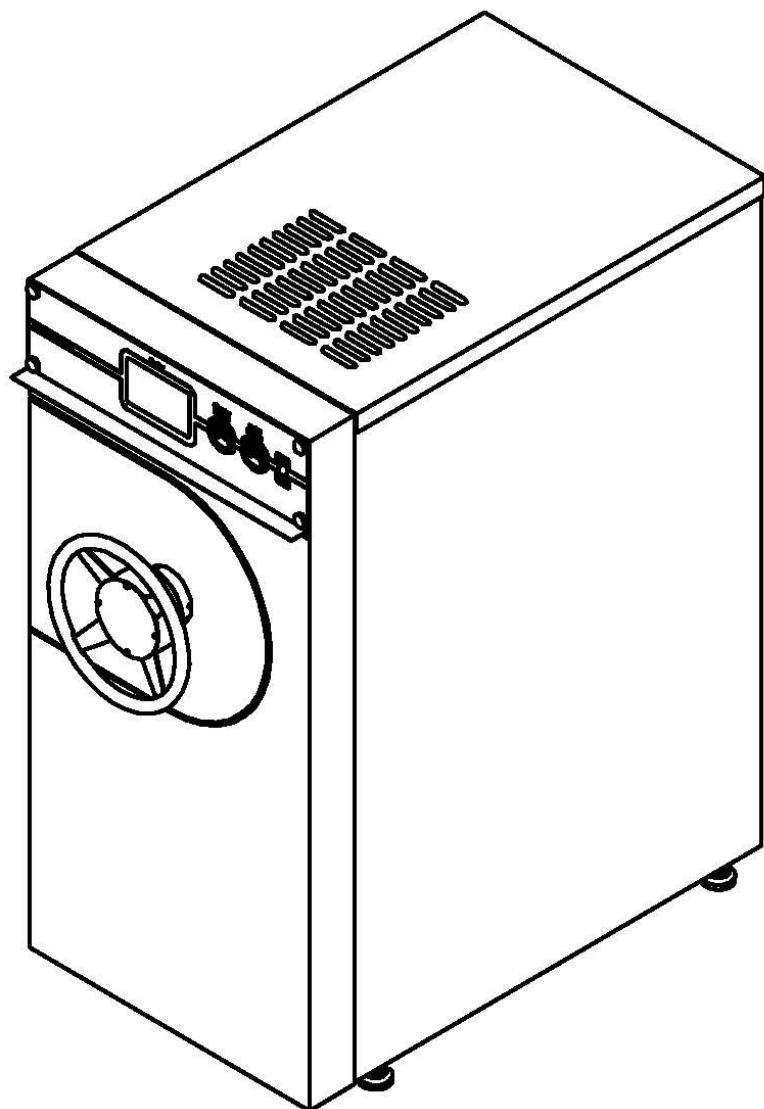


# **OPERATING SERVICE MANUAL**

## **MODEL : NB-SS105 / SS210**



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## - CAUTION -

※ This product is a sterilizer using high pressure saturated steam. Therefore, always keep safety caution

1. Use exclusive line as the capacity of this product is 9kW and 11kW.  
Also use a plug with a grounding conductor. If not, use a separate grounding conductor.
2. Make sure that chamber pressure is 0 when opening or locking the door.
3. Do not load sealed bond or Vaseline antiseptic.  
Airtight container can explod or liquid can deposite, damaging the chamber and leading to electronical malfunction.  
In particular, vaseline can break the sterilizer.
4. Do not bend or put together the loads that cannot withstand higher temperature such as rubber or plastic products.  
Loads that cannot withstand high temperature can deform.  
Please use low-temperature sterilization (E. O. GAS) for those that cannot withstand high temperature.  
Reference: Read the instructions of rubber or plastic products before loading.
5. When using dressing drum, place two-sided cotton cloth underneath the load to prevent re-contamination.
6. Turn off the power after usage.
7. Open the door and remove the remaining steam if the sterilizer is not to be reused within an hour.
8. Do not use the sterilizer when water supply is cut off or there is power outage.
9. Do not use emergency Ball Valve(Air In Ball Valve) in normal operation.  
Use the Ball Valve only when power is out and there is remaining pressure inside the chamber.  
Usage other than above mentioned case can cause damage.
10. Be cautious to prevent skin burns due to heat of the sterilizer.

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## 1. Technical Data

		<b>NB-SS105</b>	<b>NB-SS210</b>
Overall Size		685(W)×1480(H)×1300(L)mm	740(W)×1600(H)×1400(L)mm
Chamber	Size	Ø 420×760(L)mm	Ø 520×1000(L)
	Type	Circular	
	Material	Stainless Steel 304	
	Capacity	105Liter	210Liter
Heater	Power	AC 220V 3PH 9000W	AC 220V 3PH 11000W
	Material	Alloy	
	Control Method	Time Proportion Control System	
Shelves	Size	210(W)×720(L)mm 1EA	240(W)×960(L)mm 1EA
	Material	Stainless Steel 316	
Temperature Range		110°C ~ 135°C	
Water Supply		15A, Water Pressure 1~3kgf/cm <sup>2</sup>	
Control System		Microprocessor	
Self-Control		Auto test Mode embedded	
Operating Cycle		Pre-Vacuum System	
Dry system		Ejector or Vacuum Pump type	
Power Consumption		AC 220V 50/60Hz	AC 220V 50/60Hz
Option		Vacuum Pump	
Option		Printer	

※ Product specification can be revised without notice for product quality improvement.

## 2. Operating System Introduction

### (1) Operation Principle

This sterilizer functions in the following sequence.

PRE-VACUUM → STEAM SUPPLY → STERILIZATION → EXHAUST → DRY → COMPLETE

When Start button is pressed, vacuum pump operates in Pre-Vacuum process to remove the air inside the chamber and then goes into Steam-Supply process.

In Exhaust process, steam and pressure inside the chamber are removed and then moves into Dry process.

In Dry process, vacuum pump operates to remove the remaining steam and operation is completed.

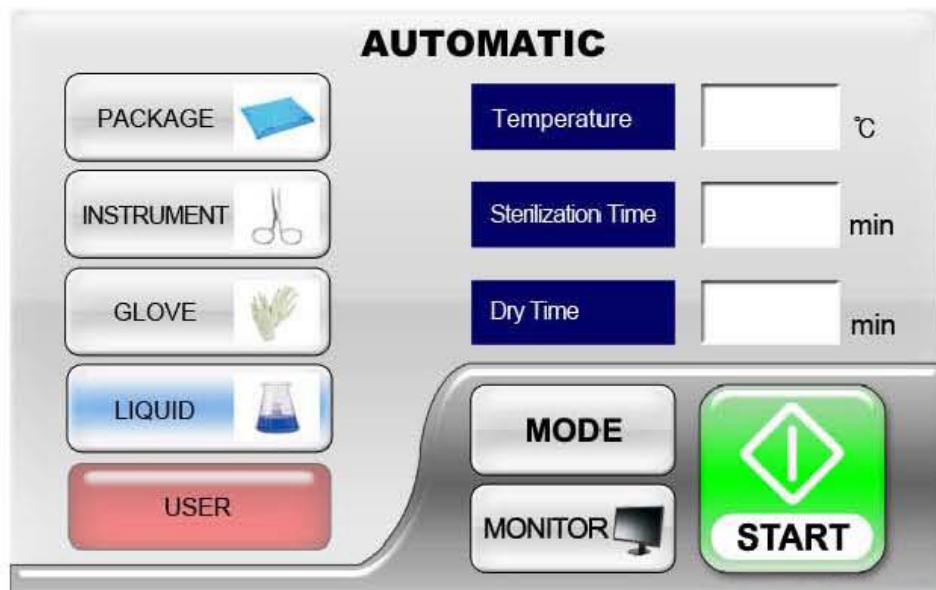
## 3. How to Use

### 1. Before Use

- 1) Turn on the power switch.
- 2) Open the door by turning the handle counter clockwise.
- 3) Place the loads to be sterilized neatly inside the chamber.
- 4) Lock the door by turning the handle clockwise.

### 2. How to Use and Operate

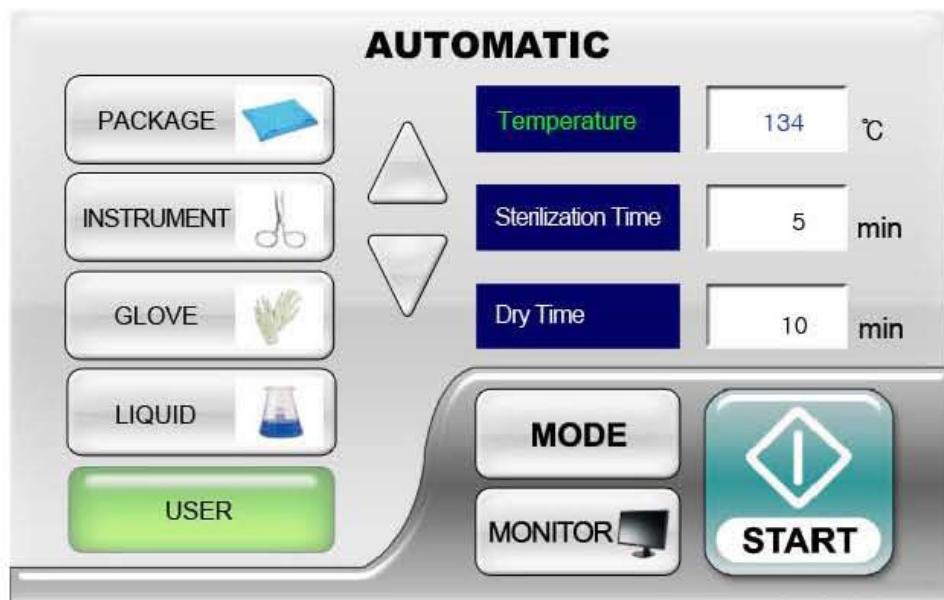
- 1) Press key on the left of the LCD screen to select sterilization course.



MODE	Sterilization Pressure	Tempe-rature	Sterilization Time	Dry Time
INSTRUMENT	2 kg/cm <sup>2</sup>	132°C	15 MIN	20 MIN
PACKAGE	2 kg/cm <sup>2</sup>	132°C	20 MIN	30 MIN
GLOVE	1.2 kg/cm <sup>2</sup>	121°C	20 MIN	20 MIN
LIQUID	1.2 kg/cm <sup>2</sup>	121°C	30 MIN	0 MIN
VACUUM LEAK	-0.6 mmHg	132°C	3 MIN	30 MIN

2) How to change sterilizing temperature, time and drying time using User Key.

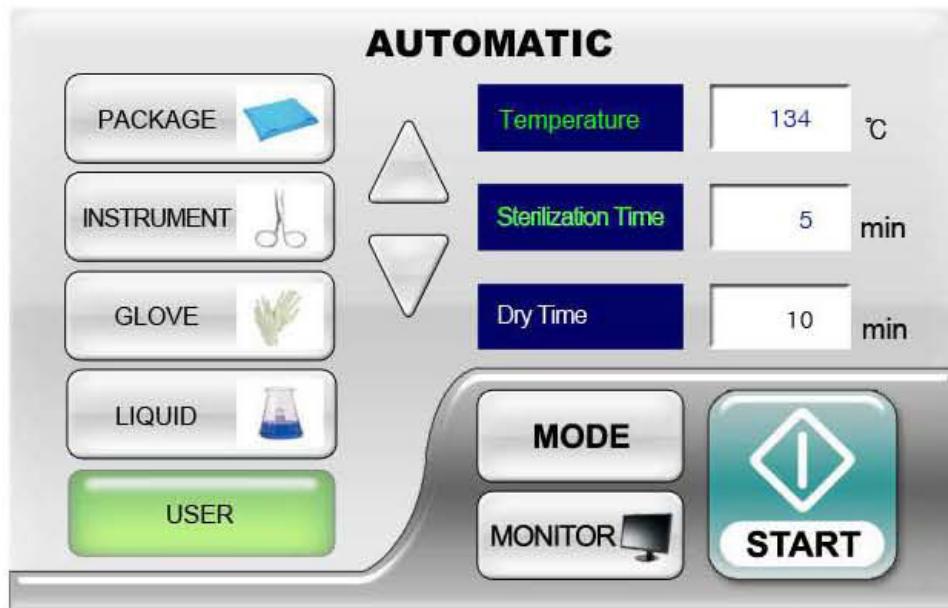
- ① Press USER Key
- ② Press Temperature Key



- ③ Sterilization temperature is selected on the LCD screen (Put in sterilization temperature).

