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INSTRUCTION MANUAL
FOR

TABLETOP
STEAM STERILIZER

Model HS-1212
HS-1321
HS-9041

한신메디칼주식회사
HANSHIN MEDICAL CO., LTD.

C O N T E N T S

SAFETY INSTRUCTIONS

For safety checkup, repair, maintenance and operation of this sterilizer, please pay attention to the following. We have no responsibility for damages resulted from not conforming this 「SAFETY INSTRUCTIONS」 and N.B. in this manual.

1. The operator (worker) shall wear protective gloves. The sterilizer may cause a skin burn as it maintains high temperature not only during operation but also for a considerable period of time after use.
2. The inspection, adjustment and repair & maintenance of the sterilizer should be conducted by persons qualified for this unit and fully experienced. If an inexperienced person repairs this unit or abnormal parts are used, he may be hurt or the unit may be greatly damaged.
3. Before repairing the sterilizer, remove the power cord, and make sure that the equipment has been cooled down to the ambient temperature.
4. When sterilizing some wrapped articles, be careful for the wraps or pouches of the package not to contact the chamber wall as there is danger of fire.
5. When lifting or moving the sterilizer, two or more people should do that.
6. The following should be observed when sterilizing liquid:
   - ① Use only vented closures. Do not use screw cap or rubber stopper.
   - ② Use only Type 1 borosilicate glass bottles. Do not use ordinary glass bottles or containers not designed for sterilization purpose.
   - ③ Do not open the door full suddenly after the sterilization cycle. Leave the door a little open for 10 minutes.
   - ④ Do not shake or move the hot bottle, which may be burst out.
7. The sterilizer should be grounded surely and leave the power switch off when not using the sterilizer.
8. When cleaning the door or chamber, do not use wire brush, steel wool, abrasives or materials containing chlorides.

1. DESCRIPTION

This sterilizer is fully automated in all processes by means of microprocessor. If a trouble takes place, it alarms with digital display and buzzer through the self-diagnosis function, and then stops the cycles. The door lock system is of new eccentric latching type, which is an epochal structure closing the chamber airtight easily.

TABLE 1-1. SPECIFICATIONS

MODEL	HS-1212	HS-1321	HS-9041
OVERALL SIZE	W413xH340xD548 mm	W483xH387xD613 mm	W581xH468xD703 mm
CABINET	W413xH313xD443 mm Zinc-coated St. Plate	W483xH360xD496 mm Zinc-coated St. Plate	W581xH441xD556 mm Zinc-coated St. Plate
CHAMBER	Ø210xL368 mm Capacity 12.7 ℓ Cylindrical Type Stainless St. Plate	W225xH225xD425 mm Capacity 21.5 ℓ Rectangular Type Stainless St. Plate	W300xH300xD450 mm Capacity 40.5 ℓ Rectangular Type Stainless St. Plate
RESERVOIR	W198xH194xD123 mm Capacity 3 ℓ Stainless St. Plate	W240xH234xD119 mm Capacity 5 ℓ Stainless St. Plate	W240xH234xD119 mm Capacity 5 ℓ Stainless St. Plate
TRAY	W160xH35xD305 mm Qty. 2 ea Stainless St. Plate	W216xH44xD405 mm Qty. 2 ea Stainless St. Plate	W291xH44xD432 mm Qty. 2 ea Stainless St. Plate
NET WEIGHT	32 kg	53 kg	79 kg
POWER SOURCE	AC220V, 50/60Hz, 6A	AC220V, 50/60Hz, 8A	AC220V, 50/60Hz, 10A
POWER CONSUMPTION	1,250 W	1,600 W	2,000 W
STERILIZATION MEDIUM	Saturated Steam of max. 2.2 bar Pressure		
AIR REMOVAL	Gravity Principle		
CONTROL	Full Automated by 8 bits Microprocessor		
STERILIZATION TEMPERATURE	121℃ ~ 132℃		
TIME RANGE	0 min ~ 60 min		
PROGRAM	Typical Cycles : 121℃/30min, 132℃/5min, 132℃/15min Typical Dry Time: 30 min		

2. INSTALLATION

This sterilizer completed all test and inspection at the factory before shipping, so there is no problem in installing and using. But, when installing firstly for user's convenience, our qualified person or an engineer authorized by us should install, check the sterilizer and explain the usage.

List of accessories: ① 2 stainless steel trays
② 1 stainless steel rack
③ 1 instruction manual
④ 1 warranty certificate

N. B. : The sterilizer should not be installed where ventilation is limited or at the vicinity of water supply or sewerage system, inflammable or toxic gas unit and heat source.

2.1 Remove sterilizer from carton. Put the sterilizer on a table of height convenient to use (about 80 cm). The table shall be level and separated from both sides and the rear for a good ventilation by spacing some gap (about 10 cm).

N. B. : In case the sterilizer is located in slanted posture, disorder such as overheating, etc. may occur.

2.2 Open the door of the chamber. Lift the handle up forwards (in 90° direction), and the tightness of the door will be released. If you push the handle to the left along the breadthwise groove, the latch will be removed from the hook. If you insert the handle in the left perpendicular groove and lower it, the door will be fastened with the latch open.

2.3 Take out the contents (trays, rack etc.) of the chamber. Clean them up, replace them into the chamber and then close and lock the door. The closing and locking of the door shall be done in the reverse order of opening.

2.4 Plug the power cord in the outlet of rated voltage.

N. B. : The sterilizer should not be connected to power outlet together with other electrical appliances. The sterilizer should be grounded and extension power cord line should not be used.

2.5 Open the reservoir fill cover on the cabinet, fill in distilled water or clean soft water up to the full level and then put the cover. As for the reservoir capacity, refer to 「TABLE 1-1. SPECIFICATIONS」.

N. B. : ① Using hard water may shorten the durability of the equipment.
② When filling water in the reservoir, put a container under the overflow outlet so that it may receive overflowing water. In case the water is spilt, clean it off immediately.
③ Water in the reservoir shall be replenished before pressing the START/STOP key.

2.6 Turn the POWER switch on. The SELECT key indicator lamp will be lit and the initial program value (121°C/30 min) will be displayed. And the reservoir level LED and READY indicator lamp will be lit.

2.7 The water level of the reservoir will be indicated in the following 5 steps:

Step 1: LED 1 (E: low level) will blink.
Step 2: LED 1 (E: low level) will be lit.
Step 3: LED 1 and 2 will be lit.
Step 4: LED 1, 2 and 3 will be lit.
Step 5: LED 1, 2, 3 and 4 will all be lit.

2.8. Now everything is ready to use the sterilizer. If you don't have to use the sterilizer continuously, turn the POWER switch off.

NOTE : Water in the reservoir tank may be contaminated due to repeated use. Replace the used water with clean water daily.

3. OPERATION

The sterilizer enables to sterilize instruments, plastics, rubbers, textiles, glasses and liquids in wrapped or unwrapped.

The sterilizer should be used after preheating and checking condition of the equipment by operating without loads at first the day. When more than three hours is passed after last use, preheat in the same manner and use the sterilizer.

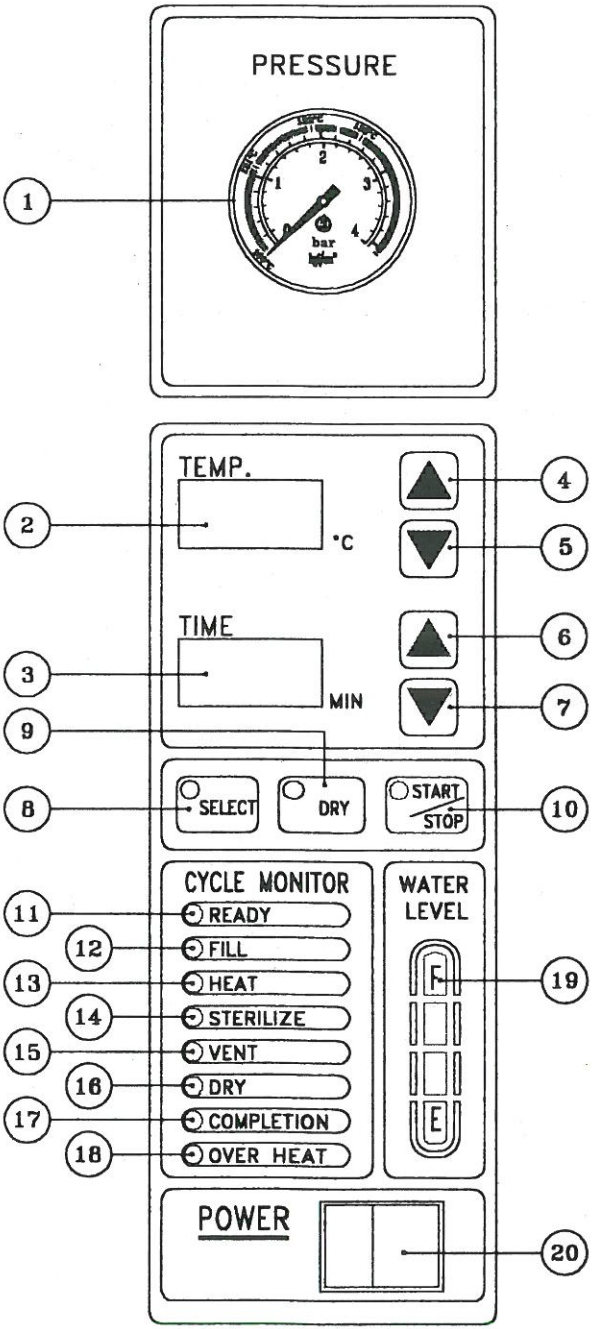
N. B. : In using this sterilizer, explosive or toxic material, and other substance which may cause deterioration, discoloration, transformation or malfunction in the heat and moisture should not be sterilized. Appling of the goods whose characteristic to heat and moisture is not identified should be made by contacting the manufacturer of that substance.

