

# HSV IIC Steam Sterilizer

## Maintenance Manual

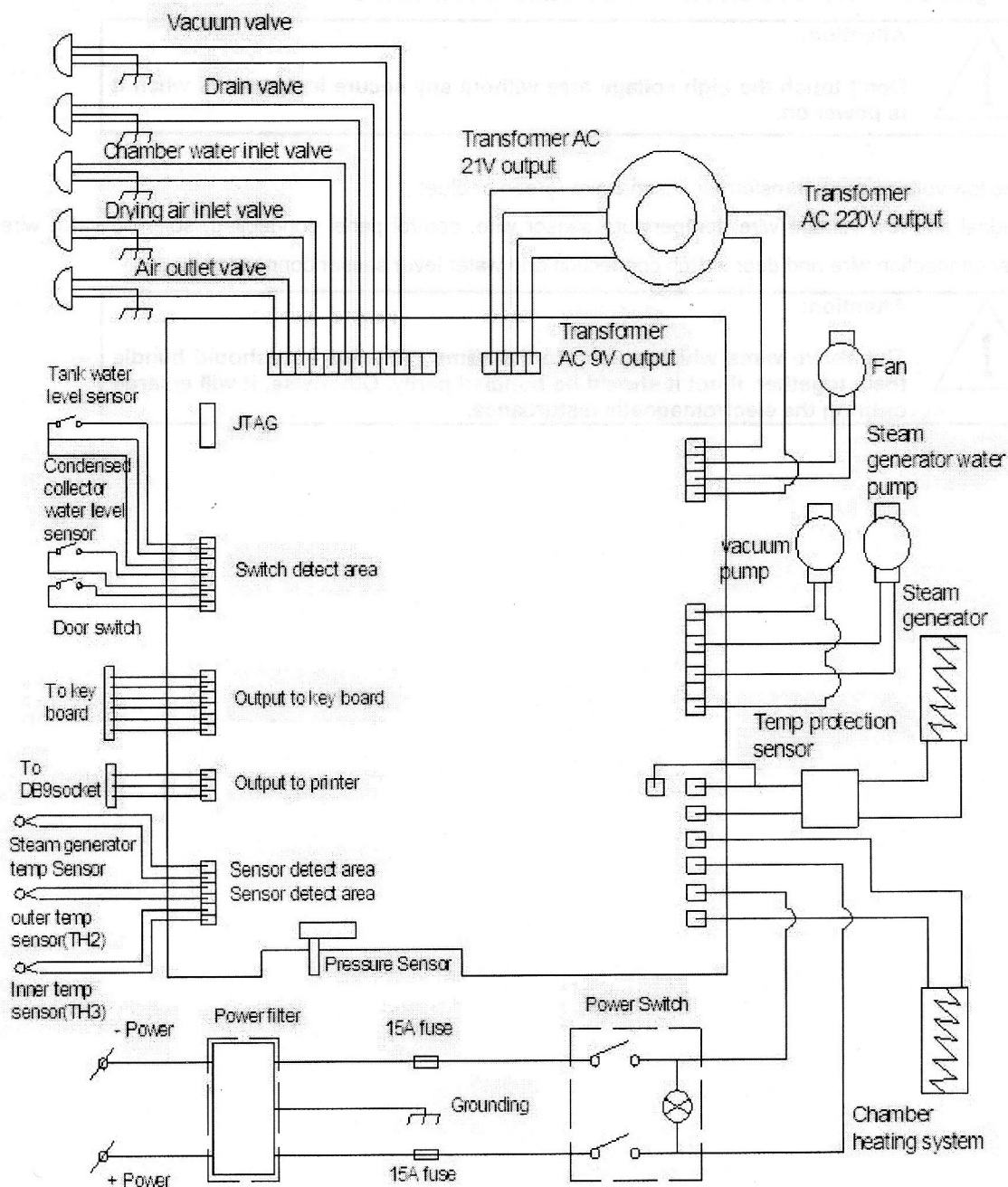
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## I . General Information

### 1. Circuit diagram



## 2. The classification of connection wire

a. The high voltage area(AC 220V): water pump wire, vacuum pump wire, power switch wire, fuse wire, steam generator wire, and transformer wire and elementary transformer wire, heating ring wire (red).



**Attention:**

**Don't touch the high voltage area without any secure instruments when it is power on.**

b. The low voltage area: transformer second wire (green or blue)

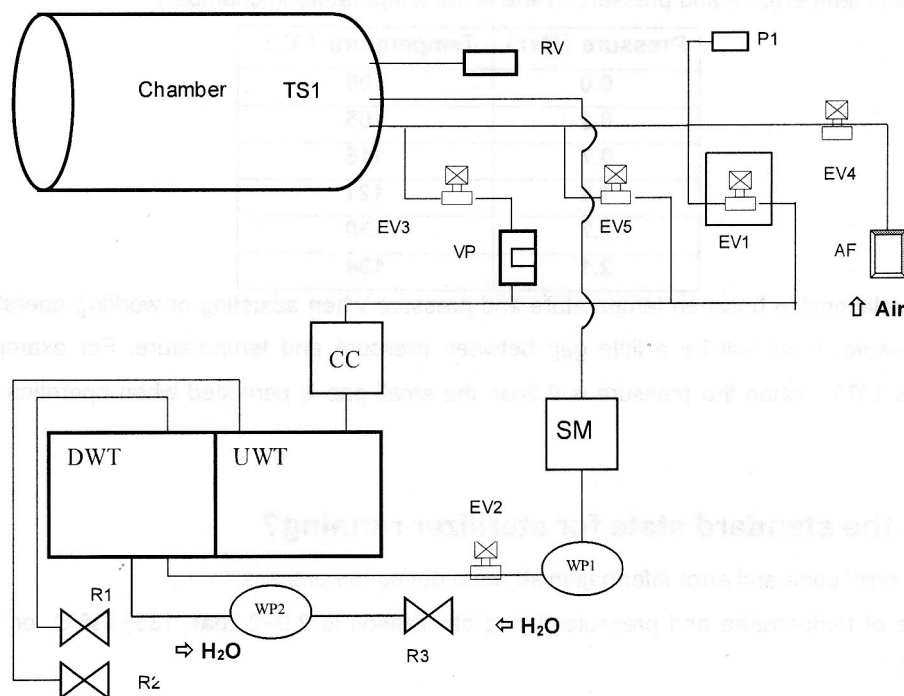
c. Signal and low voltage wire: temperature sensor wire, control panel connecting, solenoid valve wire, printer connection wire and door switch connection and water level sensor connection.



**Attention:**

**The above wires which belong to the same category, you should bundle them together, if not it should be bundled partly. Otherwise, it will enlarge or bring the electromagnetic disturbance.**

### 3. Pipeline Connection diagram



AF	Air Filter
UMT	The Used Water Tank
DWT	The Distilled Water Tank
EV1	Air Exhausting Valve
EV2	Chamber Water Supply Valve
EV3	Vacuum Valve
EV4	Air Return Valve
EV5	Water Drain Valve
P1	Pressure sensor
DS	Door security device
CC	Condensate Collector

WP1	Main Water Pump
WP2	Add Water Pump
SM	Steam Maker
VP	Vacuum Pump
RV	Relief Valve
R1	Distilled Water Drain Port
R2	Used Water Drain Port
R3	Water Adding Port
Ts1	Temperature Sensor
Ts2	Temperature Sensor

#### 4. The relationship between temperature and pressure

Saturation steam (pure steam) the temperature is fixed under the different pressure, the below is the convertible about temperature and pressure: (Here is the temperature in chamber)

Pressure (Bar)	Temperature (°C)
0.0	100
0.2	105
0.7	115
1.1	121
1.7	130
2.1	134

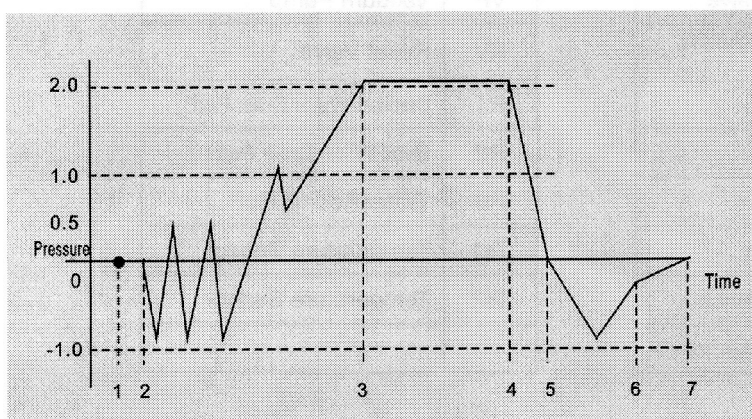
Look into the relationship between temperature and pressure when adjusting or working operation. But at the lower pressure, there will be a little gap between pressure and temperature. For example, maybe temperature is 107°C, when the pressure is 0.2bar, the small gap is permitted when operation on the low pressure.

#### 5. What is the standard state for sterilizer running?

- A. No alarm, error code and error information showing during the process.
- B. The range of temperature and pressure during sterilization is 2.0~2.2bar, 133~135°C, or 1.0~1.2bar, 120~123°C
- C. The temperature in the chamber is 120~125, or 133~136°C.
- D. The program could be finished completely and restart.