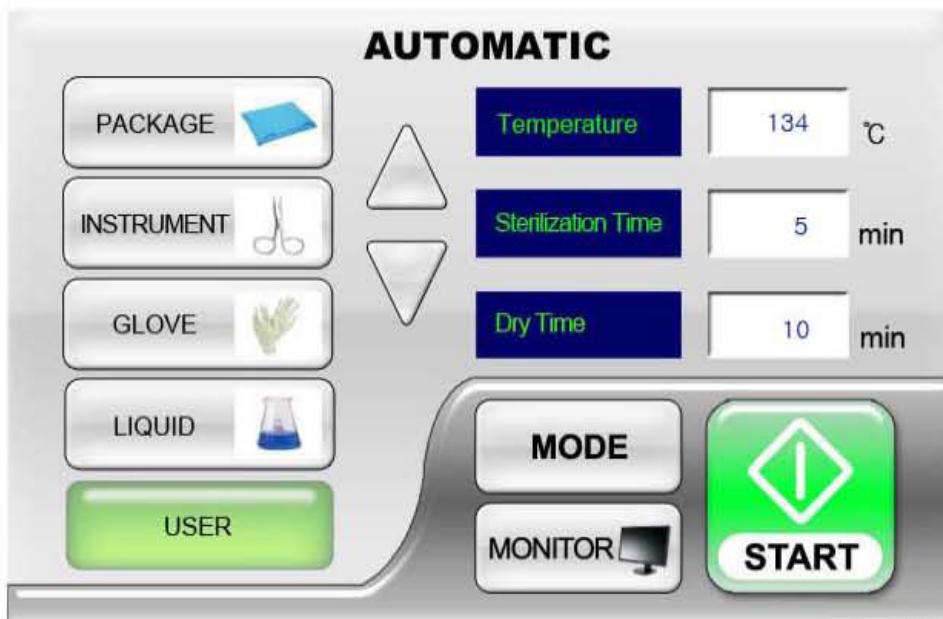
② Press Sterilization Time Key. Sterilization Time is selected on the LCD screen  
(Put in sterilization time).

Time can be changed in 1 MIN by UP and DOWN Key.



③ Press Dry Time Key. Dry Time is selected on the LCD screen (Put in dry time)

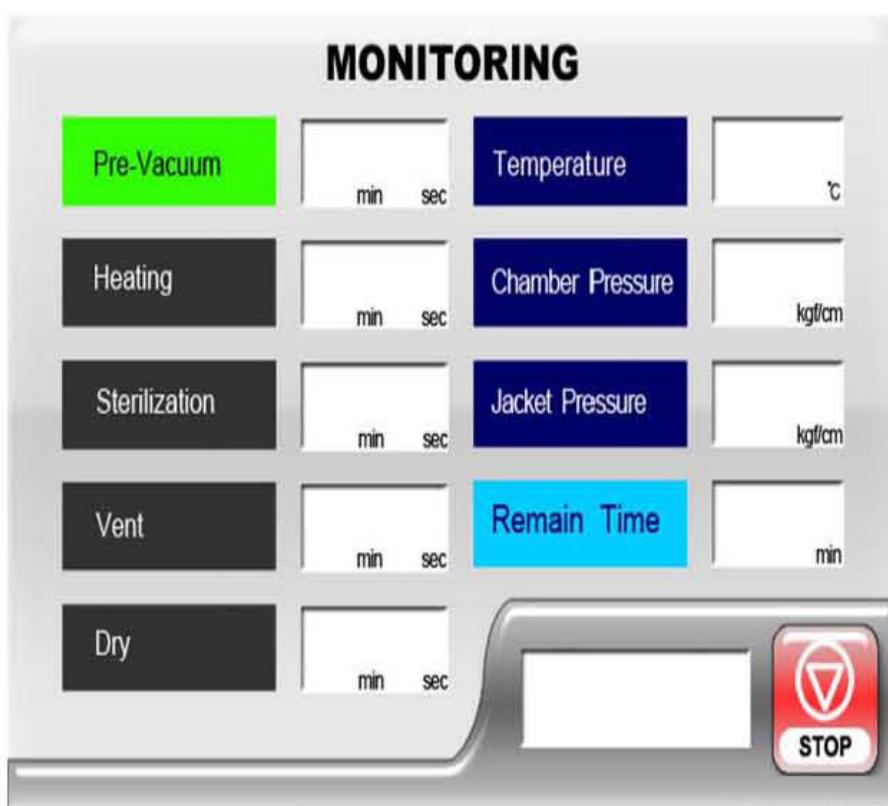
Time can be changed in 1 MIN by UP and DOWN Key.



### 3) Press START Key

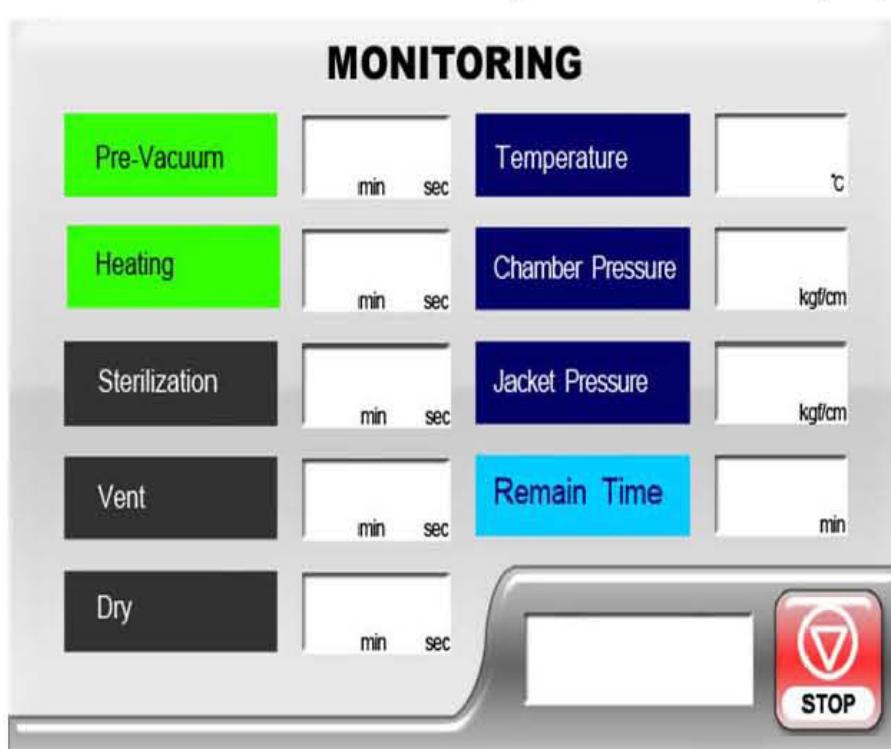
⑦ On the LCD screen, Pressure, Temperature, Sterilization Time and "PRE-VACUUM" are lighted in green.

Vacuum pump starts operating to suck the air inside the chamber to turn it into vacuum status.

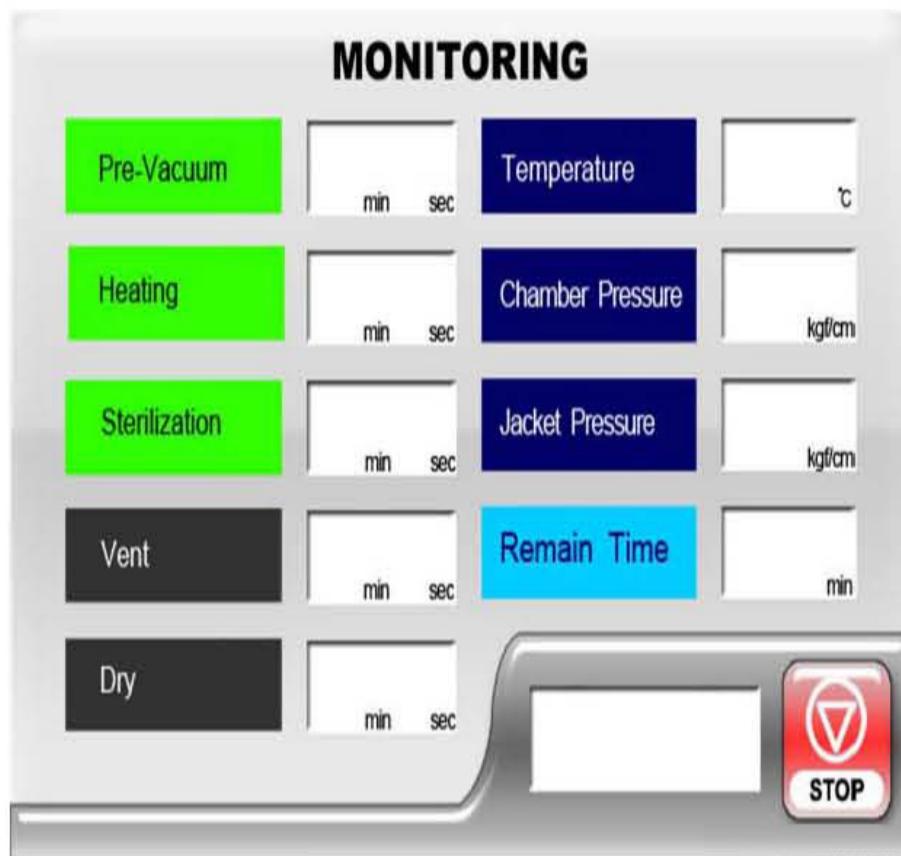


⑧ On the LCD screen, Pressure, Temperature, Sterilization Time, Dry Time and "HEATING" are lighted in green.

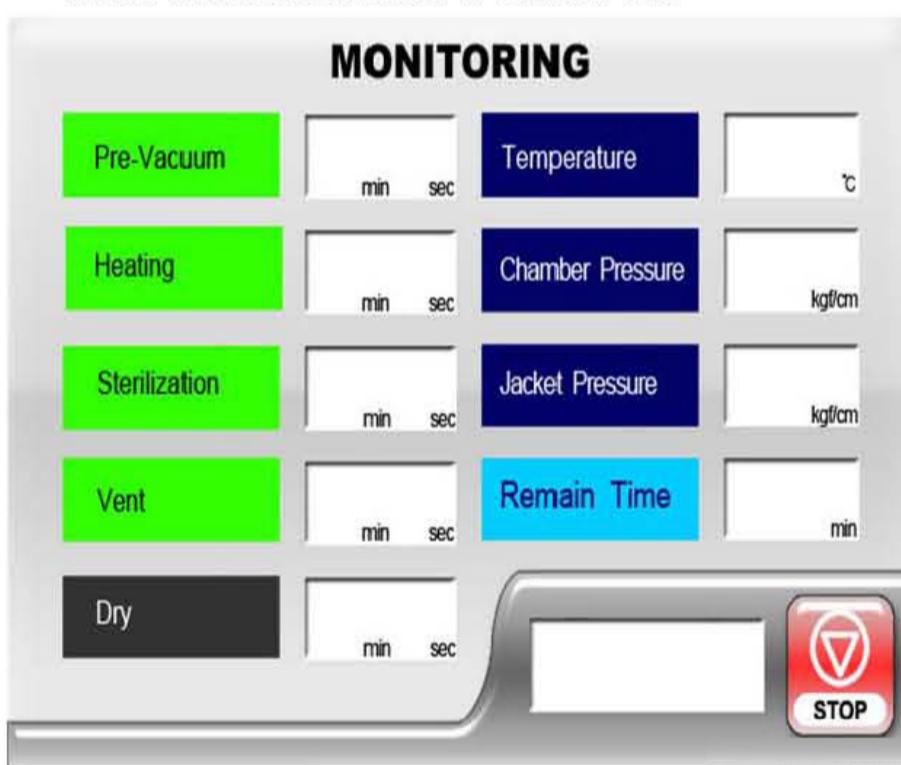
Certain amount of steam from jacket is automatically supplied to the chamber.