NOTE : ① Sterilization is full-automatically processed from water filling, heating, sterilizing, exhaust and drying to completion. Open the door
② If the door is not locked, it does not run.
③ In case there takes place an abnormality during cycles, it automatically stops the cycle by self-diagnosis function, and the chamber pressure drops down to the atmospheric pressure.
④ Once the cycle stops, loads should be reprocessed.

3.1 Sterilizing Wrapped and Unwrapped Goods

1. Turn the POWER switch on. The typical cycle program (121°C/30min) and the reservoir level will be displayed.

NOTE : In case the reservoir level has dropped down to step 2 or below, Alarm [Err 1] will be given. Press the START/STOP key and fill in water.



① Pressure Gauge
② Temperature Display
③ Time Display
④ Temp. UP Key
⑤ Temp. DOWN Key
⑥ Time UP Key
⑦ Time DOWN Key
⑧ Select Key
⑨ Dry Key
⑩ Start/Stop Key
⑪ Ready Indicator
⑫ Filling Indicator
⑬ Heating Indicator
⑭ Sterilizing Indicator
⑮ Venting Indicator
⑯ Drying Indicator
⑰ Completion Indicator
⑱ Overheat Indicator
⑲ Water Level Indicator
⑳ Power Switch

FIG. 3-1. CONTROL PANEL

2. Set the sterilization temperature and time.

A. When you want to select the typical cycle program out of 「121°C/30min」, 「132°C/5min」 and 「132°C/15min」, set one with the SELECT key by referring to the following table. Whenever pressing the SELECT key, the program is changed and set.

TABLE 3-1. TYPICAL CYCLE PROGRAM

L O A D S	TYPE	EXPOSURE PROGRAM VALUE		DRY TIME (min)
		TEMP (℃)	TIME (min)	
Fabric, Rubber and Plastic Products	Wrapped	121	30	30
Instruments	Unwrapped	132	5	-
Instrument Sets	Wrapped	132	15	30

B. Sterilization temperature/time will be set arbitrarily by using the temperature up/down(▲, ▼) key and the time up/down(▲, ▼) key. When pressing up(▲) key, temperature rises in 1℃ increments and time in 1 min increments. When pressing down(▼) key, the set values drops in the same increments. As for the sterilization temperature/time setting, refer to 「 Appendix I Recommended Exposure Time 」 .

3. Set the drying phase. In case drying of the wrapped fabric pack or instrument set is required, set as follows:

A. Typical Dry Time: Press the DRY key once, and the drying phase will be set. The dry time is 30 minutes. Before the drying phase begins, it is possible to set or dissolve at any phase.

B. Arbitrary Dry Time: In case more or less than 30 minutes drying is required, set in the following manner:

① Press the DRY key twice. The DRY key lamp will blink, the [TEMP] LED will display 0(zero) and the [TIME] LED will display 30 minutes.

② Set desired Dry Time with the time up/down(▲, ▼) key.

③ Press the DRY key once again. The DRY key lamp will be lit back, and the Dry Time setting will be completed displaying [TEMP] and [TIME] LED.

4. Load the sterilization materials and lock the door. The READY lamp will be lit. It means that everything is ready to begin the sterilization cycles.

NOTE : Unless the door is locked, the sterilizer does not run.

5. Press the START/STOP key, and it will begin cycle. Cycle is full automatically proceeded in the order of FILLING, HEATING, STERILIZING, EXHAUST, DRYING and COMPLETE as follows:

WARNING
1. During operation of the sterilizer, the POWER switch should not be OFF.
2. During operation of the sterilizer, the door should not be opened.
3. During operation of the sterilizer, the reservoir should not added water.

N. B. : During the operation of the sterilizer, if you have to turn the POWER switch off, opening the door or replenishment water in the reservoir, you should press the START/STOP key first to stop the cycle.

NOTE : After performing water FILLING, if the power is disconnected or the cycle is suspended under the condition not finishing HEATING, that is, under the condition that there is water in the chamber and the pressure is lower than 1 kgf/cm^2, the water in the chamber will not be discharged into reservoir so you should open the door, drain out the water remaining in the chamber perfectly and operate the cycle again.

A. FILLING: If you press the START/STOP key, the fill valve gets open, and the water in the reservoir will enter the chamber through the water line. The filling indicator lamp blinks. When a measured volume of water fills into the chamber by the control system, water valve closes and the phase of the FILLING will be finished. In normal state, filling is completed within 2 minutes. When it is successively used, filling time may be a little delayed.

NOTE : In case the filling time is 5 minutes delayed due to some trouble, Alarm [Err 5] will be given. In such case, if you press the START/STOP key, the audible signal stops and the sterilizer returns to the original state. The cause of exceeding filling time should be clarified.

NOTE : After performing the FILLING, if LED of the Step 1(E: low level) blinks, you should replenish with water in the reservoir before pressing the START/STOP key of next cycle, after completion of current cycle. Replenishing water in the reservoir during operation of the sterilizer especially during the FILLING or EXHAUST, water level measuring at the reservoir of the controller cannot be performed accurately and the water of the reservoir may overflows in the EXHAUST, after STERILIZE.

B. HEATING: When chamber fill has been completed, it proceeds to the heating phase. [TEMP] LED indicates the actual temperature, and the heating indicator lamp blinks.

NOTE : In case the heating time exceeds 60 minutes for some reason, alarm [Err 6] will be given, it will stop cycle and the chamber will be exhausted. In such case, if you press the START/STOP key, the audible signal stops, and the control panel returns to the original state. If the chamber is cooled, the cause of exceeding heating time shall be clarified and repair and maintenance shall be made. In normal state, required heating time is 20 to 30 minutes for the first operation (cold water) and 15 to 20 minutes for successive operation (hot water).

C. STERILIZING: When the preset temperature is reached, it proceeds to the sterilization phase. The sterilization indicator lamp blinks, and the [TEMP] LED will maintain the setting with an allowance of +1°C and -0°C. As the sterilization begins, the [TIME] LED displays the remaining sterilization time in one minute decrements.

NOTE : In case the sterilization temperature exceeds the setting by 4°C or more or drops 4°C or more than the setting, it will stop cycle and exhaust with Alarm [Err 4]. If you press the START/STOP key, the audible signal will stop and the sterilizer will return to the original state.

NOTE : If the heater is overheated during the heating phase or the sterilization phase, Alarm [Err 2] appears. The sterilizer will stop cycle and exhaust. If you press the START/STOP key, the audible signal will stop, and when the chamber has been cooled, the control panel will automatically return to the original state. Problems should be checked and repaired before using further.

D. EXHAUST: When the sterilization phase is completed, it proceeds to the exhaust phase. With the EXHAUST lamp blinking, the solenoid valve will get open and the steam and remaining water of the chamber will be discharged to the reservoir. When the [TEMP] LED display 107℃ (0.3bar), the exhaust will terminates.

E. DRYING: When the DRY key is pressed, the sterilizer carries out the drying phase. The drying indicator lamp blinks and the audible signal buzzes for 10 seconds at an interval of 0.1 second. Leave the door 20~30 mm open. The [TEMP] LED continues to maintain the actual temperature during the process, and the [TIME] LED displays the remaining time out of the setting.

F. COMPLETION: ① In case the drying phase has not been set: When the EXHAUST phase has been finished, the completion lamp is lit. The [TEMP] LED displays 107°C, the [TIME] LED displays 'End' and the audible signal buzzes for 30 seconds at an interval of 0.1 second. When the door is opened, the control panel will return to the original state. ② In case the drying phase has been set: After the drying phase, the completion indicator lamp is lit. The [TEMP] LED displays the actual temperature, the [TIME] LED displays 'End', and the audible signal buzzes for 30 seconds at an interval of 0.1 second. If you press the START/STOP key, the audible signal stops (when buzzing). If you open the door, the control panel returns to the original state.

G. Take out the sterilization goods and turn the POWER switch off if there is left nothing to sterilize.

3.2 Sterilizing Liquids

Liquid is principally sterilized in the same manner as unwrapped goods. However, particular attention should be paid to the following:

1. Set the sterilization temperature to 121°C, and set time to 20 minutes, 25 minutes, 30 minutes or 40 minutes depending on the capacity of bottle. (Refer to APPENDIX I 「Recommended Exposure Time」.) It's not required to set the drying phase.

2. Capacity of the liquid to be sterilized should not exceed 70% of the bottle capacity.

3. Use only vented closures. Do not use screw cap or rubber stopper. A loose plastic or paper tube cap or cotton ball may be used.

4. Use Type I borosilicate glass bottle. Do not use ordinary glass bottle or container not manufactured for sterilization purpose.

