TOP-LOADING AUTOCLAVE

WITH HEAT/VACUUM DRYING CYCLE

AT-HA-300P

OPERATING/SERVICE MANUALS

HA-300P: CONDENSED INSTALLATION AND OPERATION INSTRUCTIONS

1. Plug in power cord. The cord plug is standard for 120V, 20A equipment. The positive and negative pins are perpendicular to each other. Ideally, the end user should call an electrician to change the outlet plate so that it will accept a 120V, 20A plug. Or, a regular 120V, 15A plug may be substituted although this is not Amerex's recommendation.

2. Connect the drain hose (with washer) to the back of the autoclave (see diagram on next page). Fill the 15-liter carboy with water to a depth of about 2" and put the metal hose into the carboy below the water surface. **NOTE:** During the course of a cycle, steam will vent and condense into the carboy. If the drying cycle is used, water in the chamber also will be forced into the carboy before drying begins. The capped drain pipe near the bottom of the right side of the autoclave is used **only** for draining of dirty waste water, e.g., if you clean the chamber with detergent or spill media into the chamber. The conical water deflector is used only if water-absorbent loads such as dressing or gowns are autoclaved and dried.

3. Connect one end of the blue rubber hose to the back of the autoclave. Connect the other end to a tap or a funnel. Fill the water tank inside the autoclave housing until the level seen through the plastic tube on the right side of the autoclave is just above the minimum mark. About 4 gallons are needed. The blue hose can then be disconnected. **NOTE:** This water is not consumed during a cycle and is never mixed with the chamber water. It is needed only to operate the vacuum pump and is circulated between the pump and the inside water tank. The water needs to be changed about once a month to keep it clean. The vacuum generated by the pump decreases as the water temperature in the rises. Therefore, to maintain optimum pump efficiecy, the water should be replaced by colder tap water after 2 or 3 consecutive drying cycles.

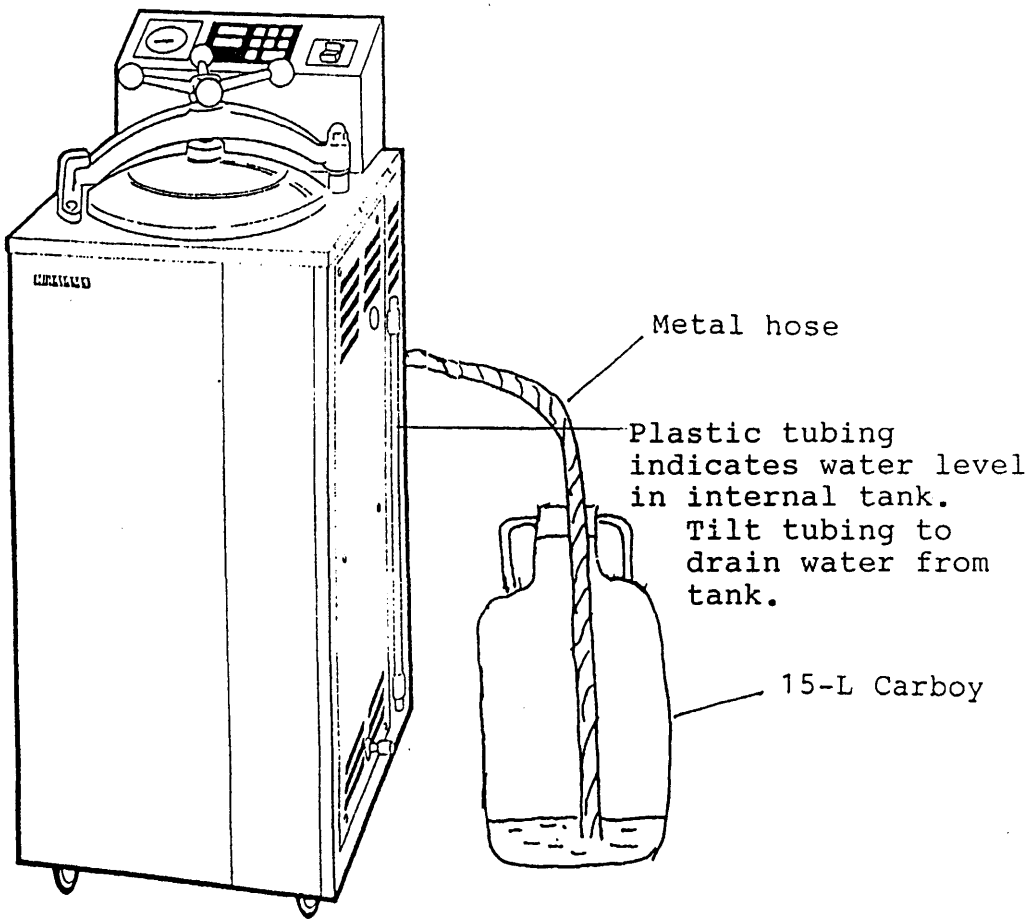
4. Pour 2.5 liters of water into the chamber. Turn on the power switch. You are in mode #1 of three modes and should see the temperature and time displays. The alternating flashing times are the sterilization time and drying times. To change the sterilization time, press the **STER TIME** button, the arrow up or arrow down buttons, and then **STER TIME** again. Drying time and sterilization temperature are changed similarly. Also, the green LED lights are lighted beside **STER**, **EXHT**, and **DRY**. These lights indicate that you want sterilization, automatic steam exhaust (fast), and drying. Press **MODE** once to go to mode #2. You now see only the green lights beside **STER** and **EXHT** which indicate sterilization and automatic exhaust (fast) only--no drying. Press **MODE** a second time to go to mode #3. In mode #3, you see the green light beside **STER**. This means

sterilization and automatic slow exhaust (liquid cycle). Although there is slow steam exhaust, the green **LED** beside **EXHT** does not light up. This is because we want to distinguish it clearly from mode #2 in which there is fast exhaust. A mistake may cause liquid to boil over if slow exhaust is intended but fast exhaust is accidentally selected. **NOTE:** Pressing **MODE** a third time will take you back to mode #1 again.

5. Press **START** to begin the cycle and wait for the buzzer to signal the completion of the cycle. If the drying cycle has been used, pour 2.5 liters of water into the chamber before starting the next cycle. Otherwise, add only 300 mL to 500 mL of water. **NOTE:** In modes #1 and #2, when the **START** button is pressed, the pre-vac cycle to pump air out of the chamber, will be initiated. The pump will be turned on for 3 minutes, stopped for 4 minutes, turned on for 4 minutes, and then off again.

6. For the pre-warm function, go to the liquid cycle, mode #3. Select 85°C. The time will default to "**CON**" which is 20 hours. Press **START** to begin pre-warm. Press **STOP** to end pre-warm.

7. **PLEASE REFER TO THE OPERATION MANUAL FOR DETAILED INSTRUCTIONS.**



BEFORE OPERATING...

During sterilization, the pressure applied to the lid inside the chamber at above 121°C is equivalent to 1-2 tons of force. In order to achieve complete sterilization, high temperature and extreme pressure of saturated steam are essential. If one considers the autoclave as an ordinary gas equipment or electrical product and does not handle it with great care, one may end up with an accident. Therefore, please read this manual carefully to enjoy a safe and proper operation.
In order to ensure safety, please conduct regular self-inspection on the unit once a year.