#### 6. The whole process for sterilization

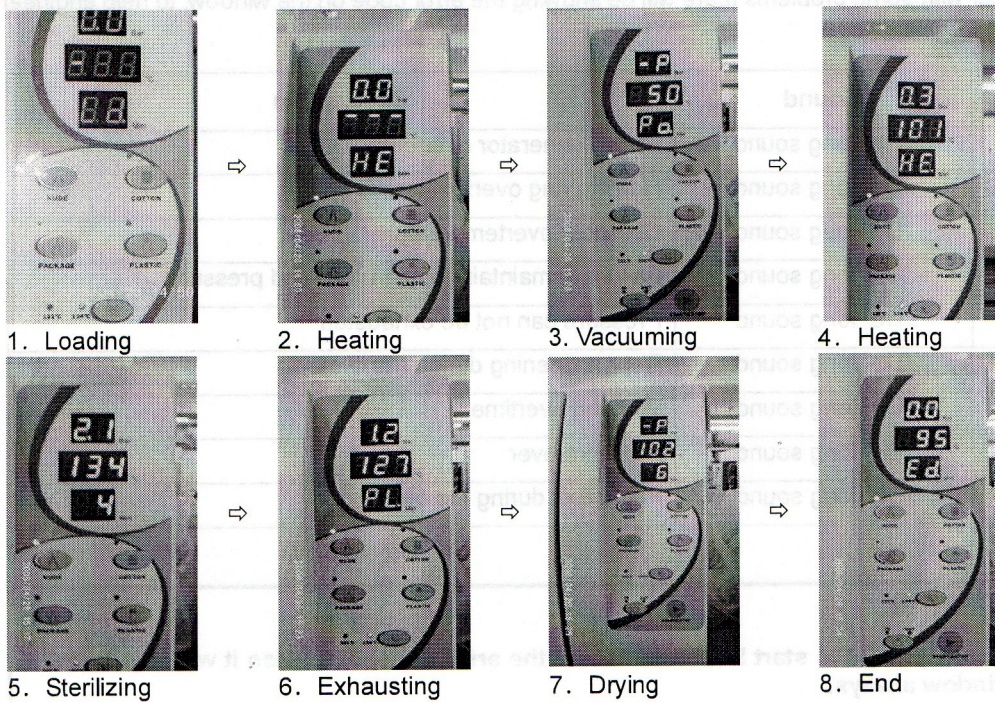
- A. The sterilization cycles drawing



- 1-2 pre-heating
- 2-3 pre-vacuum
- 3-4 sterilizing
- 4-5 air-discharging
- 5-6 drying
- 6-7 stabilizing
- 1-7 entire duration



## B. Panel showing during whole process



## 7. Something should be attention when testing or adjusting.

- The service people should be approved and have qualification.
- Some one if want to dismantle the sterilizer have to know which parts are high voltage area and be careful of that.
- Make sure the door has closed completely before start the program every time.
- If the sterilizer alarming and showing the error information or error code, please write down the error information like pressure, temperature, error code before cancel it.



## II. Error Code and the corresponding solutions

When the sterilizer with some problems there will be showing the error code on the window, to help engineer to judge what the problem is.

No.	Error Code	Sound	Description
1	E1	"De" long sound	Steam generator overtemperature
2	E2	"De" long sound	Heating ring overtemperature
3	E3	"De" long sound	Chamber overtemperature
4	E4	"De" long sound	Failure to maintain temperature and pressure
5	E5	"De" long sound	Pressure can not be exhausted
6	E6	"De" long sound	Door is opening during the cycle
7	E7	"De" long sound	Working overtime
8	E8	"De" long sound	Pressure over
9	EE	"De" long sound	Force Exit during the cycle



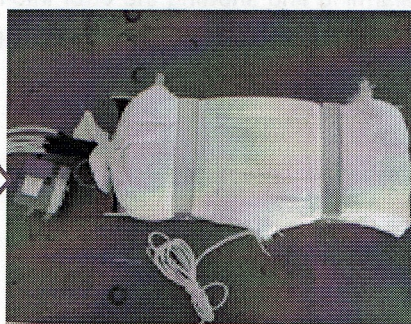
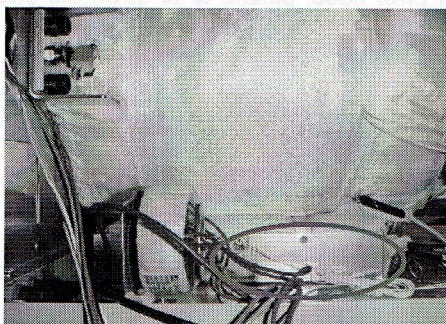
### Attention:

Please press the start button to cancel the error code, otherwise it will show on the window always.

### 1. Code E1: steam generator over-temperature

#### Description:

The steam generator is a white oblong box at the bottom of the chamber. The function of it is changing water inside the generator to steam instantly. Steam generator temperature sensor is measuring the temperature of generator. if there is a error code "E1" showing on the window, it means steam generator overtemperature.



Steam Generator

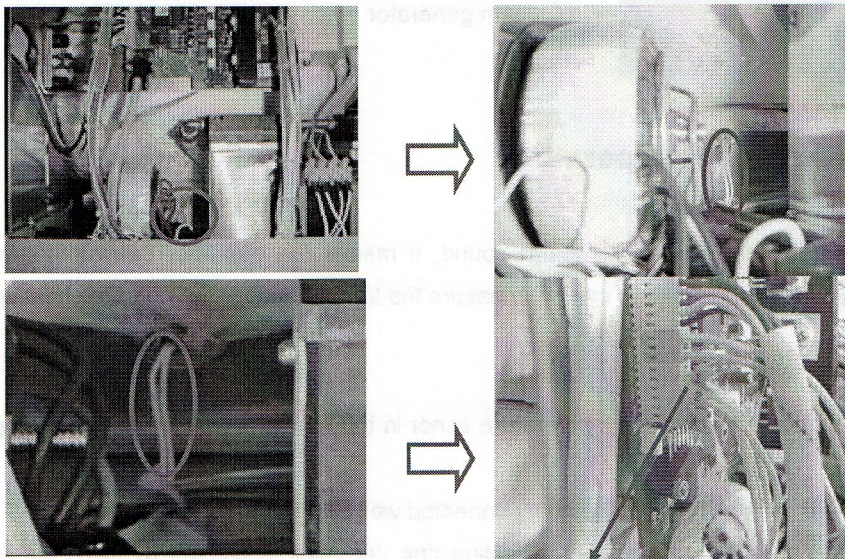


**Reasons:**

- A. The power voltage is not stable, it caused the temperature sensor in the steam generator providing wrong signal.
- B. The temperature sensor is not connected well with PCB or Steam generator.
- C. The temperature sensor is not setting into steam generator very well. It caused by fixing screw loose, or the thermal conducting silicone grease is not enough can not conduct thermal to temperature sensor very well.
- D. The temperature sensor is broken.

**Solution:**

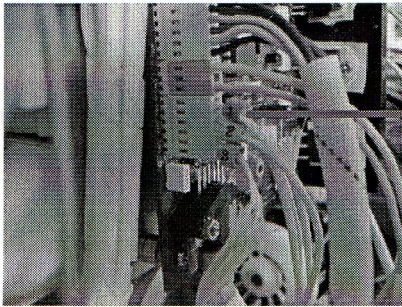
- A. Use multimeter to measure input power, to judge if the voltage is high or low intermittently. If it is stable, restart the sterilizer when it cool down enough. You can also change another power or add a manostat if it necessary.
- B. If the voltage is stable, please check every connection port on the steam generator and PCB, make sure that they are all connecting well. (Pic 1)



Pic1      Temperature Sensor (Line No.1)

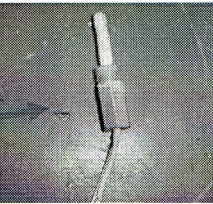
- C. Check if the temperature sensor (Line No.1) setting into the steam generator very well, spread thermal conducting silicone grease and set into the steam generator.
- D. Replace the temperature sensor (No.1 Line showing in the picture 4)





Line No.1 is the temperature sensor of steam maker

Pic 2



Line No.1 is the temperature sensor of steam generator

Pic 3

## 2. Code E2: Heating Ring overtemperature

### Description:

If the display panel showing "E2" error code with alarm sound, it means the chamber heating ring is overtemperature. It caused by temperature sensor can not measure the temperature of the chamber heating ring.

### Reasons:

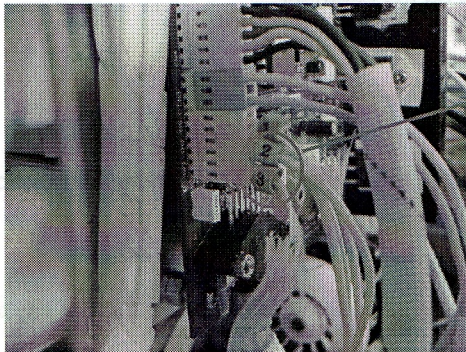
- A. The power voltage is not stable, it caused the temperature sensor in the chamber heating ring providing wrong signal.
- B. The heating ring temperature sensor (Line No.3) is not connected well with PCB or Heating ring.
- C. The temperature sensor is not setting into chamber heating ring very well. It caused by fixing screw loose, or the thermal conducting silicone grease is not enough can not conduct thermal to temperature sensor very well.
- D. The temperature sensor is broken.

### Solution:

- A. Use multimeter to measure input power, to judge if the voltage is high or low intermittently. If it is stable, restart the sterilizer when it cool down enough. You can also change another power or add a manostat if it necessary.



- B. To check every connection port with the heating ring and PCB, make sure that they are all connecting well. The temperature sensor should be touching completely with heating ring.
- C. Check if the temperature sensor (Line No.3) setting into the chamber heating ring very well, spread thermal conducting silicone grease and set into the chamber heating ring.
- D. Replace the temperature sensor (Line No.3 showing in the picture 4)



Line No.3 is the  
heating ring's  
temperature sensor

Line No.2 is the  
chamber temperature  
sensor

Pic 4

### 3. Code E3: The temperature in chamber over-temperature

#### Description:

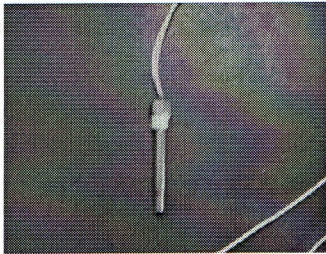
If the display panel showing "E3" error code with alarm sound, it means the chamber is overtemperature. It caused by temperature sensor can not measure the temperature of the chamber.

#### Reasons:

- A. The power voltage is not stable, it caused the temperature sensor in the chamber providing wrong signal.
- B. The chamber temperature sensor (Line No.2) is not connected well with PCB.
- C. The temperature sensor is broken.

#### Solution:

- A. Use multimeter to measure input power, to judge if the voltage is high or low intermittently. If it is stable, restart the sterilizer when it cool down enough. You can also change another power or add a manostat if it necessary.
- B. To check every connection port with the chamber and PCB, make sure that they are all connecting well. The temperature sensor should be touching completely with chamber.
- C. Replace the temperature sensor (No.2 Line showing in the picture 4)



Chamber temperature sensor



Screw on the chamber

#### 4. Code E4: Failure to maintain temperature and pressure

##### Description:

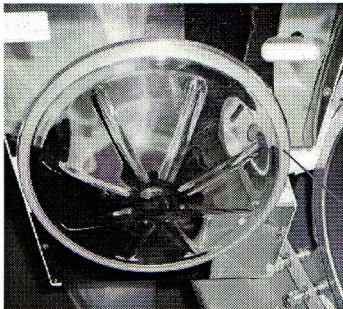
"E4" Error code is caused during the sterilization, temperature and pressure can not keep on the sterilization state, the state window showing "E4".