- ② On the LCD screen, Pressure, Temperature, Sterilization Time, Dry Time and "STERILIZATION" are lighted in green.  
Sterilization Time decreases by 1MIN.

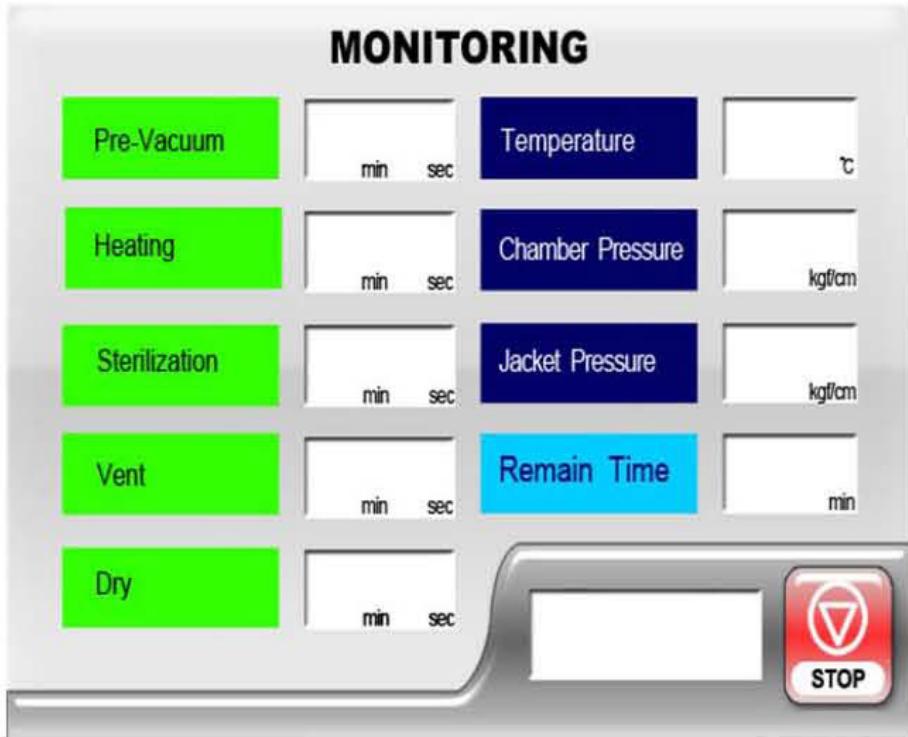


- ③ On the LCD screen, Pressure, Temperature, Sterilization Time, Dry Time and "Vent" are lighted in green.  
Steam inside the chamber is drained out.

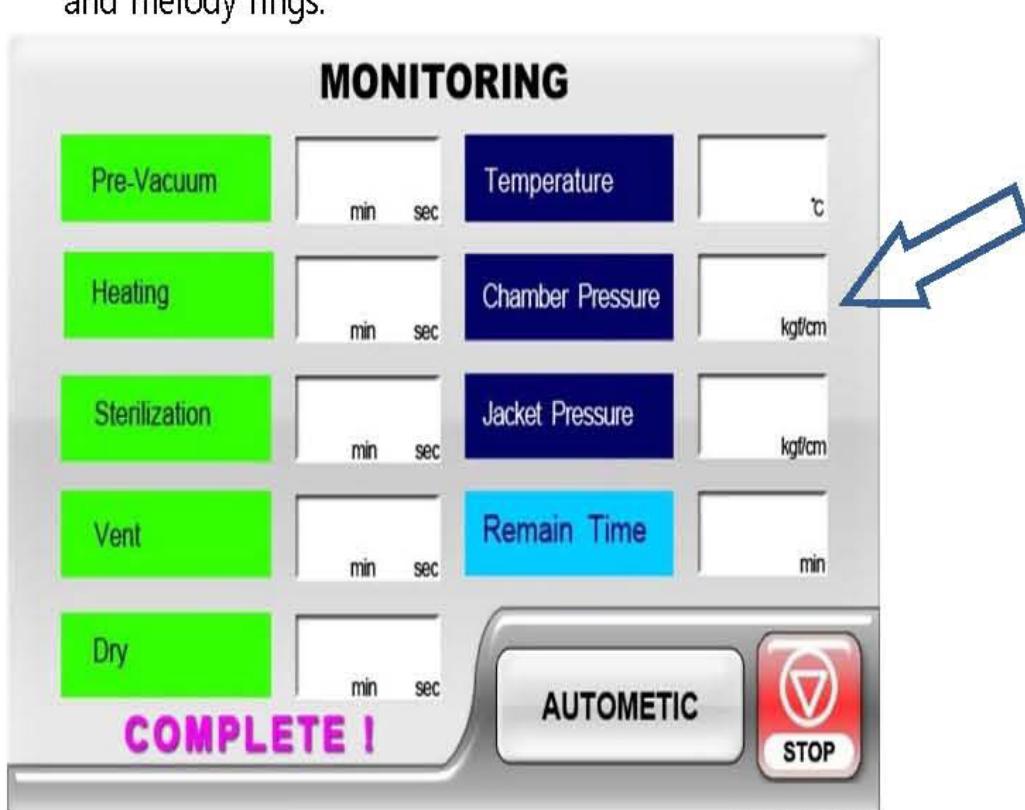


④ On the LCD screen, Pressure, Temperature, Sterilization Time, Dry Time and are lighted in green.

Dry Time decreases by 1MIN.



⑤ On LCD screen, Pressure, Temperature, Sterilization Time, Dry Time and "COMPLETE" are lighted in green.  
and melody rings.



5) Make sure that chamber pressure is 0.0bar.

After checking the pressure, turn the handle counter clockwise to open the door.

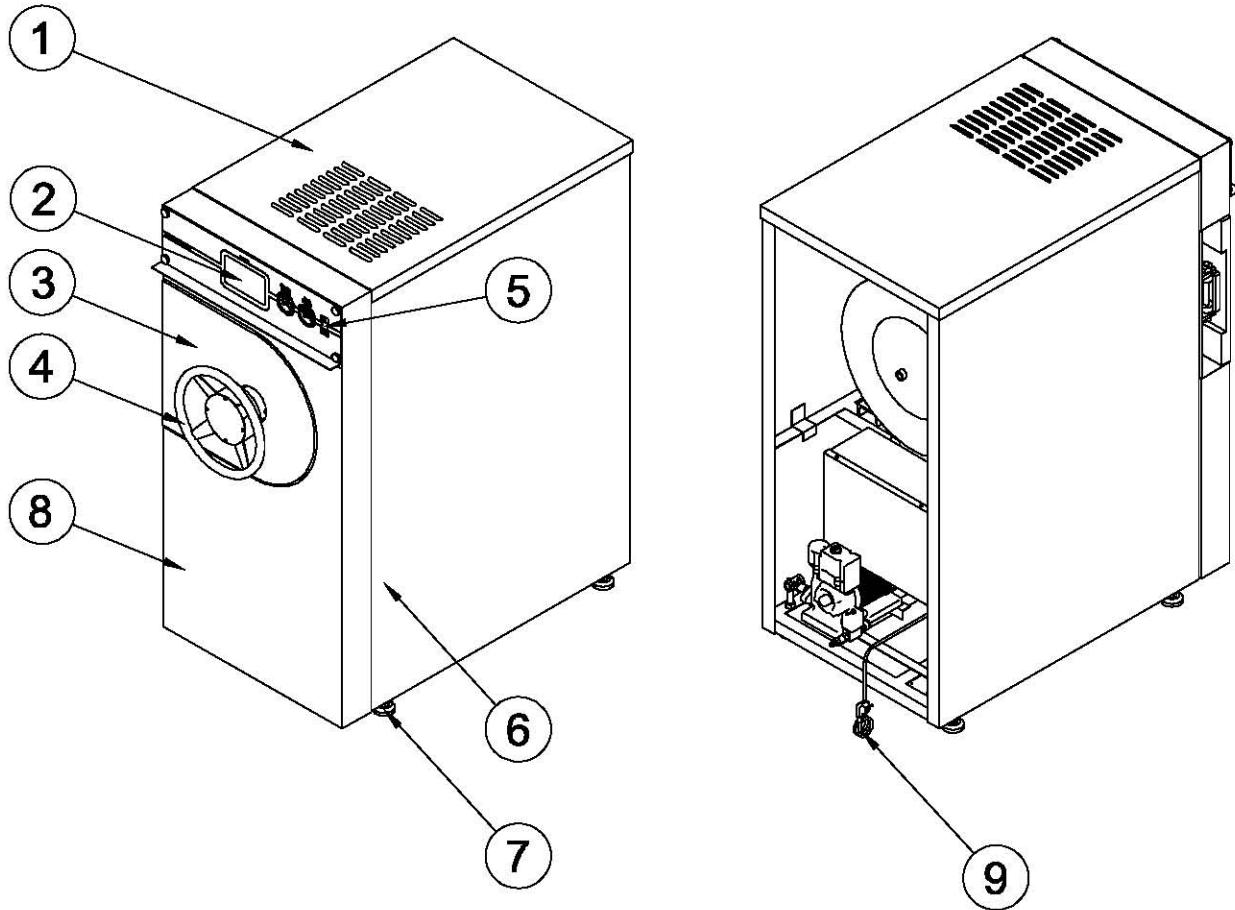
## 6) ERROR CODE



ERROR No.	Meaning
A1	Door is not completely closed
B1	Chamber temperature sensor malfunction
B2	Jacket temperature sensor malfunction
B3	Chamber pressure sensor malfunction
B4	Jacket pressure sensor malfunction
C1	Water supply time exceeded
C2	Steam supply time into the jacket exceeded
D1	Failure to generate vacuum inside the chamber
D2	Steam supply time into the chamber exceeded
E1	Sterilization temperature deviation
E2	Drain not done properly
F1	Overheating of chamber
F2	Overpressure of chamber
F3	Overheating of jacket
F4	Overpressure of jacket
G1	Failure in vacuum leak test