5. After the sterilization cycle is completed, do not open the door full suddenly, but leave it 20~30 mm open. Cool it down for about 10 minutes and then take out the sterilized materials.

6. Do not shake the hot bottle. If you move a bottle where liquid is boiling, the bottle may be burst off.

NOTE : Liquid containing chlorides may rust the chamber. It's recommendable to avoid sterilizing such liquid. In case solution containing chlorides has been sterilized, however, you have to clean it immediately. (Refer to 5.1.)

4. TROUBLESHOOTING

During operation of the sterilizer, there may take place the following abnormalities, which can be treated as follows:

TABLE 4-1. ERRORS DETECTED BY SELF-DIAGNOSIS

CODE	CONDITION	AUTOMATICALLY	MANUALLY
Err 1	Reservoir water level has fallen below step 2.	ALARM: Err code display and audible signal sound.	Press START/STOP key and fill in reservoir.
Err 2	Overheated during cycle.	Aborts cycle and vents chamber. ALARM: Err code display and audible signal sound.	Press START/STOP key and remedy after cooling.
Err 3	Latch unlocked during cycle.	Aborts cycle and vents chamber. ALARM: Err code display and audible signal sound.	Press START/STOP key and adjust the door switch. Resume cycle.
Err 4	Chamber temperature has risen 4℃ or more fallen 4℃ or more than setting.	Aborts cycle and vents chamber. ALARM: Err code display and audible signal sound.	Press START/STOP key and remedy after cooling.
Err 5	Filling time has exceeded 5 min.	Aborts cycle and vents chamber. ALARM: Err code display and audible signal sound.	Press START/STOP key and remedy after cooling.
Err 6	Heating time has exceeded 60 min.	Aborts cycle and vents chamber. ALARM: Err code display and audible signal sound.	Press START/STOP key and remedy after cooling.

TABLE 4-2. TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
1. Control panel does not display, when POWER switch is pressed.	① No power to unit. ② Defective circuit breaker. ③ Defective power switch. ④ Defective PCB. ⑤ PCB connector has gone loose.	① Check plugging cord. ② Replace circuit breaker. ③ Check POWER switch. ④ Request A/S. ⑤ Correct connection PCB cable.
2. When reservoir water level is above step 2, alarm [Err 1].	① Malfunction of reservoir level probe. ② Defective float ball. ③ Loose of variable resistor ④ Defective control PCB.	① Request A/S. ② Check and adjust or replace float ball. ③ Tighten set screw. ④ Request A/S.
3. Unit does not respond to control key.	① Defective key. ② Defective control PCB.	① Replace key. ② Request A/S.
4. READY indicator does not light, when door is locked.	① Defective lock device. ② Defective door switch. ③ Defective READY indicator.	① Check and repair. ② Check and repair or replace. ③ Replace indicator.
5. Unit does not run, when START/STOP key is pressed.	① Defective START/STOP key. ② Door is not locked. ③ Defective door switch. ④ Defective control PCB.	① Check and repair key. ② Lock door. ③ Check and adjust switch. ④ Request A/S.
6. Chamber is not filled properly, when START/STOP key is pressed. -Alarm [Err 5]-	① Water tubing clogged. ② Defective fill valve. ③ Incorrect control PCB. ④ Fill filter clogged. ⑤ Unit is slanted. ⑥ Chamber does not vent air.	① Clean tubing. ② Check and clean valve. ③ Request A/S. ④ Clean fill filter. ⑤ Adjust unit level. ⑥ Check and clean valve.

(continued)

PROBLEM	POSSIBLE CAUSE	REMEDY
7. Unit is not heated. -Alarm [Err 6]-	① Defective heater. ② Defective control PCB. ③ Defective temperature probe. ④ Low voltage.	① Replace heater. ② Request A/S. ③ Request A/S. ④ Check line voltage.
8. A temperature discrepancy exceeds the allowable (±4℃). -Alarm [Err 4]-	① Defective steam trap. ② Defective heater. ③ Defective control PCB. ④ Defective temperature probe. ⑤ Defective vent valve. ⑥ Tubing leaks.	① Clean and repair. ② Check and replace. ③ Request A/S. ④ Request A/S. ⑤ Check and clean valve. ⑥ Repair tubing.
9. Chamber is overheated. -Alarm [Err 2]-	① Insufficient filling ② Defective temperature probe. ③ Defective control for heater.	① Refer to PROBLEM 6. ② Request A/S. ③ Request A/S.
10. Chamber pressure does not rised during cycle.	① Defective vent valve. ② Defective steam trap. ③ Defective door gasket. ④ Tubing leaks.	① Check and clean valve. ② Check and clean trap. ③ Replace gasket. ④ Repair tubing.
11. Unit does not exhaust.	① Defective exhaust valve. ② Defective control PCB. ③ Tubing clogged.	① Check and clean valve ② Request A/S. ③ Clean tubing.
12. Loads are not dried.	① Defective heater. ② Insufficient dry time. ③ Door is not opened during drying.	① Check and replace. ② Extend dry time. ③ Open door a little during drying.
13. Loads are not sterilized.	① Insufficient sterilizing time or temperature. ② Insufficient fill. ③ Defective steam trap.	① Reset temperature/time. ② Refer to PROBLEM 6. above. ③ Check and clean trap.

5. MAINTENANCE

5.1 Preventive Maintenance

1. Before every use, check and maintain as follows:

   A. Check if it's clean, damaged and well-arranged in appearance.

   B. Turn the POWER switch on, and check if all keys and lamps are in normal operation. Do not use wire brush, steel wool, abrasives or products containing chlorides.

   C. Check if the door locking system is in perfect operation and any part has become loose.

   D. Take out the chamber contents such as tray, tray cover, tray rack assembly, and clean the inside of the chamber, the heater, the door and gasket with dustcloth dipped in detergent water, rinse them with clean water and remove moisture with dry cloth. The chamber contents shall also be cleaned in the same manner.

N. B. : ① Do not use wire brush, steel wool, abrasives or products containing chlorides.

② Be sure that there is not left any debris in the chamber after cleaning.

③ Whenever some liquid with chlorides has been sterilized, clean it immediately in the foregoing manner.

2. Check and maintain in the following manner weekly

   A. Clean the reservoir. Put a water container under the drain stopper, and drain the reservoir by opening the stopper. Remove the cabinet cover, and open the reservoir top panel. Wipe out the inside of reservoir, the float ball and the steam condenser with dustcloth dipped in detergent water carefully and rinse them with clean water.

B. Check the deformity, damage or elasticity of the door gasket closely, and if defects found, replace immediately.

C. To prevent the door gasket from being stuck, clean the edge ring of the chamber with dustcloth dipped in mild detergent.

D. Try pulling the ring of the safety valve. Check repeatedly if it is freely moved and returned to the original position. Check if there is some indication of leakage or cracks, and remove dust or debris cleanly.

E. Drain filter of the chamber should be dismantled and cleaned.

5.2 Repair and Maintenance

1. Door Gasket

If there is any defect in the gasket, replace it immediately. Even though there is no particular defect, it should be replaced at least once a year. Method of replacement is as follows.

A. Remove the defective gasket, and clean the gasket groove.

B. Insert new gasket into the groove. Thrust the gasket in the groove at four points first in the same distance, and then thrust the rest in turn. Applying a bit of lubricant such as olive oil, etc. will make the work easy. Be careful so that the gasket may not be partially extended or compressed.

2. Steam Trap

In case the chamber temperature does not go up 100°C or above, or it takes much time to reach to the set temperature, it may be suspected that there are some defects in the steam trap. In such case, replace the steam trap or clean in the following manner:

A. Cool down the sterilizer and then remove the cabinet.

B. Open the reservoir top panel and remove the steam trap.

C. Grip the trap body in a vise and unscrew the cap. Then the gasket, spring, diaphragm, spacer, valve seat and seat gasket ("O" ring) will be disassembled. Clean and check closely these parts and the body. Replace defective parts. Assembling shall be made in the reverse order of disassembling.

D. Install the repaired trap and make a trial operation. If the result is not satisfactory, replace it by new one.

3. Safety Valve

If some trouble is suspected in the safety valve, check it under steam pressure. If the chamber pressure does not blow up at 2.4 bar (35 psig), replace it by a new one.

