

# **Steam Sterilizer**

## **Operation Manual**

**Please read the manual carefully, operate it according to the manual strictly, and avoid any hazard!**

**This manual applies to SUN8-III、SUN12-III、SUN16-III、SUN18-III、SUN23-III (M)Steam Sterilizer.**

**File No: MTQM/C1-7.5.1-05-02**

**REV1607ER**

# Content

1、 General Introduction .....	1
2、 Application Scope .....	1
3、 Tech. Parameter.....	2
4、 Diagram Specification .....	3
5、 Installation .....	3
6、 Packing accessory.....	5
7、 Display and keypad description .....	6
8、 Emergency Condition.....	9
9、 Maintenance and Service.....	11
10、 Transportation and Storage.....	12
11、 Attention.....	13

## Appendix:

NO.1: The working status display table

NO.2: Circuit diagram of sterilizer

NO.3: Steam loop

NO.4: BD test method

# Steam Sterilizer

## 1. General Introduction

This Steam Sterilizer is a precision instrument specializing in the operation occasion in need of simple, fast and efficient sterilization by the doctor or his/her assistants, and the doctor shall take the responsibility for such work.

This Steam Sterilizer is specially designed for the occasions in use of frequent sterilizations. It is equipped with the microprocessor for intelligent control and man-machine interface for convenient operation. With the distinctions in displaying parameter and condition actively, evaluating malfunction automatically, shutting off for self-protection automatically in case of excessive temperature and pressure, this type Steam Sterilizer is reliable product in sterilizing.



1. Printer      2.USB      3.Used water outlet      4. Used water outlet  
5.Power switch      6. Power source socket      7. Fuse

## 2. Application Scope

This machine can be applied in sterilizing for the tooth device, operation device, Sanitary Material and other heat-resisting articles existing in the Dept. of Stomatology, Ophthalmology and lab.



When Choose 121 °C sterilization procedure, the highest temperature in cavity body is 125 °C. When choose 134 °C sterilization procedure, the highest temperature in cavity body is 138 °C.



This product is not suitable for sealing, not resistant to high temperature products sterilization.



This product is not suitable for airtight liquid class sterilization



The product is prohibited to sterilized the liquid which were sealed into glass bottle or glass vessel, Because when operating, the change of temperature and pressure may cause the liquid bottle burst, so that endanger the safety of the

person and equipment.



The chloride ion is an important factor of stainless steel corrosion damage. If use this sterilizer sterilization items containing chlorine ion, must rinse sterilization indoor wall every day, in order to avoid deposition on internal stainless steel corrosion of chlorine ion, delayed the service life of the product.



The product is only suitable for high temperature resistance, high humidity medical appliance sterilization box, cannot be used with vaseline oil and powder of sterilization, etc.

### 3. Tech. Parameter

Chamber size of the Steam Sterilizer(Diameter X Depth) 8L... 170mmX310mm

Chamber size of the Steam Sterilizer (Diameter X Depth) 12L...200mmX360mm

Chamber size of the Steam Sterilizer (Diameter X Depth) 16L...230mmX360mm

Chamber size of the Steam Sterilizer (Diameter X Depth) 18L...249mmX355mm

Chamber size of the Steam Sterilizer (Diameter X Depth) 23L...249mmX460mm

Rated Voltage.....230~, 50Hz

Rated Power.....1800VA ☐ 2300VA ☐

Sterilizing (Pressure/temp.).....100-120KPa/121° C

200-220KPa/134° C

(Both of above are Under Standard Atmospheric pressure)

Fuse-Melting pipe..... 250V/T 15A

Capacity of water tank.....2L

Probable water consumption of one cycle ..... .0.4L

Environment temperature of operate.....0-40° C

Type of sterilization cycles.....Class B

Wire heat resistance level.....70° C

N·W 23L.....53kg




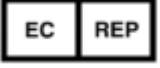


N·W 18L.....48kg

N·W 16L.....47kg

N·W 12L.....46kg

N·W 8L..... 44kg

## 4. Diagram Specification

Symbol	Meaning
	CAUTION
	Warning: dangerous voltage
	CE MARKING, with notified body number 0197
	WEEE MARKING
	MANUFACTURER
	DATE OF MANUFACTURE
	AUTHORISED REPRESENTATIVE IN THE EUROPEAN COMMUNITY
	SERIAL NUMBER
	CONSULT INSTRUCTIONS FOR USE
	Earthing