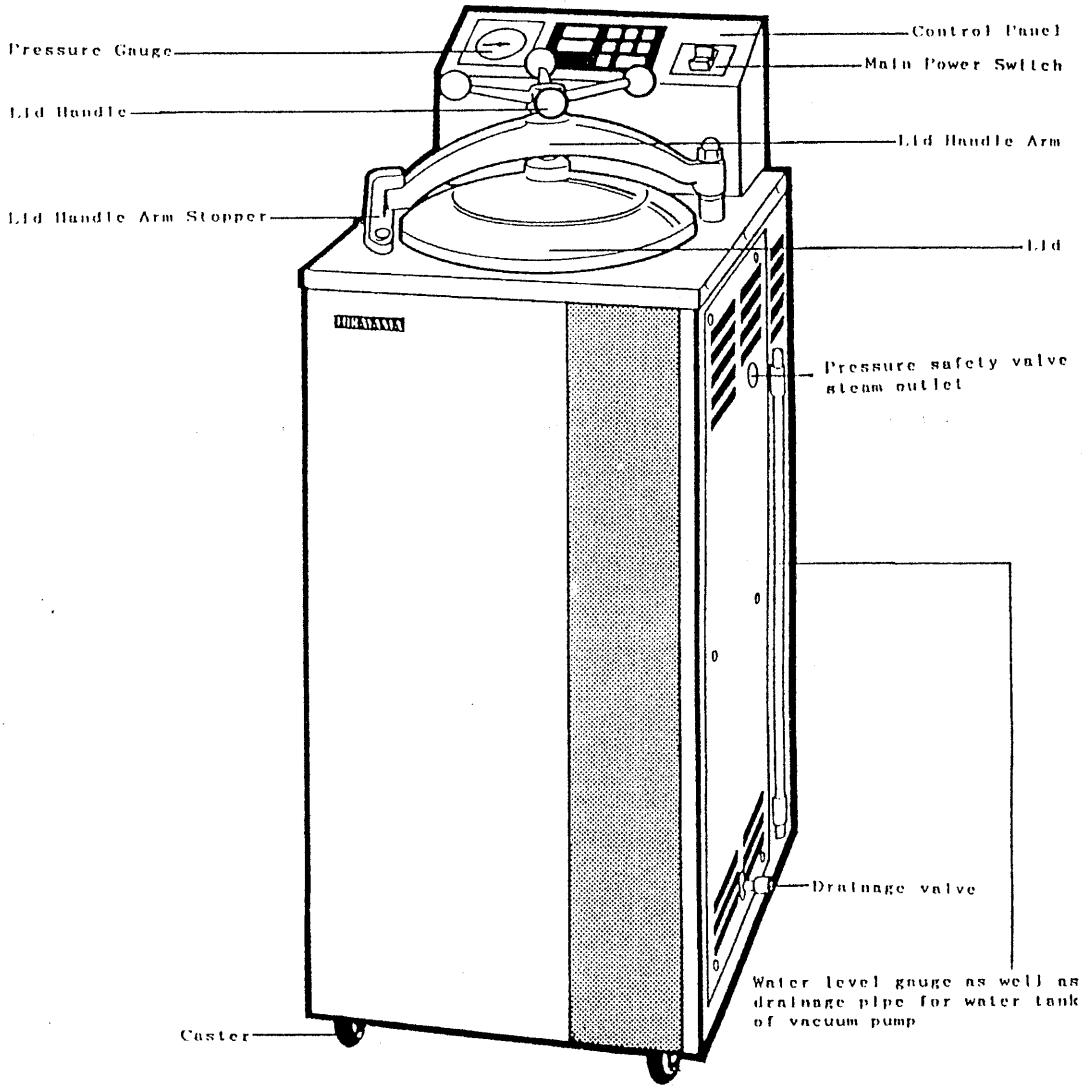
CONTENTS

SPECIFICATIONS

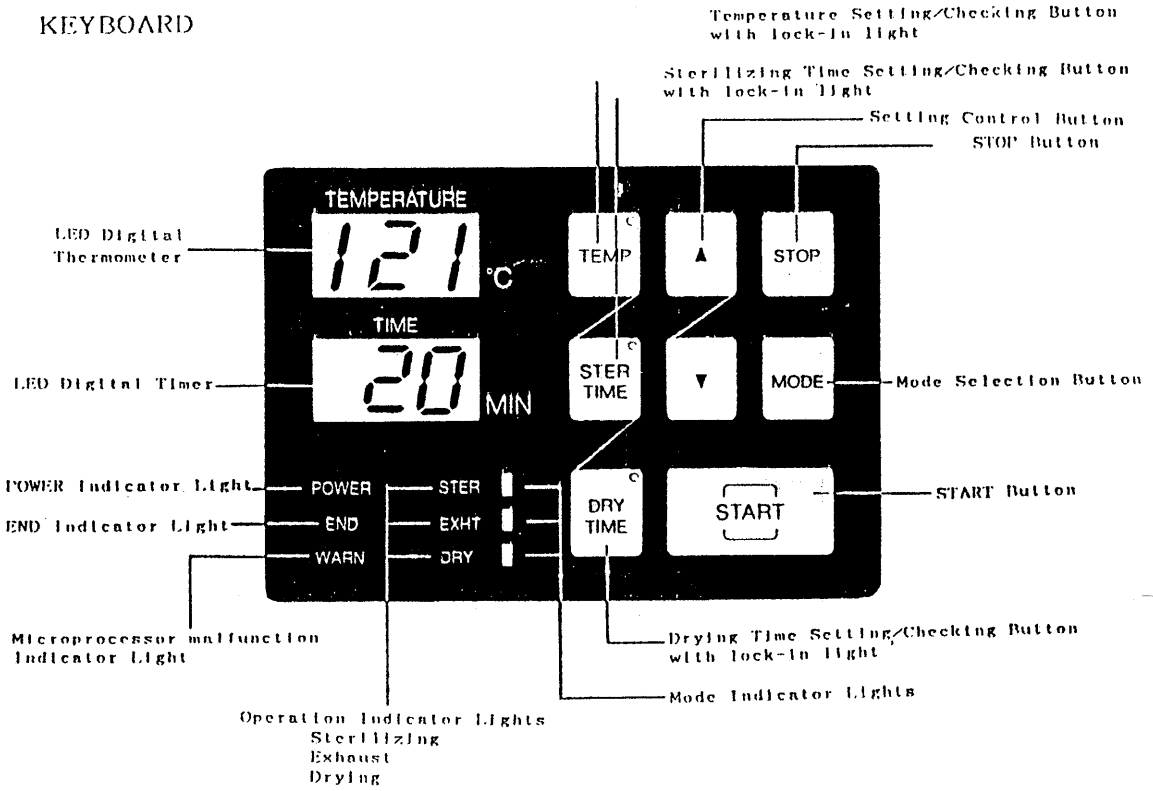
Model	HA-300P
Outside Dimensions	440W x 1,070H x 600D mm
Chamber size/Capacity	300 diameter x 670 deep mm / 47 liters
Power Requirement	AC, 50/60 Hz
Power Consumption	2.0 kW (20A)
Net Weight	85 kg
Pressure Chamber type	Small pressure chamber
Chamber Material	SUS304 (Stainless Steel)
Temperature Range	105°C - 126°C adjustable by keyboard control
Chamber Pressure	1.9 kg/cm2G (Safety Valve)
Digital Timer	Indicates remaining time from 1 to 90 min.
Digital Thermometer	80 - 127°C
Pressure Gauge	-76cmHg to 3kg/cm2
Drying Method	Water sealed vacuum pump and outer heater
Safety Warning Devices	Pressure Safety Valve, Excess-pressure switch, Circuit Breaker, Lack-of-water cutoff, Microprocessor malfunction detection device, Pump breaker, Error codes (Lack-of-water in water tank and in chamber, Snapping of sensor wire, Overheating, Underheating, Excess pressure, Locking of vacuum pump)
Standard accessories	Water-drop preventive cover (1 pc) Bottom plate (1 pc) Water supply hose (1 pc) Flexible drainage pipe (1 pc) 15-L Plastic bottle 1 pc

NAME OF PARTS

OUTER APPEARANCE



KEYBOARD



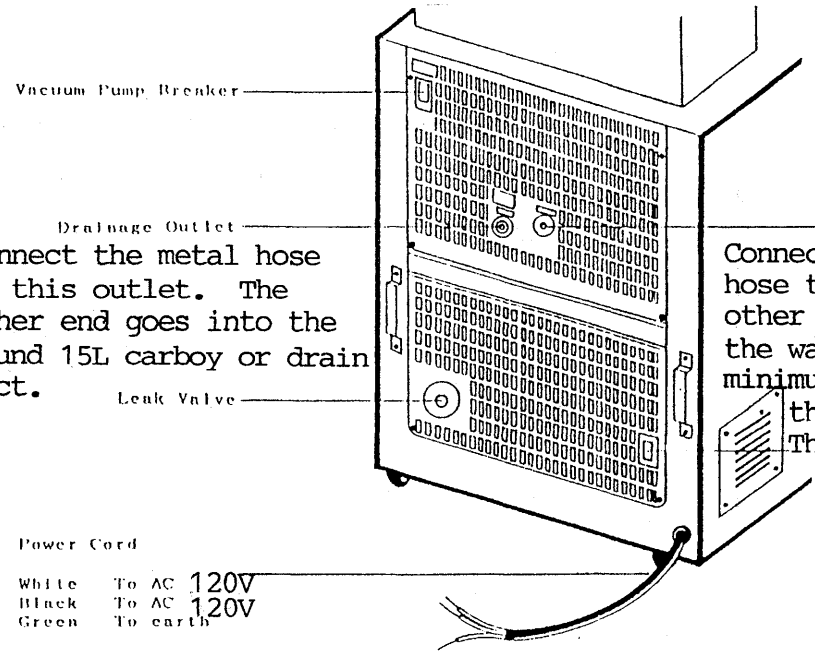
INSTALLATION

1. Avoid installing the equipment at places where the unit can become wet or is exposed to high humidity. It should be levelled on solid floor.