4. Solenoid Valve

This sterilizer employs 2 solenoid valves. An abnormality which takes place herein will bring about a trouble in the sterilization cycle such as FILLING, HEATING, STERILIZING and EXHAUST. If the valve operation is slow or there are disorders such as leakage or noise, disassemble the valve, and remove debris completely by cleaning the body and parts. Disassembling will be done in the following order:

A. Unscrew the nut and remove the coil housing. And the sleeve will appear.

B. Unscrew and remove the sleeve (the lower part). And the plunger (core), spring and the "O" ring will be removed.

C. Check closely and clean the valve body and parts. Defective parts should be replaced.

D. If the result of test operation is not satisfactory, replace the solenoid valve.

5. Door Locking System

The locking system allows the door to get open by turning the eccentric latch 90° with the handle. Therefore, it is a device of high safety and reliability easy to door operation. Consequently, there is little possibility that troubles take place. If necessary, disassemble in the following manner for checking, cleaning and repairing:

A. Open the door.

B. Lift the handle, and a set screw will appear on the latch.

C. Unscrew the set screw by the key wrench, and the handle will be removed.

D. Remove the latch, and the spring will be removed together.

E. There are two needle bearings in the latch. If you remove the retaining ring, it may be disassembled.

F. Check the needle bearing and if necessary replace it.

G. Assembling shall be done in the reverse order of disassembling.

APPENDIX

I. RECOMMENDED EXPOSUR TIME

Material to be Sterilized vs Minimum Time in Minutes	250°F 121℃	270°F 132℃
INSTRUMENTS- metal only, in perforated tray, unwrapped	15	3
INSTRUMENTS- metal, unwrapped, combined with sutures, tubing or other porous materials	20	10
INSTRUMENTS- metal only, in lightly covered or padded tray	20	10
INSTRUMENTS- metal, combined with other porous materials, in lightly covered or padded tray	30	15
INSTRUMENTS- wrapped in muslin -4 thicknesses- for storage	30	15
GLASSWARE- empty, inverted	15	3
DRESSINGS- wrapped in paper or muslin	30	15
DRESSINGS- loosely packed, in canisters (on sides)	30	15
SYRINGES and NEEDLES- disassembled, lumen moist, individually packaged in muslin or paper	30	15
RUBBER GLOVES- wrapped in muslin or paper	20	-
RUBBER CATHETERS, DRAINS, TUBING- lumen moist, unwrapped	20	10
RUBBER CATHETERS, DRAINS, TUBING-lumen moist, individually packaged in muslin or paper	30	15
TREATMENT TRAYS- wrapped in muslin or paper	30	-
SOLUTIONS (square-pak bottles)		
75 mℓ ~ 250 mℓ	20	-
500 mℓ ~ 1,000 mℓ	30	-
UTENSILS- on edge, unwrapped	15	3
UTENSILS- on edge, wrapped in muslin or paper	20	10

REFERENCE : Perkins, J. J. : Principles and Methods of Sterilization in Health Sciences, 2nd ed. Springfield, IL., Thomas, 1983, p. 165, 166.

Ⅱ. TECHNIQUES OF STERILIZATION

The information in this section is intended as a guide to steam sterilization techniques for the most common types of steam sterilizable articles and materials. Prior to sterilization, all materials and articles must be thoroughly cleaned. After sterilization, most goods should be stored for no longer than 30 days, depending on wrapping materials. For sterilization of articles or materials not covered in this section, contact the manufacturer of the article for the recommended procedure.

1. Principles of Steam Sterilization

Steam under pressure is the simplest and most reliable method available for sterilizing medical items in health-care facilities. Steam can be inexpensively produced and rapidly penetrates and heats a wide range of items to provide effective sterilization. Typical steam sterilization temperatures are 121℃ and 132℃.

Effective steam sterilization requires the following:

- Presence of saturated steam
- Achievement of proper temperature
- Exposure to steam for proper time

Steam sterilization relies on steam condensing on the item to be sterilized. When steam condenses, moisture and heat are transferred to the item. The presence of saturated steam assures that this transfer of heat and moisture occurs.

Removal of air from the sterilizer and items to be sterilized is absolutely essential for proper sterilization and achievement of saturated steam conditions. Air hinders the penetration of steam and protects microorganisms from the moisture in steam. Sterilizers are equipped with automatic air bleed valves. These valves remain open until air is removed from the sterilizer. Once air is removed, the valve closes to allow

pressure to build up so that the set sterilization temperature can be reached.

The importance of moisture and saturated steam is illustrated by the fact that steam sterilization occurs within a few minutes at 132℃, while sterilization requires hours at that same temperature when little or no moisture is present (i.e., dry-heat sterilization).

The presence of saturated steam can be determined by monitoring the sterilizer temperature and pressure during the sterilization phase (i.e., once unit has reached set temperature). When saturated steam conditions exist, there is correlation between temperature and pressure.

Temperature and pressure should be monitored each cycle to assure proper sterilization conditions are present. The recommended amount of water must be placed in the sterilizer and the air vent properly functioning to assure adequate air removal and achievement of saturated steam.

Selection of proper sterilization time and temperature is critical to ensure that the entire contents of the load are exposed to steam long enough to assure sterilization. The time/temperature combinations for particular loads have been thoroughly tested to give sufficient time for steam penetration. These are minimum recommendations and should be strictly followed.

Item to be wrapped should only be wapped in appropriate sterilization wraps or pouches. Fabric and hard goods packs should be placed on edge to aid in air removal and facilitate proper drying. Do not overload sterilizer. Items should be placed in the tray so that steam can surround each pack.

As a check on the overall process (i.e., pack preparation, sterilizer loading and sterilizer operation), biological indicators containing B stearothermophilus spores should be run at least weekly.

2. Cleaning of Loads

Instruments: Cleaning the instruments immediately after use is most effective. Disassemble that assembled devices and unlock that locked devices and wash with water. At this time, every debris of dirts should be removed completely. Then, wash out cleanly with warm water and an appropriate detergent and apply water-soluble instrument lubricants, specifically designed for sterilization.

Lumens: Catheter, syringe needle, and tube should be washed cleanly and remove moisture, then soak with distilled water. Pack it with moisture remained in the tube and sterilize immediately (at least within 24 hours) for achieving effective sterilization and prevention of pyrogen generation.

Textiles: Wash out cleanly immediately after use and dry completely before sterilize.

3. Wrapping Fabrics and Hard Goods

Wapping of packs, instrument sets, and other porous materials provides protection against recontamination when the items are removed from the sterilizer.

The protective wrapping also serves as protection against contact contamination in handling, guards against the entry of insects, etc., and serves as a dust filter for normal storage of sterilized goods.

Use steam-sterilization wrappers for surgical supplies to provide protection after sterilization.

NOTE : Muslin of 140 thread count is the present standard for steam sterilization. The manufacturers of other materials should show data that indicates their product is equivalent to or better than the muslin profile in steam sterilization, drying and sterility maintenance.

Use of freshly laundered 140 thread count muslin (or equivalent) helps prevent superheating and provides longer life of the textiles. You may also use nonwoven wrap, self-seal and heat-seal pouches.

All fabric packs should be placed on edge, and arranged in chamber to allow for maximum exposure (i.e., minimal resistance for steam passage through the load.)

Also place utensils and treatment trays on edge so they will be sterilized and dried properly.

Instrument sets should be placed flat in tray having perforated bottom (or equivalent).

When processing mixed loads combining fabrics and hard goods, place the hard goods on the lower tray or rack. This prevents wetting of muslin packs from condensate dripping from hard goods load.

Remove any caps from and invert empty jars, canisters and all other nonporous containers to facilitate sterilization and drying.

N. B. : DO NOT OVERLOAD STERILIZER. Allow for steam penetration between packs. Avoid contact of load components with the walls of the chamber.

4. Avoiding Wet Packs

A major factor governing the sterility of supplies is a "state of dryness." Wet materials may transmit bacteria, therefore a "state of wetness" could compromise the sterility of processed packs and instruments.

No single factor stands out as the primary cause of wet packs, but rather several factors should be considered. Wet pack conditions occur in various:

- types of loads (i.e., instrument sets, utensil sets, textile packs, and steam-sterilized plastic, paper, or all-plastic peel pouches).

- types and sizes of wrappers (i.e., reusable textiles of all thread counts, disposable cellulose-based, and disposable polypropylene-based).
- pack preparation and sterilizer loading techniques.

Following are some guidelines for evaluating packs for acceptable drying.

① External droplets or visible moisture on the exterior of the pack, or on the tape, are unacceptable unless that wrap is completely impermeable to water (e.g., plastic film).

② Water droplets on the interior of a wrap (unless it is completely water impermeable), or on the items within the pack are unacceptable.

③ A pack is unacceptable if the pack is damp or wet when opened for use. A general guideline is that the pack be completely dry after cooling at room temperature (i.e., 21℃ and 50% relative humidity) for a minimum of one hour following removal from the sterilizer. (If the room temperature and relative humidity vary from these recommendations, a longer drying time and increased cooling time may be necessary before the packs are handled or stored.)

These guidelines are not intended to be the final word in establishment of wet pack criteria, but serve as a basis for evaluating sterilized packs to assure an acceptable "state of dryness."

5. Sterilizing of Liquids

This sterilizer is designed to process liquids only when borosilicate flasks with vented closures are used . Sterilization of liquids in any other flask or with the use of non-vented closures requires a sterilizer specially designed for that purpose.

