FISON

Horizontal Autoclave

FM-HA-C100

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1. Safety Measures

- The users should read the users' manual before the operation, strictly use the unit according to the manual one step by another, and schedule maintenance, make sure the unit is in a normal situation to prevent accidents.
- The solution that will be sterilized should be filled in heat-resistant flasks, but don't fill too full. 1/2 – 3/4 of the volume is good. The flasks should be plugged with absorbent gauze, in no wise with the non-pore plugs, such as rubber cork stoppers. The flasks should be placed in a tray and then in the container in case the flasks may break up and the solution will remain in the tray and will not contaminate other articles. It is dangerous if there is any crash or pressure during working, if the pressure shown on the gauge exceeds the allowable pressure but without exhausting, the safety valve may break, and the unit should be cut off directly to stop working, after the replacement and inspection of the safety valve, the unit can be used again.
- The rubber seal ring is easily aged. If aging causes leakage, the seal ring should be replaced in time.
- Specification and the parameter of the replaced fuse should be the same as the original one and strictly conform to the manual.
- The units must be firmly grounded. The power supply must be firmly grounded.
- Keep clean of the sterilizer.
  Appendix:
  ″ Sterilizing plate: mainly to put instruments.
  ″ Cup: for adding the distilled water. ″ Clamp: used for moving sterilization plate the from chamber. (See Figure 1)

Figure-1

Alarm

- If the pressure exceeds 0.24 mpa but without exhausting the air, and the pressure keeps coming up, the safety valve is broken, kindly cut off the power supply directly to stop use and later inspect.
- The unit must be firmly grounded.
- Distilled water is required.

2. Introduction

Horizontal Autoclave FM-HA-C100 is a specialized steam sterilization unit designed to operate under the principle of gravity-assisted pressure sterilization using electrical heating to sterilize various laboratory items. A spacious horizontally oriented cylindrical 90-liter chamber and sterilizing temperature range of 115°C to 134°C ensures efficient and reliable sterilization. The unit combines high efficiency, stability, and reliability, making it a great choice for a wide range of applications.

3. Features

- ✓ Equipped with a microcomputer digital controller and a clear screen indicator for user convenience.
- ✓ Integrated with a safety door lock system to prevent accidental openings during operation.
- ✓ Includes electrical elements as heating source.
- ✓ Features a built-in safety valve that offers protection mechanisms against water shortages, over-temperature conditions, over-current situations, and over-pressure issues.
- ✓ Choice provided between automatic and manual settings for sterilization temperature, sterilization time, and drying time, allowing for flexibility and ease of use.

4. Specifications

Model	FM-HA-C100
Capacity	90 L
Temperature Range	115°C to 134°C
Pressure Control Range	0.07 to 0.22 Mpa
Timer Range	0 to 99 min
Controller	Microcomputer
Heating	Electrical
Parameter Settings	Automatic and Manual
Power Supply	AC 220 V, 50 Hz
Power	4000 W
Dimension (W×D×H)	940×690×1330 mm
Packaging Dimension (W×D×H)	1030×770×1460 mm
Net Weight	187 kg
Gross Weight	232 kg

5. Applications

It serves as a critical tool for disinfecting and sterilizing an array of items, including medical devices, dressings, glassware, laboratory equipment, cultures, and hydroponic mediums. Its application extends across a wide spectrum of medical, scientific, and research institutions.

6. Instrument Introduction

Construction

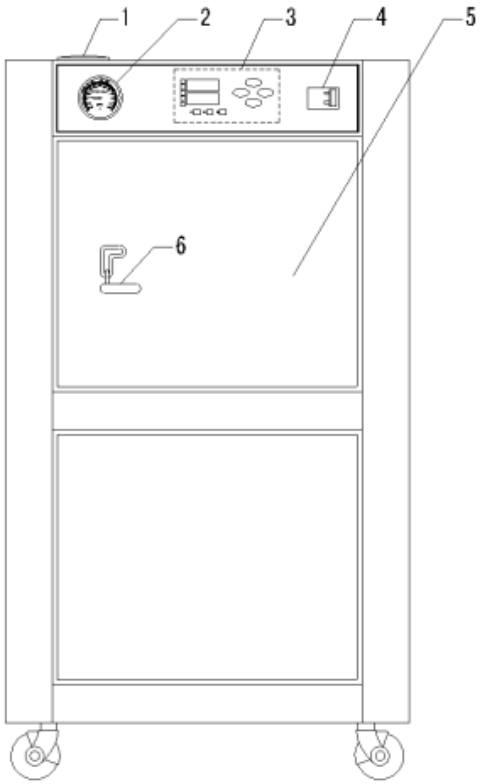

Figure-2

1) Water Inlet
2) Pressure Gauge
3) Control System
4) Breaker
5) Chamber door
6) Handle