2. Allow enough clearance at the back and on the side in order not to block the ventilation holes.

3. For best reading comfort of the keyboard displays and indicators, avoid facing the keyboard against direct sunlight.

4. Connect the plug of the power cord to a 120VAC, 20A electrical outlet.



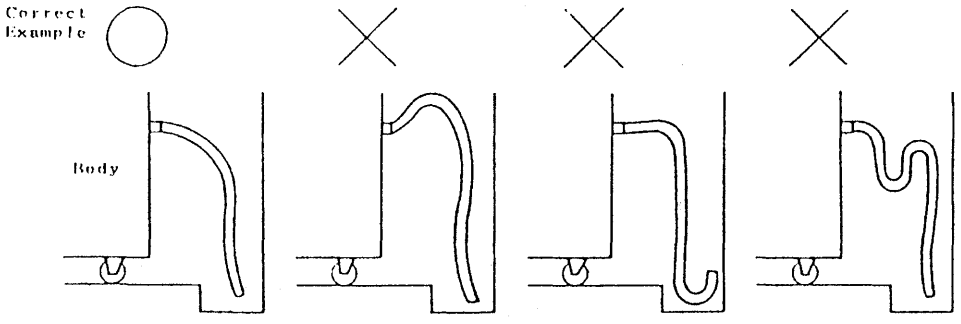
Connect the metal hose to this outlet. The other end goes into the round 15L carboy or drain duct.

Connect the blue plastic hose to this inlet and the other end to a tap to fill the water tank up to the minimum level marked on the right side panel. The hose may then be removed as no more water is required after each cycle. However, drain and refill periodically to keep water clean.

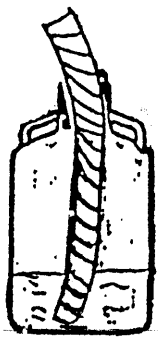
6. Connect the water supply inlet at the back of the unit to a water tap by using the water supply hose. Tighten the hose belts at both ends of the hose securely.

7. Connect the flexible drainage pipe to the drainage outlet at the back of the unit. Guide the end of the pipe as shown in the diagram below.

(1) When running down a drainage duct



(3) When running water into the bottle. Put a piece of aluminum foil around the mouth of the bottle, if desired. The bottle should not be more than 3/4 full to prevent water spillage.



Attention

1. During exhaust drainage pipe vibrates vigorously so ensure to secure it firmly.
2. In order to prevent drainage water from backflowing into the unit, the end of the drainage pipe must not contact the drainage water surface.
3. In case of running down into a drainage hole, to prevent backflow problem, the drainage hole must be bigger than the diameter of the drainage pipe.

8. Turn on the water tap to fill up the water tank for vacuum pump until the water level reaches the high point mark. Turn off the water tap.
The hose may be disconected at this time, if desired.

Attention

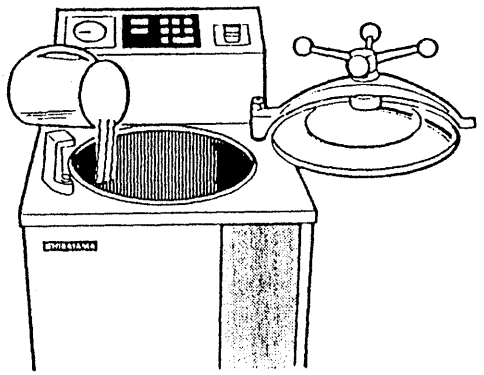
1. After three times of continous operation or when the drying result deteriorates, the water inside the tank must be changed to keep it cool.

2. The water inside the tank must be changed at least once a fortnight to keep it clean. Drain the tank if the autoclave will not be used for a week or longer.

OPERATION PROCEDURES

1. WATER SUPPLY

A. Turn lid handles counter-clockwise and swing the lid sideway as show in the diagram on the left.



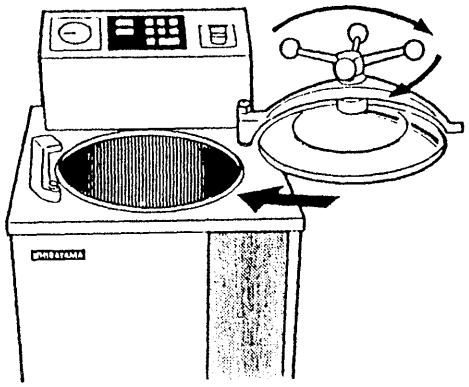
B. Ensure Drainage Valve under the lower right hand side of the unit is fastened.

C. Pour 2.5 liters of water into chamber. Be sure to check amount of water before every sterilization. If necessary add water before restart.

D. Use distilled, deionized or tap water.

2. OBJECT PLACEMENT

A. Place objects to be sterilized into the chamber. Put the water-drop preventive cover on the top touching the chamber body. From the front swing the lid handle arm fully into the arm stopper.



B. Close the lid by turning the lid handles clockwise.

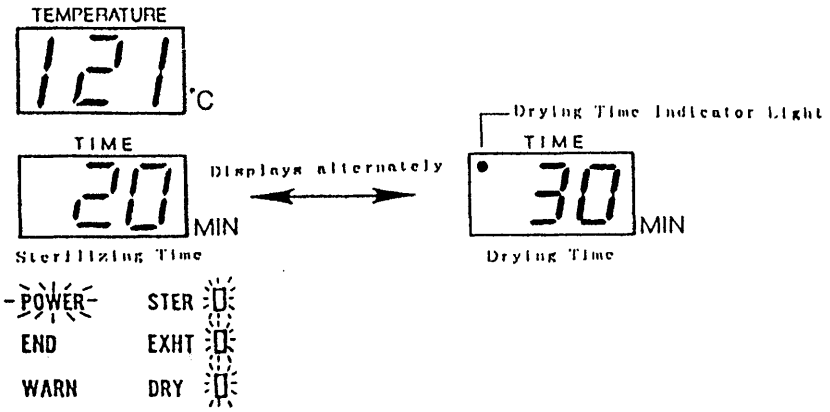
Attention

It should be noticed that putting too much clothing type of material into the dressing drums or wire baskets may cause incomplete sterilizaton and drying.

3. CIRCUIT BREAKER AND MAIN POWER SWITCH

A. Turn the Circuit Breaker (CB) at the back of the unit to ON position.

B. Turn the Main Power Switch ON so that the POWER Indicator Light and all MODE Indicator lights go on. Operation Mode No. 1 preset values are displayed on the LED Digital Thermometer (121°C) and Timer (Sterilizing time 20 min and drying time 30 min).



4. SELECTION OF BASIC OPERATION MODES

A. According to the type of sterilizing materials, the microprocessor memorize three basic operation modes as shown below. Desired mode can be selected/set by using the Mode Selection Button (MODE).

B. Besides Basic Mode No. 1, Mode No. 2 or 3 can be selected by pushing the MODE button. Push once, Mode No. 2 is set: push twice, Mode No. 3 is selected: push three times, it will return back to Mode No. 1 again.

Mode	Operating Process	Sterilizing Object	Memory Pattern			MODE Indicator Lights
			Conditions		Drying	
			Temp.	Time	Time	
1	Pre-vacuum, Sterilization, Fast exhaust, Drying	Glassware Tips Clothing	121°C	20 min	30 min	STER ☐ EXHT ☐ DRY ☐
2	Pre-vacuum, Sterilization, Fast exhaust	Glassware Instruments Waste				STER ☐ EXHT ☐ DRY
3	Sterilization, Slow exhaust	Liquids only				STER ☐ EXHT DRY

C. Do not put too much clothing type of materials for sterilizing at one time. It may cause incomplete sterilization and drying.