## 5. Installation

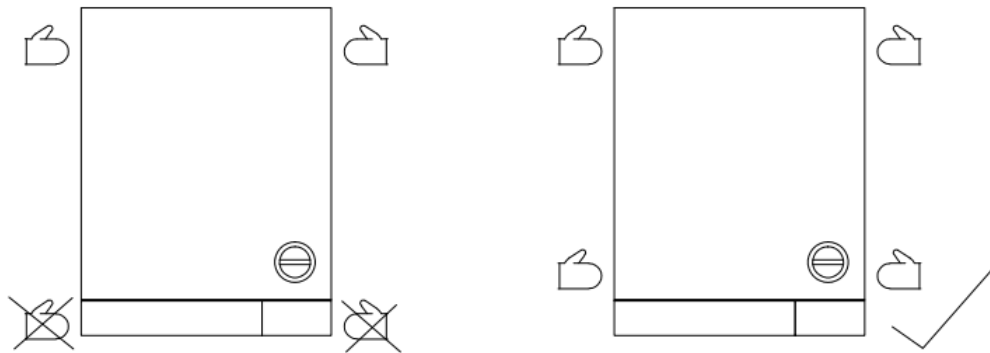
### 5.1 Remove the packing

Dismantle thin film, open the packing, get the equipment from the packing



Hauling precautions:

- forbid lift up door
- forbid lift up legs of machine
- forbid Rollover or upside down
- Hauling sketch map is as follows:



5.2 The air-cooling window attached to the exterior surface of the Steam Sterilizer shall be non-clog by dust or articles, and the Steam Sterilizer shall working in the proper air flowing environment, and no dangerous flammable and explosive gas.

Equipment normal working conditions:

environment temperature:  $+5 \sim +40^{\circ}\text{C}$

Relative humidity:  $\leq 85\%$

barometric pressure:  $70\text{kPa} \sim 106\text{kPa}$

minimum brightness:  $215 \pm 15 \text{ lx}$ ,

5.3 The Steam Sterilizer shall be installed on the horizontal working base. Put machine on the table, refer to specifications, table must be able to bear the weight of the machine. The clearance between the outside of Steam Sterilizer and the around articles shall be 10cm as retained, and the top surface shall be 20cm retained. Used to exhaust or drain.

5.4 The 2 front feet of Steam Sterilizer can be adjusted the height, please ensure the front of machine slightly higher than the back.

5.5 The machine will be hot during working time, keep it away from any combustible materials!



The equipment must be far away from flammable items

5.6 After placing the Equipment


Check whether the power supply is in conformity with the requirements: 230 ~, 50 hz, voltage fluctuation range


$\pm 10\%$ , power supply  $\geq 2300 \text{ VA}$  (23L), 1800VA (8L & 12L & 16 & 18L).

In order to ensure the safety of the person and equipment, must be equipped a ground wire, the equipment casing and the ground wire of the control cables must be connected to external ground wire reliable.



Must use the attached plug, do not change it.

 The equipment must be reliable grounding.

 Must use distilled water

Attention!

Through poor conditions of the electrical MAINS, shortly voltage drops can appear when starting the EQUIPMENT. This can influence other equipment (eg. Blinking of a lamp). If the MAINS-IMPEDANCE  $Z_{max} \leq 0.114 \text{ OHM}$ , such disturbances are not expected. (In case of need, you may contact you local supply authority for further information.)

Hinweis!

Beim Anlaufen (Starten) dieser Ausrüstungen kann ein kurzzeitiger Spannungseinbruch auftreten, insbesondere bei schlechter Netzqualität. Diese Einbrüche können andere Geräte beeinflussen (z.B. Flimmern einer Lampe). Bei einer Netzimpedanz  $Z_{max} \leq 0.114 \text{ OHM}$  sind solche Störungen nicht zu erwarten. (Bitte kontaktieren Sie Ihre lokales Energieversorgungsunternehmen für weitere Informationen).