##### Reasons:

- A. The effect of rubber gasket is weak, the pressure in chamber push steam out due to the rubber gasket out.
- B. The efficiency of water pump is weak or it was broken.
- C. The efficiency of chamber heating ring is not enough, it limited water pump working, due to steam supply not enough, can not keep the temperature and pressure.
- D. Steam generator jammed, can not supply enough steam into chamber, can not keep temperature and pressure. It caused by user does not use the distilled water or does not use steam generator cleaning program to clean the generator termly.

##### Solution:

- A. Replace the rubber gasket, you can take it off and replace a new one, we have a spare one as attached.

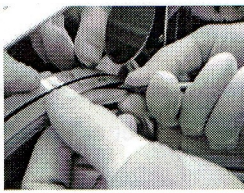


Rubber Gasket

Tool: a plain screw driver without sharp head is needed.

Disconnect the sterilizer from the power supply. Ensure that the sterilizer is cool and depressurized.

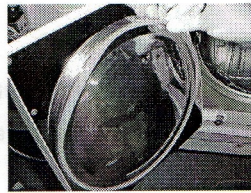




1)



2)



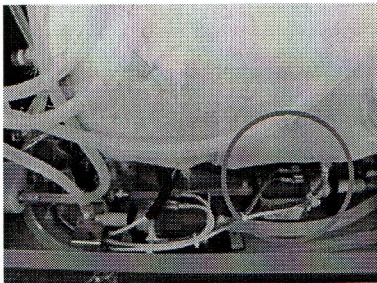
3)



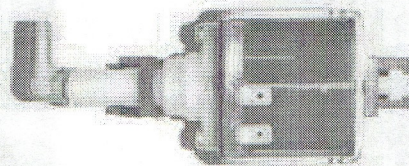
4)

- 1) Hold verge of the seal by one hand softly, and another hand should be inserted the screwdriver into the gap between gasket and door, take out the seal slowly.
- 2) Once you take out one part of the seal, you can draw out the whole seal slowly. After taking out the seal, please check and clean the groove of gasket, so does the gasket, please replace the gasket if there is some damage.
- 3) Fix the clean gasket in initial door groove. Attention: the gasket should be imbedded in the groove equably. At first, please imbed the 4 spots equably into groove when fix the gasket, and then embed the other parts. After that, press the gasket equably by hand.
- 4) The inner edge of gasket may be ectropium during embedding it in the door groove, at this time; you'd better to tight it back to the groove by using the screwdriver carefully.

- B. Replace the water pump. There are two water pumps in the sterilizer, the main water pump is connecting with steam generator.



Main Water Pump



- C. Replace the chamber heating ring.
- D. Run the steam generator cleaning program, if the it is jammed, please replace the steam generator.

## 5. Code E5: Pressure can not be exhausted

### Description:

Error code "E5" alarm is during state which pressure from 2.1bar exhaust to standard pressre 0, at limited time, the pressue can not exhuaust to 0 bar, can not into drying state, showing "E5" alarm on the panel.



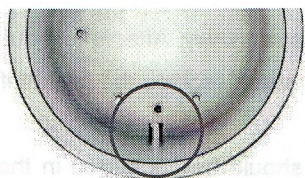
**Reasons:**

- A. The water filter in the chamber is jammed.
- B. The draining solenoid valve is jammed can not open completely. The draining solenoid valve is most possible to be jammed by long time using. Because all the steam and water in the chamber exhausting by this valve.

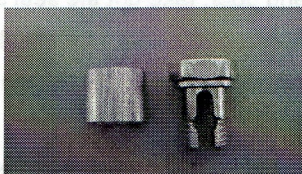
**Solution:**

- A. Clean or replace the chamber filter.

Screw out the water filter inside the chamber, wash and clean it, then to set it back.



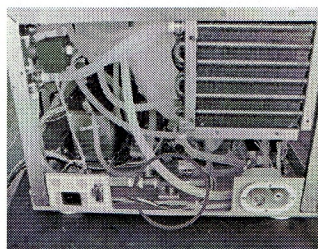
Water Filter in the Chamber



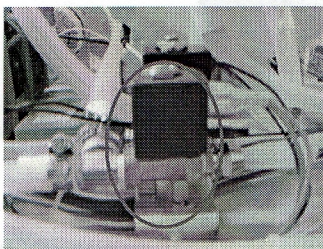
disassembly

- B. Clean or replace the draining solenoid valve.

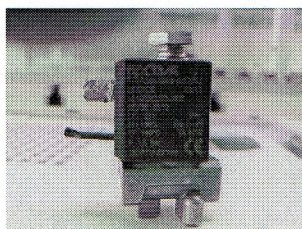
- a) Use driver screw out the screw on the back of the board, then take down the back and left board.
- b) Find the draining water solenoid valve(Green Line) at the middle of the bottom board. Remove the valve from the board.
- c) Dismantle the valve to check and clean if there was any impurity inside.
- d) Assembly the valve and set it back on the board.



Remove the board, you can see the valve at the middle of the board



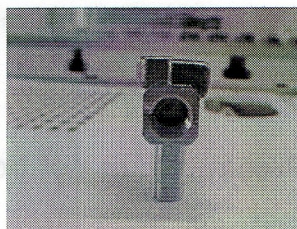
Draining Solenoid Valve(Green Line)



Draining Solenoid Valve(Green Line)



Valve Discharge



Valve Core



- e) If the vale still can not work well after cleaning, you have to replace a new one.

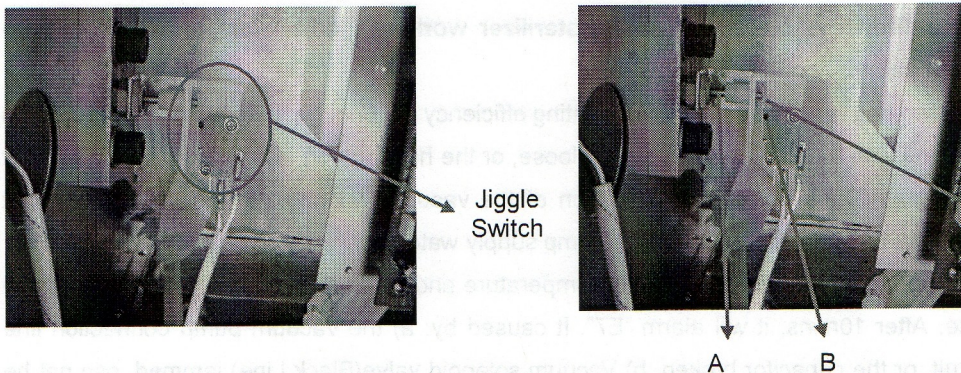
## 6. Code E6: Door is opening during the cycle

Reasons:

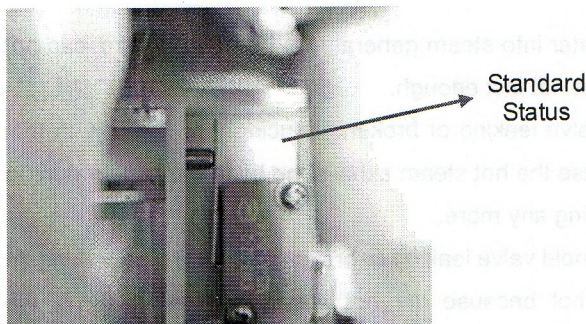
- A. The door has not closed completely, it opened by the high pressure during the program.
- B. The door jiggle switch is loose, it will be flicked by high pressure in the chamber.

Solution:

- A. You have to confirm that the door has closed completely before every time to use sterilizer.
- B. Adjusting the door jiggle switch.
  - a) You may easily understand how it works according to the following pictures: A (Mental Pole) push C (Sheet Metal) for turn on the B (switch)



Keep the autoclave in the off status, use pinchers to pull the (B) sheet metal towards the Mental Pole (A) that make sure both are tightly meets. As picture showing:



- b) If it still can not be solve, replace the jiggle switch by a new one.

**Attention:** For your safety, please do not open the door during the working processes.  
Please not close the door completely after sterilization end because 2 reasons as followed:

1. The door will not be opened by negative pressure,
2. The jiggle switch will be loose in closed state long time.

## 7. Code E7: Working overtime

### Description:

"E7" alarm is during the HE( Heating) State to sterilization state, caused by many possibilities. So it have to check all the state and information during the working process, check followed solution step by step. The standard process please check chapter I point 6.

### Reasons:

- A. The rubber gasket was dapping out or was not sealing well. In this situation, the water or steam will jet from the door crack with sound "si, si".
- B. Check the relief valve if it was locked. On the top of the relief valve there is a screw part which used for exhausting air. It caused by the relief valve screw switch loose of shaking.

**Attention: Please confirm it is closed when the sterilizer working , otherwise the steam will be exhausted from relief valve.**

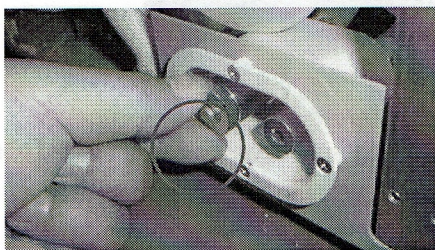
- C. The chamber heating ring is not working well or heating efficiency not enough. It because the connection between heating ring with the PCB is open circuit, loose, or the heating ring is broken. It due to can not go to vacuum program(Does not get the condition of the vacuum working), or the temperature not enough, it can not get the condition of the water pump supply water.
- D. At "PO" state, vacuum pump is not working, the temperature and pressure can not be marched during the heating state. After 10mins, it will alarm "E7". It caused by: a) the vacuum pump connection line loose, open circuit, or the capacitor broken. b) Vacuum solenoid valve(Black Line) jammed, can not be opened.
- E. The water supply solenoid valve is not opened by jammed or broken, water can not supply to steam generator.
- F. The water pump is not working well, even little water into steam generator to be made steam, can not provide enough steam into chamber. The heating is not fast enough.
- G. At the pressure rising state, air return solenoid valve leaking or broken, inducing pipe leaking. In that situation, the solenoid valve will be very hot because the hot steam exhausting by it, the temperature in chamber will stay around a value and stop increasing any more.
- H. At the pressure rising state, air Exhausting air solenoid valve leaking or broken, inducing pipe leaking. In that situation, the solenoid valve will be very hot because the hot steam exhausting by it, the temperature in chamber will stay around a value and stop increasing any more.
- I. At the pressure rising state, air Exhausting air solenoid valve leaking or broken, inducing pipe leaking. In that situation, the solenoid valve will be very hot because the hot steam exhausting by it, the temperature in chamber will stay around a value and stop increasing any more.