D. In case of sterilizing liquid (e.g. medicine) and objects in sealed packages, select MODE No. 3 (slow steam exhaust) in order to prevent troubles such as liquids spillage and packages bursting due to abrupt pressure reduction.

Attention

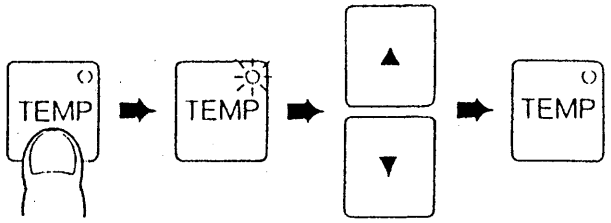
1. Do not change the MODE in the middle of a sterilizing cycle. If modification is needed, press STOP button to terminate the operation first and then select a new MODE to re-start again.

5. MODIFICATION OF STERILIZING CONDITION AND DRYING TIME

If other sterilizating condition and drying time besides the patterns in memory are required, modify the setting values by the method illustrated below.

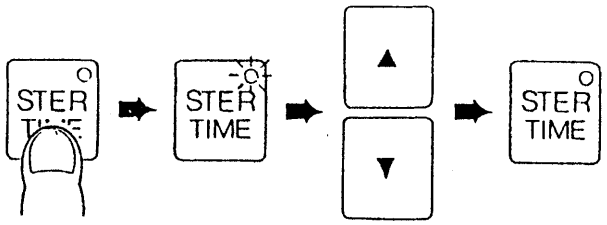
A. Modification of sterilizing temperature

* Push the Temperature Setting/Checking Button (TEMP).
* When the red lock-in light on the TEMP button is on and the Digital LED Digital Thermometer display is flashing, modification mode is ready.
* Use the Setting Control Buttons (Up or Down Arrow) to modify the temperature setting. One push changes the setting higher or lower in sequence of five preset values: 105°C, 110°C, 115°C, 121°C and 126°C. When the upper limit is reached it loops to the lower limit and vice versa.
* When the desired temperature is set, push the TEMP button again.
* Then, the red lock-in light on the TEMP button goes off and the LED Digital Thermomter returns to normal.



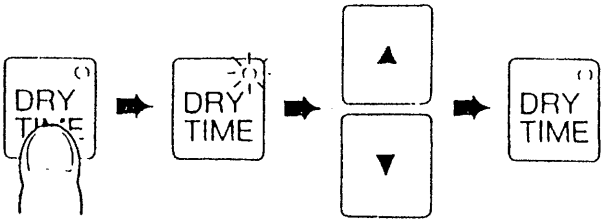
B. Modification of sterilizing time

* Push the Sterilizing Time Setting/Checking Button (STER TIME).
* When the red lock-in light on the STER TIME button is on and the LED Digital Timer display is flashing, modification mode is ready.
* Use the Setting Control Buttons (Up or Down Arrow) to modify the sterilizing time setting. One push changes the setting higher or lower in sequence of six preset values: 15 min, 20 min, 30 min, 45 min, 60 min and 90 min. When the upper limit is reached it loops back to the lower limit and vice versa.
* When the desired sterilizing time is set, push the STER TIME button again.
* Then, the red lock-in light on the STER TIME button goes off and the LED Digital Timer returns to normal.



C. Modification of drying time

* Push the Drying Time Setting/Checking Button (DRY TIME).
* When the red lock-in light on the DRY TIME button is on and the LED Digital Timer display is flashing, modification mode is ready.
* Use the Setting Control Buttons (Up or Down Arrow) to modify the drying time setting. One push changes the setting higher or lower in sequence of six preset values: 15 min, 20 min, 30 min, 45 min, 60 min and 90 min. When the upper limit is reached it loops back to the lower limit and vice versa.
* When the desired drying time is set, push the DRY TIME button again.
* Then, the red lock-in light on the DRY TIME button goes off and the LED Digital Timer returns to normal.



ATTENTION

1. The modified temperature, sterilizing and drying time settings are stored in memory so continuous operation without resetting is possible. However, if the MODE button has been pushed or power has been cut off, it returns to Mode No. 1 again.

2. Settings cannot be modified during sterilization. If modification is needed, press STOP button to terminate the cycle first, reset the values and then restart.

6. START OPERATION

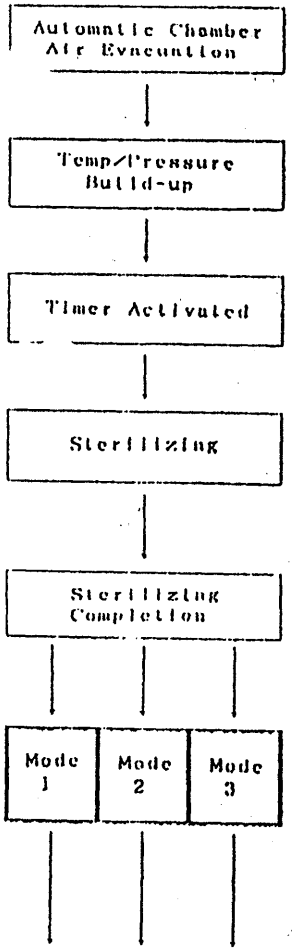
A. Push the START button.

B. When the LED Sterilizing Indicator Light (STER) flashes, the LED Digital thermometer shows "Lo" and the Timer display goes out, it indicates the sterilization cycle has started. From now onwards, the operation is automatic.

ATTENTION

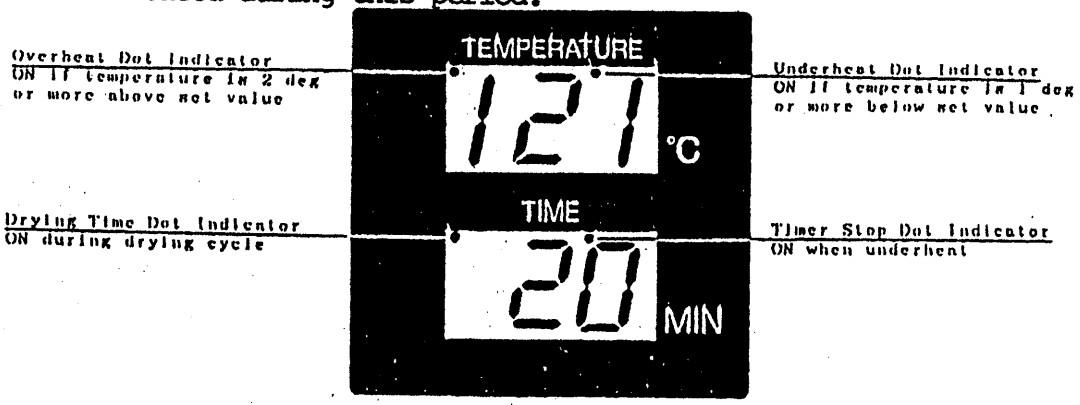
1. After the operation cycle has started, settings can be reconfirmed by pushing the respective setting/checking buttons (TEMP/STER TIME/DRY TIME).
2. Setting values are flashed every 5 seconds.

C. Automatic Operation Cycle



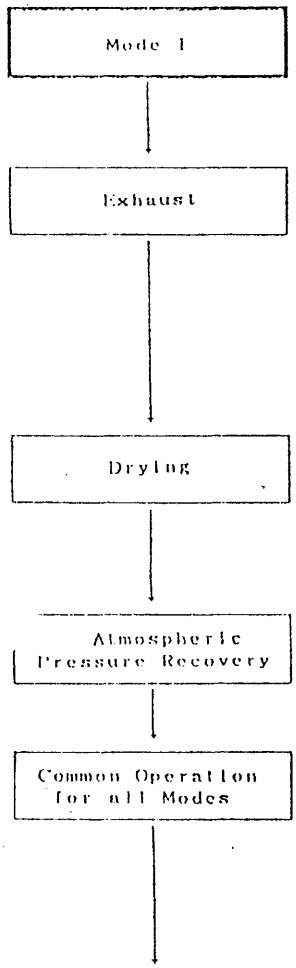
- If there is air left inside the chamber, the temperature distribution is uneven, which causes incomplete sterilization. Automatic Air Evacuation Valve achieves close to 100% air evacuation without any manual intervention.
- After the chamber temperature rises to 80°C, LED Digital Thermometer starts to display temperature value.
- Temperature and pressure continue to build up until the preset value is reached.
- Once the preset value is reached, LED Digital Timer starts to countdown and displays the preset time value.
- Operation Indicator Light STER changes from flashing to ON status.
- Temperature is kept constant through out the preset sterilizing time span.
- If the chamber temperature falls one degree below the preset temperature value, the dot lights at the left top corner of the first digit of the temperature and time displays will be on and the Digital Timer will stop countdown until the preset temperature is recovered.