### PREPARATION BEFORE OPERATION

Before operation, please connect well to the power source. Connect the power source hole under the back left side of the Steam Sterilizer and the power socket by the attached plug. Press the green switch right bottom corner of the front side, when the indicator light is on, it means that Steam Sterilizer get through with the electric power, and the process then is in initialization status and showing “LD” being on the screen. At this time the Steam Sterilizer is not heating.

## 6. Packing Accessory

1.	Draining pipe	1 pc
2.	Mesh tray	2-3 pcs
3.	Plug	1 pc
4.	Bracket	1 pc
5.	Manual holder	1 pc
6.	Fuse	2 pcs
7.	Operation manual	1 pc
8.	Measuring cup	1 pc
9.	Sealing ring	1 pc

## 7. Display and keypad description



### 7.1 Control Panel

1) Temperature display window

Displaying the temperature inside the chamber. Unit: °C

2) Status/ Error code number display window

Applied for displaying kinds of status of the autoclave during its working time. See more details in “Appendix working status display form”. When alarm occurs to the autoclave, the digital pipe of the display will show the alarm code number, the user can find out the malfunction part. (Once the malfunction occurring to the autoclave, please contact the service center or distributor immediately).

3) Air pressure display window

Displaying the air pressure inside the chamber. Unit: KPa

4) Door lock indicator light

It is the light for door closing well, can press START to working. or during the working cycle, the door were not opened.

5) Distilled water tank shortage light

It's the light indicator for alarming the shortage of water in the distilled water tank and reminding for filling distilled water.

6) Used water tank full light

It's the light indicator for alarming the full of the waste water tank, and reminding for draining used water.

7) UP select key

When in program Setting, the UP key were used to indicate the parameter data up.

8) SET: date, time, language, custom setting key


Press SET to enter the advanced settings status. Press UP and DOWN button to select the Date or Time, press SET again to choose the data which you want to set,



use UP and Down to change the data, then press START to quit and save the setting.

Press SET to enter the advanced settings status, press SET again to set the custom setting of the working cycle, like the Temperature, Sterilizing time..., use UP and Down to change the data you want to set, then press START to quit and save the setting.

9) Door Status light  (auto-door lock only, manual door is invalid)

10) DOWN select key   
When in program Setting, the down button were used to change the parameter data down.

11) PROGRAM key 

Press PROGRAM, use UP and DOWN to select program, the temperature window display sterilizing temperature of selected program; Pressure window display sterilizing pressure of selected program; The Status window display selected cycle code as below:

“-1”: 134°C UNWRAPPED

“-2”: 134°C WRAPPED

“-3”: 121°C COTTON

“-4”: 121°C PLASTIC

“-5”: 134°C PRION

“-6”: Custom set cycle

“-7”: BD test

“-8”: Helix test

“-9”: Vacuum test

Press START to confirm the selected program.

12) START Key 

Press the Starting button for starting the sterilizing process or save the setting.

## 7.2 Fill & drain water

When you install the Steam Sterilizer for the first time, after turn on the switch, then The machine would displaying lack of the source water. Then you need to use the measuring cup to fill distilled water from the top inlet around 1500ml for the first time, next time do not filling the water too full.

When the machine displaying the used water full, after sterilizing, please drain used water out in time.

Please clean the brass filter inside the chamber, or it would effect the pressure releasing during the sterilization. Please clean the filter in the same time with you draining the used water.



**Note: Be sure to fill distilled water .**

1. Before filling the distilled water, you must turn on the switch of the power!
2. Please fill the distilled water only after finish working!

### 7.3 Function description

Vacuum sterilizer divided into the following process: preheating process;the vacuum step-up process; sterilization process; exhaust drying process; the pressure balance process.