- J. At the pressure rising state, air Draining solenoid valve leaking or broken, inducing pipe leaking. In that situation, the solenoid valve will be very hot because the hot steam exhausting by it, the temperature in chamber will stay around a value and stop increasing any more.
- K. The temperature of steam generator is not hot enough for working, heating stick broken, or the temperature sensor is broken which can not check the right temperature of it. The generator can not get 160 degree, can not give water supply signal to water pump. In that situation, in the "HE" state, the water pump working less or stop working in a long time.
- L. The steam generator is jammed. If the customer did not use the distilled water or not use steam generator cleaning program clean the generator termly, the steam generator will be jammed very quickly. And the silica gel tube connection with water pump will be cracked, to be broken. In that situation, you will hear the sound from the tube cracking at first time, and then you restart the program some water will be draining from the bottom of the sterilizer.

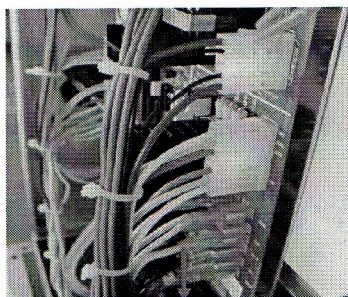
#### Solution:

- A. Rebuilt the rubber gasket, or replaced by a new one.
- B. Find the relief valve and confirm that the screw switch has been screwed clockwise on the top of the relief valve.



Relief valve at the bottom back of the sterilizer. To screw the screw switch clockwise is close, to screw counter-clockwise is open.

- C. If after more than 20mins, the sterilizer have not been into vacuuming state("Po" State), press "START/STOP" 5secs to exit cycle. Then wear the glove to touch surface inside chamber, if it is no temperature or low temperature, it means the heating ring of the chamber is broken. To check every connection with heating ring and PCB, if all connected well, please replace the heating ring.



Heating ring connect to the PCB connection port.

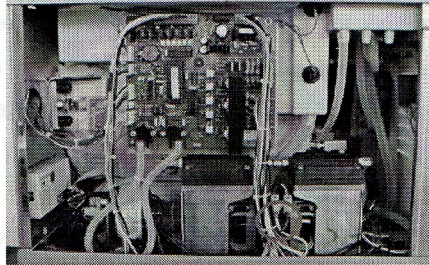


Heating ring temperature protector connection line.

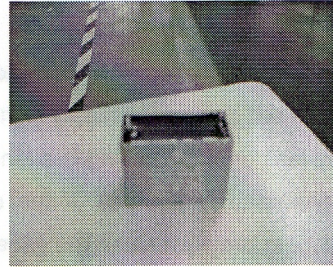


D. At vacuuming state("Po" state), the vacuum pump is not working(no sound).

- a) Check every connection line is connected well. If not work, please replace the capacitor, or replace the vacuum pump.

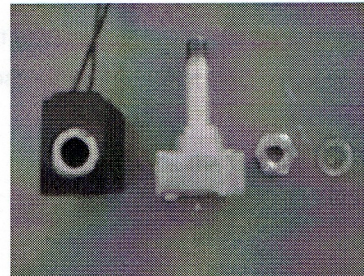


Vacuum Pump Connection Port

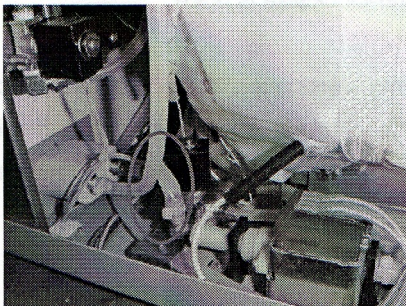


Capacitor

- b) Disconnect the vacuum solenoid valve and clean if it was jammed. If still not work, please replace by a new one.



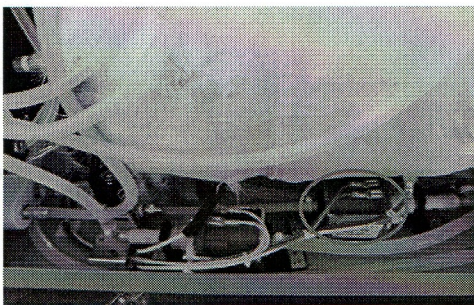
E. At heating or pressure rising state, you hear the water pump is working without water(Deviant sound "Ga, Ga"), it means the water supply solenoid valve is not opening, need to clean or replace a new one.



Remove the right board, you will see the water supply solenoid valve as picture showing.( Black Line)

F. Use multimeter to check if the water pump is open circuit, if yes, replace the water pump.





Remove the right board, you will see the water pump which near the steam generator as picture showing.

- G. Disconnect the air return solenoid valve and clean if it was jammed. If still not work, please replace by a new one.
- H. Disconnect the air exhausting solenoid valve and clean if it was jammed. If still not work, please replace by a new one.
- I. Disconnect the vacuum solenoid valve and clean if it was jammed. If still not work, please replace by a new one.
- J. Disconnect the draining solenoid valve and clean if it was jammed. If still not work, please replace by a new one.
- K. Use multimeter to measure the heating stick of steam generator. If it is open circuit, it need to replace.
- L. Replace a new steam generator and reconnect the connection port.

### III. Other malfunctions

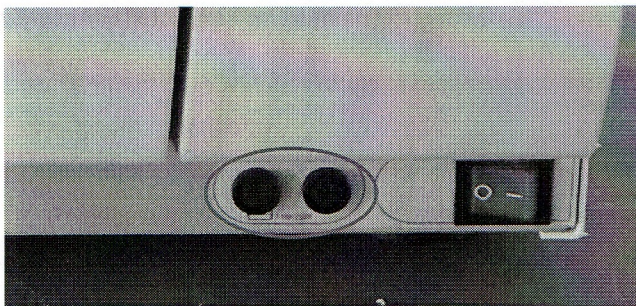
#### 1. No power inputting

##### Description:

The sterilizer no power inputting even the connect the power plug and turn on the power switch.

##### Reasons:

- A. Fuse is broken off by some protection reaction.



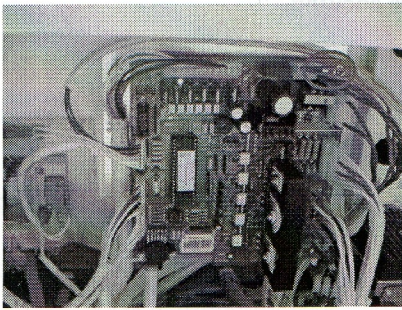
Fuse and Fuse Holder

- B. The transformer is broken.
- C. Power line can not connect completely with PCB.

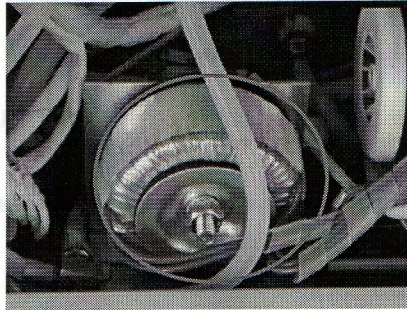


**Solution:**

- A. Check the fuse, and replace by a new one if it is broken.
- B. Connect AC230V voltage to the inputting port(Red) of the transformer and use the multimeter to check outputting voltage, 21V blue, 9V Green, If it is not and gap vey big , replace it by a new one.
- C. Check the connection port with PCB and input power. Make sure every connection port is connected completely.



The green light on PCB indicates the power



Transformer

**2. The operation panel can not display.****Description:**

Display panel is on the right, it is used for operating and display information of sterilizer. The panel can not display when turn on the power switch(the light of power switch is illumed).

**Reason:**

- A. The connection port of signal line between the operation panel with PCB is loose.
- B. The operation panel or PCB is broken.
- C. If the indication on the panel just showing unbalanced code or sign, showing and off, that mean the power supplier is not stable.

**Solution:**

- A. Change the fuse at bottom of the sterilizer.
- B. Check every connection port of operation panel and PCB, the signal line must be connected completely with each port.
- C. Replace the operation panel or PCB by a new one.
- D. Change another stable power or add a manostat and try again.

**3. Can not run the program****Description:**

Turn on the power switch, and choose the program, but can not run the program.

**Reasons:**

- A. "LD" is winking, can not run the program.
  - a) Used water tank full, "OUT" lamp is lighted.
  - b) Distilled water tank is empty, "IN" lamp is lighted.
  - c) The door is not closed completely or the jiggle switch is loose.
- B. "LD" is not winking, can not run the program.
  - a) The buttons on the panel does not work, no sound reminding, the connection from panel to PCB is not connected well.
  - b) PCB is broken.

**Solution:**

- A. "LD" is winking, can not run the program.
  - a) Drain water empty in Used water tank, "OUT" lamp is off.
  - b) Top up water distilled water tank, "IN" lamp is off.
  - c) Closed the door completely or replace the jiggle switch. (Refer the chapter II 6 point)
- B. "LD" is not winking, can not run the program.
  - a) Check the connection between display panel with PCB, to ensure connect well.
  - b) Replace the PCB.

**3. Can not open the door****Description:**

The door can not be opened after finished cycle, or can not open before next cycle.

**Reasons:**

- A. Suddenly cut the power supply. If the sterilization program stopped at the procedure of vacuum, the pressure in the chamber is negative, and the door can not be opened in that situation.
- B. Close the door a long time after finished work, and the chamber is still warm. It is a sealing space in the chamber. When the air in the chamber getting cool, it will come into being negative pressure, so you can not open the door.

**Solution:**

- A. Open the power, and press the START button for 5 seconds, it will into the "protect and exit program". For digital display it will show "EE" on the state window. In this program, you just keep trying to open until the door is opened. After you open the door, press the START button to exit the program.
- B. The relief valve can be found in the back of the autoclave. You could screw the thread in the head of the relief valve, Then you could try to open the door, if can not, adjust the thread again until it is opened. Caution, after open the door, don't forget to screw the relief valve back, otherwise it will be error in next sterilization program.

