



Horizontal Autoclave

LMHA-A101

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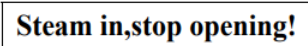
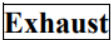
1. Safety Measures

1.1 Precautions before use

The horizontal autoclave is an equipment, which takes advantage of saturated steam to sterilize the dressing packages and various medical appliances. Pay attention to the following:

- 1) Sterilization articles of this device are the ones with the characteristics of high-temperature resistance and high humidity resistance.
- 2) Sterilization articles of this device shall be washed prior to use. Otherwise, the dirt attached will affect the sterilization effect.
- 3) Under normal circumstances, it is different from the drying degree of the sterilization articles.
- 4) **Security:** Since the device belongs to a Class I pressure vessel, ensure the proper and safe way to use this device.
- 5) Horizontal autoclave in normal use will produce sound pressure ≤ 85 dB, be relaxed to use.

1.2 Sign Instruction

Sign	Description
	Caution to be scalded!! Warning signs of scald
	Warning sign
	Safety valve
	External steam exhaust port
	Requirement of external power supply
	Grounding sign
	Door-Lock indication sign

1.3 Instruction on circuit breaker and fuse capacity

- 1) With three-phase circuit breaker.
- 2) The fuse is 250V/2A $\phi 5 \times 20$ mm.

2. Introduction

Horizontal Autoclave LMHA-A101 is a highly efficient and spacious-free standing autoclave that ensures stable and reliable sterilization of laboratory applications. Structured with high-quality rust-free and easily cleanable stainless-steel chamber. It works within the temperature range between 50 °C to 134 °C with a loading capacity of 200 L. Simplified with an easy-to-read LED digital display that allows intuitive operation with clear monitoring.

3. Features

- Energy-efficient microcomputer control system that ensures accurate and reproducible result
- Enhanced with a semi-automatic control system for better working condition
- Integrated with safety features to ensure overheating and over-pressure protection
- The self-diagnostic control system includes a program to sterilize solid body
- Provide temperature and pressure check interface
- Equipped with an automatic alarm that triggers indication after shutdown
- Supplied with exhaust steam control for safe and convenient operation
- Intended with an interlock door to prevent unauthorized access
- Upgraded with a safety valve for over-pressure exhausting
- Remote USB port that provides easy communication via PC or printer

4. Specifications

Model No.	LMHA-A101
Capacity	200 L
Temperature Range	50 °C to 134 °C
Pressure	0.217 Mpa
Time Range	0 to 99 hr
Power	7.5 kW
Voltage	380 V
Chamber Size	500 × 1020 mm
Dimension	1460 × 722 × 1650 mm
Weight	250 Kg

5. Applications

It is extensively used to sterilize surgical equipment, laboratory instruments, pharmaceutical items, and other materials.