### 3. Sterilizer Composition

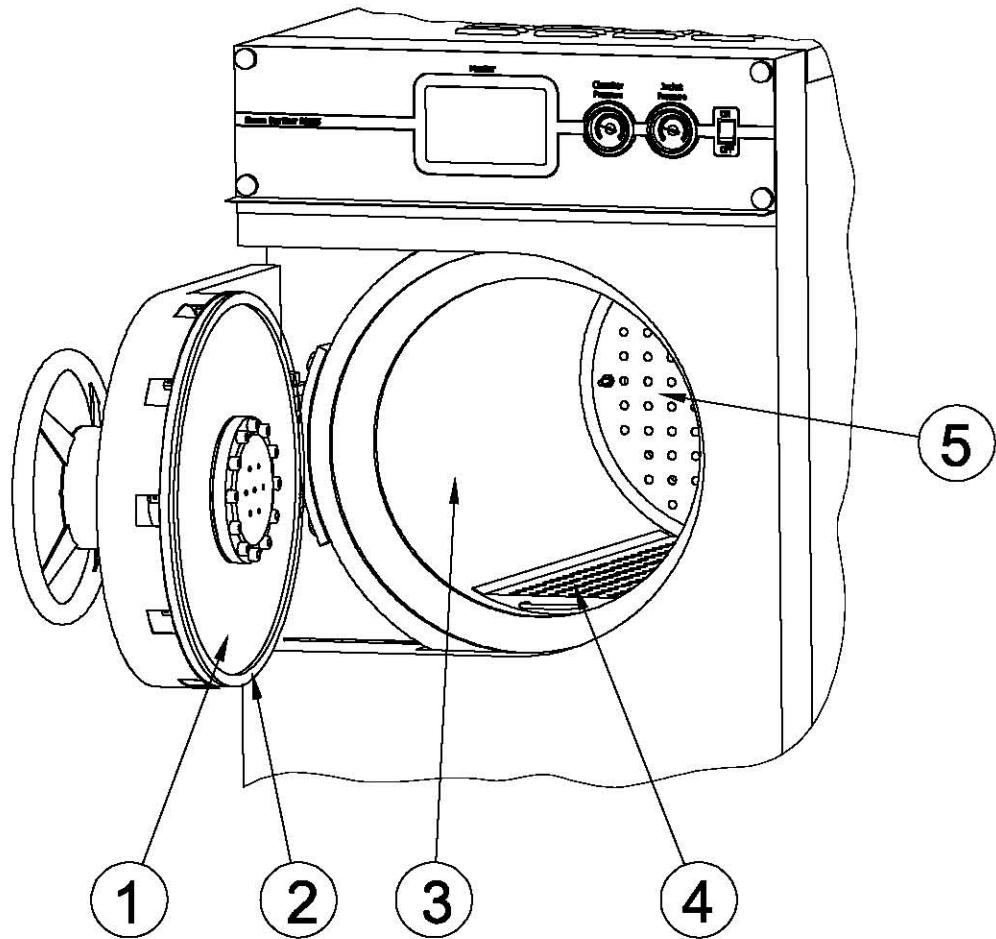
(1) Front and Back



- ① Upper Cover
- ② LCD Screen
- ③ Door Cover
- ④ Door Lock Handle
- ⑤ Power Switch

- ⑥ Side Cover
- ⑦ Levelling Foot
- ⑧ Front Cover
- ⑨ Power Cable

(2) Inside the chamber



① Door

② Door gasket

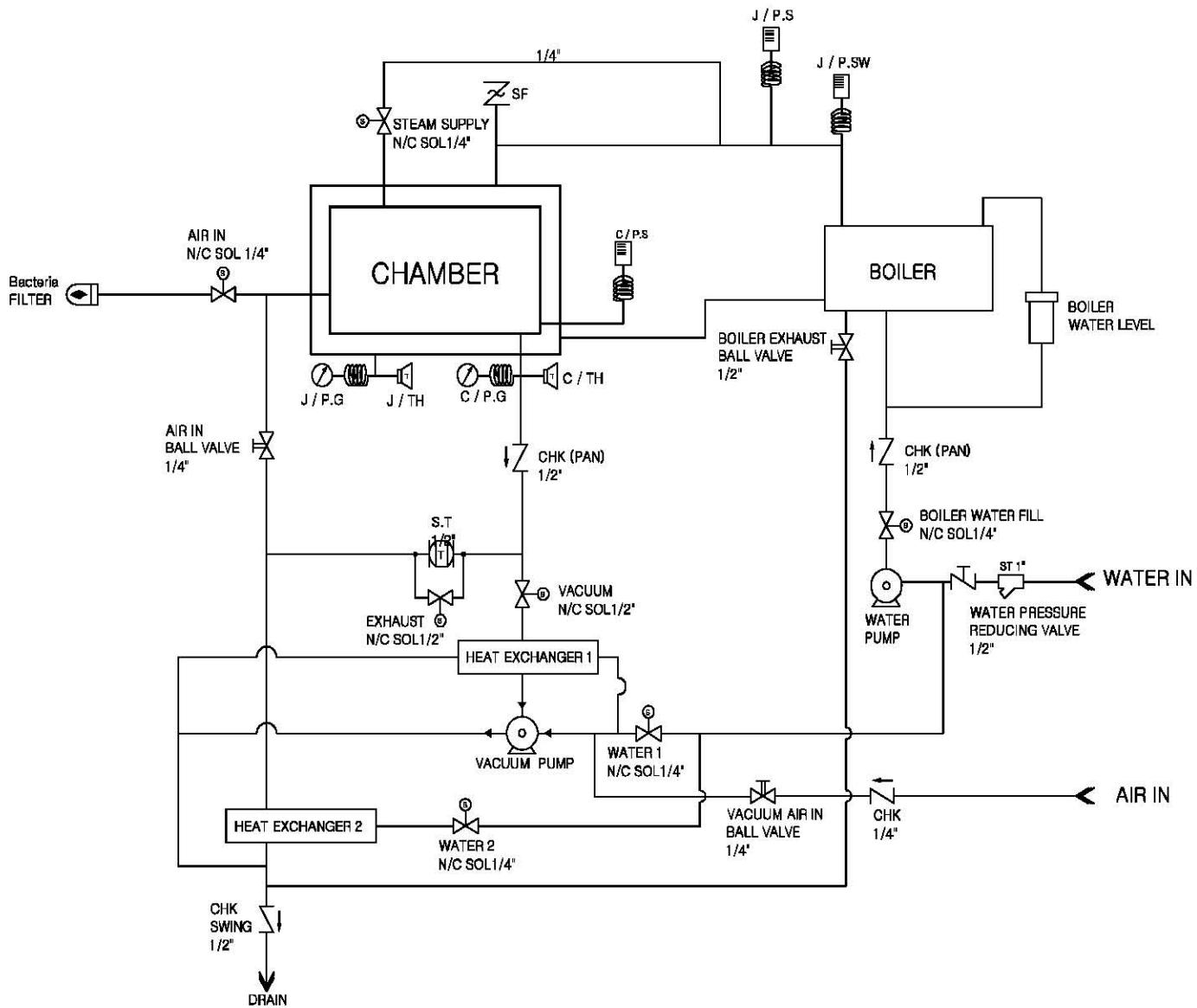
③ Chamber

④ Tray

⑤ Baffle

## 4. Piping Diagram Description

### (1) Piping Diagram (schematic)



1. **J / PG (Pressure Gauge)** is the pressure gauge that shows jacket pressure.

2. **C / PG (Pressure Gauge)** is the pressure that shows chamber pressure.

3. **J / P.SW (Pressure Switch)** is pressure switch, which controls the boiler to be turned off automatically when its pressure is above. 2.7Kgf/cm<sup>2</sup> and turned on when its pressure is below certain level of set pressure.

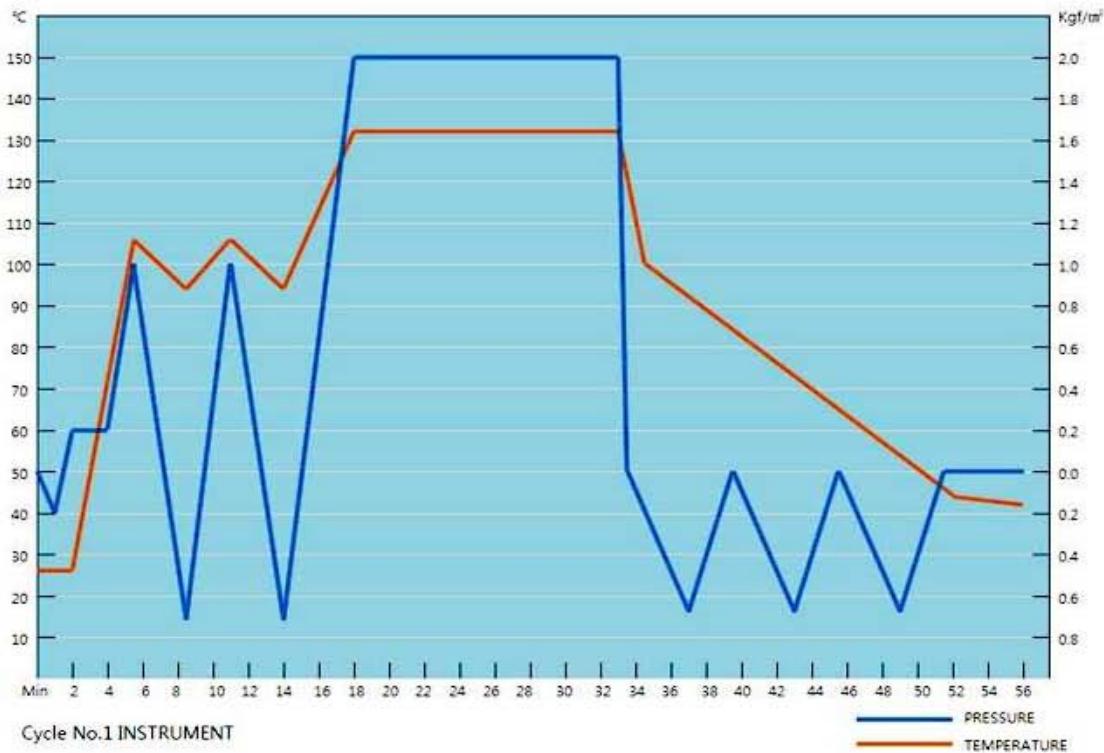
4. **SF (Safety Valve)**1 is the safety valve that reduces jacket pressure if it reaches above 2.7Kgf/cm<sup>2</sup>.

- 5. STEAM SUPPLY N/C SOL (Solenoid Valve)** is the valve that supplies steam from jacket to chamber.
- 6. EXHAUST N/C SOL (Solenoid Valve)** is the valve that releases the steam inside the chamber.
- 7. WATER 1 N/C SOL (Solenoid Valve)** is the valve that supplies water to Vacuum Pump and HEAT EXCHANGER 1.
- 8. VACUUM N/C SOL (Solenoid Valve)** is the valve that delivers air, water and steam to Vacuum Pump through HEAT EXCHANGER 1.
- 9. Vacuum Pump** takes out the air, water and steam inside the chamber to make the chamber vacuum.  
As **Vacuum Pump** is water seal type, water needs to be supplied.
- 10. AIR IN N/C SOL (Solenoid Valve)** releases the vacuum. Purified air is supplied through BF(Bacteria filter), thereby releasing the vacuum.
- 11. BF(Bacteria filter)** filters out 99.99% of bacteria that are bigger than  $0.3\mu\text{m}$ .
- 12. WATER 2 N/C SOL (Solenoid Valve)** is the valve that supplies cooling water to HEAT EXCHANGER 2 that is on exhaust side.
- 13. BOILER WATER FILL N/C SOL (Solenoid Valve)** is linked with Water pump and supplies water to Boiler.
- 14. Water pump** supplies water to Boiler when BOILER WATER Level is low.  
As Boiler pressure is high, water pump is used to increase water pressure and supply water.
- 15. BOILER WATER LEVEL** is linked to BOILER and detects Boiler level.