**Caution:** You'd better not to open the door when you finishing the sterilization. Because hot air in



the chamber will shrink after cool down, and it will make a negative pressure in chamber, to cause of can not open the door.

#### 4. Water lever sensor locked

##### Description:

"IN" lamp is the distilled water tank empty alarm, it need to add water.

"OUT" lamp is used water tank full alarm, it need to drain water. The alarm lamp can not indicate the right situation, even provide the wrong signal.

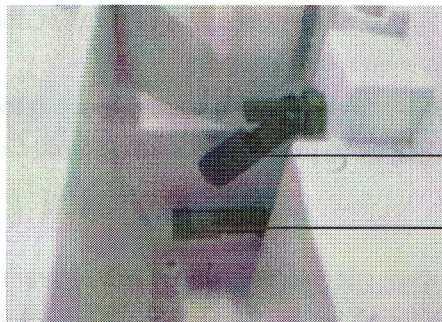
##### Reason:

Any water level sensor locked is caused by the impurity or oil. So that you'd better clean the water level sensor and water tank termly.

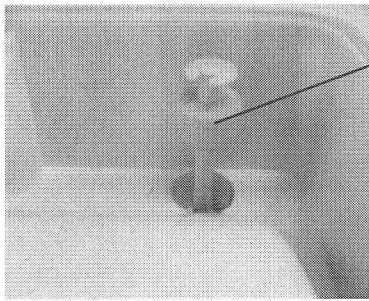
- A. The water sensor connection line is open circuit.
- B. "IN" lamp keep light or keep dark, the high or low water level sensor(distilled water tank) broken.
- C. "OUT" lamp keep light or keep dark, float water level sensor(used water tank) broken.
- D. The "IN", "OUT" lamp broken.

##### Solution:

- A. Check every water level sensor connection line is connected water.
- B. Distilled water tank have high and low water sensor inside. Lift the float part of the high water level sensor flatly, you will hear the alarm for "water tank is full" sound like "di-di-". Put float part of low water level sensor flatly, you will see the "IN" lamp in the panel is lighted. If the water level sensor is not showing right, it need to be replaced.



- C. If you lift the float of the water level sensor in the used tank up to the top, you will see the "OUT" light in the panel is turned on. If the water level sensor is not work or showing differently, it need to be replaced.



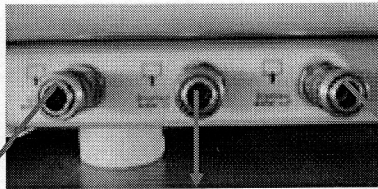
Float of water level sensor

- D. To remove the display panel, use multimeter to check if the indication lamp on panel board is correct, if not, replace it. If the lamp

## 5. The process for cleaning and replacing the draining port.

### Description:

There are 3 draining ports at the bottom of sterilizer. They are used water tank draining port (Left), automatically adding water port (Middle), distilled water draining port (Right). Maybe the draining port will be jammed or leaking water by long time using. That makes the water in the used water tank can not drain out. You could be according to the process as below pictures showing.



used water tank draining port

automatically adding water port

distilled water draining port

### Reason:

- A. The port is jammed or the spring in the port is weak.
- B. The seal ring on core inside port is broken.

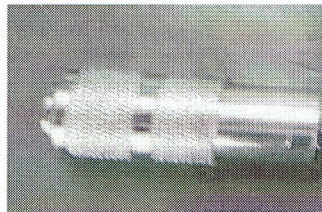
### Solution:

- A. Use the tip tool to take the lock spring out at the head of the port. Take the valve core out, clean it and elongate the spring (For add elasticity), then set all parts back. Or replace whole port.
- B. Check the seal ring on the port core, if the seal ring is broken, you need to replace it. Or replace whole port.





Use pincers to take port out



Draining Port



Disconnected

Port Core

## 6. Can not add water automatically by water pump

### Description:

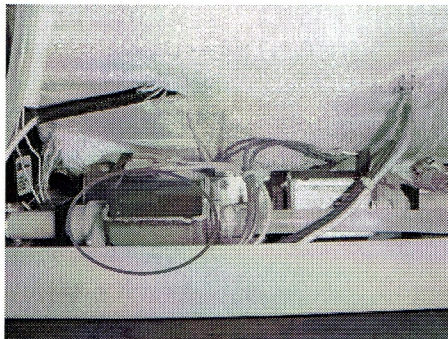
Press water automatically adding button, but adding water pump does not work.

### Reasons:

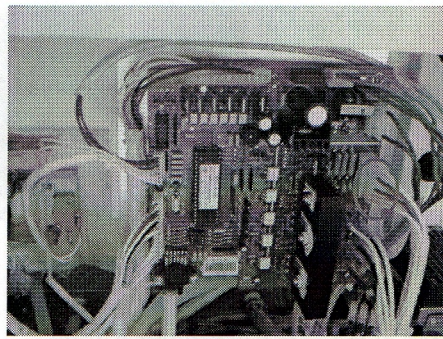
- A. The connection port is loose from adding water pump and PCB.
- B. The adding water pump is broken.
- C. The PCB does not output the power to water pump.

### Solution:

- A. Check all the connection ports between water pump with PCB, to ensure all the connection port are connected well.



Adding Water Pump



Adding Water Pump Connection Port

- B. Replace the water pump.
- C. Check the output power for the water pump by multimeter. If no power output, fix or replace PCB.

## 7. The chamber was not dry enough after sterilizing.

### Description:

Some water left inside the chamber after finished sterilization.

### Reasons:

- A. The filter in the chamber is jammed. The filter in the chamber that is very important for draining. It

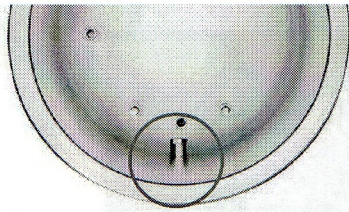


directly effects the drying of sterilization if it is working well. The water in the chamber can not be drained to the used tank when it is jammed. That causes the problem drying incompletely.

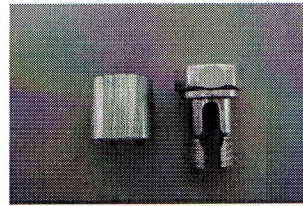
- B. Sterilizer is not placed smoothly. If the sterilizer is not placed smoothly, higher in the front and lower in the behind, that will cause much water converging in the front of the chamber, and the filter in the bottom can not suck the water and drain to the tank.

**Solution:**

- A. Lift the filter, check it carefully if it was jammed, the "o" ring in the filter if still complete. You could use the 3-ways syringe to blow it and make sure it is circulated. And then you should rebuild it in the same place, please remember the touching side must be closed with the bottom of chamber like the picture showing.



Water Filter Inside Chamber



Water Filter Inside Chamber

**Attention:** You'd better lift and clean the filter termly, ensure the filter is working well is the key to keep dry.

- B. Place the sterilizer on the smooth table or situation, if it still did not improve, you should adjust the bottom at the front of the sterilizer, ensure the water is in the back of bottom.

## 8. Alarm about "EE"

If there is any anomaly in the cycle or you need to exit during the cycle, you can run a coercive exit program and show "EE" on the panel. And if you did not cancel (to press the start bottom), it will be alarming and showing "EE" every time when you turning on the power switch. So that you have to press the start bottom to cancel alarm information and then it will be back to the default state.

## 9. The outside printer can not print date.

**Description:**

The sterilizer can connect the outside printer to printer the sterilization date.

**Reason:**

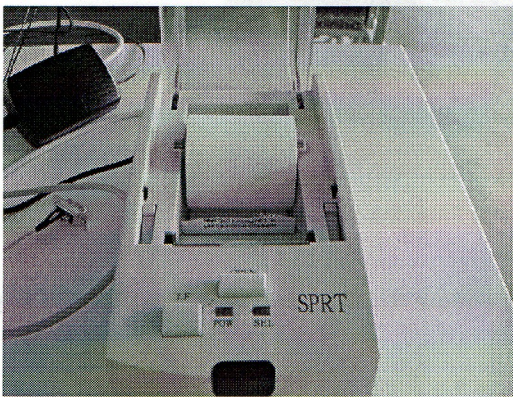
- A. The printer is broken
- B. The thermal printer paper is set contrary.
- C. No power input or the input power is not stable.
- D. The signal line of the printer is not connected well or unstable.



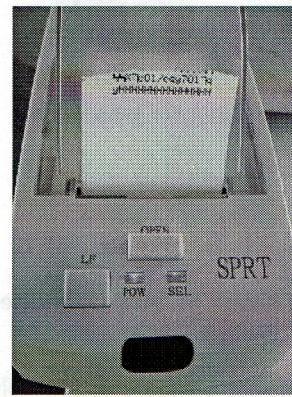
**Solution:**

- A. Turn off the power, keep press "LF" button on the printer, and then to turn on the power, it will print out the default date of the printer. If no date print out or not the right date print out, it need to change the printer.
- B. Set the thermal printer paper correctly. Unpack the printer paper, then set the roller into the reel, and put thwart up the groove inside of printer. Lid the cover, and insert the roller in, then make sure the cover has been closed fully. And then, press LF button, to check if the work of roller is all right, no matter paper block, jammed, and don't move, haven't been happened.

**Caution:** the paper has two sides, please put the slippery one adown, or any words will not be printed out.

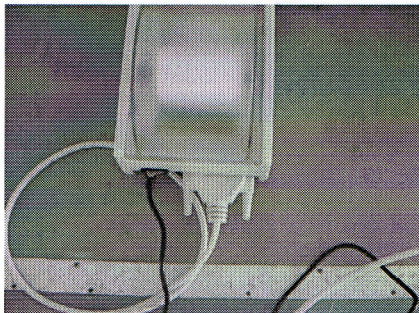


Set the roll paper inside the printer

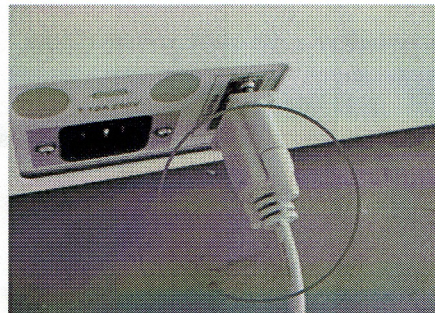


Test the paper is working well

- C. Check the power input of printer and also ensure the input voltage is stable. Electrify the power socket and connect power connector to the printer, turn on the power supply and check whether has been electrified, the electrification is normal, and turn off the power supply, connect the connector of data line to the printer and sterilizer, after finish it, please turn off power supply then . Attention: to make sure all of connectors especially data connector, have been linked tightly, otherwise will affect the normal operation to the printer.