6. Instrument Introduction

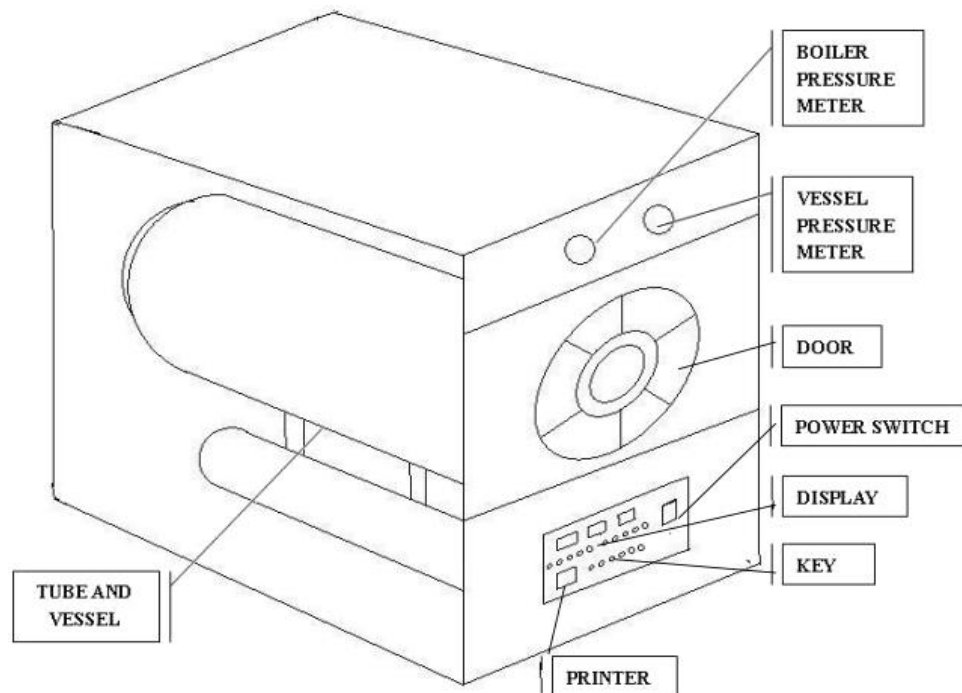


Figure-1 Outline the structure of the autoclave

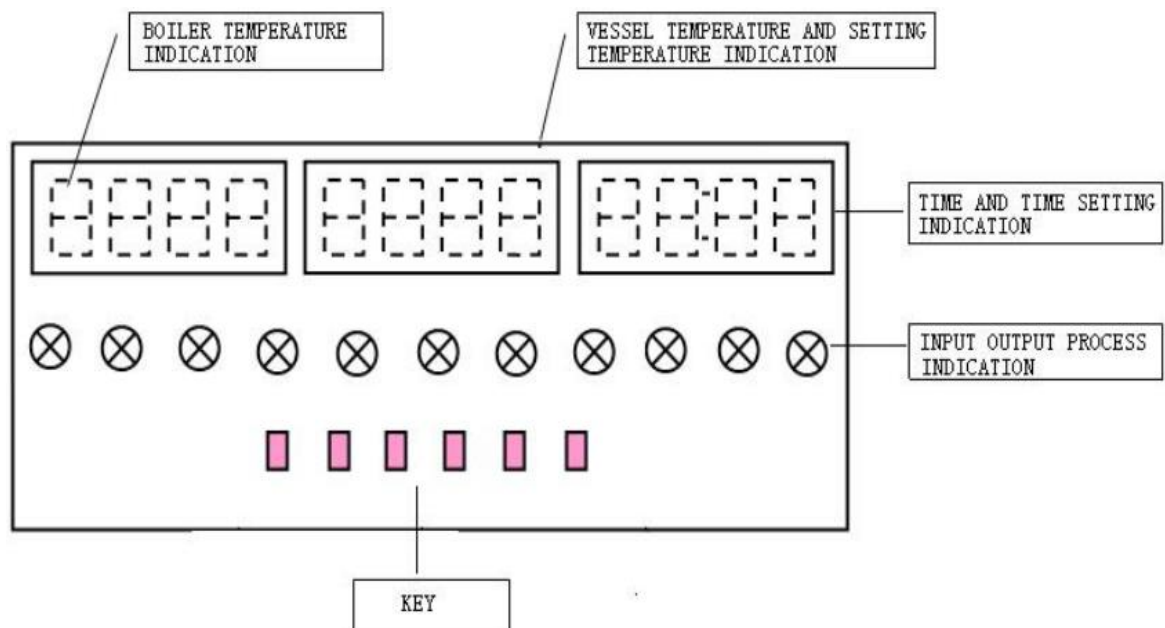


Figure-2 Display screen indicating.

6.1 Outline structure parts instruction

1) Nixie Tube

The upper end of the display panel is installing three nixie tubes to display data. Display contents in the correct order: jacket temperature, sterilization room temperature and time.

2) Indicator Light

To be used for displaying the input and output of the working process. From left to right in correct order are as below:

Door- Door indicator light; light-on means the door has been closed.

Starting- Operation indicator light; light-on means the operation stroke has been started, and it is in the sterilization cycle.

Water Inlet- Water inlet indicator light; light-on means it is letting water inside the evaporator. **Heating-** The heating indicator light, light on means the electric heating pipe is in the ohmic heating state.

Sterilization- The sterilization indicator light, light on means the sterilization cycle has been in the sterilization state.

Slow Exhaust- Slow exhaust indicator light, light on means the slow exhaust valve is opened to exhaust steam, which is mainly used for drainage of the sterilization room.

Fast Exhaust- A fast exhaust indicator light, light on means a fast exhaust valve is opened to exhaust steam, which is mainly used for freezing air replacement and exhaust steam.

Drying- Drying indicator light, light on means the sterilization cycle has been in the sterilization state.

Full Exhaust- A full exhaust indicator light, light on means the sterilization room and evaporator are in the exhaust steam in the fault state.

Water break- Water break indicator light, light on means the evaporator is in a low water level state.

Print- Print indicator light, A light on means the printer is printing the sterilization record which has been saved. The sterilization record contains sterilization parameters and the time and date before the sterilization is finished. During the period of the indicator light on, pressing the printer key again is in vain.

6.2 Instruction on other parts of the operation panel

1) Power switch

It is on the side lower part of the autoclave, which is used for the power supply junction or cut off for the equipment control system.

2) Breaker

It is on the side lower part of the autoclave, which is used for the power supply junction or cut off for the electric heating tube inside the evaporator.

3) Micro Printer

It is on the side lower part of the autoclave, which is used for printing sterilization records that have been saved.

4) Pressure Meter

It is on the side upper part of the autoclave, displaying the pressure of the sterilization room and jacket (evaporator) pressure indication of the autoclave.

5) **Operation keys, from left to right in correct order are:**

Setting - Set sterilization parameters

It is used for setting sterilization temperature (50 °C - 134 °C), replacement time (0 minute - 60 minutes), sterilization time (0 minute - 99 minutes), drying time (0 minute - 99 minutes) and parameter inquiry during the working process.

▲ - Increase key

It is used to set the increase of sterilization parameter value.

▼ - Decrease key

It is used to set the decrease of sterilization parameter value.

Starting- Starting key

It is used to start the working stroke and set the colour system time in the control system.

Exhaust Steam- Exhaust steam key

It is a press key used to reset the control system when it occurs abnormal situation during the working process. After the system is reset, the sterilization room will exhaust steam.

Print - Print key

It is used to print the parameters of the sterilization record process in working.

6.3 Instruction on characteristics and functions of parts

- 1) The autoclave body is featured with an air-tight double-layer structure, composed of a sterilization room and steam jacket. When the steam flows in and fills the jacket, the sterilization room wall will be preheated. There is an electromagnetic valve between the sterilization room and the jacket, pressure steam enters the sterilization room from the jacket through the main valve to moisten and heat articles, to achieve the goal of disinfection and sterilization under the influence of moisture and heating. Meanwhile, it can satisfy the requirements of preheating, drying and continuous operation of the objects waiting to be sterilized.
- 2) Cover the enclosure outside of the jacket of the sterilization room and fill glass wool with well-insulating performance, it is favorable to save energy resources and prevent the environmental temperature from rising too much.
- 3) The opening and closing of the door of the sterilization room adopts a radiation bar rotary disk. It is installed with a secondary self-lock and interlocking safety device, first, pull the safety fixing hand wheel when closing the door, and displace it at the angle of 45 degrees with the joint center of the radiation bar rotary disk; after the radiation bar is placed in complete meshing place, turn the hand wheel again, the central rotary disk is placed in the axial direction and self-locked by the locating pin. When the pressure inside the sterilization room is larger than 0.0217 MPa, the interlocking device enters automatically to avoid being opened by misoperation. When the pressure inside the sterilization room is less than 0.0217MPa, the interlocking device quits, but the rotary disk is still self-locked, the hand wheel can be turned counterclockwise, the central rotary disk can quit only in the axial direction, the door seal fails gradually and the remaining steam is released to null, that is, release pressure first, then open the door. Only after the hand wheel quit to the outermost, can the safety fixing hand wheel be pulled, withdraw the radiation bar and open the door.