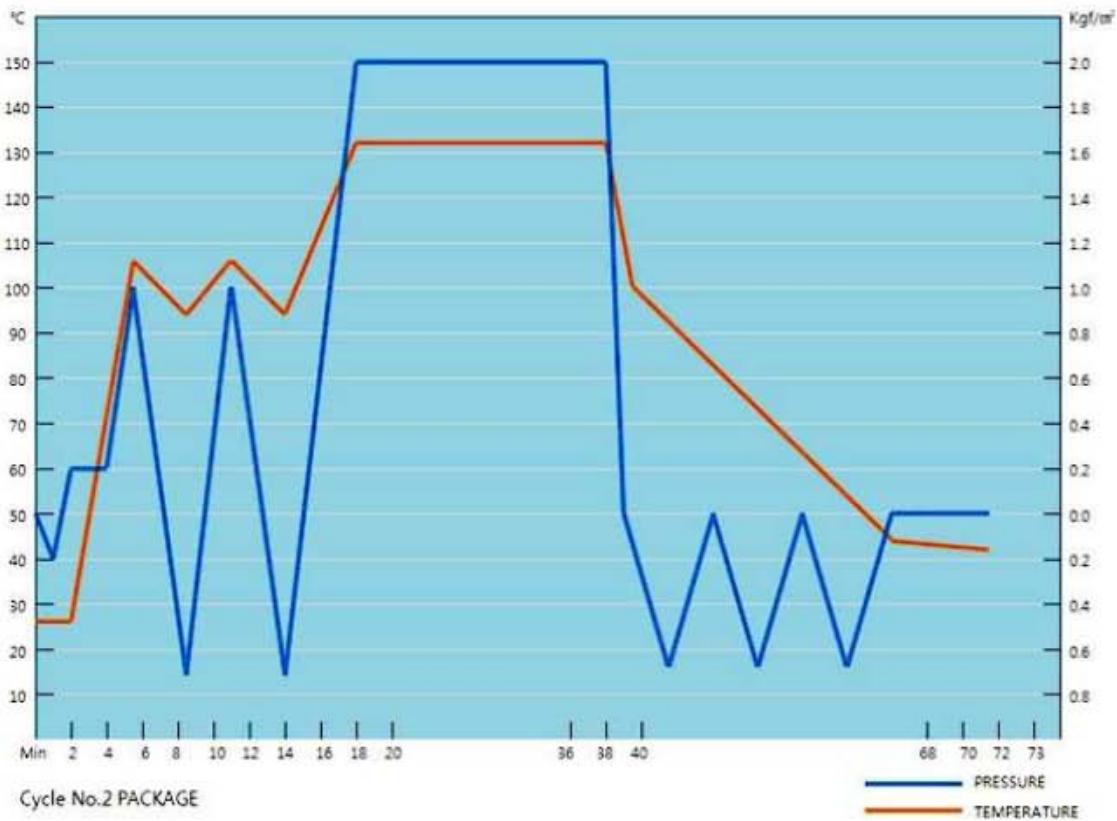
- 16. S.T (Steam Trap)** is chamber stream trap that eliminates air, unsaturated steam and condensation water and it ensures that steam is not leaked out.
- 17. C / TH(Temperature Sensor)** is the chamber temperature sensor that senses chamber temperature.
- 18. J / TH(Temperature Sensor)** is jacket temperature sensor that senses chamber temperature.
- 19. C / P.S(Pressure Sensor)** is chamber pressure sensor that senses pressure inside the chamber.
- 20. J / P.S(Pressure Sensor)** is jacket pressure sensor that senses pressure inside the jacket.
- 21. CHK(Check valve)** prevents counter current by ensuring that current flows in one direction.
- 22. AIR IN BALL VALVE (Glove Valve)** releases pressure inside the chamber when there is a problem inside the chamber by manual opening of the valve.
- 23. BOILER EXHAUST BALL VALVE (Ball Valve)** is the valve for eliminating residues that form and sink under the water when boiler is used for a long time.  
**BOILER EXHAUST BALL VALVE** should be opened weekly to get rid of residues.
- 24. VACUUM AIR IN BALL VALVE (Ball Valve)** is the valve for reducing noise of vibration pump. However, if valve is opened too wide, vacuum level can go down, causing malfunction. Therefore, open the valve at the minimum level.
- 25. HEAT EXCHANGER 1** is for cooling the heat to make sure that Vacuum Pump does not get heated when air, condensation water and steam inside the chamber are released.
- 26. HEAT EXCHANGER 2** is for cooling the heat upon exhaust of the steam.