* The air evacuation cycle includes holding the temperature and venting steam for 12 minutes at 100°C. This procedure helps purge air from the chamber, especially for porous loads such as dressings or clothing. For liquids, the cycle time is not increased, because the liquid is being heated during this period.



* If the temperature rises 2°C or more above the preset temperature value, the dot light at the top left corner of the third digit of the LED Digital Thermometer will go on. As the LED Digital Timer displays the remaining time of the operation cycle, when reconfirming the preset time values, take note of the precautions mentioned above in section on "Start Operation".
* When the preset sterilizating time has elapsed, Operation Indicator Light STER goes off.

As the operation after sterilizing cycle depends on the MODE selected, refer to the respective section below for details.



Mode 1

* Operation Indicator Light EXIT goes on and the LED Digital Timer goes off.
* Exhaust Valve opens, both water and steam are forced out of the chamber at the same time.
* Exhaust cycle is regulated by a build-in timer (for about 3 min). When the time is over, EXIT light goes out.

Attention

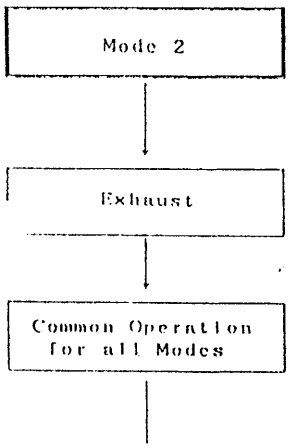
Be careful not to get scalded during exhaust cycle as the temperature of the hot water from the drainage pipe is extremely high.

* Operation Indicator Light DRY goes on, LED Digital Thermometer displays "- - -" and the LED Digital Timer displays the preset drying time.
* Within the preset time, vacuum pump operates to maintain a negative chamber pressure.
* During drying cycle, LED Digital Timer displays the remaining time. In order to confirm the preset drying time, refer to section on "Start Operation" above.
* When the drying time is over, LED Digital Thermometer displays the temperature inside the chamber, LED Digital Timer and DRY light go off.
* Air flows into the chamber via the Bacteria Removal Air Filter so the inside pressure recovers back to atmospheric level.

Attention

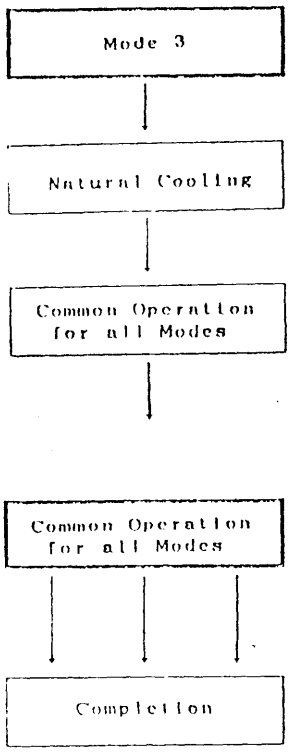
After the completion of drying cycle, no water remains inside the chamber so in case of continuous operation, adequate amount of water must be poured back into the unit.

Over 3 times of consecutive operations, the temperature of the vacuum pump water tank rises causing the vacuum efficiency to fall and the drying effectiveness to drop. Change the water inside the tank before restarting the cycle.



Mode 2

* Operation Indicator Light EXIT goes on and LED Digital Timer goes off.
* Exhaust Valve opens, only steam is released out with hot water remaining in the chamber.
* Exhaust cycle is regulated by a build-in timer (for about 2 min). When the time is over, EXIT light goes out.



Attention

Be careful not to get scalded during exhaust cycle as the temperature of the hot steam from the drainage pipe is extremely high.

Mode 3

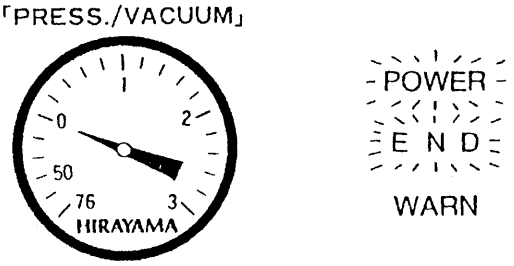
* LED Digital Timer goes off.
* Exhaust valve opens and closes repeatedly to effect a slow and controlled rate of steam venting for rapid cool down without boiling over.
* END Indicator Light flashes. Alarm sounds at about 96°C, except for high altitude models.

Attention

Although it is possible to remove sterilized objects prior to the END of the cycle, ensure the chamber pressure falls to "0" before doing so.

Common Operation for all Modes

* Upon completion of the operation under respective modes, the buzzer beeps three times and END Indicator Light goes on.
* After confirming the chamber pressure has recovered to "0", turn lid handles to open the lid and remove sterilized objects.
* LED Digital Thermometer displays the chamber temperature until 80°C. Below 79°C it displays "Lo".
* After removing the sterilized object, unless intending to continue with the next operation, turn the Main POWER Switch OFF.



Attention

1. During or at the end of drying cycle, chamber temperature may rise higher than 128°C. Under this condition, overheat error code (Er 3) will not be displayed.

2. In case of continuous operation, between the time when the sterilized objects are removed and the time of next sterilizing cycle, make sure to allow an interval of at least ten minutes. Refill chamber when its water level is low. Press START Button after the sterilizing objects are properly enclosed.

3. At the end of the work day or when the unit is not in use for a long period of time, turn the Circuit Breaker OFF.

* When Mode No. 1 is selected, it is possible to preheat the chamber in order to increase the dryness. For details, please contact our dealer.

7. Correct usage of STOP Button

A. During automatic sterilizing cycles, if it is necessary to terminate the operation halfway, press the STOP Button when the following situations occur:

* Placement of sterilizing object is mistaken or forgotten.
* Terminate the operation at the middle of the natural cooling process under Mode 3.
* Chamber negative pressure recovered to "0".
* Automatic sterilizing cycle terminated halfway due to any other malfunctions.

B. When the button is pressed, chamber pressure recovers to atmospheric level either by exhausting or offsetting negative pressure. The unit returns to the condition before start.

Attention

1. When opening the lid, ensure chamber pressure is at zero.
2. Before re-starting another cycle, allow 10 minutes interval.
3. STOP button also has the function to stop alarm buzzer.

OPERATION FAULT AND ERROR CODES

Should a fault occur, error detection circuit activates and takes control of the operation to ensure safety. Corresponding error code is instantly displayed on LED Digital Thermometer. At the same time warning buzzer beeps to signal malfunction.

Error Code	Cause	Control
Er 0	Lack of Water In Vacuum Pump Water Tank	If START Button is off, only Error Code is displayed. If START Button has been pressed, heater circuit is cut off and buzzer on
Er 1	Lack of Water In Chamber	Heater Circuit Cut Off Buzzer beeps
Er 2	Broken Temperature Sensor	
Er 3	Overheating Inside Chamber (over 128°C)	
Er 4	Underheating Inside Chamber during sterilizing (below 102°C)	
Er 5	Excess-pressure Inside Chamber (Over 1.5kg/cm2G)	
Er A	Locking of Vacuum Pump	

A. When warning buzzer sounds, besides confirming the error code, push the Power OFF Button to cut off power supply.
B. In case of Er 0 lack-of-water in water tank, fill water up to the high level mark.
C. In case of Er 1 lack-of-water in the chamber, let the inside pressure fall down to "0". Then, open the lid slowly to allow the heaters to cool down. Add water and restart again.
D. In case of Er 2,3,4 & 5, contact our authorized dealer from whom the unit was purchased.

E. For Er A, release the locking of the pump, turn ON the pump breaker restart from the beginning. For details, refer to section "Maintenance and Servicing".
F. Other than the error warnings mentioned above:
* When temperature control of the microprocessor malfunctions, the WARN light goes on and buzzer beeps.
* In this case, turn Main Power Switch off and restart the operation once again. If the same problem recurs, contact our dealer from whom the unit was purchased.