- 4) It sets the program function in an autoclave, the air and condensed water in the autoclave will be discharged automatically during the sterilization process so that the sterilization temperature in the sterilization room can approach balance.
- 5) It is installed with a steam pressure device to maintain stable pressure; its pressure is controlled within the range of 0.217 MPa and the relative temperature is 50 - 134°C. Select working temperature pressure through the temperature control knob on the electric apparatus control box panel.
- 6) It is installed with a timer device, with the time set within the range of 0 - 99 hr, select working time through the time control turn button on the electric apparatus control box panel.
- 7) It is installed with a high-water level device, after pressing the starting button, the inlet indicator light is on, the water supply will enter the water tank automatically, and it will heat up immediately after reaching the high-water level, meanwhile, the indicator light is off.
- 8) It has automatic control functions:
 - If the door of the sterilization room is not closed tightly and it cannot sterilize, prompting the door indicator light to be off, now we can conduct a drying operation.
 - If the door is opened by an error in the starting process of the sterilization room, the electromagnetic valve which enters the sterilization room will be closed automatically, and the door will be a mechanical self-locked ≥ 0.0217 MPa.
 - If starting without selecting to set sterilization time, the buzzer will be alarmed to prompt.
 - It is installed with a low water level protective device, when the water level is lower than the requirement and lack of water in the entire process, it can cut off the heating power supply automatically and meanwhile, the water break indicator light is on, heating and sterilization indicating is off and the buzzer is alarmed, and the steam is exhausted automatically.
 - It is installed with an overload leakage protective device, when it occurs electrical leakage or over-current, it can cut off the power supply automatically and the indicator light of the electric appliance control panel is off. It is installed with temperature controlling failure protective device, the fine-open spring safety valve is fixed on the top of the autoclave, which can open automatically and release over-pressure steam, when the steam pressure in the jacket exceeds the maximum permissible range and will close automatically when the steam pressure reduces to normal. It plays a very important role in ensuring safe application; the operation pressure range of the safety valve is 0.217 MPa.
- 9) It is installed with a manual emergency switch valve, when the equipment is switched off suddenly and need to open the door to fetch the objects, it is allowed to open the manual ball valve on the back of the equipment manually, releasing the pressure of autoclave and open the door to fetch objects after pressure gauge returns to zero.
- 10) It is installed with a manual maintenance switch valve, when the evaporator of the equipment needs cleaning and draining, open the manual valve on the left bottom side of the equipment to exhaust the wastewater from the pressure box.

11) Installed with electromagnetic valve:

- **The inlet valve:** Press the start key, and the program will close after it is inlet water to a high water level automatically.
- **Drainage valve:** Electrify and press the starting key and the program will be opened automatically at the temperature $\leq 108^{\circ}\text{C}$ when it is exhausting air, heating and sterilizing automatically, When the temperature is $\geq 108^{\circ}\text{C}$, it will be closed.
- **Exhaust steam valve:** Electrify and press the starting key, the programme will be closed after it finishes, exhausting air and its inlets water to a high-water level. When sterilization is completed and the emergency stop key is installed, the program exhausts steam and opens automatically.
- **Sterilization valve:** Electrify and press the starting key, and the program inlets steam automatically; when the water inlet reaches the high-water level, the door is closed tightly, and vice versa, the door is opened.