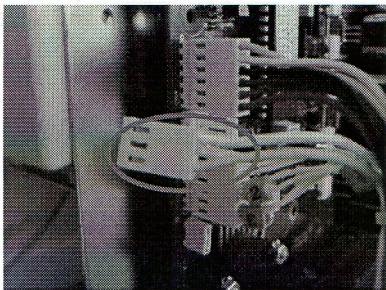
Data Signal Line



Data Signal Line



- D. If still can not work, please check the signal line between printer to PCB, if it is connected well. Then to change place of the yellow line and white line.



Change the place of the yellow and white line, then to retest.

## IV Appendix

### Appendix 1: Adjust The Default Pressure And Temperature

#### Description:

The pressure and temperature is not matched. Pressure and temperature is around the sterilization pressure 134°C and pressure 2.0bar, like 133°C or 120°C, but can not enter the sterilization state.

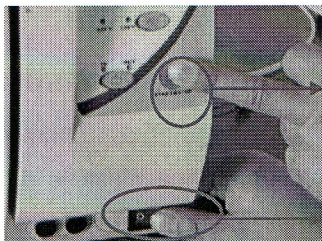
#### Reason:

The standard air pressure in different area is different, so that will cause the pressure and temperature not matches very well.

#### Solution

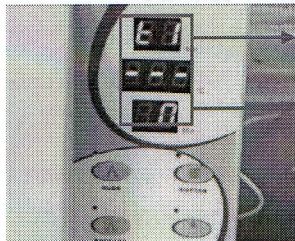
1. Enter the hide adjusting program

Turn off the power, pressure "START/STOP" button, and then turn on power switch. Release the button until the window showing as followed:



Keep pressing "START" button

And then to turn on power switch



State Window

Value Window

2. Display State

There are 5 states on the state window can be adjusted. ("T1" means an inverted "F" like picture showing)

- a. "T1"状态: Adjust the temperature in chamber. If the temperature is a little gap with the standard, you can adjust it.
- b. "T2": Adjust the temperature surround the chamber. Normally, we do not adjust it.



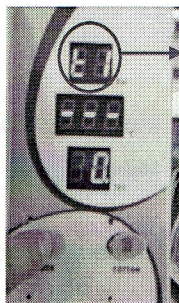
- c. "P1": Adjust plus pressure. Normally, we do not adjust it.
- d. "P2": Adjust negative pressure adjust. Normally, we do not adjust it.
- e. "PT/H4": To adjust temperature and pressure to standard value. At this state, the chamber, surround ring sensor instead by 1506  $\Omega$ . Steam generator sensor instead by 1200 $\Omega$ . Press "Nude", to confirm and save, then press "start" button to quite

### 3. Buttons:

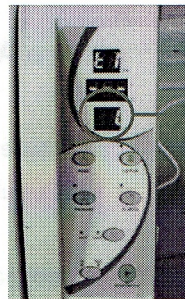
- a. "COTTON" button to change the state function
- b. "PACKAGE" button to add value
- c. "NUDE" button to decrease value.

### 4. Process:

- a. According to part 1 to enter the adjust program.
- b. To choose the state which you need to adjust. Eg.: if you want to adjust the temperature in the chamber, you have to choose the "T1"

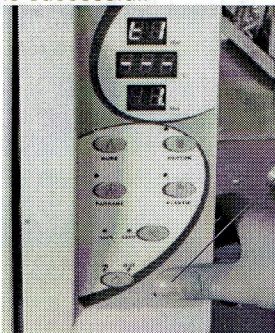


"T1" State



This window "1" mean to add on 1 degree temperature.

- c. Adjust the value of the state which you need. Eg.: press "NUDE" button to add on 1 degree value.
- d. Press "START/STOP" button to save and quite. You will hear a sound "de, de", it means your operation is successful.



Press "Start/Stop" button to save and quite

- e. Restart the cycle and testing.

## Appendix 2: Steam Generator Cleaning Program

The steam generator will be jammed by the impurity or other dirty stuff. So it need to run the claning program

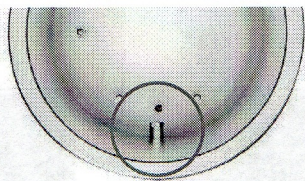


to clean the generator termly.

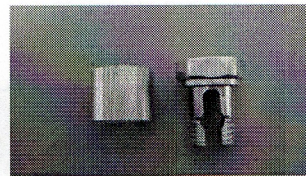
1. Turn on the power switch, close the door, to ensure the sterilizer is at "Ld" state. (Ld is not winking)
2. Keep press the "NUDE" button 5secs, it will enter steam generator cleaning program. The cleaning time is 1 min, state window show "cL"
3. Clean the impurity or dirty thing inside the chamber which washed from steam generator.
4. If the generator is not cleaned for a long time, or you think it is not cleaned enough, you can run the cleaning program time after time.

Warning: Before run the cleaning program, please confirm that the filter inside the chamber is completed.

The water filter inside chamber must be cleaned after running cleaning program, in case left impurity in the chamber and affect the sterilization of next cycle.



Water Filter Inside Chamber



Disassembly

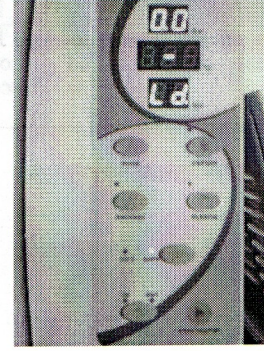
Cleaning program state process:



"Ld" state, press "NUDE" button 5 secs.



Clean State "cL"



Return to the default state

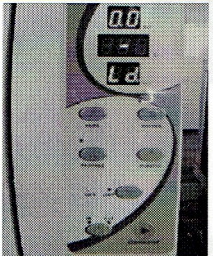
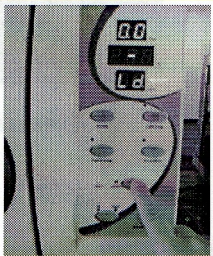
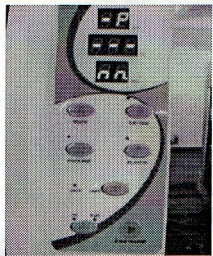



### Appendix 3: Vacuum Test

The negative pressure could get -0.8bar by vacuum pump, it eliminate the cool air out inside the chamber to get the good sterilization And it can help to exhaust the air in sterilization instrument for drying. You can use the vacuum test to test the vacuum efficiency.

1. Turn on the power, close the door completely.
2. Keep press temperature choose button 8secs, release it until hear "de" alarm sound, enter the vacuum test program, "nn" state.
3. Vacuum Test: running vacuum pump 6mins, then to keep this pressure 5mins.
4. Quite automatically the program after finished.

Sate process:

			
<p>1. Turn on the power and close door completely. "Ld" state</p>	<p>2. Keep press temperature choose button 8secs to enter vacuum test program.</p>	<p>3. Vacuum test program state "nn"</p>	<p>4. Vacuum test: running vacuum pump 6mins and to keep this pressure 5mins, then to quit.</p>

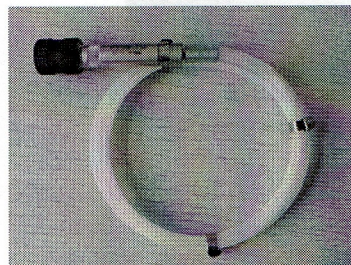
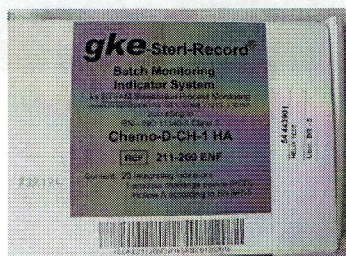


## Appendix 4: Helix Test

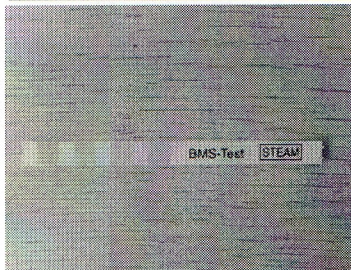
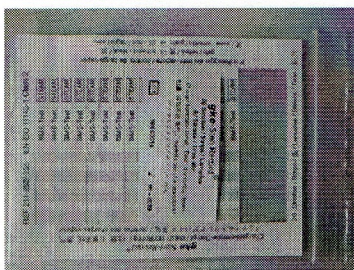
Helix test is for testing the ability of B class sterilization.

Test Tool:

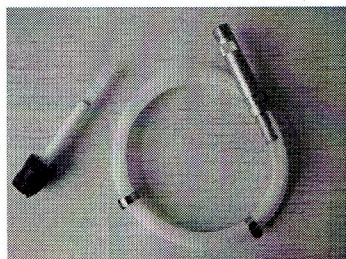
GKE-Steri-Record  
and Helix pipe



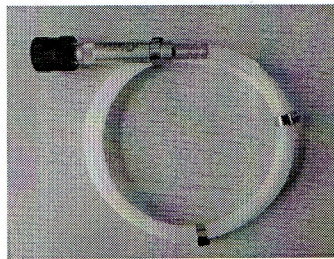
Helix Paper



Put the unused helix paper into the helix tube, Lock it and ensure it is sealed well.



Insert the helix test paper to the test pipe head.



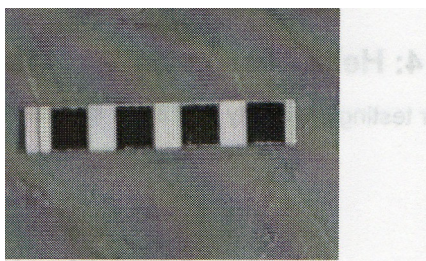
Set the pipe head back

Put the helix tube into the chamber of the sterilizer, and running the Helix test program, 3.5mins sterilization, 3 times pre-vacuum, 8mins drying. Check if the helix paper changed color from yellow to black color totally after finished the helix test program.