## (2) Flow Diagram

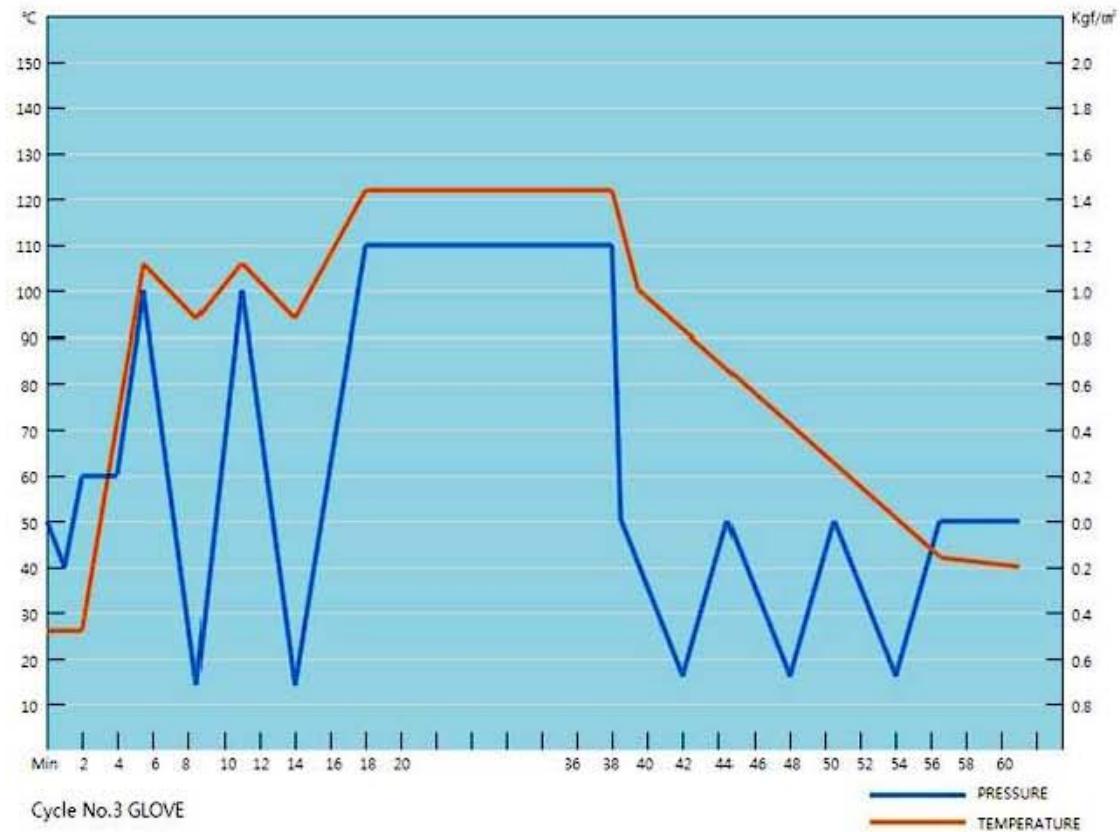
### ① Instrument



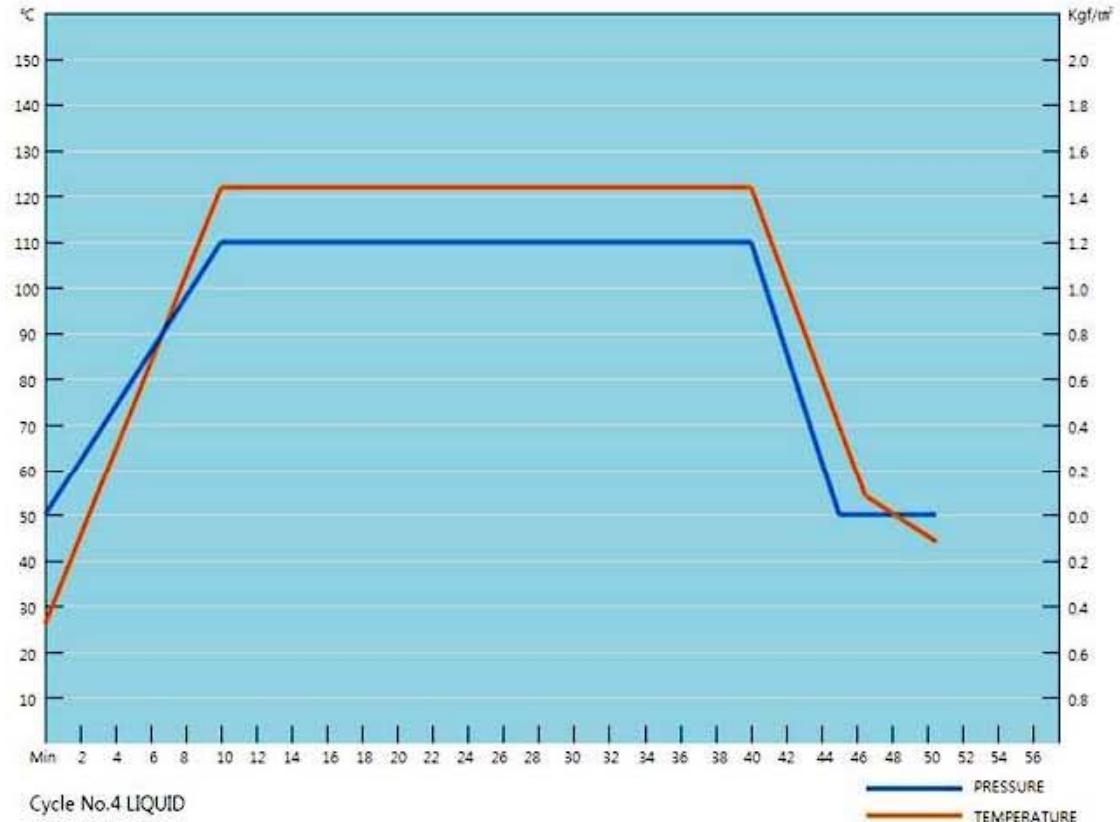
### ② Package



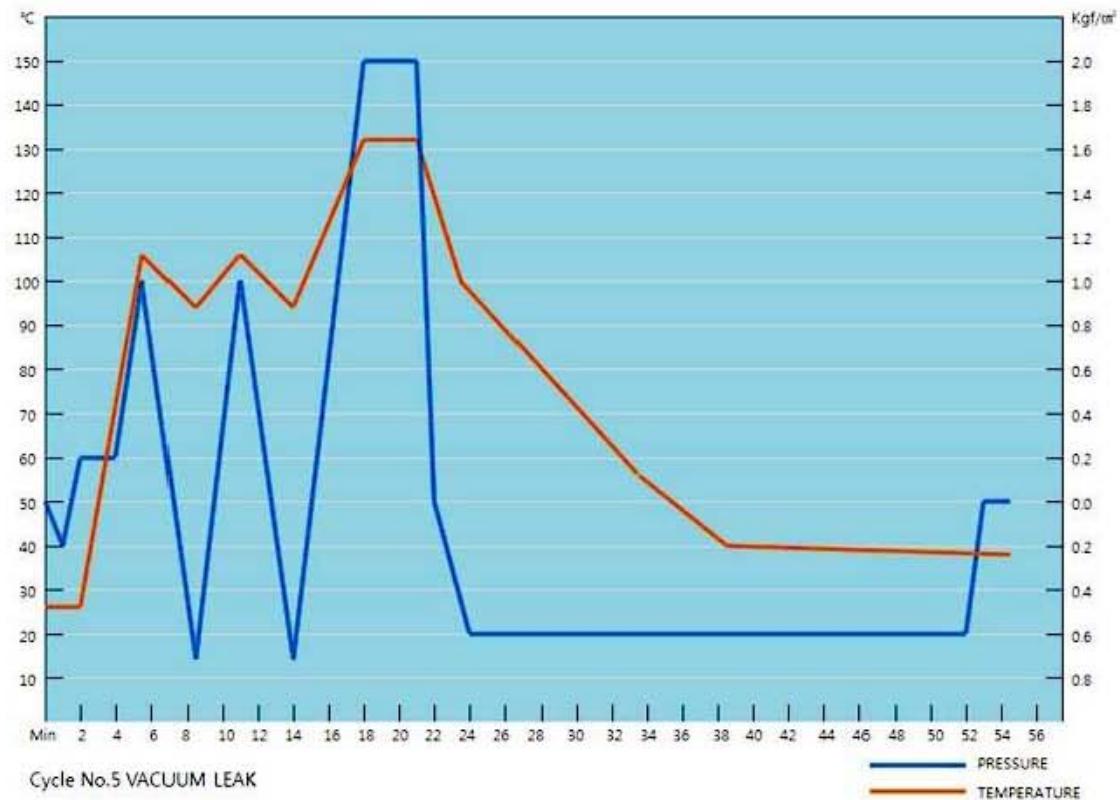
### ③ Glove



### ④ Liquid



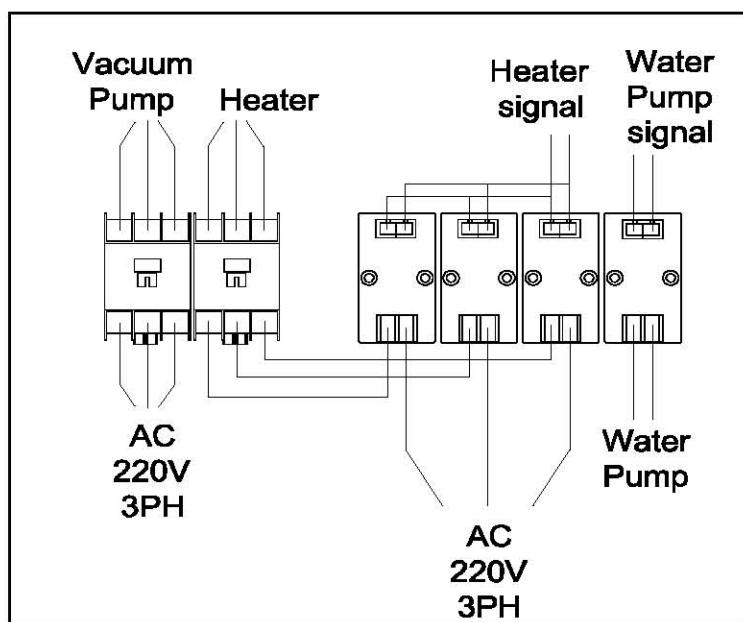
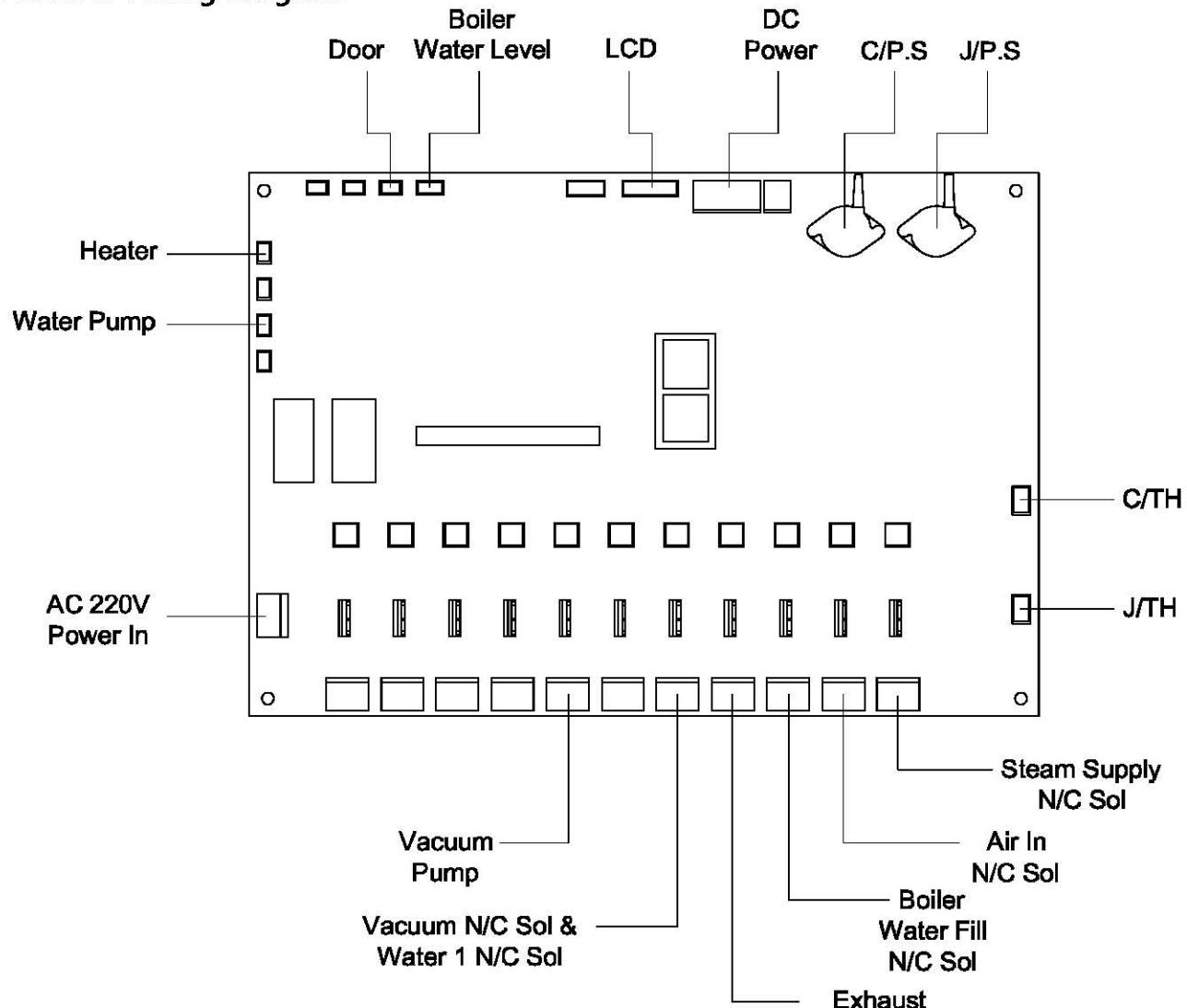
## ⑤ Vacuum Leak



(3) Flow Diagram Operation Description

Cycle Status	Operation Description
Power Switch On	When power switch, which is on the front right side of the product, is turned on, AC 220V is applied to input of Power, generating DC 5V output and initializing the program of Micro Processor. Next, [BOILER WATER FILL N/C SOL] and [WATER PUMP] operate to fill water inside the boiler. Then heater starts to work to generate steam inside the boiler.
Pre-Vacuum	When Start button is pressed to run Sterilization Cycle, according to Micro Processor, [VACUUM N/C SOL], [VACUUM PUMP] and [Water 1 N/C SOL] start working to create vacuum inside the vacuum. Next, [AIR IN SOL] operates to release vacuum. This process is repeated 3 times.
Steam Supply	When steam with certain level of pressure is generated inside the BOILER [STEAM SUPPLY N/C SOL] works to supply steam that matches the set chamber temperature
Sterilization	When Sterilization starts, [STEAM SUPPLY N/C SOL] repeats "On/Off" to make sure that chamber temperature is maintained. If chamber temperature goes below the set value, [STEAM SUPPLY N/C SOL] is turned on. If it matches the set temperature, it repeats on and off and turns itself off when it exceeds the set temperature.
Vent	When sterilization is completed, [STEAM SUPPLY N/C SOL] stops operating and Micro Processor opens [EXHAUST N/C SOL] to drain water and steam inside the chamber.
Dry	When temperature falls below 106°C during Vent, Micro processor starts Dry process. In this process, [VACUUM N/C SOL], [VACUUM PUMP] and [WATER 1 N/C SOL] operate to create vacuum inside the chamber. When vacuum is created, [AIR IN SOL] operates to release vacuum. This process is repeated.
Complete	When Dry is completed, Micro Processor stops operation of all functional parts.

## 5. Electric Wiring Diagram



Switch Box Wiring Diagram

## 6. Trouble Shooting Procedures

- ① All processes of this sterilizer proceed automatically through Micro Processor.

When there is an error during sterilization process, Micro Processor stops all processes and shows error code to the user.

and shows error code to the user. Error message will be shown as below and there will be error sound until the user resets the sterilizer.



- ② When there is an error, record the error code and press stop button to stop the sterilizer.
- ③ When there is an error during the course of sterilization, steam and water inside the chamber will be automatically drained through exhaust pipe (only when there is pressure).

\* Please make sure that the sterilizer is cool enough before inspecting it.

Error and Cause of Failure	Level 1 Action	Level 2 Action and Inspection
A1 Door is not completely closed	① When START button is pressed when door is not completely closed	① 1. Start again after completely closing the door by turning the door handle clockwise
	② Error occurs on micro switch that detects opening and closing of the door	② Check whether door micro switch connection socket on Main PCB Board is connected properly
		③ If socket is OK, then change the switch
B1, B2 Chamber, jacket temperature sensor malfunction	① Chamber, jacket temperature sensor (C/TH, J/TH) error - When there is an error on sensor itself or connection of chamber, jacket temperature sensor	① Check chamber, jacket (C/TH, J/TH) wiring
	② If the displayed temperature accurately reflects the actual temperature inside the chamber right after the error message, cool sterilizer fully and start again.	② If wiring is OK, then replace chamber or jacket temperature sensor
		③ Replace MCP3204 chip on Main PCB Board
B3,B4 Chamber, jacket pressure sensor	① Chamber, jacket pressure sensor (C/PS, J/PS) error - When there is an error on sensor itself or connection of chamber, jacket pressure sensor	① Replace MCP3204 chip on Main PCB Board
		② Replace chamber pressure sensor on Main PCB Board
C1 Water filling time exceeded	① When water is not supplied to the boiler	① Check whether water is supplied from the outside water supply line
		② Check whether BOILER WATER FILL N/C SOL is functioning properly and if not, replace it
		③ Check whether water pump is functioning properly and if not, replace it
		④ Check whether SSR that controls water pump is functioning properly and if not, change it
		⑤ If wiring is OK, replace BOILER WATER LEVEL sensor

Error and Cause of Failure	Level 1 Action	Level 2 Action and Inspection
C2 Jacket heating time exceeded	① Jacket heating time exceeded- When jacket pressure fails to reach certain pressure	<p>① Check SSR that controls boiler heater is functioning properly</p> <p>② Check whether power is supplied to the boiler</p> <p>③ Check whether overheating sensor that controls overteating of boiler is functioning properly</p> <p>④ Check whether magnet switch that controls overheating of boiler is functioning properly and if not, replace it</p> <p>⑤ Check whether overheating sensor that controls overteating of boiler is functioning properly</p>
D1 Vacuum not created inside the chamber	① When pressure inside the chamber does not reach -100mmHg within 15MIN during Pre-Vacuum cycle	<p>① Check power of vacuum pump</p> <p>② Check whether enough water is supplied to vacuum pump</p> <p>③ Check whether vacuum pump is functioning properly and if not, replace it</p> <p>④ Check whether magnet switch that controls vacuum pump is functioning properly and if not, replace it</p> <p>⑤ Check whether VACUUM N/C SOL is functioning properly and if not, replace it</p> <p>⑥ Check whether there is water leakage in chamber and on piping</p>
E1 Sterilization temperature deviation	① Temperature deviation - When chamber tempearaure is not within the range of set temperature of -0 ~+5°C during sterilization cycle	<p>① Check temperature and pressure of jacket</p> <p>② Check whether STEAM SUPPLY N/C SOL is functioning properly</p> <p>③ Check by disassembling steam trap (ST)</p> <p>④ Check whether there is water leakage in chamber and on piping</p>