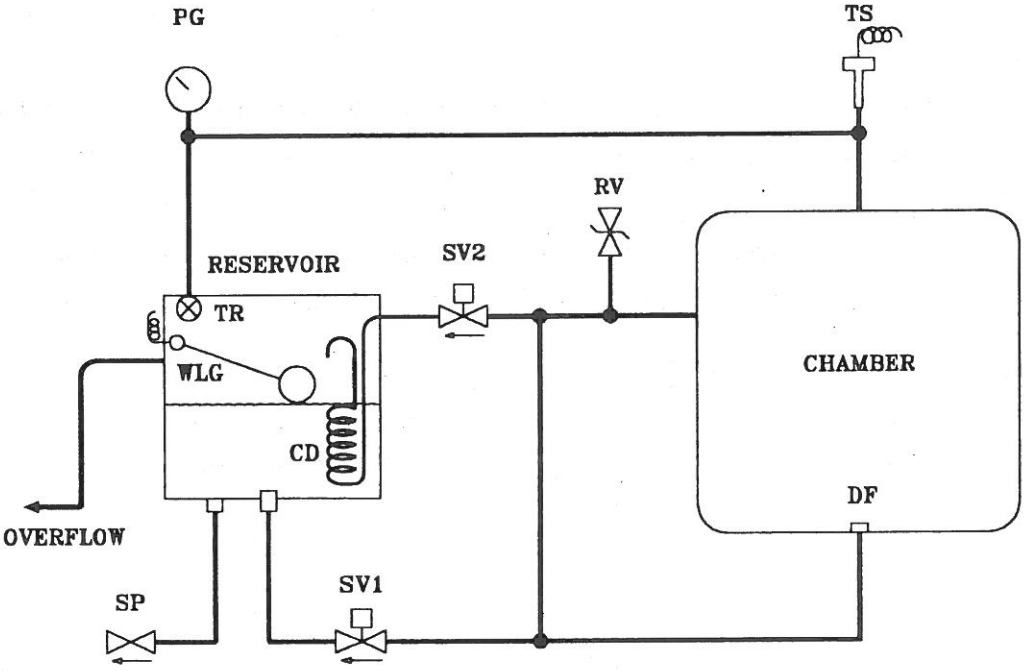
Borosilicate glass is recommended because it is a superior glass capable of containing higher pressure, of resisting thermal shock (such as cold air striking the hot glass), and of withstanding repeated handling.

Vented closures are required because, by design, they will relieve excess pressure by automatically venting a flask.

If other types of glass (such as flint glass) and non-venting (sealed) closures are used to sterilize liquids in the sterilizer, dangerous condition, capable of causing personal injury and property damage, is created. As the liquid and residual air in a sealed flask are heated, they expand and create an internal pressure greater than the external pressure of the steam. With the weaker glass, a greater potential for bursting exists. After the sterilization exposure, the chamber is exhausted slowly but it still exhausts more rapidly than the pressure within a sealed flask.

This pressure within the flask will exist until the residual air and the liquid have cooled (unlike a flask with a vented closure that relieves this excess pressure). Thus, potential exists for the flask to burst and cause personal injury or property damage.

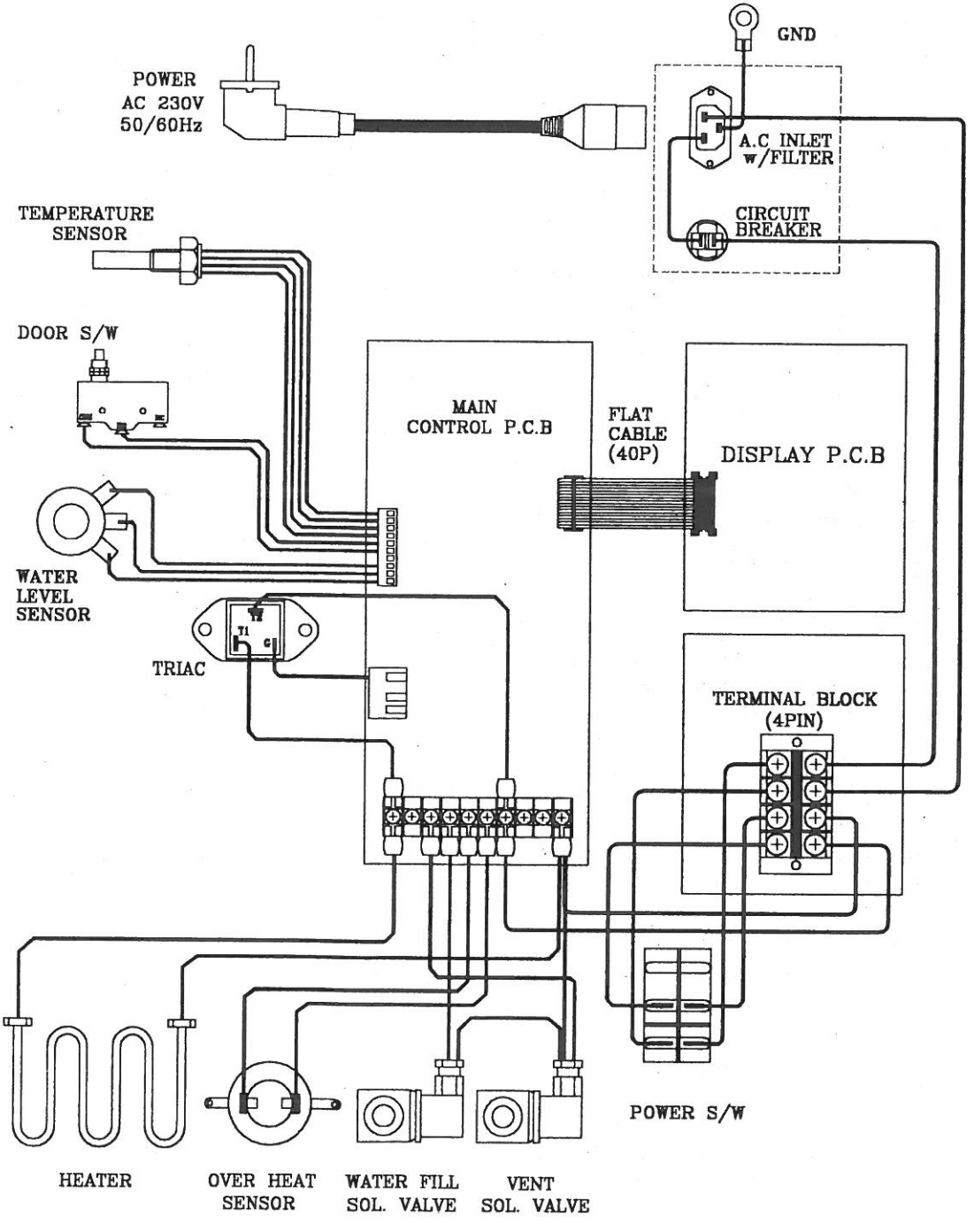
Ⅲ. PIPING SCHEMATIC



L E G E N D

SV1 : SOLENOID VALVE (Water Fill)
SV2 : SOLENOID VALVE (Vent)
RV : SAFETY VALVE
TR : STEAM TRAP
CD : CONDENSER
PG : PRESSURE GAUGE
WLG : WATER LEVEL GAUGE
TS : TEMPERATURE SENSOR
DF : DRAIN FILTER
SP : STOPPER, DRAIN

Ⅳ. WIRING DIAGRAM



V. PARTS LIST

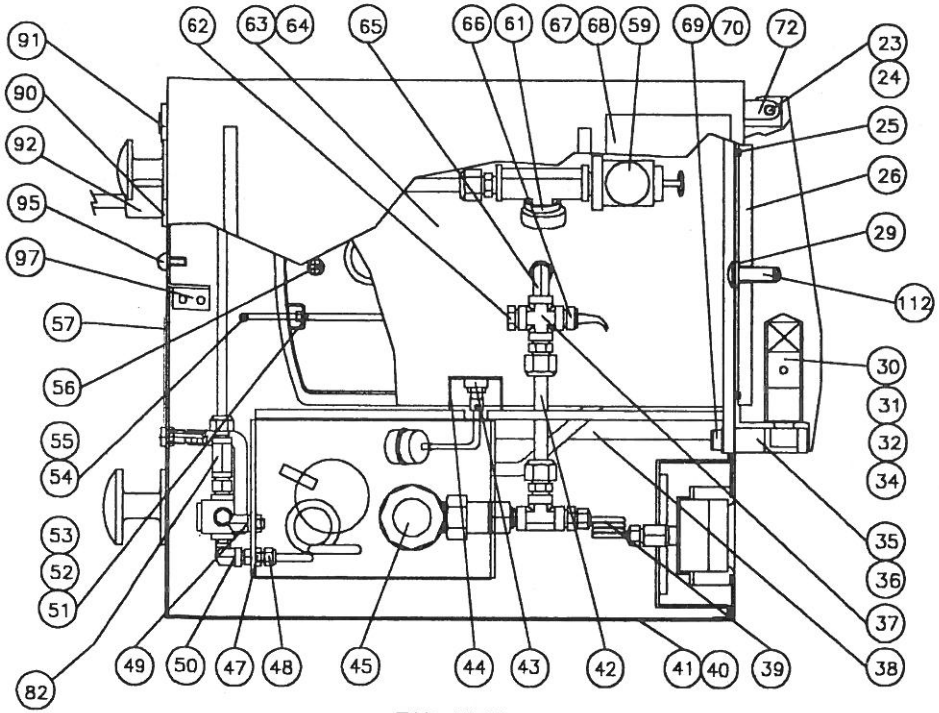
ITEM NO.	PART NO.	DESCRIPTION	QTY.		
			1212	1321	9041
1	1212-100-0010	Panel, Control PCB	1		
2	1321-200-0011	Nut, Rack	1	1	1
3	1212-100-0005 1321-100-0005 9041-100-0005	Rack Assy., Tray Rack Assy., Tray Rack Assy., Tray	1	1	1
4	1321-100-0015 9041-100-0009	Washer, Rack, ϕ55 Washer, Rack, ϕ65.5	1	1	1
5	1212-100-0006 1321-100-0006 9041-100-0006	Tray Tray Tray	2	2	2
6	1212-400-0003 1321-400-0003 9041-400-0003	Label, Autoclave, 1212 Label, Autoclave, 1321 Label, Autoclave, 9041	1	1	1
7	1321-300-0005	Handle, Carrying		2	
8	1321-100-0010 9041-100-0010	Backboard, Door Cover Backboard, Door Cover		1	1
9	1212-200-0003 1321-300-0003 9041-300-0003	Cover, Door Cover, Door Cover, Door	1	1	1
10	1321-600-0010	Screw, BH, M4x8	4	5	5
11	1212-300-0002 1321-300-0007	Handle, Stem Handle, Stem	1	1	1
12	1212-200-0011 1321-200-0017 9041-200-0017	Stem, Latch Stem, Latch Stem, Latch	1	1	1
13	1321-600-0011	Screw, Socket, Hd, M4x10	1	1	1
14	1321-300-0013	Foot	4	4	4
15	1321-600-0012	Screw, BH, M8x40	4	4	4
16	1321-600-0026	Nut, M8	4	8	8
17	1212-400-0003 9041-400-0004	Decal, Power Switch Decal, Power Switch	1		1
18	1321-300-0004 9041-300-0004	Frame, Control Panel Frame, Control Panel		1	1
19	1321-500-0077	Switch Assy., Door	1	1	1
20	1212-400-0001 1321-400-0001 9041-400-0001	Decal, Control Panel Decal, Control Panel Decal, Control Panel	1	1	1
21	1321-400-0002 9041-400-0002	Decal, Pressure Gauge Decal, Pressure Gauge		1	1
22	1321-300-0006 9041-300-0005	Cover, Hinge Cover, Hinge		1	1