If the test paper change the color form yellow to black, it means test passed.



Test Before



Test After



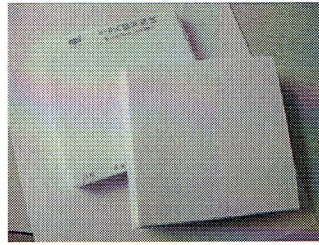
## Appendix 5: B&D Test

B&D test is special for test the ability of steam penetrating. The operation process please as followed:

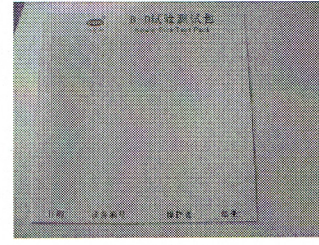
1. Turn on the power and put the B&D test bag into the chamber.



B&D Test Bag

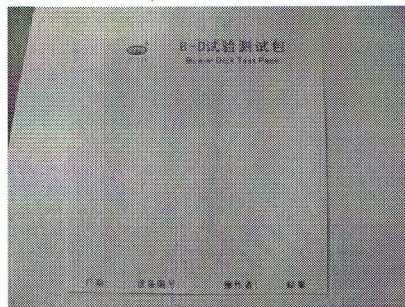


Test Paper Inside



Test Paper

2. Keep pressing "PACKAGE" button 8secs until hear "de" alarm sound. It enter to the B&D test program. The state window showing "bd"
3. B&D test, 3.5mins, 134°C.
4. It will quit automatically after finished. To take out the test bag and check the test paper inside if it is change color form yellow to black. If the test paper is not changed color, it means test failure.

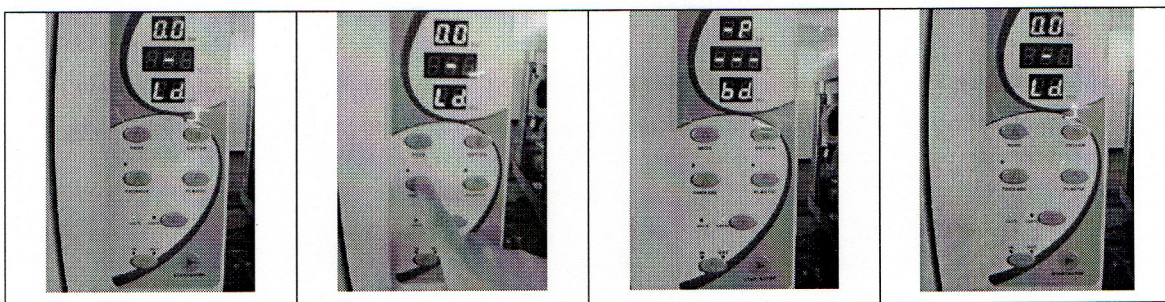


Test Before

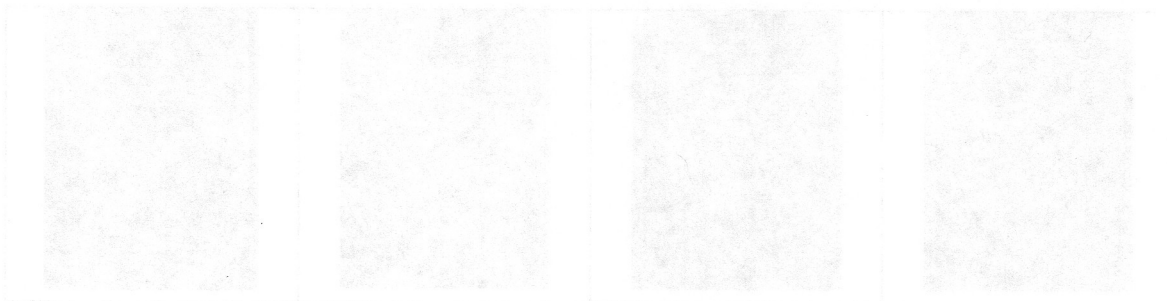
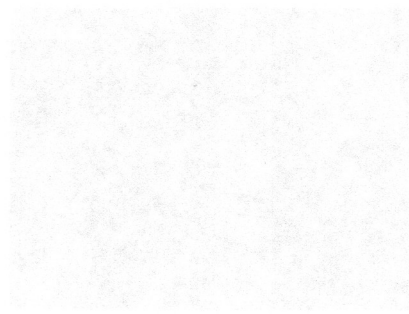
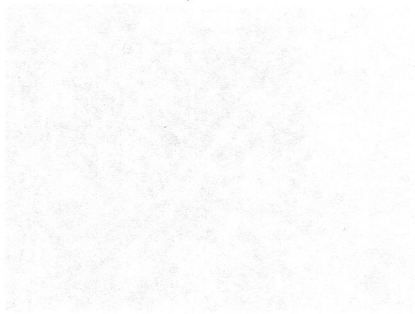
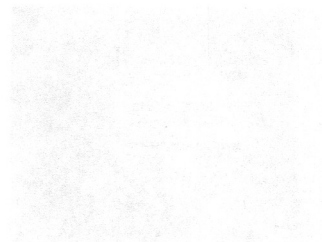
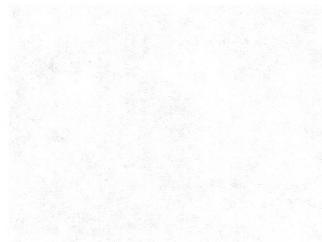
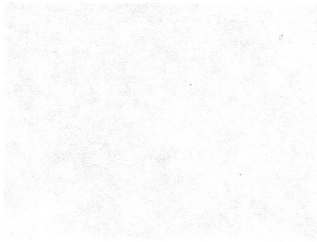


Test After

State Process:



1. Turn on power, put the B&D test bag into chamber, closed the door completely. "Ld" State.	2. Keep pressing "PACKAGE" button 8secs until hear "de" alarm sound to enter B&D test program	3. B&D test program, the state window showing "Bd"	4. It will return default state.
--	---	--	----------------------------------





## Appendix 6: User defining program

If user want to adjust the sterilization time or drying time, he can enter user defining program to adjust.

### 1. Enter user defining program

At "Ld" state, keep pressing "PLASTIC" button 8secs until hear "de" alarm sound. It enter into the user defining program.

### 2. Sate: "-1-", "-2-", "-3-"

Sate	Name	Description
"-1-"	Adjust Sterilization Time	Default time 4mins, Max 60mins
"-2-"	Adjust Drying Time	Default time 4mins, Max 60mins
"-3-"	Choose Vacuum Times	Default 1 time, 1 or 3 chosen

### 3. Buttons

"COTTON" button to choose the defining state as "-1-", "-2-", "-3-"


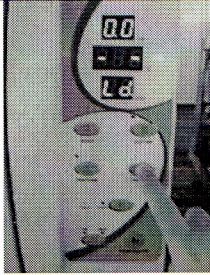
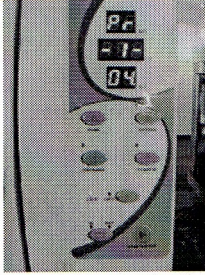
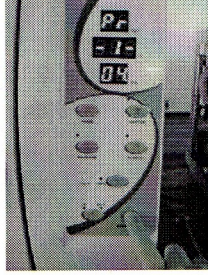
"PACKAGE" button to increase the value.

"NUDE" button to Decrease the value.

4. Press " START/STOP" button to save and quite. Then you will see the lamp of sterilization program button is dark, that means in the user defining program.

5. Run the cycle, the sterilization time, drying time, pre-vacuum times will process as your set.

State Process:

			
1. Turn on the power, and load the instrument, close the door. "LD" State	2. keep pressing "PLASTIC" button 8secs until hear "de" alarm sound to enter defining program.	3. Use "COTTON", "PACKAGE", "NUDE" button to set the value as you need.	4. Press "START/STOP" button to save and quite. And run the cycle.

## Appendix 7: Solenoid Valve Position

There are 5 solenoid valve inside the steam sterilizer as followed:

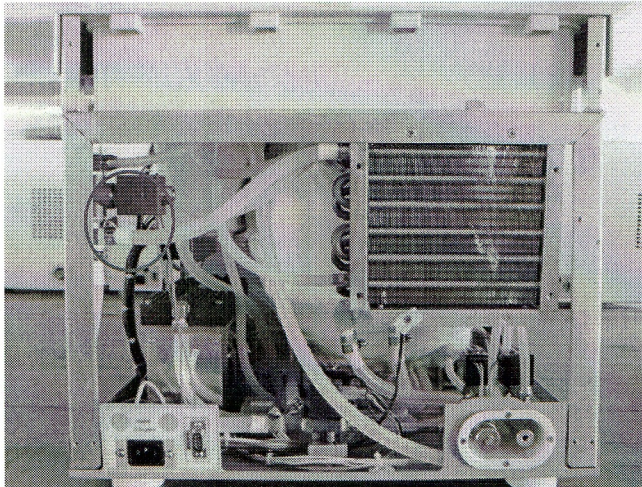
No.	Code	Name	Description	Wire Color	Normal State (without power)
1	EV1	Air Exhaust Valve	To exhaust air, when the chamber with pressure at no power state	Blue	Open
2	EV2	Chamber Water Supply Valve	To control water supply into chamber	Yellow	Close
3	EV3	Vacuum Valve	To control vacuum pump vacuum air from chamber	Black	Close
4	EV4	Air Return Valve	To control the return air into chamber	White	Close
5	EV5	Water Drain Valve	To control water drain out from chamber	Green	Close



## A. Air Exhaust Valve(EV1)

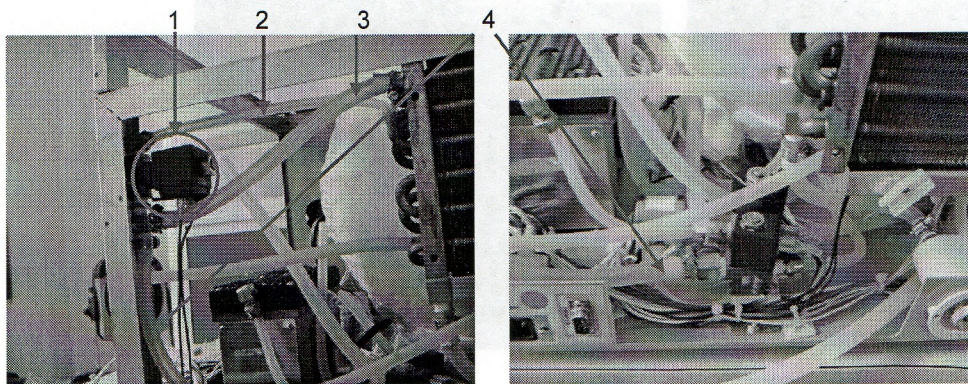
Position:

when you remove the back board and face it, the air exhaust valve is on the top left, under water tank. As followed picture showing.