#### 7.3.1 preheating process:

Select the program firstly, then close the door, press start button to enter the preheating process,electrify heated steam generator heater reaches 100 °C, electrify heated the chamber wall heater to set temperature 50 °C.

#### 7.3.2 vacuum process:

Chamber wall temperature to 50 °C, when the steam generator temperature reaches 100 °C, into the vacuum heating process, open the vacuum selection valve, exhaust valve (normally on) and start the vacuum pump, 300 seconds later Close the vacuum selection valve, exhaust valve (normally on) and the vacuum pump to stop pumping the vacuum. Pot inlet valve intermittent pumping power, as steam generator to generate steam. If the system is set up one pre-vacuum, the pressure rise to +50 kPa until the pot stops pumping, open the drain valve to drain the exhaust 0.0kPa to close drain valve, intermittent steam generator to pump water to generate steam, when the pot the temperature reaches the set value, the end of the vacuum and transferred to sterilized itinerary. If the system is set three times pre-vacuum, then when the pressure inside the chamber rise to +50kPa ,end the first pulse. Start the pump again, begin the second pre-vacuum process.

#### 7.3.3 Sterilization process:

This trip is insulation packing process, when the pot temperature dropped to the set sterilization temperature of +0.5 °C , the pump starts pumping water to the steam generator, the pot temperature rise to the set sterilization temperature of +0.9 °C ,open the exhaust exhaust valve, allowing the pot temperature is kept between the set sterilization temperature +0.3 °C to the set sterilization temperature +0.9 °C.

#### 7.3.4 Exhaust drying process:

When the sterilization time, reduced to zero, into the exhaust stroke dry, open the drain valve to drain the pressure reduced to +0.0 then the vacuum pump to start. When the drying time only 3 minutes, open the intake valve to vacuum drying.

#### 7.3.5 Pressure equilibrium process:

When the drying time is reduced to zero, turn off the exhaust, dry intake valve opens, so that the pressure to achieve and external balance, open the automatic doors, complete sterilization.

#### 7.3.6 Sterilization program is as follows:

	1	2	3	4	5
	134℃ UNWRAPPED	134℃ WRAPPED	121℃ COTTON	121℃ PLASTIC	134℃ PRION
Sterilizing temperature	134℃	134℃	121℃	121℃	134℃
Sterilizing pressure	210KPa	210KPa	110KPa	110KPa	210KPa
Vacuum times	1	3	3	1	3
Sterilizing time	5	5	20	20	25
Drying time	15	18	20	20	20

7.4 Emergency exit, Long press the start key 5 s, Machine will out of sterilization procedures, meanwhile "EC" alarm

7.5 After sterilization, use manual holder to take the sterilized devices out.



Must use manual holder to take the device, and prevent scald!

## 8. Emergency Condition

During the working time, the Steam Sterilizer will automatically alarming, then release pressure, stop heating and display the error code (The definition of the error code is as the below table: error code and resolving method). It would ensure the safety of the operator if the emergency occur.

Any emergency happen, please check the warning code table for resolving the according malfunctions. If not possible to resolve, please contact the dealers. We will try our best to provide help to you in short time.

After the alarm, The machine can't work, Long press the start key, can unlock alarm.



Must wait after the pressure release to “0 Kpa” , then open the door!



Even the pressure is 0 Kpa, there is still hot steam inside the chamber,  
Operator need to take care it and prevent scald!