ITEM NO.	PART NO.	DESCRIPTION	QTY.		
			1212	1321	9041
23	1212-200-0008 1321-200-0008 9041-200-0008	Pin, Hinge, ϕ9.5x59.5 Pin, Hinge, ϕ12x82 Pin, Hinge, ϕ19x106.5	1	1	1
24	1321-600-0005 1321-600-0004 9041-600-0004	Ring, Retaining, E, #6 Ring, Retaining, E, #8 Ring, Retaining, E, #10	1	1 2	1 2
25	1212-300-0001 1321-300-0001 9041-300-0001	Gasket, Door Gasket, Door Gasket, Door	1	1	1
26	1212-200-0007 1321-200-0007 9041-200-0007	Plate, Door Assy. Plate, Door Assy. Plate, Door Assy.	1	1	1
27	1321-200-0003 9041-200-0003	Cross Arm, Door Cross Arm, Door		1	1
28	1321-200-0009 9041-200-0009	Pin, Door Arm, ϕ15x68.5 Pin, Door Arm, ϕ19x82.5		1	1
29	1321-600-0034	Washer, Copper	1	1	1
30	1321-200-0005 9041-200-0005	Latch, Eccentric, ϕ28x89 Latch, Eccentric, ϕ32x89	1	1	1
31	1321-400-0009	Spring, Latch, ϕ26x85xϕ1	1	1	1
32	1321-600-0001 9041-600-0001	Bearing, Needle, HK2220 Bearing, Needle, HK2520	1	1	1
33	1321-600-0002 9041-600-0002	Bearing, Needle, NK12/16 Bearing, Needle, NK15/16A		1	1
34	1321-600-0003 9041-600-0003	Ring, Retaining, Snap,#22(ISTW) Ring, Retaining, Snap,#25(ISTW)	1	1	1
35	1212-200-0001 1321-200-0001 9041-200-0001	Hinge, Latching Hinge, Latching Hinge, Latching	1	1	1
36	1212-100-0012 1321-100-0013 9041-100-0013	Shim, 15x40, t1, t1.2 Shim, 20x55, t1, t1.2, t1.5 Shim, 24x75, t1, t1.2, t1.5	1	1	1
37	1321-700-0004	Cross, ¼FPT	1	1	1
38	1212-100-0004 1321-100-0004 9041-100-0004	Panel, Partition Panel, Partition Panel, Partition	1	1	1
39	1321-700-0023	Tube, Copper 3/16	A/R	A/R	A/R
40	1212-100-0007 1321-100-0007 9041-100-0007	Case Case Case	1	1	1
41	1321-600-0007	Screw, TRH, M4x10	34	34	34
42	1321-700-0025	Tube, Copper, ⅜	A/R	A/R	A/R
43	1321-500-0088	Volume Assy., Water Level	1	1	1

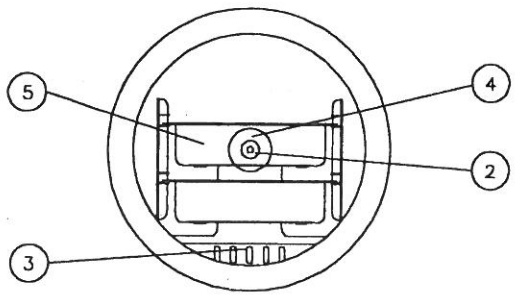
ITEM NO.	PART NO.	DESCRIPTION	QTY.		
			1212	1321	9041
44	1321-100-0018	Bracket, Volume Assy.	1	1	1
45	1321-700-0001	Trap, Steam	1	1	1
46	1321-600-0020	Screw, HH., M8x20		4	4
47	1321-200-0035	Nut, Hex., 7/16-20UNF	2	2	2
48	1321-200-0034	Nipple, ¼MPTx¼ODT (7/16-20UNF)	1	1	1
49	1321-200-0030	Elbow, Barbed Connector, Overflow	1	1	1
50	1321-700-0007	Elbow, ¼FPT	2	2	2
51	1321-100-0020	Gasket, Copper Asbestos	2	2	2
52	1212-500-0002 1321-500-0090 9041-500-0003	Heater Assy., Sheathed, 1,250W Heater Assy., Sheathed, 1,600W Heater Assy., Sheathed, 2,000W	1	1	1
53	1321-600-0042	Washer, Lock, M14	2	2	2
54	1321-600-0028	Washer, Flat, Bs, M4	4	4	4
55	1321-600-0036	Washer, Lock, M4	6	6	6
56	1321-020-0001	Strainer, Drain Assy.	1	1	1
57	1321-400-0005	Name Plate	1	1	1
58	1321-700-0013	Elbow, Flare, ½MPTx⅜ODT		1	1
59	1321-700-0002	Valve, Safety, ½, 35psi	1	1	1
60	1321-500-0089	Thermostat, Low Water	1	1	1
61	1321-700-0009	Nipple, ½MPT	1	1	1
62	1321-700-0019	Plug, ¼MPT	1	1	1
63	1321-600-0044	Insulation, t25	A/R	A/R	A/R
64	1212-020-0004 1321-020-0004 9041-020-0004	Chamber Assy., 12.7 ℓ Chamber Assy., 21.5 ℓ Chamber Assy., 40.5 ℓ	1	1	1
65	1321-700-0008	Elbow, ¼MPT	1	1	1
66	1321-500-0087	Probe Assy., Temperature	1	1	1
67	1321-600-0032	Rivet, ϕ2.4	10	10	10
68	1321-400-0004	Plate, Instruction	1	1	1
69	1212-600-0002 1321-600-0021 9041-600-0006	Screw, Socket Hd, M10x35 Screw, Socket Hd, M10x45 Screw, Socket Hd, M12x50	4	6	6
70	1321-600-0040 9041-600-0007	Washer, Lock, M10 Washer, Lock, M12	4	6	6
71	1321-100-0012 9041-100-0012	Shim, 20x70, t1, t1.2, t1.5 Shim, 24x99, t1, t1.2, t1.5		A/R	A/R

ITEM NO.	PART NO.	DESCRIPTION	QTY.		
			1212	1321	9041
72	1212-200-0002 1321-200-0002 9041-200-0002	Hinge, Door Hinge, Door Hinge, Door	1	1	1
73	1321-700-0003	Gauge, Pressure, 0~4.0 bar	1	1	1
74	1212-100-0009 1321-100-0009	Bracket, Gauge Bracket, Gauge	1	1	1
75	1321-060-0001	PCB Assy., Control	1	1	1
76	1321-060-0002	PCB Assy., Display	1	1	1
77	1321-600-0033	Support, PCB, M3x10		4	4
78	1321-500-0076	Switch, Power	1	1	1
79	1212-100-0008 1321-100-0008 9041-100-0008	Panel, Front Panel, Front Panel, Front	1	1	1
80	1212-100-0001 1321-100-0001 9041-100-0001	Chassis, Base Chassis, Base Chassis, Base	1	1	1
81	1321-700-0010	Nipple, Hex, 1/4MPT	3	3	3
82	1321-700-0006	Tee, 1/4FPT	3	3	3
83	1321-700-0015	Elbow, Flare, 1/4MPTx3/8ODT	2	2	2
84	1321-700-0011	Nipple, Hex, Hose,1/4MPT	1	1	1
85	1321-100-0021	Float Ball Assy.	1	1	1
86	1321-700-0026	Hose, Overflow, 1/4	A/R	A/R	A/R
87	1321-200-0032	Adapter, Barbed Con., Overflow	1	1	1
88	1321-020-0006	Stopper Assy., Drain	1	1	1
89	1321-500-0078	Valve, Solenoid, NC	2	2	2
90	1321-500-0093	Inlet, AC Power	1	1	1
91	1212-500-0001 1321-900-0081 9041-900-0001	Circuit Breaker, 7A Circuit Breaker, 8A Circuit Breaker, 10A	1	1	1
92	1321-500-0092	Cord Set, Power	1	1	1
93	1321-100-0014 9041-100-0014	Cover, Tray Cover, Tray		1	1
94	1321-200-0041	Nut, Drain Stopper, M20	1	1	1
95	1321-600-0008	Ground Terminal	1	1	1
96	1321-600-0038	Washer, Lock, M8	4	8	8
97	1321-100-0019	Bracket, Power Cord	1	1	1