6.4 Schematic diagram of pipeline

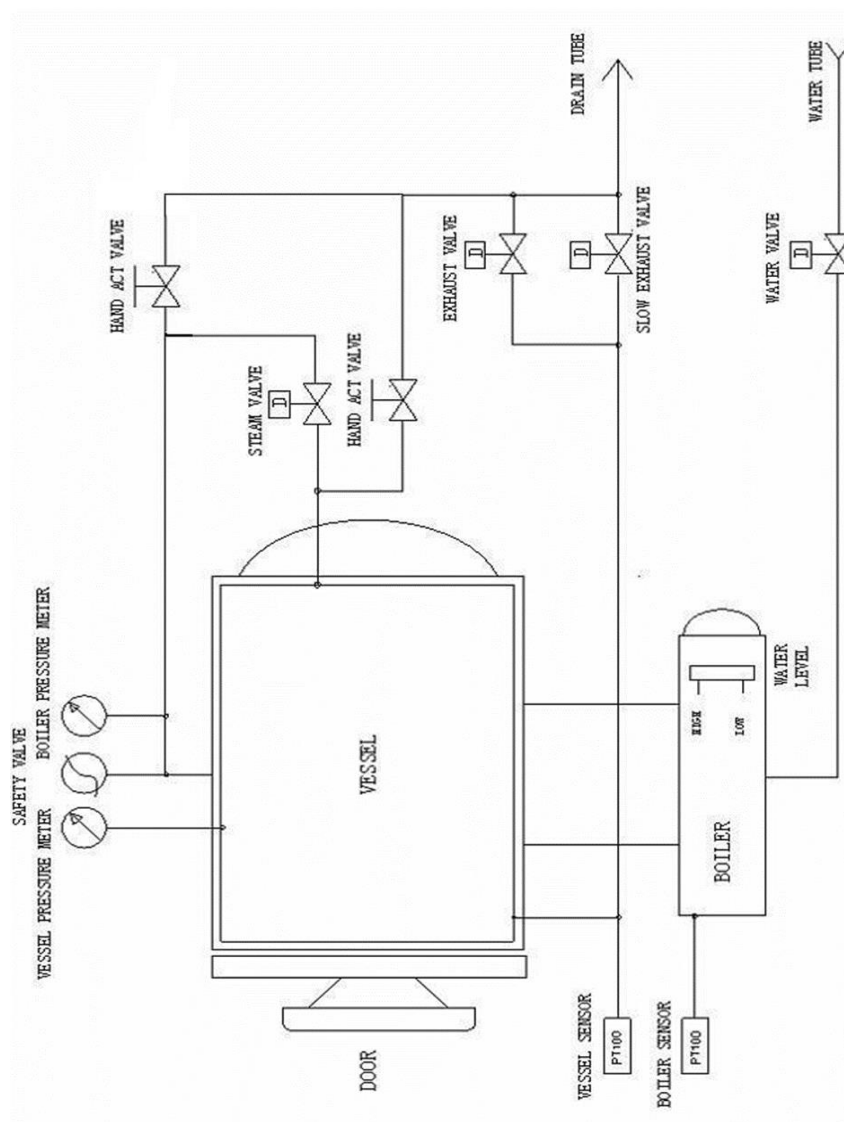


Figure-3

7. Installation

Installation and commissioning

- 1) Put the shock pad under the two rotation legs, rotate the support leg after the universal wheels leave the ground, and put the shock pad under the oriented wheel.
- 2) It shall leave some space all around when installing the autoclave, convenient to operate and maintain; the outline dimension of the maximum limit is 200×93×182cm after the steam door is opened.
- 3) Adjust the inner drum level of the equipment by regulating the height of the rotating support leg.
- 4) Connect the pipeline of drainage, water inlet and water source to the related ones of the equipment (see **Figure 4**), and meanwhile configurable power source according to the requirements.

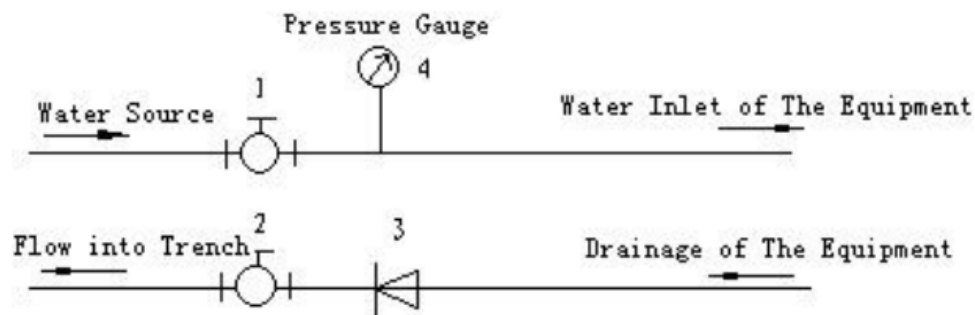


Figure-4

- 5) After installing the equipment, inspect the equipment completely once again, after confirmation without fault, it can start the trial run. Refer to the operation method, open the manual water inlet valve, observe the state of the water source pressure gauge and examine whether the pressure is in the required pressure range. Switch on the power supply and operate the trial run referring to the operation method.
- 6) It has been inspected by rising temperature before the products leave the factory, but after it is installed and ready, the user shall perform a trial run according to the user's manual; if there is any problem, inquire about the reasons and solve it, it can't be put into operation until it runs normally.

8. Operations

8.1 Operation method of the door

Because the device is a pressure vessel, it is important to operate the door exactly, read the following items carefully before operating the door.

8.1.1 Close the door

Before closing the door, make sure there are no cracks, damage and dirt on the sealing material of the door and make sure there is no damage and dirt on the contact face between the main body and the sealing material of the door damage and dirt. First turn the handle counterclockwise to limit position when closing the door, to make all the radiation bars of the door in contraction position. Then get the door close to the main body, and turn the handle clockwise, at the beginning, turn a bit, after the door indicator light gives out a signal, continue to turn the handle for 1/4- 1/2 cycle. Strictly prohibit rotating the door counterclockwise after the door is closed.

8.1.2 Open the door

The door can be opened only when the inner drum pressure is equal to the ambient atmospheric pressure.

Note: The temperature of the door body is higher when sterilizing; prohibited to touch it to avoid being burned.



Warning:

- 1) It must confirm the following items before opening the door:
 - The stroke is in preparation exhaust steam is finished or drying is finished.
 - Inner pressure displays "0" MPa.
 - It is in normal operation and the buzzer has alarmed.
 - The self-lock device of the door is relieved.

Warning: The steam is not exhausted, please do not open the cover

2) Turn the handle counterclockwise

- Turn to the limit position counterclockwise to have the radiation bar contracted completely.
- Take notice if it cannot rotate counterclockwise, check whether the self-lock on the handle seat has been relieved.

3) Open the door

When the steam exhaust is finished, open the door, a great deal of steam will let out, pay attention not to be scalded, and open the door a moment later.

4) About doorlock structure

According to the stipulation of pressure vessel safety performance by the country, the device is set with a safety interlock, the door will be self-locked when the inner chamber pressure exceeds 0.0217MPa, and it cannot be opened at any time.

8.2 Proper method for inletting sterilization objects

1) Pay attention to the uniformity of sterilization

- The package of sterilization articles needs to be small and inlet in loosen space.
- The package dimension of textile sterilization shall be less than 50×30×30 (cm) and the weight does not exceed 5 kg. Do not put the bottle covered tightly and disinfectant solution in the vessel.

