device	For HA-300MD(0.2MPa)	306682
Lack-of-water prevention device	For HA-300MD(50～300˚C)	306704
Drying temperature controller	For HA-300MD(50～300˚C)	306704
Solenoid valve	For HA-300MD	307028
Fine exhaust valve	For HA-300MD	306686
Exhaust valve	For HA-300MD	306684
Temperature sensor	For HA-300MD	307020
Leakage breaker	For HA-300MD	307127
Switch board	For HA-300MD	307125

2. Glossary

- Autoclave
  Equipment to sterilize with saturated steam the instruments and gauze for medical treatment and surgical operations and media used in laboratories under a pressure higher than atmospheric pressure.

- Type D grounding work
  Grounding work that ensures the grounding resistance of less than 100Ω, using a soft copper wire of 1.6 mm or more in diameter or any other wire equivalent to or better than the said copper wire.