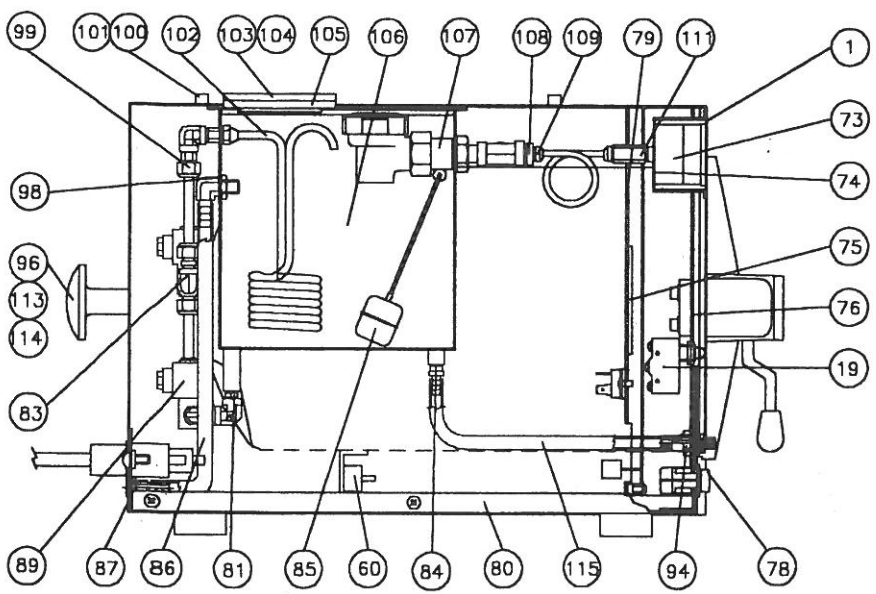
ITEM NO.	PART NO.	DESCRIPTION	QTY.		
			1212	1321	9041
98	1321-600-0031	Washer, Flat, M10, Overflow	2	2	2
99	1321-700-0012	Nipple, Flare, ¼MPTx⅜ODT	6	6	6
100	1321-600-0023	Nut, M3	12	12	12
101	1321-300-0002 9041-300-0002	Rail, Tray Rail, Tray	2	2	 2
102	1321-700-0024	Tube, Copper, ¼	A/R	A/R	A/R
103	1321-300-0009	Gasket, Reservoir Cover	1	1	1
104	1321-300-0010	Cover, Reservoir Fill	1	1	1
105	1212-100-0016 1321-100-0017	Cover, Reservoir Tank Cover, Reservoir Tank	1	 1	 1
106	1212-100-0015 1321-100-0016	Reservoir Tank Assy., 3ℓ Reservoir Tank Assy., 5ℓ	1	 1	 1
107	1321-200-0024	Nipple, Union, ¼ MPTx5/8-18UNF	1	1	1
108	1321-700-0017	Bushing, ¼MPTx⅛FPT	1	1	1
109	1321-700-0014	Nipple, Flare, ⅛MPTx3/16ODT	2	2	2
110	1321-500-0050 9041-500-0050	Backboard, Control PCB Backboard, Control PCB Backboard, Control PCB	2	 2	 2
111	1321-700-0018 9041-700-0001	Socket, ¼FPTx⅛FPTxL20 Socket, ¼FPTx⅛FPTxL60	1	1	 1
112	1212-200-0012 1321-200-0019 9041-200-0019	Screw, HH, M16xL25 Screw, HH, M16xL20 Screw, HH, M16xL30	1	 1	 1
113	1321-300-0008	Hanger, Cord Set	2	2	2
114	1321-600-0019	Screw, HH, W¼xL10	2	2	2
115	1321-700-0027	Hose, Reservoir Drain, ⅜	A/R	A/R	A/R