Warning: If operated improperly, the bottle will explode, and the liquid attachment will damage the inner surface of the drum body and door.

2) When sterilizing the injection syringe, don't put the injection syringe and cast parts together directly to sterilize, it needs a single package or fixed package, otherwise:

- Castings of injection syringe influence drying effect.
- Unused products will be polluted during the application period after germicidal treatment.
- It is easy to mix using used products and unused products after sterilization.

3) The cover of the castings easily collects water droplets.

4) When using a retort pouch, it is suggested to inquire about the factory for its performance and whether it has heat-resisting properties and air permeability.

5) Do not put moisture sterilization articles in it to easily dry.

8.3 Parameter setting method

1) The equipment program is optional and set freely, it is supposed as follows:

- **Replacement time:** 0 - 60 minutes.
- **Sterilization time:** 0 - 99 minutes.
- **Drying time:** 0 - 99 minutes.
- **Sterilization temperature:** 105 - 134°C (it is generally 50°C - 134°C in actual).

2) The programming method is shown as follows:

Instruction of Parameter Definition

- **Sterilization temperature:** The lower limit temperature for control and timing during sterilization.
- **Replacement time:** The time for inletting steam and removing freezing air from the inner chamber.
- **Sterilization time:** Time for timing in the sterilization process.
- **Drying time:** Time for drying stroke timing (excluding the exhaust steam time in drying stroke).

Example for Setting the Parameter

(1) Turn on the power supply, it displays **8888 8888 8888** on the display panel nixie tube, and all the indicator lights are on, after control system initialization is finished, it displays interlayer temperature, sterilization room temperature and number 0 in turn.

(2) Press the setting key, it displays the temperature numeral value needed to be set on the nixie tube, displaying sterilization temperature, the displayed value is the numeral value that was set last time.

The numeral value flashes by 1S frequency. Meanwhile, the sterilization indicator light is on, meaning it is setting the sterilization temperature.

Press ▲ the key, the nixie tube will stop flashing when the set sterilization temperature value increases by way of plus 1. The upper limit value of the set sterilization temperature is 134°C, and go on to press ▲ a key, the value is kept at 134°C.

Press ▼ the key and the nixie tube will stop flashing when the set sterilization temperature value decreases by minus 1. There is no lower limit value for setting sterilization temperature, it decreases to 50 °C, returns to 134°C and decreases circularly.

Press ▲ the key for a long time, and the nixie tube will stop flashing when the set sterilization temperature value increases quickly and continuously by way of plus 1.

Press ▼ the key for a long time, and the nixie tube will stop flashing when the set sterilization temperature value decreases quickly and continuously by the way of minus 1.

If not press ▲ the key or ▼ key for 10S, the nixie tube will recover to flash. Now the set sterilization temperature is not saved.

- (3) Press the setting key again, and the nixie tube which displays the value 0 displays the replacement time value needed to be set, the displayed value is the one set last time. The value is flashing by 1S frequency (if the previous sterilization parameter is still in setting state and not flashing, the value will be flashing 10S later). Meanwhile, the sterilization indicator light is off, which means it is setting replacement time.

Press ▲ the key, and the nixie tube will stop flashing when the set replacement time value increases by way of plus 1. Set the upper limit value of replacement time for 60 minutes, go on to press ▲ a key, and the value is kept at 60 minutes.

Press ▼ the key, the nixie tube will stop flashing when the set replacement time value decreases via minus 1. There is no lower limit value for setting replacement time, it decreases to 0, returns to 60 min and decreases circularly.

Press ▲ the key for a long time, the nixie tube will stop flashing when the set replacement time increases quickly and continuously by way of plus 1.

Press ▼ the key for a long time, the nixie tube will stop flashing when the set replacement time value decreases quickly and continuously by the way of minus 1.

If not press ▲ the key or ▼ key for 10S, the nixie tube will recover to flash. Now the set replacement time is not saved.

- (4) Press the setting key for a third time, the nixie tube which displays the value 0 displays the sterilization time value needed to be set, and the displayed value is the one set last time. The value is flashing by 1S frequency (if the previous sterilization parameter is still in setting state and not flashing, the value will be flashing 10S later). Meanwhile, the sterilization indicator light is on, which means setting the sterilization time.

Press ▲ the key, and the nixie tube will stop flashing when the set sterilization time value increases by plus 1. The upper limit value of setting sterilization time is 99min, go on to press ▲ the key; the value is kept at 99min.

Press ▼ the key; the nixie tube will stop flashing when the set sterilization time value decreases by minus 1. There is no lower limit value for setting sterilization time, it decreases to 0, then returns to 99min, and it decreases circularly.

Press ▲ the key for a long time, the nixie tube will stop flashing when the set sterilization time value increases quickly and continuously by way of plus 1.

Press ▼ the key for a long time, and the nixie tube will stop flashing when the set sterilization time value decreases quickly and continuously by the way of minus 1.

If not press ▲ the key or ▼ key for 10S, the nixie tube will recover to flash. Now the set sterilization time is not saved.

- (5) Press the setting key for a fourth time, the nixie tube which displays the value 0 displays the drying time value that needs to be set, the displayed value is the one set last time. The value is flashing by 1S frequency (if the previous sterilization parameter is still in setting state and not flashing, the value will be flashing 10S later). Meanwhile, the drying indicator light is on, which means setting the drying time.

Press ▲ the key, the nixie tube will stop flashing when the set drying time value increases by plus 1. The upper limit value of setting drying time is 99min, go on to press ▲ a key, and the value is kept at 99min.

Press ▼ the key, the nixie tube will stop flashing when the set drying time value decreases by way of minus 1. There is a lower limit value for the set drying time, it decreases to 0, then returns to 99min, and it decreases circularly.