7. Installation

Normal Working Condition

Normal working conditions shall comply with the following conditions:

1) Environmental Temperature +5℃～+40℃.
2) Relative Humidity ≤80%RH
3) Atmospheric Pressure 70kPa～106 kpa
4) Working Power Supply: AC 220V±20V50Hz±1H

8. Working Principle

The sterilizer is designed by gravity-type pressurized steam sterilization principle. Put enough distilled water into the sterilization chamber, and electrically heat directly to produce pressurized steam. The pressurized steam acts with microorganisms on the objects to be sterilized to destroy their structure and reach the purpose of Sterilization.

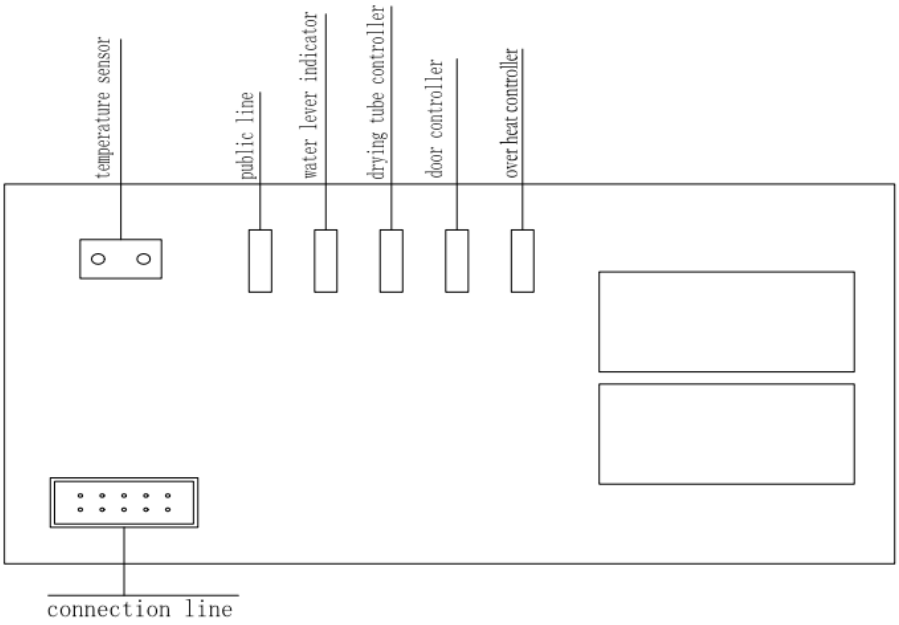

Figure-3

9. Operations

9.1 Environment Requirement and the Setting

1) This unit should be placed on flat ground.
2) the temperature of the environment should not be over 40℃. As with the other electrical equipment, the electrical system fails and the working procedure disorder which leads to the high temperature would cause the malfunction of the unit.
3) Make sure there is ample room for placing the unit in, a ventilation well, and the unit should keep a certain distance from the wall, over 50cm from the left wall, over 50cm from the back wall, and over 50cm from the right wall. Keep the exhausting port of the safety valve away from the pug socket, and the port cannot be blocked by anything. The placing room should be big enough to confirm the door can be freely opened and closed, the sterilizing objects can be delivered smoothly, and the steam can be scattered rapidly, which would affect the features and lifetime of the unit.

⚠ **Alarm:** The unit is equipped with a safety valve if the steam valve exceeds 0.24 mpa, it will release the pressure automatically, and if the temperature exceeds140℃(284°F), the unit will cut off the power, and the unit is equipped with water lack protection, over the current cut off system.

9.2 The Power Connection

Power requirement: Single phase AC220V±10% 50HZ b）Power supply must be firmly grounded, if the outlet is without the ground end, a separate ground line must be required to connect before energizing.