### Error code and resolving measures

NO	Code display	Alarm Tone	Malfunction content	Resolving Measures
1	E1	long "du"	Fault of temperature sensor inside the chamber	Inspect if anything effected the sensor or wire not connecting well or sensor was broken
2	E2	long "du"	Pressure over 240 KPa	Inspect pressure sensor or vacuum pump working
3	E3	long "du"	Fault of temperature sensor outside the chamber	Inspect the temperature sensor outside of the chamber
4	E4	long "du"	Super high inner temperature when pressure rising	Inspect inside temperature sensor or pressure sensor
5	E5	long "du"	Pressure releasing slowly	Inspect the filter inside the chamber keep it clean and no jam
6	E6	long "du"	Problem of door switch or door being opened when working	Inspect door switch or if door handle were revolved to the right MAX position
7	E7	long "du"	Fault of temperature senor on steam generator	Inspecting the temperature sensor on steam generator
8	E8	long "du"	Fail on pressure rising	Inspect water flowing road and steam leaking.
9	EH	long "du"	Steam generator not heating	Inspect connecting wire or resistance of steam generator
10	EF	long "du"	Pressure not over than 0 KPa	Inspect water pump/steam generator
11	EL	long "du"	Pressure not over than 20 KPa	Inspect if electric valve causing steam leak, or replace water pump
12	Eo	long "du"	Pressure not over than 65 KPa	Inspect if the water pump working weakly. Or replace it
13	E9	long "du"	Fail on keeping pressure and temperature	Inspect the steam leaking
14	EC	long "du"	The process interrupted artificially	Long press the start key, can unlock alarm.

## 9. Maintenance and Service



Shut off the power before service or components' replacement, and the service or replacement work shall be done by the technician.

Working environment minimum brightness to  $215 + 15$  lx.

9.1 Clean the top water tank by disinfectant or alcohol once a week.

9.2 Disinfect and clean the interior surface of the Steam Sterilizer chamber monthly.

9.3 Replace the fuse.

Fuse Type: 250V,15A



Check the parameters of new fuse is correct .

- 1) Before change the fuse, turn off the power, and must pull out the plug.
- 2) Revolve the fuse base by counter-clockwise by screwdriver to bring out the melting fuse to be replaced;
- 3) Replace the new fuse and reset the fuse base on the original position, then use the screwdriver to fasten the base by clockwise.
- 4) Check the correctness of the data of the new fuse replaced.

9.4 Clean the sealing ring periodically

The operator shall clean the sealing ring periodically for avoiding the influence to the seal caused by the dust/dirt left due to the long period use. Use the smooth cloth with distilled water to wipe the surface of the sealing ring or sealing cap gently. The user shall discharge the sealing ring for further cleaning or replacement if the air-leaking problem can not be resolved after the above process (The user shall discharge the sealing ring periodically for cleaning and inspection as recommendation by the supplier).

9.5 The replacement work for sealing ring

Tool: One flat screwdriver (No sharp edge at the head)

- 1) One hand catches the lip of the sealing ring, the other hand insert the screwdriver into the clearance between the sealing ring and the door for raise up the sealing ring.
- 2) After raising up part of the ring, you can use hand to draw the whole ring out. Wash its groove after drawing out the ring and pay attention to see whether it's spoiled or not in consideration of the necessity of replacement.
- 3) Put back the ring to the original door groove after cleaning. Most Important: the inset work must be done equably to the groove During the installation, the laid four equal points of the ring must be inserted to the groove firstly, later for the same work for the remaining segments of the ring. After finishing, press the sealing ring equally by the force of hand.

4)Note: The inner circle of the ring may be raised up when insert the ring into the groove. Please press it to the groove by using the screwdriver carefully.


Shut off the power and cooling the Steam Sterilizer sufficiently before inserting the ring for avoiding scald.

#### 9.6 Check the safety valve

In order to prevent the safety valve in the blocking state, Under normal use, allow the steam pressure release through it once a month.

1)operation sterilizing procedure

2)When the pressure in the sterilizer reaches 100 kpa, Pull rings on safety valve, make the safety valve open,about 2S, if steam jet, the safety valve work is normal. If not, the safety valve need for effective inspection or replacement

 Pull rings on safety valve will steam jet, It is best to use tools such as screwdriver when pull. Do not use finger directly, Operator also need keep away from it , prevent burns!


Replace the safety valve:

 This operation is limited to the professionals

1) Loosen the set screws of the safety valve, take the safety valve down from the panel,

2) replace with a qualified safety valve (must provide by manufacturers).

3) Test a sterilization process

 The machine maintenance and replacement of electrical components must cut off power supply first. And only the manufacturer or professional person designated by the manufacturer can operate

## 10. Transportation and Storage

10.1 The preparatory work before transportation and storage, Shut off the power, draw out the plug and cool the autoclave down.