GENERAL CAUTIONS DURING OPERATION

1. OFF Circuit Breaker and Main Power Switch

A. At the end of the day or when left idle for a long period of time, Circuit Breaker must be turned off.
B. In case of any abnormality during operation, turn off the Main Power Switch and then restart from the beginning. If the same problem recurs, turn off the power and contact our authorized dealer from whom the unit was purchased.

2. When power fails halfway

A. In case of power failure due to blackout etc., sterilizing cycle terminates, chamber pressure recovers, LED Digital Thermometer/Timer display Mode No. 1 of the memory pattern. Restart the operation once more.

3. When sterilizing liquid (medicine, culture media etc)

A. When sterilizing liquid (medicine, culture media etc), select mode 3 and set timer longer.
Timer setting time = Sterilizing time + Delay time
Take note that water inside a medicine bottle takes a longer time (Delay Time) to reach the sterilizing temperature after the chamber temperature has reached the same temperature.
B. Sterilized liquid requires a long time to cool down inside the container so be careful not to get scalded.

4. Be careful of High Temperature and High Pressure

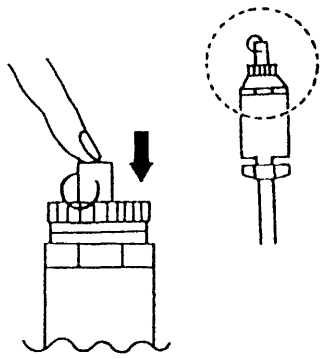
A. During or right after operation cycle, lid and lid handle arm etc are very hot, do not touch by hand. Be careful not to get scalded.
B. In the course of sterilizing or when there is pressure remaining inside the chamber, the Drain Valve on the right hand bottom of the unit must not be opened. Hot water and steam will escape so it is very dangerous. Ensure the unit has completely cooled down before any drainage operation is conducted.
C. In the course of sterilizing or when there is pressure remaining inside the chamber, the lid must not be opened. Hot steam will escape so it is very dangerous. Confirm the chamber pressure is "0" before opening the lid.

5. Water supply and drainage of Vacuum Pump Water Tank

A. Use tap or distilled water. Water with high ferric or calcium content may cause malfunction.
B. Be sure to drain up the tank before moving the unit.
C. Water tank must be drained after use if the unit is exposed to low temperature to avoid freezing.

6. About the Pressure Safety Valve

A. No matter what the cause, when the pressure inside the chamber exceeds 1.9kg/cm2G, Pressure Safety Valve operates to reduce the pressure so as to ensure safety.
When this occurs, cut off power and wait for the unit to cool down. Open the side panel, press the head of the Safety Valve as shown in the diagram and restart operation again.



B. If the same problem recurs, contact our authorized dealer from whom the unit was purchased.
C. During the operation, do not put the hand or face close to the outlet of the Safety Valve. It is very dangerous when steam escapes.

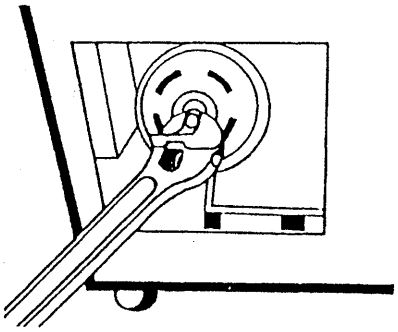
7. Lid Gasket and Method of Tightening the Lid

A. The Lid Gasket used is pressure adjusting seal design (patented) made of silicon rubber.The higher the chamber pressure rises, the tighter sealing becomes. As such, to close the lid too tightly will adversely weaken the sealing and the gasket will be worn out faster.
B. As the gasket is made of rubber, it is subject to normal aging or wear and tear. Change it when necessary. (Refer to the illustration under Maintenance and Servicing for details)

8. About the Vacuum Pump

A. The pump locks due to solid residue in water or when the pump is not in use for an extended period. If this happens, Pump Breaker at the top of the back cover goes OFF and buzzer beeps continuously. After turning off the Main Power Switch, follow the instructions below to unlock it.

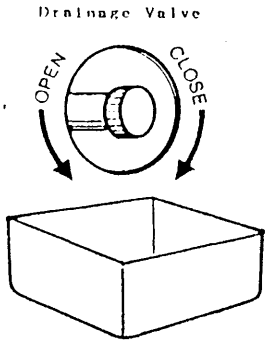
* Open the panel on the left side of the unit and use a spanner to turn the shaft of the pump clockwise.
* Turn the Pump Breaker ON.
* ON the Main Power Switch and restart from the beginning.



B. If abnormal noise comes from the pump, turn the Vacuum Pump Leak Valve counter-clockwise a little bit. Clockwise turn increases degree of vacuum and counter-clockwise turn decreases it.

1. Draining and Cleaning the Chamber

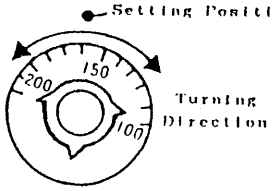
A. Always pay attention to keep the inside of the chamber clean. To avoid blocking the pipes, after one day's use, the water inside the chamber must be drained out. Right after use, the temperature is very hot so allow chamber water to cool down before draining.
B. Place water container below the outlet of the drain pipe located at the lower part on the right hand side of the unit body. Turn the drain cap towards OPEN and remove the screw to allow drainage. (Be careful not to lose the drain cap)



C. After drainage is completed, screw back the drain cap tightly to avoid water leakage. The cap can cause the chamber to be out of water during operation, which is dangerous.
D. When the surface of the heater at the bottom of the chamber is stained, clean it with a soft brush etc. and running water. As the heater is installed with temperature sensor be careful not to damage it when cleaning.
E. Clean the filter at chamber base.

NOTE:
There is a silicone rubber disc at the bottom of the drain cap. Do not lose this or water will leak out of the cap.

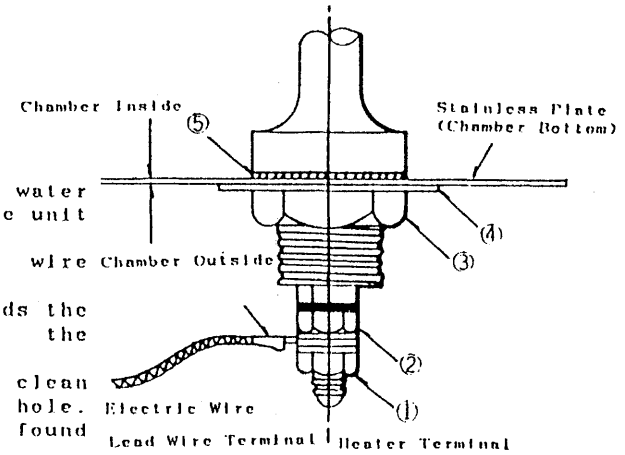
2. Lack-of-Water Cut-Off Device



Lack-of-water cut-off preset at the side panel

A. The buzzer sounds continuously if there is not enough water. In this case, press the Power OFF button, open the lid and after the heater cools off, add water and start operation again.
B. The temperature sensor of the lack-of-water cut-off device is directly connected and installed to the heater. The maximum temperature is 126°C so abnormally high temperature due to lack-of-water etc. triggers the device to disconnect power supply.
C. When installed in factory, the device is preset to activate at 160°C. However for any reason if the switch is adjusted to operate at a temperature lower than 160°C (e.g. 110°C) when the surface temperature of the heater reaches 110°C this device is triggered, heater power supply is cut off and buzzer beeps continuously.
D. If the lack-of-water cut-off switch activates at, around or below sterilizing temperature, open the left hand side panel and turn the switch to the right to adjust it back to 160°C.