Press ▲ the key for a long time, the nixie tube will stop flashing when the set drying time value increases quickly and continuously by way of plus 1.

Press ▼ the key for a long time, the nixie tube will stop flashing when the set drying time value decreases quickly and continuously by the way of minus 1.

If to press ▲ the key or ▼ key for 10S, the nixie tube will recover to flash. Now the set drying time is not saved.

- (6) Press the setting key for a fifth time, nixie recovers the display when turning on the power supply and meanwhile saves the set parameters.

Time clock setting

The control system consists of a real-time clock, the clock mainly provides the time parameter which is in accordance with the local time for the printer, after the arrival of equipment, users shall adjust the time parameter according to the practical situation, the detailed adjusting method is as follows.

Press the starting key and turn on the power supply switch, then a voice of "Di" from the buzzer can be heard. It displays 8888 8888 8888 on the nixie tube of the panel from left to right in the correct order, all indicator lights are on, after 10S, the nixie tube displays time, they are: year (e.g. 08 years), month (e.g. 04 months), day (e.g. 20 days), hour (e.g. 12 hours), minute (e.g. 00 minute), second (e.g. 00 second) in turn.

- (1) Press the starting key for the first time, the value of the year is flashing, presses ▲ the key or ▼ key to adjust the value of the year. If not press ▲ the key or ▼ key, the value will be flashing 10S later.
- (2) Press the starting key for the second time, the value of the month is flashing, press ▲ the key or ▼ key to adjust the value of the month. If not press ▲ the key or ▼ key, the value will be flashing 10S later.
- (3) Press the starting key for the third time, the value of the day is flashing, press ▲ the key or ▼ key to adjust the value of the day. If not press ▲ the key or ▼ key, the value will be flashing 10S later.

- (4) Press the starting key for the fourth time, and the value of the hour is flashing, press ▲the key or ▼key to adjust the value of the hour. If not press ▲the key or ▼key, the value will be flashing 10S later.
- (5) Press the starting key for the fifth time, the value of the minute is flashing, press ▲the key or ▼key to adjust the value of the minute. If not press ▲the key or ▼key, the value will be flashing 10S later.
- (6) Press the starting key for the sixth time, the value of the second is flashing, press ▲the key or ▼key to adjust the value of the second. If not press ▲the key or ▼key, the value will be flashing 10S later. After adjusting the parameters, the parameters will be saved automatically.
Turn off the power supply and the clock parameter adjustment is finished.
Adjust the clock parameters every six months to make sure the time is exact.

8.4 Instruction of sterilization sequence

8.4.1 Preparation Stroke

The preparation procedure mainly finishes: By loading the sterilized articles, turning on the water source switch, checking whether the water source pressure complies with the requirement and closing the door of the sterilization room.

Electrify and plug the attaching plug into the power supply socket and turn on the breaker switch and the power supply switch of the control system. It displays 8888 8888 8888 on the Nixie tube of the display panel, all indicator lights are on, after the control system initiation, the Nixie displays jacket temperature and sterilization room temperature 0, the slow exhaust steam light and fast exhaust steam light of indicator light are on, then set working parameters (if necessary). The setting range can refer to the sterilization reference table for various kinds of articles (see **Table 1**) and comply with different sterilization articles to set sterilization temperature/sterilization time.

Sterilization Reference Table for various kinds of Articles (Table 1)

Category of Sterilization Articles	Sterilization Time min	Steam Pressure MPa	Steam Relative Temperature °C
Category of Rubber	15	0.1 - 0.11	121
Category of Dressing	10	0.215	134
Category of Vessel	8	0.215	134
Category of Equipment	8	0.215	134
Category of Bottling Solution	30	0.08	115