#### 10.2 Draining water

Empty the water storing tank and the used water tank; The terminal side of the attached pipe with no connecting joint shall be inserted into the water exiting joint pipe. As the above picture showing, 3 is the water exiting mouth for used water

collecting tank, 4 is the water exiting mouth of the water storing tank. Revolving the water exit button by anticlockwise direction so as to release the water.

10.3 The autoclave shall be transferred and stored with the below conditions:

Ambiance temperature: -40°C -+55°C

Relative humidity:  $\leq$  85%

Atmospheric pressure: 500HPA-1060HPA



Note: Don't drag or drop during transportation.

## 11. Attention



### ATTENTION

1. The Steam Sterilizer must be placed on the horizontal working base.
2. Must use the distilled water for the purpose of lasting the operation life of the Steam Sterilizer.
3. There shall be no clog to the air cooling window on the outer surface of the Steam Sterilizer.
4. The object apparatus to be sterilized shall be placed on the device plate with enough clearance retained in favor of the air circulation inside the sterilizing room.
5. Empty the water inside the cooling water collecting tank frequently. Usually, the cooling water collecting tank shall be emptied once the water storing tank emptied.
6. The door handle must be buttoned up before working.
7. Don't open the door of Steam Sterilizer before seeing the "0" kPa displayed on the pressure indicator.
8. Not be too closed to the door of the Steam Sterilizer in case of scald when open the door.
9. Shut off the power before discharging/installing the sealing ring, and the work shall be carried out after further sufficient cooling in case of scald.
10. Don't drag or drop the Steam Sterilizer during relocation period of the Steam Sterilizer.
11. The protecting ground shall be reliable.
12. Equipment must be used away from the magnetic field.
13. The device end of life must be for processing scrapped in accordance with the local environmental protection laws and regulations.
14. Such as power failure occurs during the working, need to disinfect the equipment out, it must be open the door 2 minutes later.
15. The equipment must be far away from flammable items.
16. The equipment must be reliable grounding.
17. Must use the attached plug, do not change it.
18. When Choose 121 °C sterilization procedure, the highest temperature in

cavity body is 125 °C. When choose 134 °C sterilization procedure, the highest temperature in cavity body is 138 °C.

19. This product is not suitable for sealing, not resistant to high temperature products sterilization.

20. This product is not suitable for airtight liquid class sterilization

21. The product is prohibited to sterilized the liquid which were sealed into glass bottle or glass vessel, Because when operating, the change of temperature and pressure may cause the liquid bottle burst, so that endanger the safety of the person and equipment.

22. The chloride ion is an important factor of stainless steel corrosion damage. If use this sterilizer sterilization items containing chlorine ion, must rinse sterilization indoor wall every day, in order to avoid deposition on internal stainless steel corrosion of chlorine ion, delayed the service life of the product.

23. The product is only suitable for high temperature resistance, high humidity medical appliance sterilization box, cannot be used with vaseline oil and powder of sterilization, etc.