3. Replacement of Heater

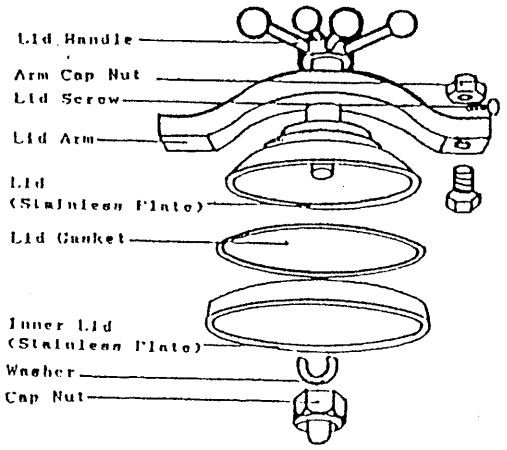


A. Drain the chamber, remove the water tank from the body and lay the unit on one side.
B. Loosen nut 1, take out the lead wire terminal and remove nut 3.
C. Push the heater terminal towards the chamber and take it out from the inside of the chamber.
D. When taking out the heater, clean the area around the attachment hole. Dirt such as scale etc can be found sticking to the surface.
E. Remove nut 3 and metal washer 4 from the new heater before inserting it into the hole. At this moment, check if washer 5 is in place or not and confirm if it is in good condition.
F. Put back metal washer 4 and fasten nut 3 tightly. (Ensure the nuts on both sides are equally tightened.)

G. Take out nut 1, install back lead wire terminal and fasten nut 1.
H. Precaution notes when changing heater.

* The sensor of the lack-of-water preventive device (rod shape object) is curled around the heater so when changing the heater take great care not to damage the sensor.
* If nut 3 is not properly tightened, it may cause leakage of water and electricity so fasten it tightly.
* If the lead wire terminal is stained, use sandpaper etc. to clean it properly.
* Remember to replace washers 4 and 5; also when replacing take care not to damage them.
* If the tightening back of nut 1 to fasten lead wire terminal is done too loosely, the contact point generates heat and causes fire hazard. Therefore, be sure to fasten nut 1 tightly so that the screw cannot be turned anymore.

4. Replacement of Lid Gasket



Follow the steps below to replacement Lid Gasket:

A. Take out the lid screw and then loosen the arm cap nut. Remove lid arm from the body.
B. Turn the lid up side down to loosen the cap nut and to take out washer as well as inner lid.
C. Take out the old gasket and fix the new one onto the outer rim of the inner lid.
D. Attach inner lid with new gasket tightly back to outer lid as before.
E. Put washer back and tighten cap nut.
F. Fix lid arm back to the body securely as it was before. (Lid screw must be used to fasten the arm cap nut.)

5. Cleaning of Vacuum Pump Water Tank

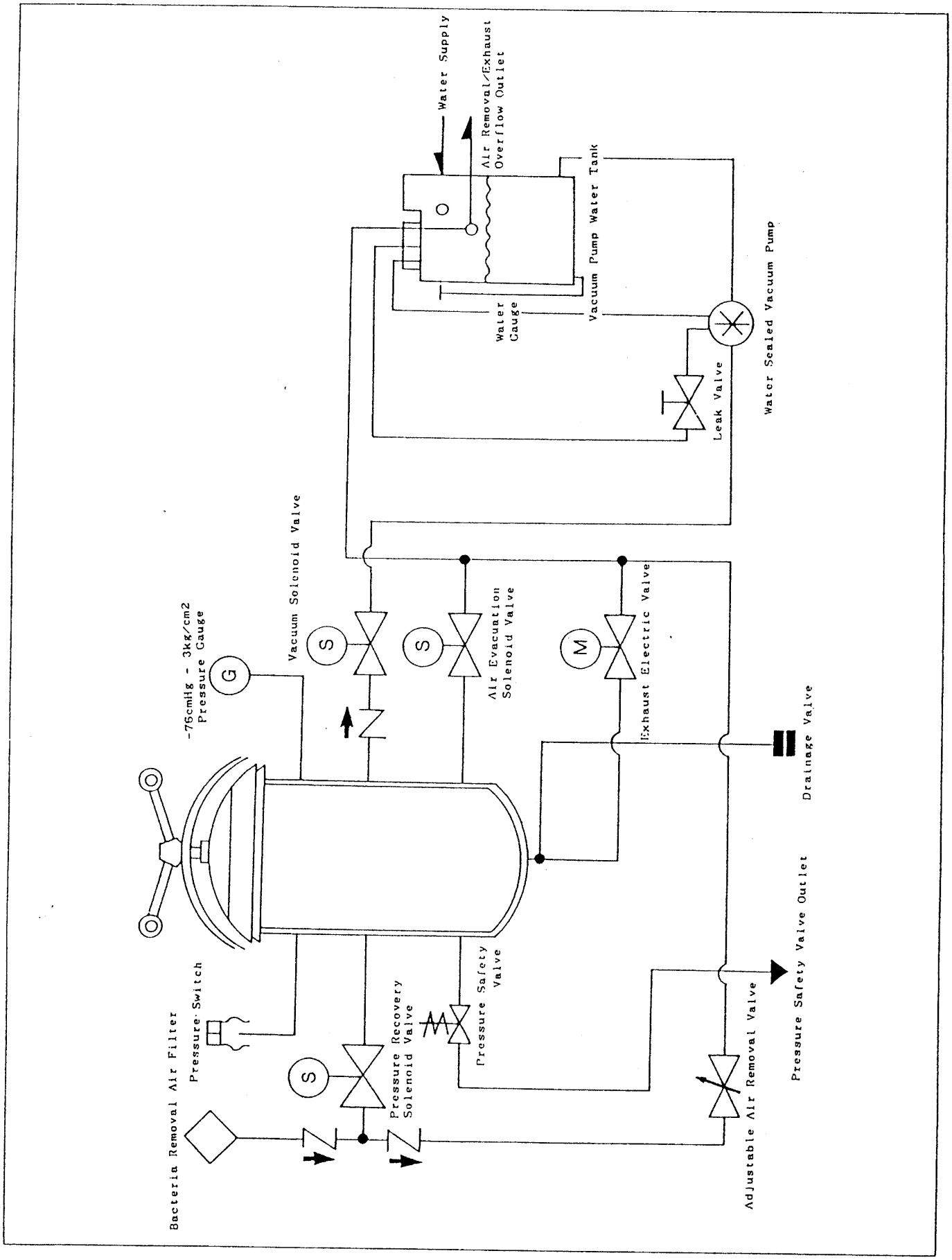
A. Change the water in the tank once a week. Use the water hose (also used as water level gauge) to drain out the tank.