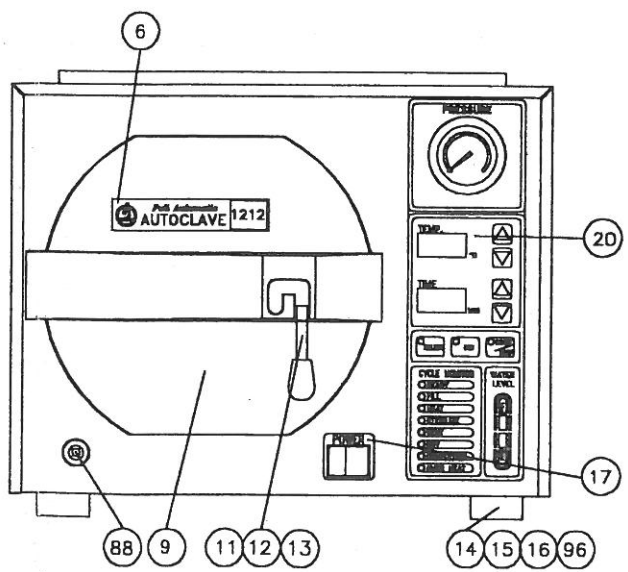
TOP VIEW



INSIDE OF CHAMBER

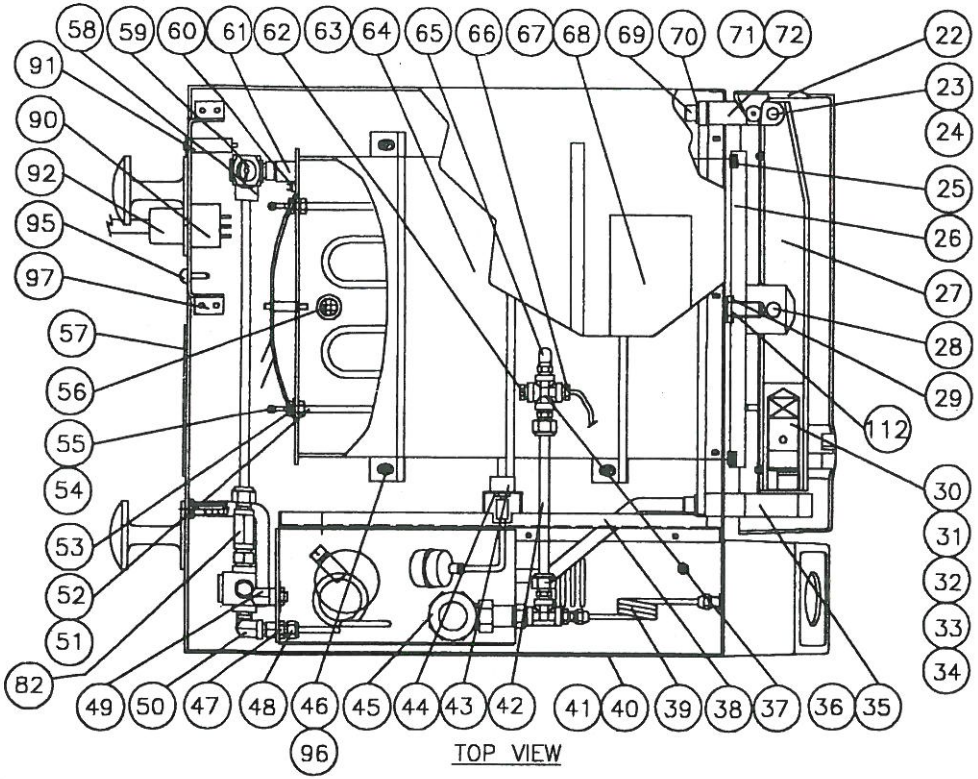


SIDE VIEW

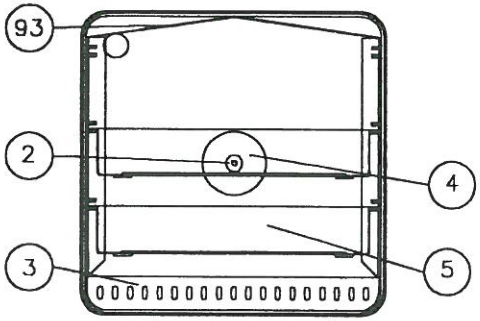


FRONT VIEW

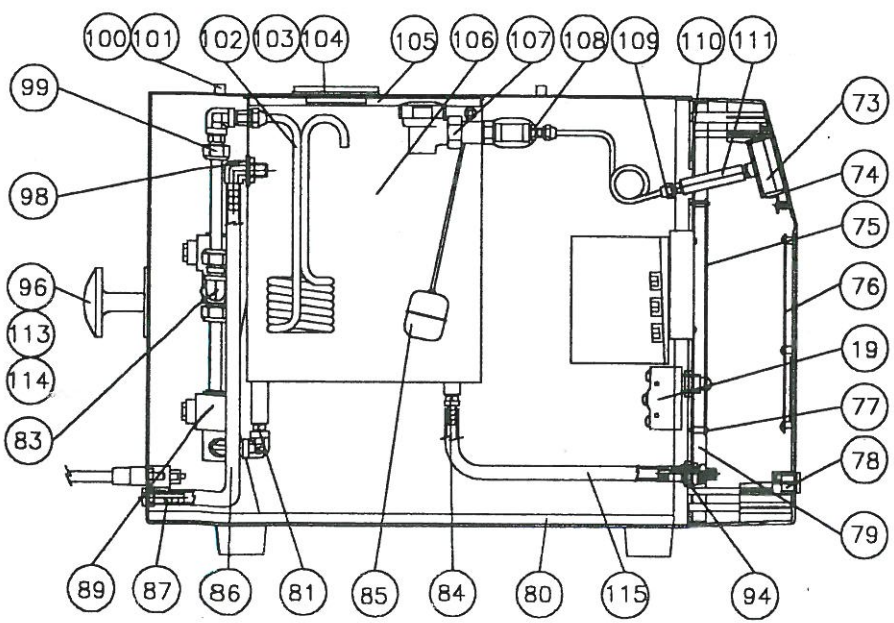
HS-1212 STEAM STERILIZER



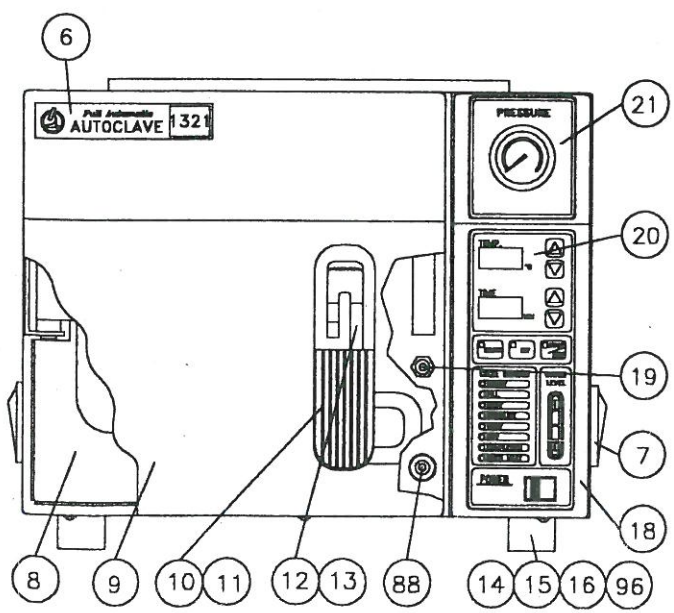
TOP VIEW



INSIDE OF CHAMBER

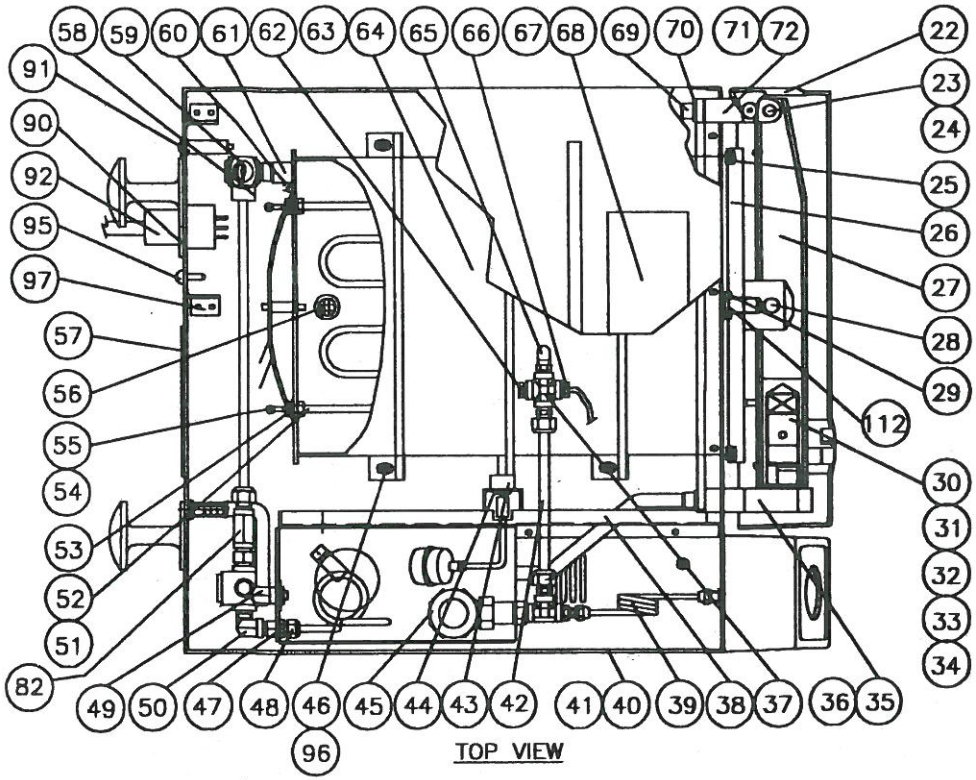


SIDE VIEW

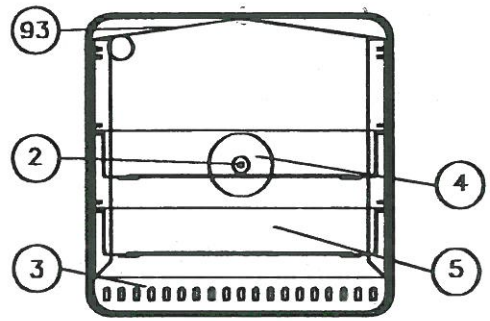


FRONT VIEW

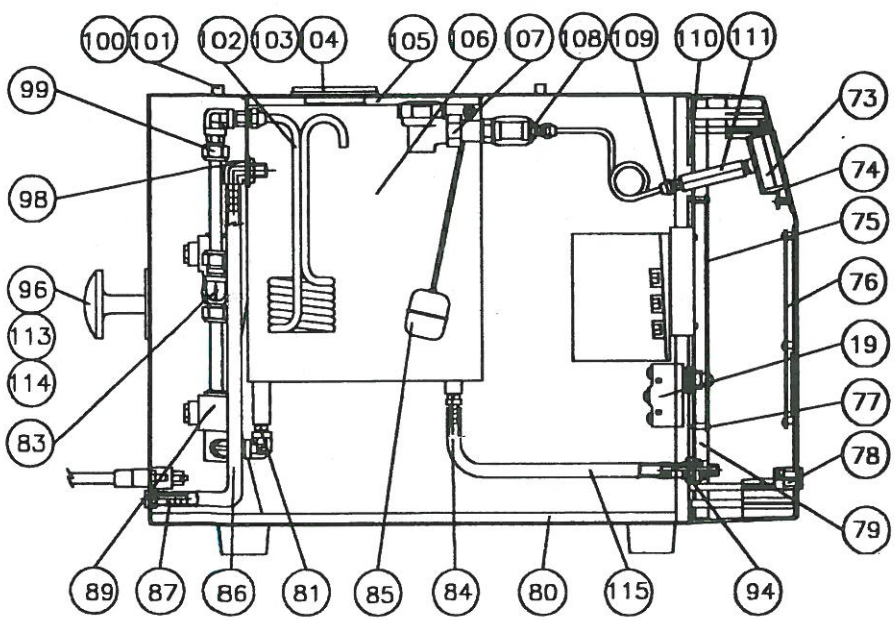
HS-1321 STEAM STERILIZER



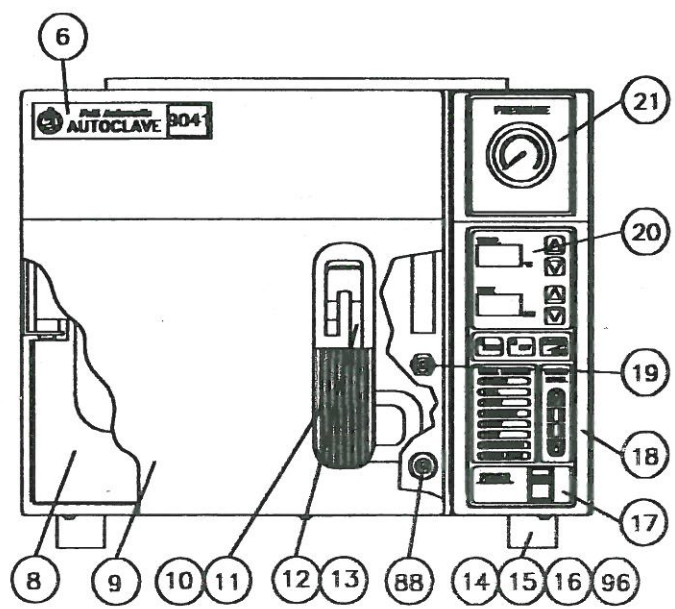
TOP VIEW



INSIDE OF CHAMBER



SIDE VIEW



FRONT VIEW

HS-9041 STEAM STERILIZER