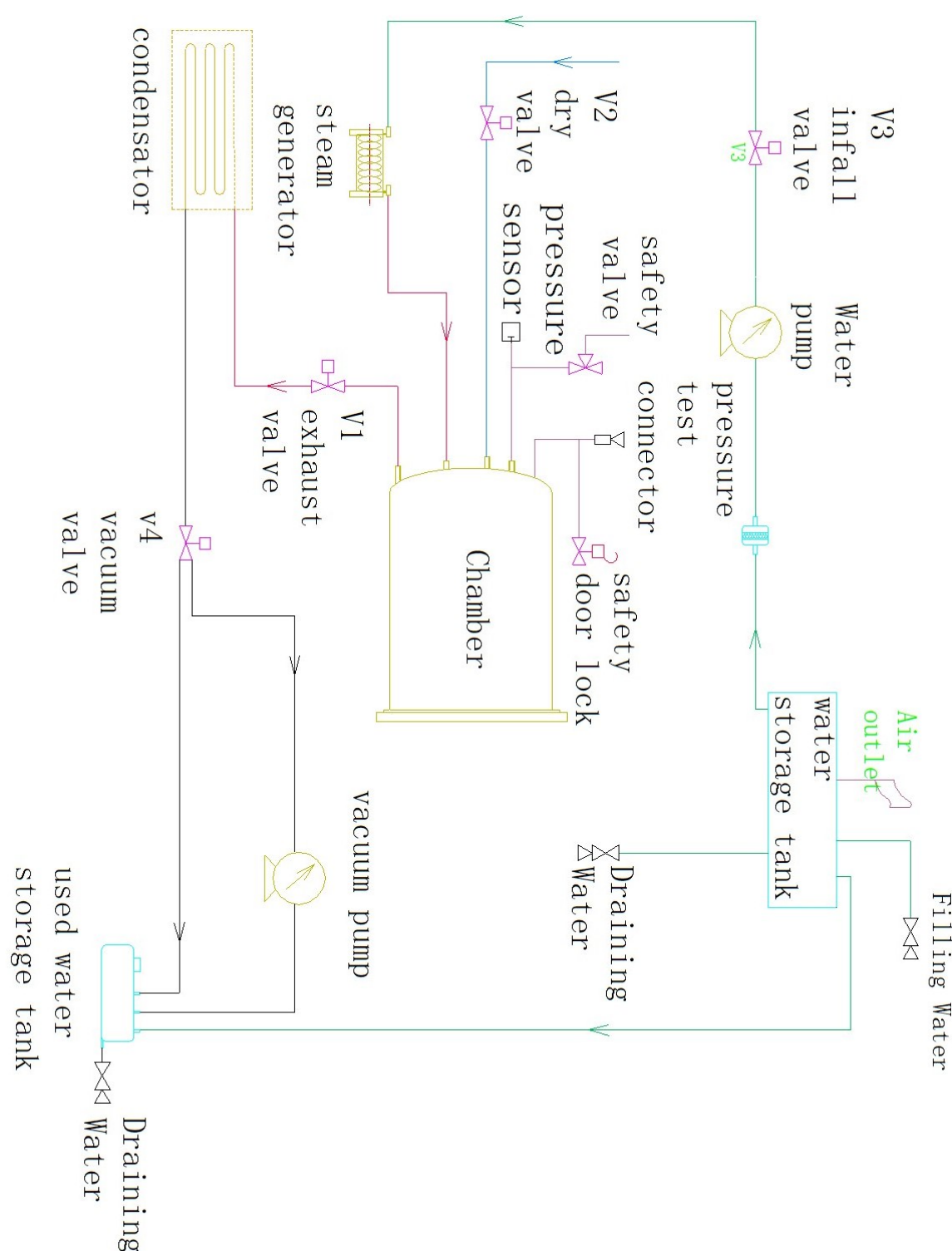


## APPENDIX

### NO.1: The working status display table:

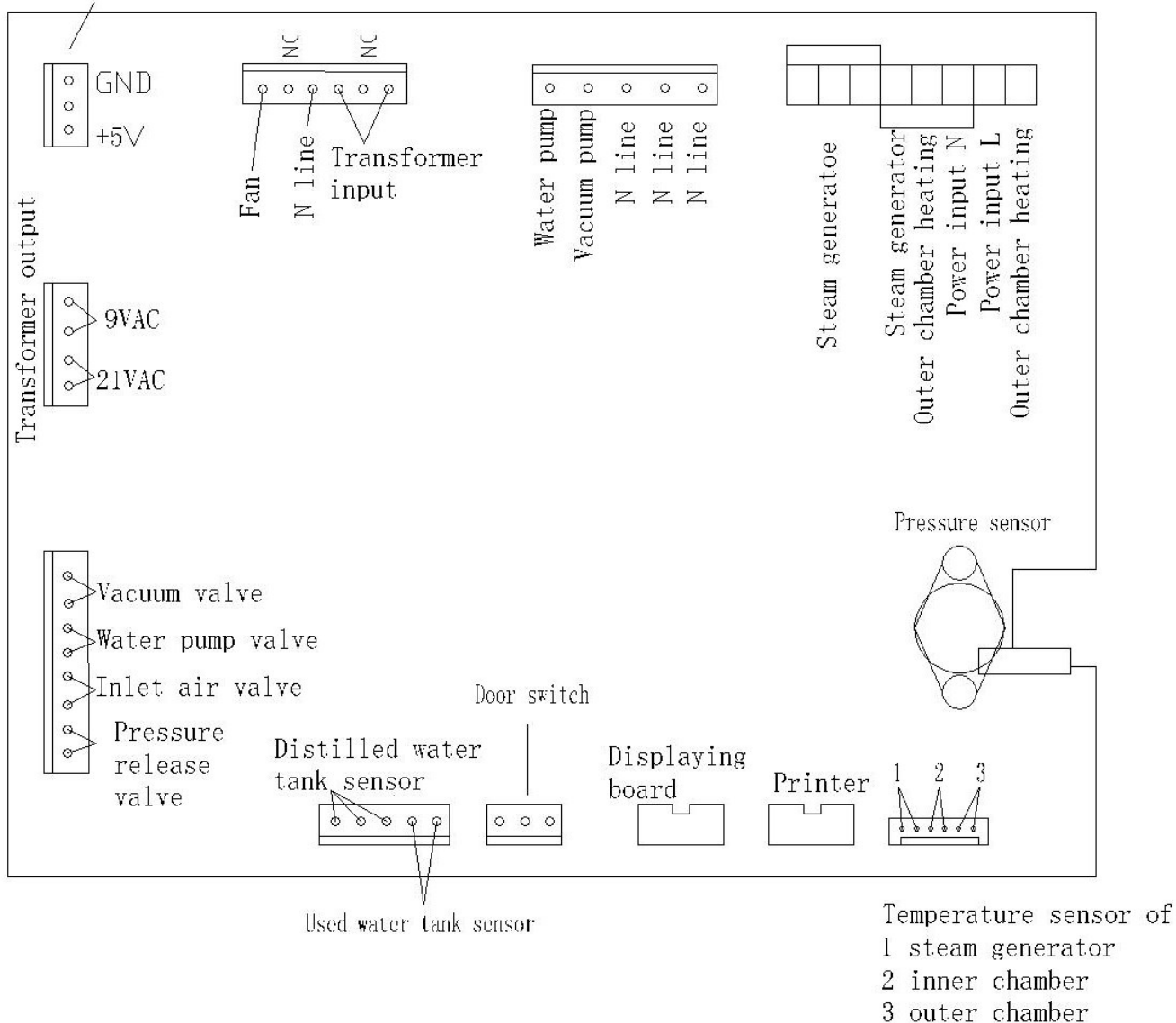
No	Digital display	Working status name	Working status specification
1	Ld	Prepare/preheating status	In this status, prepare to start working.
2	HE	Heating status	In this status, the pressure and temperature increasing
3	Displaying the working pressure	$\pm$ pressure data	In this status, the chamber have $\pm$ pressure
4	Displaying the working time	Sterilizing status	In this status. the working time and the count down figure are displaying
5	PL	Drying status	In this status, the autoclave dries on the object apparatus.
6	Ed	Working finished	In this status, the process is finished and the door can be opened.
8	bd	Testing	In this status, other testing being down
9	Error code	Any error code	Displaying the error code

NO.2: Steam loop (Work Description)



### NO.3: Circuit diagram of sterilizer

Power of Printer

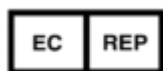


### NO.4: Vacuum test "B&D" test and Helix test methods

Press UP / DOWN key to choose the test system, close the door, then press "START" button to start.



Ningbo Mingtai Medical Instrument Co., Ltd  
Yunzhen Road, Industrial Zone, Yunlong Town, Yinzhou,  
Ningbo City, China  
Tel: +86-0574-88320096; Fax: +86-0574-88320098



Shanghai International Holding Corp. GmbH (Europe)  
Eiffestrasse 80, 20537 Hamburg, Germany  
Tel: +49-40-2513175 Fax : +49-40-255726