Error and Cause of Failure	Level 1 Action	Level 2 Action and Inspection
E2 Exhaust failure	① When chamber pressure fails to reach 0.1Kgf/cm <sup>2</sup> within 15MIN exceeding exhaust time	① Check whether EXHAUST N/C SOL is functioning properly
F1 Chamber overheating	① When chamber temperature is 150°C or above for more than 1 MIN	① Check whether STEAM SUPPLY N/C SOL is functioning properly ② Check chamber temperature sensor (C/TH) wiring ③ If wiring is OK, replace chamber temperature sensor ④ Replace MCP3204 chip on MAIN PCB BOARD
F2 Chamber over-pressure	① When chamber pressure is 2.5Kgf/cm <sup>2</sup> or above for more than 1 MIN	① Check whether STEAM SUPPLY N/C SOL is functioning properly ② Check chamber pressure sensor (C/PS) wiring ③ If wiring is OK, replace chamber pressure sensor ④ Replace MCP3204 chip on MAIN PCB BOARD
F3 Jacket overheating	① When jacket temperature is 150°C or above for more than 1 MIN	① Check SSR that controls boiler heater is functioning properly ② Check whether magnet switch that controls overheating of boiler is functioning properly ③ Check wiring of jacket temperature sensor and if it is OK, replace jacket temperature sensor ④ Replace MCP3204 chip on MAIN PCB BOARD

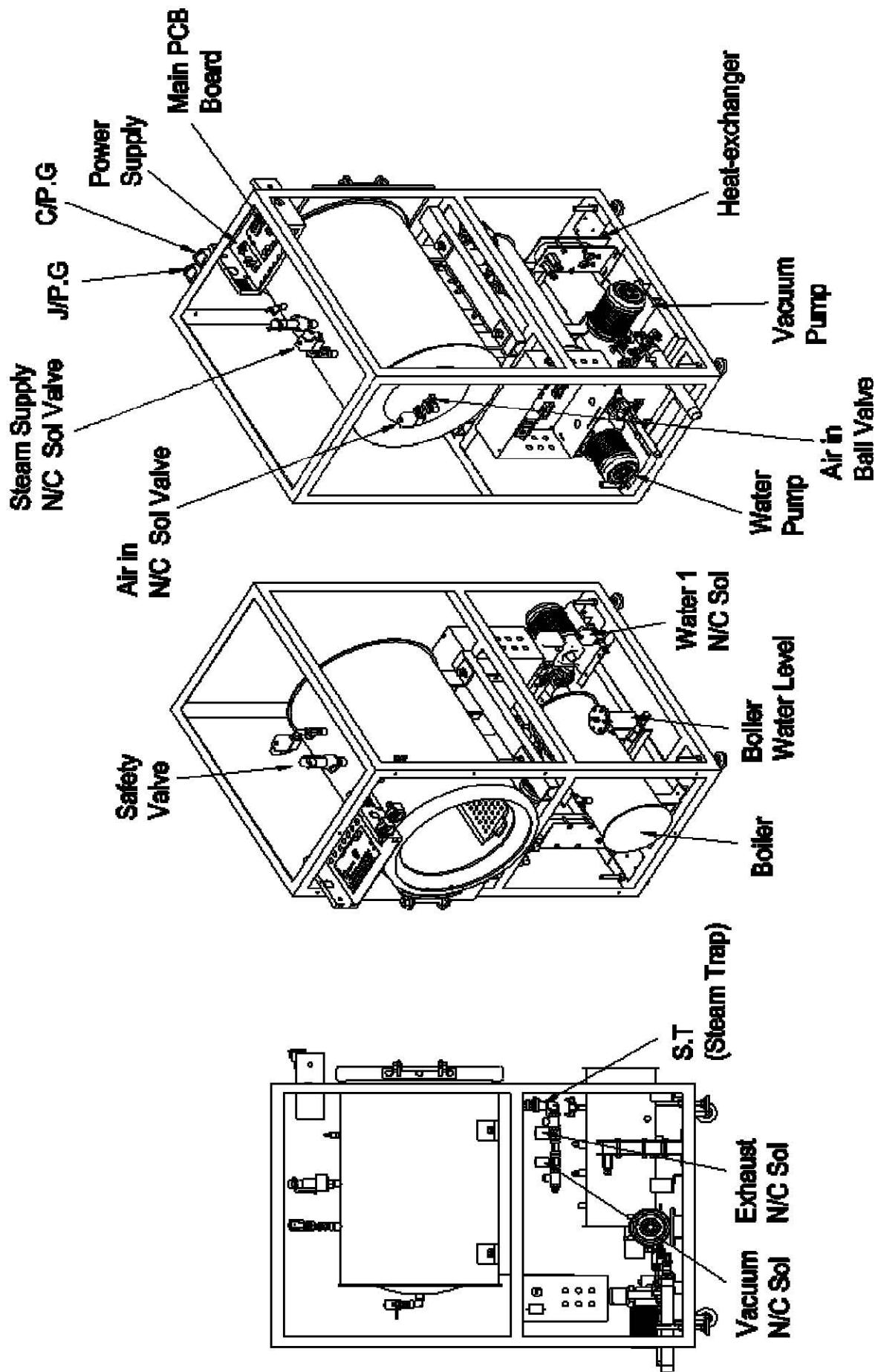
Error and Cause of Failure	Level 1 Action	Level 2 Action and Inspection
F3 Jacket over-pressure	① When jacket pressure is 3Kgf/cm <sup>2</sup> or above for more than 1 MIN	① Check SSR that controls boiler heater is functioning properly ② Check whether magnet switch that controls overheating of boiler is functioning properly ③ Check wiring of jacket pressure sensor and if it is OK, replace jacket temperature sensor ④ Replace MCP3204 chip on MAIN PCB BOARD
G1 Vacuum leak test failure	① Vacuum leak test failure	① Check whether there is water leakage in chamber and on piping



## CAUTION

- Make sure that this sterilizer is cool enough before rerunning it.
- When this sterilizer is disassembled for repair or inspection purposes, technician from manufacturer or dealership should reinstall it.  
**Users should not arbitrarily modify, change or disassemble this sterilizer.**
- When there is an error, level 1 action can be taken by users but level 2 action and inspection should be taken by special technician.

## 7. Names of Parts



## **8. Product Maintenance and Installation**

### **① How to maintain**

- a. Remove all the foreign material on Tray, Chamber and inner side of the door using brush (plastic) or washing sponge.
- b. While power is on, check whether display is functioning properly.

### **② Weekly maintenance**

- a. Clean Door Gasket and the surface where gasket can touch on Chamber Flange using washing sponge.
- b. Open water supply valve of the boiler, remove water inside the boiler and close it.

**CAUTION :** Follow the above procedure while power is turned off.

Watch out for skin burns due to boiler heat.

Make sure that boiler pressure is set at 0.

- c. Check whether solenoid valve and water pump of each part are functioning properly by running self test.

### **③ How to maintain each part**

#### **a. Chamber**

Chamber should be cleaned before running sterilizer. Wipe out the chamber using cotton cloth. Do not use cleaning equipment that have metal in them such as metal cleaning ball or brush. Same is true for tray.

Sewage inside the filter on the chamber floor should be thrown away after sterilization.

#### **b. Door**

Make sure that gasket is properly installed before running sterilizer.

If gasket is not properly installed, steam can leak since sealing is not completely done. Also foreign material on the gasket can also lead to damage such as tearing to the gasket.

#### **c. Water pump**

Cleaning is not necessary since water pump supplies water to steam generator. However, whether it is functioning properly should be checked once a week. Also when sterilizer is kept and used outside or in places where there is no

heating take special care during winter to prevent the pipe freeze and burst.

d. Safety valve

When safety valve opens under the pressure below the setting value or does not open even in higher than setting value, do not try to repair the valve but contact maintenance center or dealership and replace the old with a new valve.

Before replacing it, make sure that Main S/W is turned off, jacket pressure is 0 and cooled off enough. Sterilizer usage pressure is  $1.1\text{kgf}/\text{cm}^2 \sim 2.1\text{kgf}/\text{cm}^2$  and setting pressure of safety valve is  $3.5\text{ kgf}/\text{cm}^2$ .

e. Solenoid valve

This sterilizer is embedded with solenoid valve and this plays a very important role in sterilization process. Therefore, malfunction of even one of the solenoid valves can lead to error or wrong operation, failing to generate expected effect.

As such, make sure that inside the chamber is cleaned completely so that cloth or other waste does not get into solenoid valve.

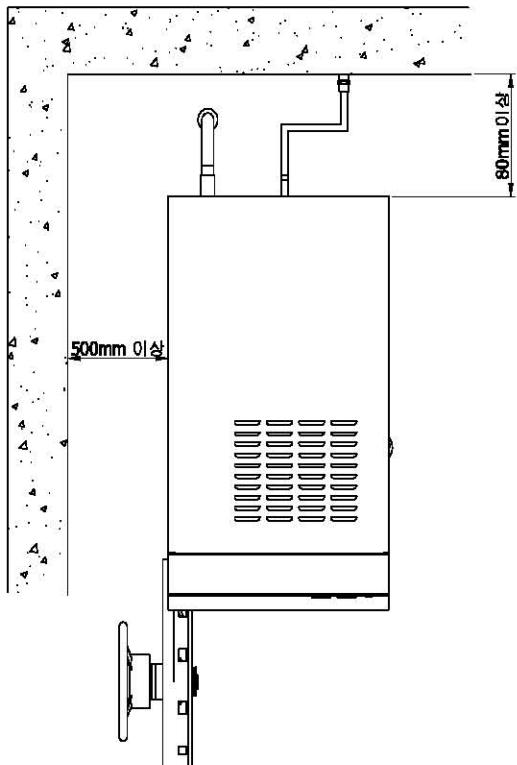
#### ④ How to install

Sterilizer should be installed in places where hospital separately designated or Central Supply Room (CSR).

Be careful about sterilizer pipe freeze and burst during winter if sterilizer is to be installed in places other than CSR.

In particular, make sure that exhaust line freeze and burst is prevented.

Tools needed for installation - Tools for electric wiring, piping, horizontal and vertical ruler.



Tools needed for installation - Electric Capa 220V (3phase 3line type, overcurrent circuit breaker that meets rated capacity) and rubber insulation cable  
Water supply and drain - 1/2" ball Valve 1ea, Nipple, wrinkled pipe1/2", 3/4" 1m

Using the levelling foot on the bottom, level the left and right side of the sterilizer. Once left and right sides are levelled, use levelling foot again to level the front and back.

Make sure that back side is little higher than the front side.

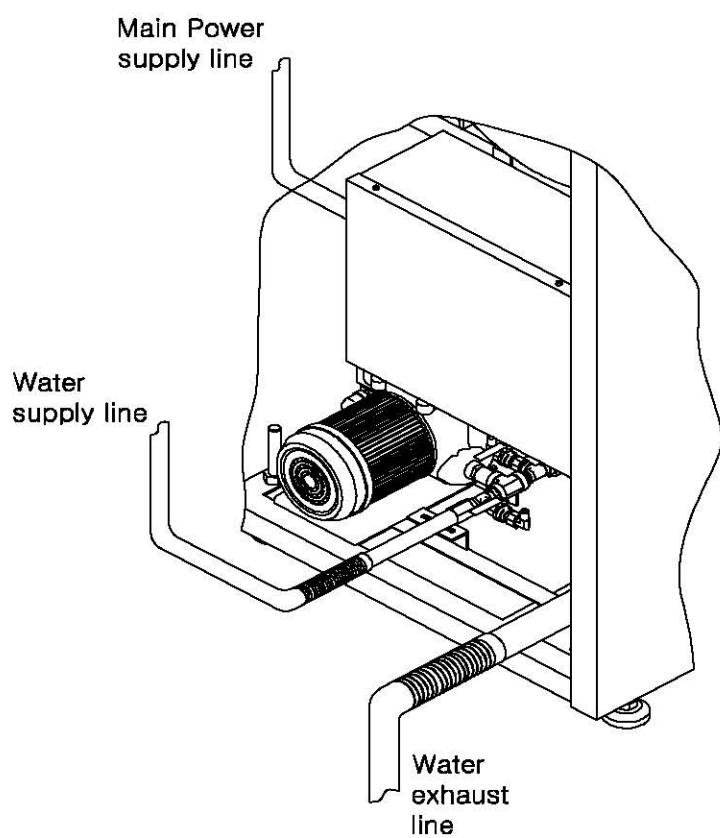
As SS105 and SS210 have embedded boiler inside, electric condition should meet rated current.