Connected Parts:

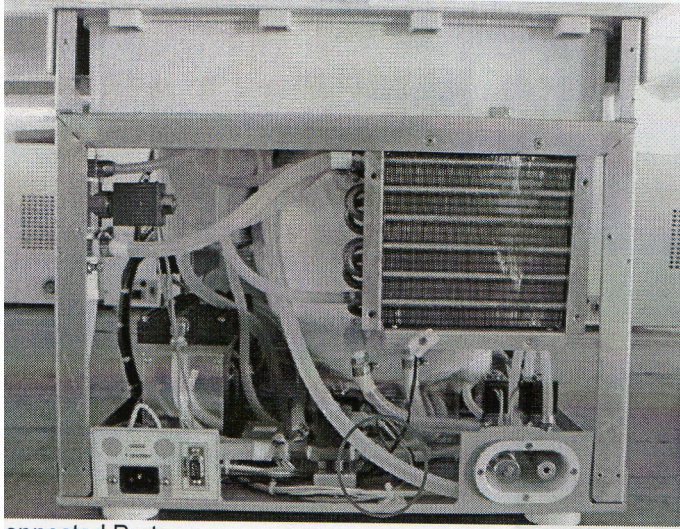
Chamber, Condenser, Water drain solenoid valve(EV5)



1. Air exhaust valve.
2. Tube connect chamber to EV1, for exhaust air from chamber.
3. Tube connect condenser with EV1, for exhaust air to condenser.
4. Tube connect EV5 valve with EV1, there is a 3 direction connection port in the middle to connect to condenser.

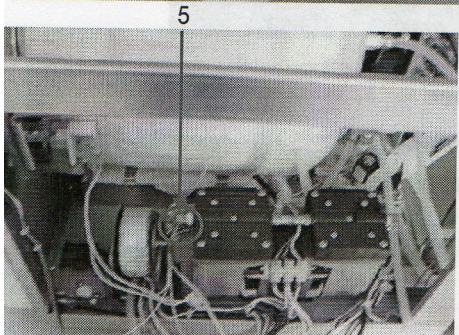
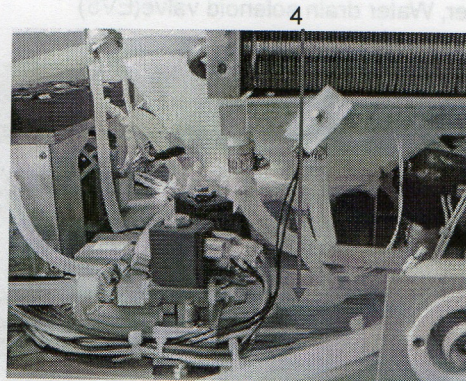
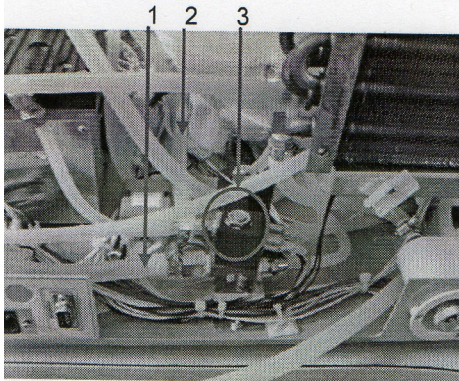


side with vacuum solenoid valve (EV3). As followed picture showing.



connected Parts:

chamber, Vacuum Pump, Air Exhaust Valve (EV1)





1. Tube connect EV5 to condenser, the water draining from this tube to condenser, there is a 3 direction connection port in the middle to connect EV1.
2. Tube connects vacuum pump to condenser, the air from vacuum pump to condenser, connect EV1 and EV5 3 way direction connection port.
3. Water drain solenoid valve(EV5)
4. Tube connects chamber to EV5, water draining from chamber.
5. Vacuum pump connection port for air out. Please refer tube 2.

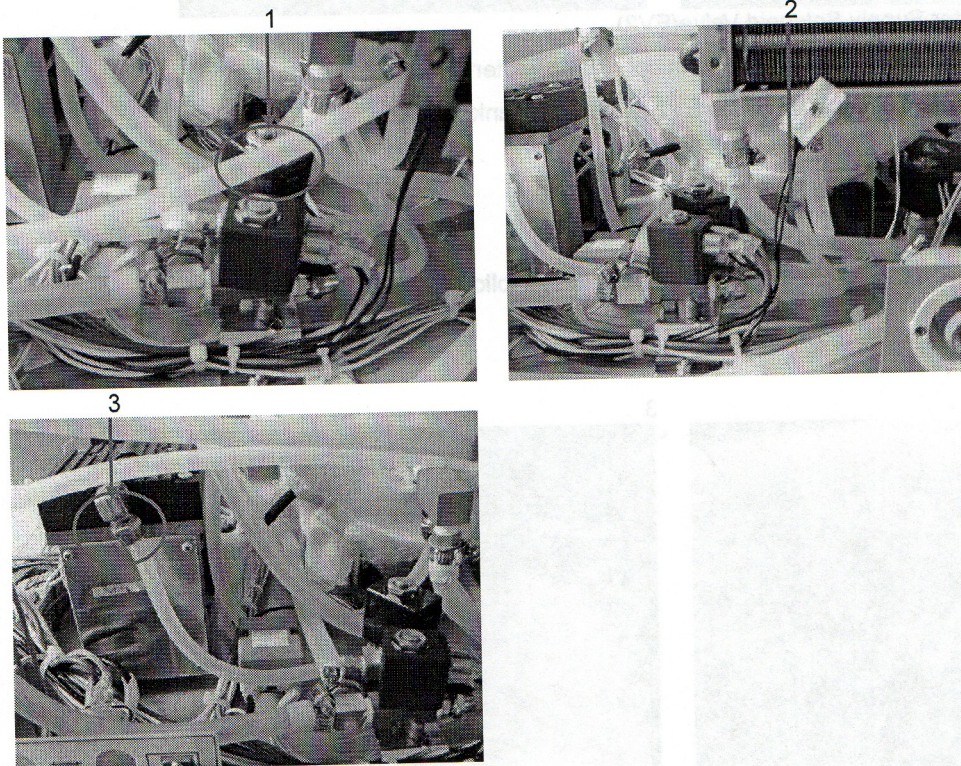
### C. Vacuum Solenoid Valve(EV3)

Position:

Side by side with the EV5 as followed picture showing.

Connected Parts:

Chamber, Vacuum pump



1. Vacuum Solenoid Valve
2. Tube connects chamber to EV3, air sucked from the chamber to EV3.
3. Vacuum pump air-in connection port.



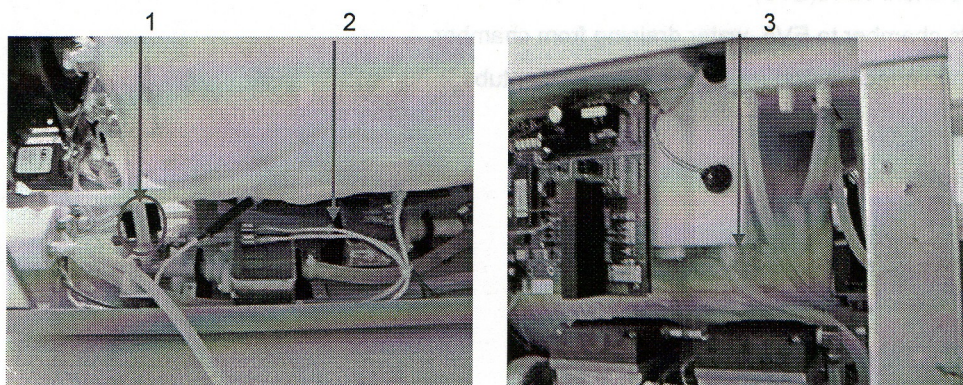
#### D. Chamber Water Supply Solenoid Valve(EV2)

Position:

Remove the left board and face it, the valve is at button left near water pump as followed pictures showing.

Connected Parts:

Distilled water tank, chamber water supply pump.



1. Chamber Water Supply Solenoid Valve(EV2)
2. Tube connects EV2 to chamber water supply pump, water from EV2 to water pump.
3. Tube connects distilled water tank to EV2, water from tank to EV2.

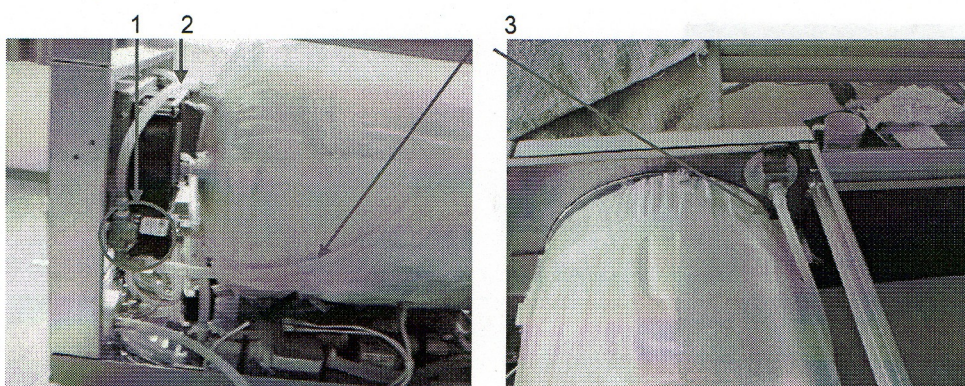
#### E. Air Return Solenoid Valve(EV4)

Position:

Remove left board and face it, the EV4 is at the left side as followed picture showing.

Connected Parts:

Chamber, Air filter.



1. Air return solenoid valve (EV4)
2. Tube connects Chamber to EV4, air form EV4 return to chamber.
3. Tube connects EV4 to air filter, air from air filter to EV4.