Curve diagram for working procedure

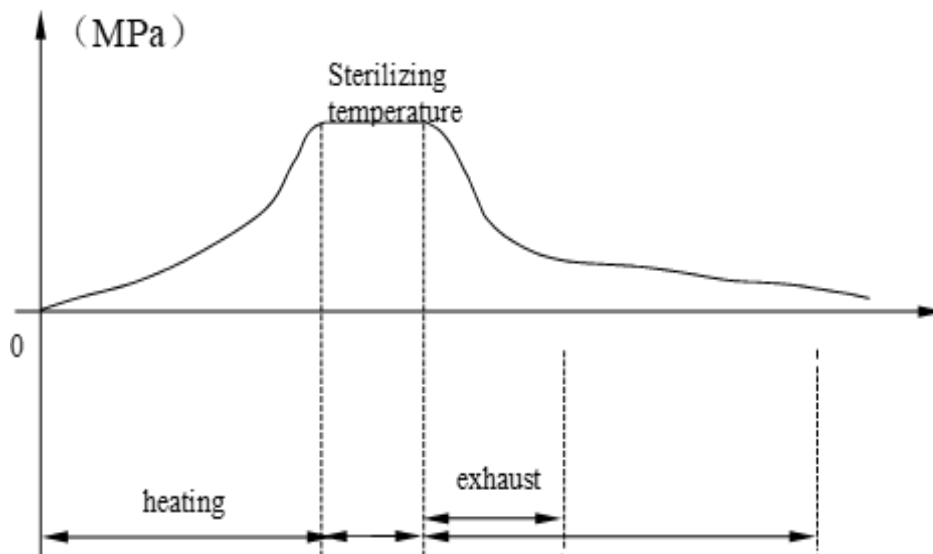


Figure-5 Curve diagram for setting working procedure

8.4.2 Temperature Rise Stroke

Press the starting key, after entering the temperature rise stroke, and both the door light and starting light are on, if the water level is in the lower level inside the generator, the water break light and inlet light are on, and the water is fed inside the steam generator. Meanwhile slow exhaust steam and fast exhaust steam lights are on, and fast exhaust steam valve, slow exhaust steam valve and inlet valve are opened. When the water level reaches a high water level, the steam valve and inlet valve will be closed, and the inlet indicator light will be off. The electric heating pipe starts to heat, and the heating indicator light is on. The temperature in the steam generator starts to rise. When heating to the set sterilization temperature of $+0.5^{\circ}\text{C}$, the inlet valve and fast exhaust steam valve will be opened to do gravity replacement. Remove the freezing air from the sterilization room. The fast exhaust steam indicator light is on. The nixie tube displays jacket temperature, sterilization room temperature and replacement time. The replacement time is decreasing. When the replacement time reduces to 0, the fast exhaust steam valve will be closed, and the inner chamber will continue to heat up. The fast exhaust steam valve indicator light is off. Start pulsating movement of the fast exhaust steam valve to drainage before not reaching sterilization temperature. The nixie tube displays jacket temperature, sterilization temperature and sterilization time in the correct order. Enter sterilization stroke when reaching the set sterilization temperature.

8.4.3 Sterilization Stroke

After entering the sterilization stroke and reaching the sterilization temperature, it will start to sterilize and timing. During the stroke, stop timing when the temperature is lower than the set temperature. Close the inlet valve when the temperature is 1°C higher than the sterilization temperature and inspect the delay exhaust steam automatically when the temperature is 3°C higher than the sterilization temperature.

The nixie tube displays jacket temperature, sterilization temperature and sterilization time decreasing in the correct order. The pulsation of the slow exhaust valve is opened to drainage. When the sterilization time is over, it will enter a drying stroke.

8.4.4 Drying Stroke

Enter the drying stroke and remove the steam from the inner chamber, when the temperature in the sterilization room is lower than 105°C, the buzzer will alarm to remind the users to open the door for drying. Pay attention to the pressure of the sterilization room and open the door for drying. Now the nixie tube displays jacket temperature, sterilization temperature and drying time decreasing in correct order. When the drying time reduces to 0, the entire sterilization period is finished (Note, if the drying time is 0, The exhausting steam and direct buzzing of the buzzer will be transferred to finish).

8.4.5 Finish Stroke

When the buzzer buzzes, take out the sterilization articles.

Note: As for sterilized fluid, pay attention to not opening the door directly, but turn the door in place, open the door to 5 mm and take out the articles, until the liquid temperature of the inner chamber reduces below 50 °C.

Warning: After entering a working state, do not try to open the door.

9. Maintenance

9.1 Daily use and maintenance

- 1) Refer to “**Operation of the door**” when opening the door, and check whether the sealing materials of the door have been cracked and damaged. Be careful not to be burnt when adding or taking out the sterilization articles.
- 2) Confirm the indications of the pressure gauges during the use of this device. Be sure to cut off the power supply and check the control system when the pressure exceeds 0.217 MPa.
- 3) Check whether the inner chamber and exhaust steam port have sundries before use every day. If there are sundries piled up on the filter net, it will cause incomplete or bad sterilization.
- 4) Be sure to maintain the performance of the device, and self-check at regular times.
- 5) The replaced fuse specification shall comply with the regulation in the user’s manual, and it is the same as the original fuse specification.
- 6) Make sure the grounding connection of the autoclave and electric outlet is in good state.

9.2 Filling up grease lubricant to the door mechanism

The door mechanism is the part that needs to be opened and closed frequently, it is always under high temperatures, so it needs to be filled up with grease lubricant regularly (it is usually about 2 months), and the method of filling up grease lubricant is as follows:

Preparation Parts:

- 1) Prepare No.4 high-temperature grease.
- 2) Gauze glove
- 3) Wipes
- 4) Necessary tools

The Order of filling up grease lubricant is as follows:

- Disassemble the ball-end part of the fixed radiation bar.
- Clean up the ageing grease lubricant in the screw thread and the ball-end part of the fixed radiation bar.
- Re-install the disassembled parts in the original order.
- Rotate the door several times repeatedly to have it smeared evenly.

Don’t make the door rotate in the open position to avoid the radiation bar extending to damage the external appearance of the equipment.

9.3 Maintenance for other components

- 1) **Safety valve:** Pull up the draw rod of the safety valve every other month, and exhaust steam several times repeatedly to avoid failure.
- 2) **Pressure gauge:** Inspect it regularly and check every year.
- 3) **Breaker:** Inspect it regularly, if there is any fault, replace it.

10. Troubleshooting

S. No	Fault	Reason analysis and troubleshooting
1	The stroke indicator light is not on.	Check whether the power is on.
		Check whether the circuit breaker is closed.
		Check whether the fuse wire on the control panel is broken.
2	Press “starting” and don’t enter the heating process	Check whether the switch of the door is closed and the corresponding indicator light is on.
3	Do not heat	Make sure the power supply (380V) is on.
		Check whether there is a fault in the water supply pipe.
		Check whether the water level has reached.
4	The door cannot be opened.	Check whether to prepare for the stroke.
		Check whether it is drying or finished.
		Check whether the inner chamber pressure is 0.217MPa
5	The door cannot be closed tightly	Rotate the door handle clockwise in place.
		Check the lubrication state of the door.
6	Sterilization time is too long	Check whether the outer chamber pressure is 0.22MPa
		Check whether the inner chamber pressure is 0.217MPa
		Check whether the state of drainage is good.

During the sterilization, if its buzzer appears and the nixie tube displays an error message, it means there is a fault in the working process, the details are shown as follows:

Error 1

It means the door is not closed tightly or the door switch is off. Check the door switch or the door.

If to press the starting key without closing the door, it will display the above error message.