As SS105 and SS210 have embedded boiler and water supply pump, pipe material for exhaust line should be metal(steel pipe or white pipe) and its size should be 5/4"~2".

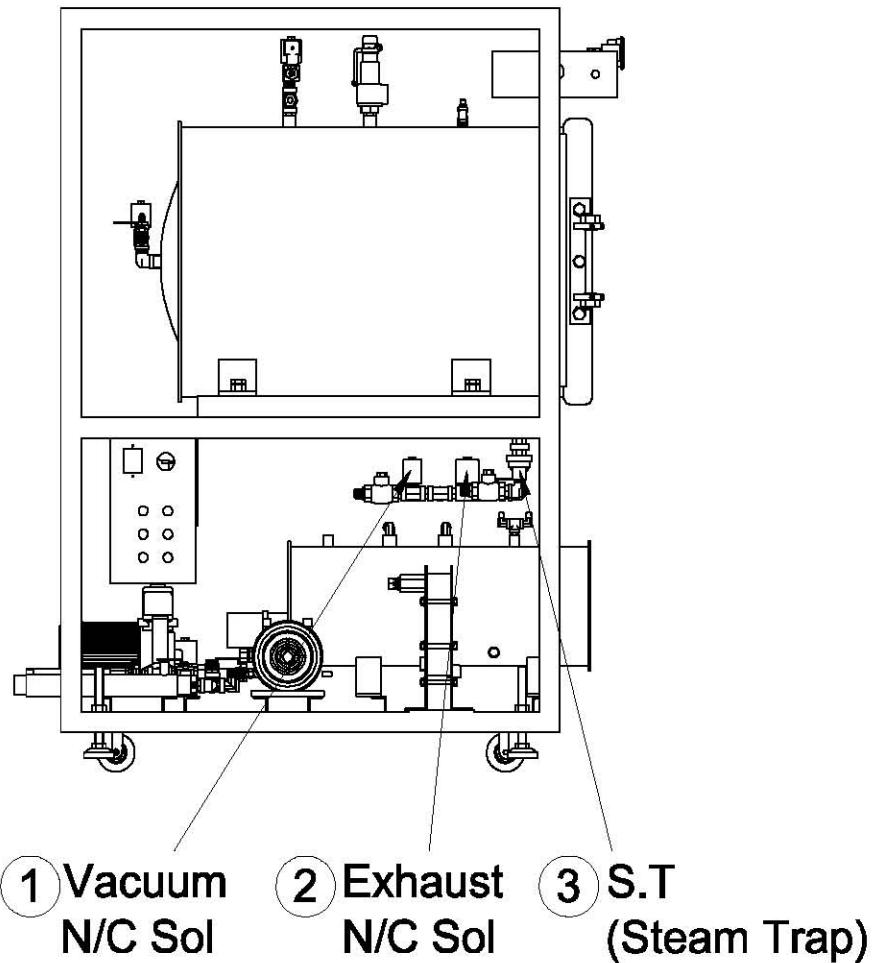
Same is true for water supply line as well (Do not install PVC pipe for water exhaust line).

If exhaust line should be inevitably installed outside, make sure that the exhaust line do not freeze and burst during winter.

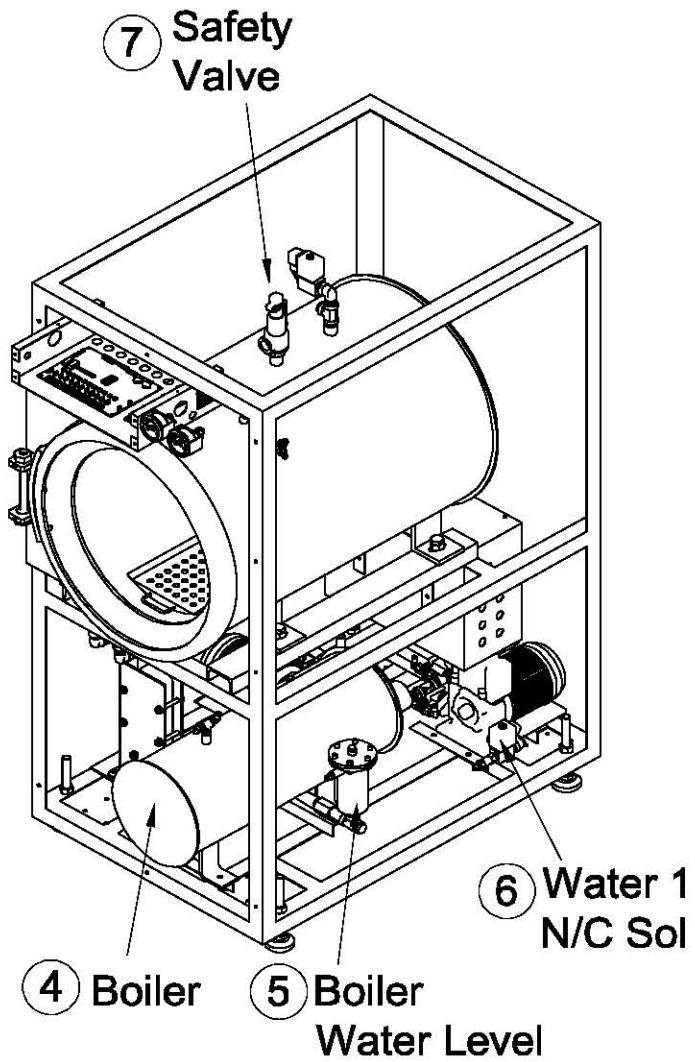
Hospitals, located in places where water quality is bad, should install filter before water supply line of sterilizer.



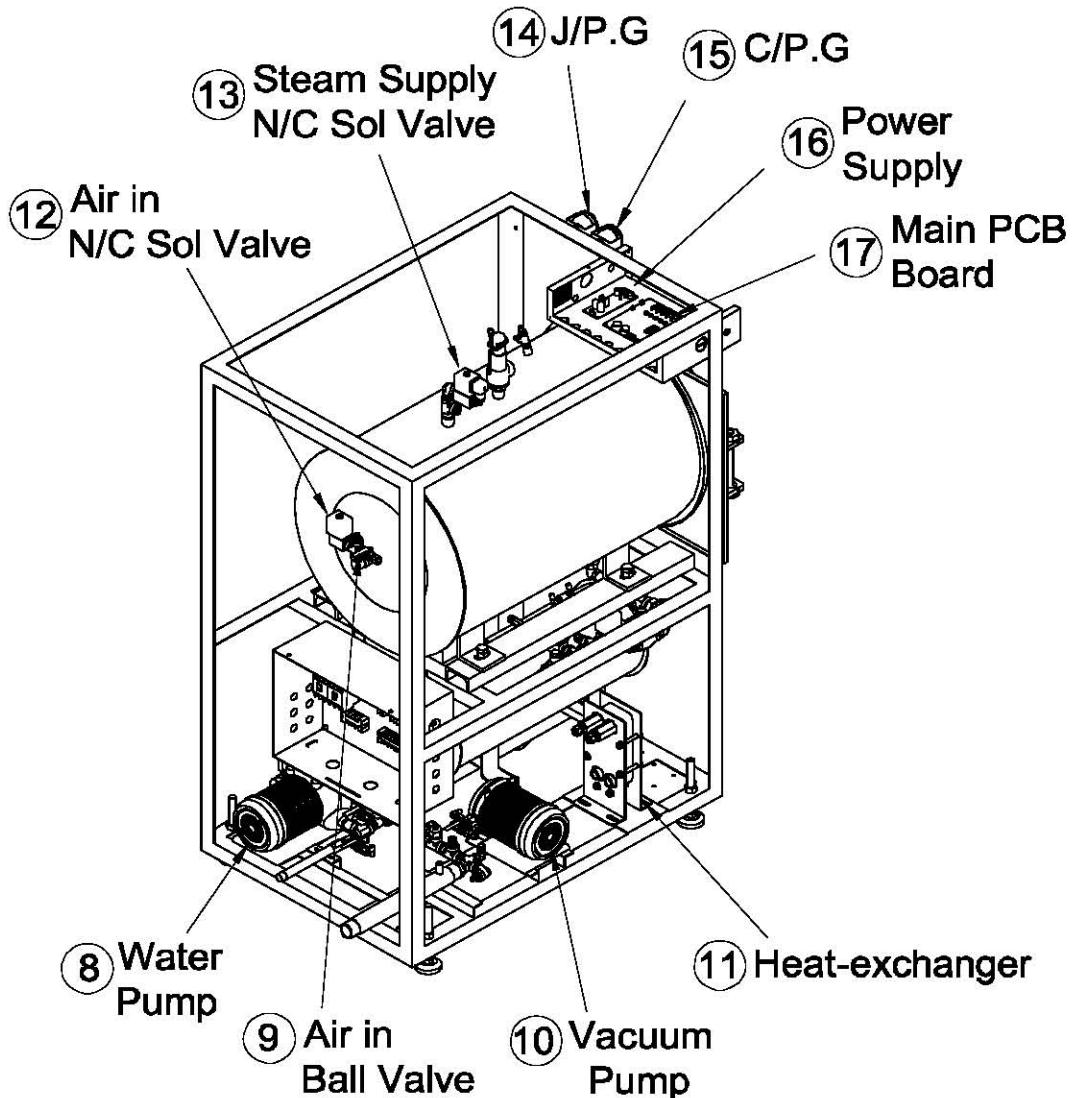
## 9. Part list



No.	Part name	Part no.	Specification	Remark
1	Vacuum N/C Sol	AOS-SS00-B-051	1/2"	
2	Exhaust N/C Sol	AOS-SS00-B-051	1/2"	
3	Steam Trap	AOS-SS00-P-080	1/2"	



No.	Part name	Part no.	Specification	Remark
4	Boiler	AOS-SS00-P-083	-	STS316
5	Boiler Water level	AOS-SS00-P-084	-	
6	Water N/C Sol	AOS-SS00-B-051	1/4"	
7	Safety Valve	AOS-SS00-P-085	1/2"	



No.	Part name	Part no.	Specification	Remark
8	Water Pump	AOS-SS00-B-052	PW-350M	WILO
9	Air in Ball Valve	AOS-SS00-P-064	1/4"	
10	Vacuum Pump	AOS-SS00-B-054	DWV-400-DC	DOOVAC
11	Heat exchanger	AOS-SS00-P-082	-	
12	Air N/C Sol Valve	AOS-SS00-B-051	1/2"	STS316
13	Steam Supply N/C Sol Valve	AOS-SS00-B-051	1/2"	
14	J/P.G	AOS-SS00-P-028	D50*4-76	
15	C/P/G	AOS-SS00-P-028	D50*4-76	
16	Power Supply	AOS-SS00-B-028	12V / 5V	
17	Main PCB Board	AOS-SS00-B-046	-	