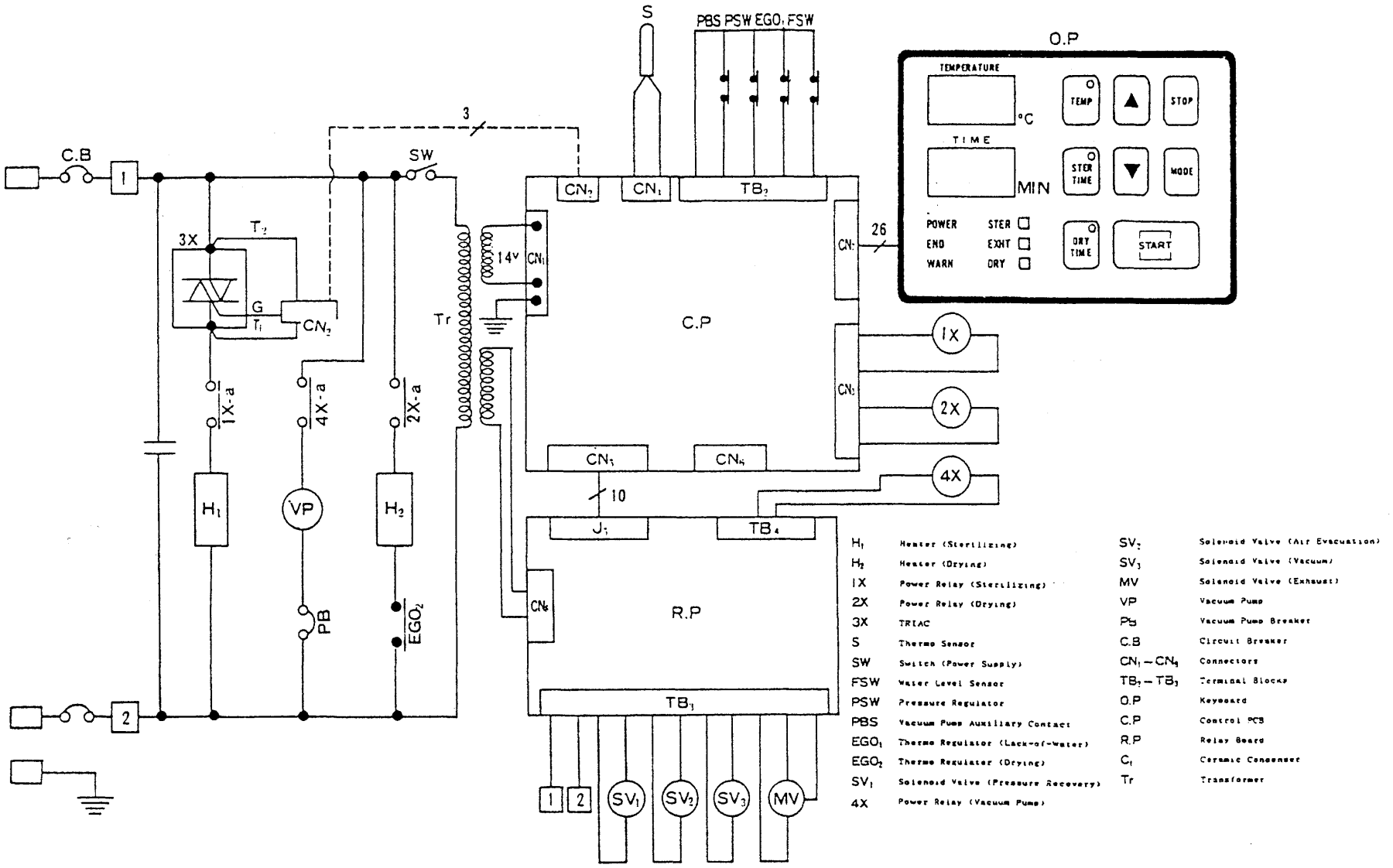
6. Changing Bacteria Removal Air Filter

A. Open the right side panel, there is an Air Filter. Be sure to replace it at least once a year.

B. In case it takes too long for atmospheric pressure to recover after drying cycle is over, replace the filter.

PIPING DIAGRAM





H_1	Heater (Sterilizing)	SV_2	Solenoid Valve (Air Evacuation)
H_2	Heater (Drying)	SV_3	Solenoid Valve (Vacuum)
1X	Power Relay (Sterilizing)	MV	Solenoid Valve (Exhaust)
2X	Power Relay (Drying)	VP	Vacuum Pump
3X	TRIAC	PB	Vacuum Pump Breaker
S	Thermo Sensor	C.B	Circuit Breaker
SW	Switch (Power Supply)	$CN_1 - CN_8$	Connectors
FSW	Water Level Sensor	$TB_2 - TB_3$	Terminal Blocks
PSW	Pressure Regulator	O.P	Keyboard
PBS	Vacuum Pump Auxiliary Contact	C.P	Control PCB
EGO_1	Thermo Regulator (Lack-of-Water)	R.P	Relay Board
EGO_2	Thermo Regulator (Drying)	C_1	Ceramic Condenser
SV_1	Solenoid Valve (Pressure Recovery)	Tr	Transformer
4X	Power Relay (Vacuum Pump)		

LASERCLAVE (HA-300P) TROUBLESHOOTING TABLE

Symptom	Possible Causes	Recommended actions
Even after pushing Power ON button, Power Indicator Light, LED Digital Thermometer/Timer and other Indicator Lights fail to turn ON	* First of all, check socket of main power source. 1 Power cord insertion improper 2 Power cord broken 3 Circuit breaker OFF 4 LED malfunction	1 Insert properly. Tighten up loose part 2 Replace power cord. Check socket joint 3 Turn ON circuit breaker 4 Contact our dealer from whom the unit is bought
Air evacuation from chamber fails	1 Malfunction of the Automatic air evacuation valve	1 Contact our dealer from whom the unit is bought
Pressure fails to build-up	1 Safety valve fails 2 Pressure gauge fails 3 heater wire broken 4 Exhaust electric or solenoid valve fails 5 Leakage of steam	1 Press head of safety valve as mentioned in "General Cautions During Operation" section. Or, replace it with a new one 2 Change it. (Discuss with our dealer) 3 Replace heater 4 Replace the failed part 5 For piping leakage, tighten or seal off the joints
Steam escapes from lid gasket	1 gasket deteriorates	1 Replace lid gasket. Refer to "Maintenance and Servicing" section
Water leakage from the bottom	1 Due to lack-of-water etc, heater washer seal deteriorates 2 Drainage outlet malfunctions 3 Rubber pipings of the inner drainage system loosen or deteriorate	1 Tighten up nut of heater or nut of lack-of-water switch. Or, replace washer 2 Replace drainage pipe (Contact our dealer) 3 Tighten hose belt or replace rubber pipings
Er flashes and buzzer beeps	1 Lack-of-water in Vacuum Pump Water Tank (Er 0) 2 Lack-of-water in chamber (Er 1) 3 Sensor wire broken (Er 2) 4 Chamber temperature rises higher than 128°C (Er 3) 5 Chamber temperature falls lower than 102°C (Er 4) 6 Chamber pressure exceeds upper limit (Er 5) 7 Locking of Vacuum Pump (Er A)	1 Add water to the tank. 2 Turn OFF power. Wait till chamber pressure reduced and heater cooled down, pour in water and restart operation 3 - 6 Contact our dealer 7 Turn OFF power. Turn the shaft at the back of the pump clockwise with a spanner to fix the lock. Turn ON the vacuum pump breaker and restart operation
WARN light flashes and buzzer beeps	1 Microprocessor malfunctions	1 Immediately turn OFF power to terminate operation. After a while, retry and if it fails again, contact our dealer

Symptom	Possible Causes	Recommended actions
Drying incomplete	1 Setting of drying time too short 2 Preset temperature of thermo regulator too low 3 No or insufficient water supply from vacuum pump water tank 4 Water temperature in vacuum pump water tank too high 5 Vacuum pump damaged or heater wire broken 6 Thermo regulator failure 7 Too much air comes in thru leak valve	1 Set longer drying time 2 Increase thermo regulator setting 3 & 4 Add water referring to section "Installation" Or, change water 5 & 6 Contact our dealer 7 Adjust leak valve by turning it clockwise
After drying cycle, atmospheric pressure recovery fails or incomplete	1 Pressure recovery valve malfunctions 2 Bacteria removal air filter clogged	1 Contact our dealer 2 Replace filter. Refer to section "Maintenance and Servicing"
Water fails to flow out from drainage valve	1 Blocking of pipings 2 Improper installation of drainage hose	1 Clean up the pipings 2 Refer to the section on "Installation"

* Please send back the attached Customer/Product Registration Card. Upon the date of receipt of the said card Guarantee Certificate will become effective.

* The above troubleshooting table is to indicate cause of simple problems. In case of complicated situation, please inform our dealer of the following:

1. Model/Manufacturing No. 2. Problem part and symptom 3. Number of days in use (since purchase) 4. condition of operation

Temperature-Pressuress Coversion Table for Saturated Steam in Autoclave

The following data are approximate values for practical use in all autoclaves:

Temperature		Pressure Gauge Reading	
(°C)	(°F)	kg/cm	lb/inch
109	228	0.35	5.0
110	230	0.5	7.1
115	239	0.7	10.0
120	248	1.0	14.2
121	250	1.1	15.6
126	260	1.5	22.0
132	270	1.9	27.0
135	243	2.1	30.0

SPARE PARTS FOR HA-300P AUTOCLAVE

Catalog No.	Description
ATA-HA9L	Lid gasket
ATA-HA22L	Heater, 2KW (specify 120V or 220V)
ATA-HAEGO	Low water power cut-off sensor and thermostat for HA series
ATA-HAPB	Plastic exhaust bottle
ATA-HAPG	Pressure gauge
ATA-PBF	Bacteria filter
ATA-PCPCB	Control PCB (printed circuit board)
ATA-PEH	Exhaust hose
ATA-PFS	Water level sensor and float switch
ATA-PPRV	Pressure relief/safety valve
ATA-PRA	Relays (acrylic, G2R-1-5, 24V DC)
ATA-PRHD	Power relay for heater or dryer, Matsushita AR5211
ATA-PROM	EPROM
ATA-PSSR	Solid state relay
ATA-PSV1	Solenoid valve (AG4X3874)
ATA-PSV2-3	Solenoid valve (AB4X0197)
ATA-PSVR	Solenoid valve relay (G4F-11123T) 24V DC
ATA-PTS	Thermistor sensor