If it displays the error message, turn on the fast exhaust steam valve and slow exhaust steam valve and turn off the electric heating pipe.

Error 2

It means the water level reaches the low level inside the evaporator, check the low water level switch or whether it needs to add water.

If it displays the error message, turn on the fast exhaust steam valve, slow exhaust steam valve and inlet valve and turn off an electric heating pipe.

Now, if it needs to add water, do not open the door and cut off the power supply till the pressure in the sterilization room and evaporator return to 0 or turn off the power supply to wait for the evaporator to cool gradually then feed the water.

Error 3

It means the heating time has reached 2 hours but the temperature inside the evaporator has not already reached the set temperature.

If the error message, turn on the fast exhaust steam valve, slow exhaust steam valve and inlet valve and turn off an electric heating pipe.

Now, it needs to check whether the power supply is in the phase-lack state and the electric heating pipe is burnt out.

11. Replacement

11.1 Replacement method of sealing materials

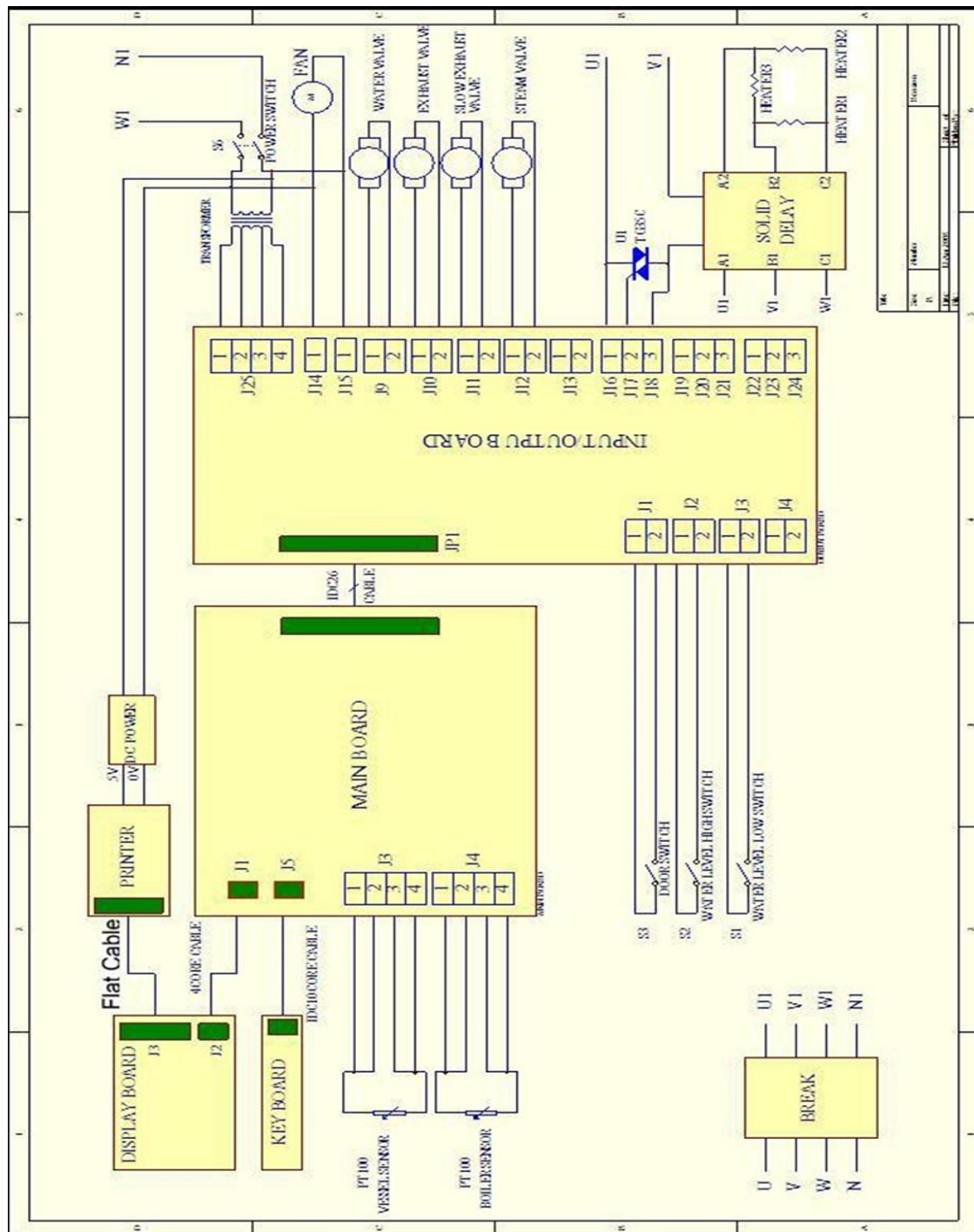
The sealing materials of the door are the main parts to seal between the door and the drum body. It must be checked regularly and have timely replacement when finding breakage.

- 1) Get the right size and complete sealing materials prepared.
- 2) Take out the aging or damaged sealing materials with wooden tools.
- 3) Wipe off the sundries on the sealing materials of the installed door with an alcohol-attached wipe and insert new materials.
- 4) Press the sealing material tightly with wooden tools; close the door 1 / 2 circle after the door switch is in the working process.
- 5) Test the machine; Shut the door tightly (No steam leakage occurs when sterilization).
- 6) Inspect every part of the door comprehensively.

11.2 Replacement for interlocking apparatus sealing element of the door

- 1) Open the door and disassemble the round copper cover or stainless-steel cover.
- 2) Remove the old cup packer and clean the installing position with wipes.
- 3) Replace new parts.
- 4) Test the machine (No steam leakage in the position of the door handle during sterilization)

12. Circuit Diagram



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