⚠ **Alarm:**

1) The power cord must be connected to a dedicated electrical power switch, which cannot be distorted, if it is damaged, exposed, or loose, it may cause a fire or electric shock.
2) Equipment must be grounded firmly, do not connect the ground wire to the plastic pipes, gas pipes, water pipes, etc.

Attention

- The unit uses saturated steam for sterilizing, and the below item should be paid attention to:
- The sterilizing objects can bear high- temperatures and high moisture, or which is not suitable for using this unit for sterilizing.
- Not suitable for the oils and fats.
- The sterilizing objects should be cleaned in advance to prevent the adherent dirt affect the sterilizing result.
- Choose a suitable sterilizing temperature and time according to different objects.
- To ensure the safety of the operation, kindly appoint a special person who is responsible directly for use and maintenance.
- Normally the unit will produce some sound during water inlet and exhaust the air, kindly feel free to use it.

9.3 The Preparation and Inspection Before Use

- Inspection of the power supply, Check the power supply if is confirmed to product requirement and grounded firmly. (Single phase AC220V, 50Hz). Prepare several liters of distilled water.
- The binding of the dressing and textile cannot be too tight. A certain amount of sterilization indicator (chemical indicating piece or biologic indicating piece).

9.4 The Instructions for Operating the Key, Indicating Lamps, Switches, and relevant

1) **Pressure Gauge**
   MPa /℃ - Display the pressure and temperature, Mpa shows inner pressure and °C shows inner temperature.
2) **Fixed Cycle**

 - Naked Instruments, Apparatus, Textiles, and Fabrics.

 - Packaged instruments, apparatus, textiles, and fabric.

 - Fluid.

3) **Setting Key**

-Setting the Sterilizing temperature /Sterilizing time
For setting sterilizing temperature (0~134 ℃)/ sterilizing time(1~99min59sec). / For check while Sterilizing.
▲ Increase
To increase the value of temperature or time, and to clear the buzzer in use.
▼ Decrease
For decreasing the value of temperature or time, also to clear the Buzzer in Using.

Confirm Key
ENT to confirm the state of sterilizing temperature and time. Also, for an emergency stop in Using.

4) **Screen Indicate**

Figure-4

℃ Window for temperature- display setting & real chamber temperature 0~134℃, range 103~134℃ Time Window for time- display setting time and sterile back timing, range 0~99min59sec. when the chamber's temperature reached the setting value, it began back timing and flash.


- Heating pilot-push key ENT, the pilot light tells the sterilizer in heating, the pilot out tells it reached the setting temperature and stops heating.


- Sterilizing Pilot light tells the objects to be sterilized have reached the setting Temperature.


- Overheating pilot---the pilot flash means the water fills the chamber from the water tank, and the pilot light means the water is lacking and the trouble of overheating.


- Water fills pilot-it light means the water is filling Now.


- Dry pilot—it lights tell in dry heating.

Water tank water outlet --The distilling water in the tank must be exhausted from this outlet every week. Switch-power switch.

9.5 Sterilizing Operation

1) Load the objects to be sterilized
   Load the objects to be sterilized on the instrument plate. Then put in the sterilizer and close the door.
2) Fill water to the water tank
   Fill 5 liters of distilled water into the water tank.
3) Start the device
   Connect the power and turn on the power switch. Three times display on the screen and three times buzzer sound, the pilot of temperature and time light, it enters the state of standby.
   Attention: This unit is equipped with safety protection, check if the control valve is at the sterilizing position after sterilizing, and the door should be closed tightly.
4) Choose the Fix Cycle Key, and then press the ENT key to start the automatic cycle.
5) Or setting the sterilizing temperature/sterilizing time/drying time
   The setting range can be referred to the below sterilizing chart, choose the sterilizing temperature/sterilizing time 134℃/4min (the sterilizing cycle is 15mins.

Article	Put Form	Sterile Temperature℃	Sterilize Time min
Instrument	Open	134	15
		126	30
	Pile	134	20
		126	40
Solution	Open	134	12
		121	30

Setting Procedure

1) Push key SET enters the state of setting sterilizing temperature, meanwhile the window of temperature flash, time, and heating pilot light.
2) The push key increases▲ the value more or the key decreases ▼the value less, users keep push seconds, and the value increases or decreases continuously.
3) Push key SET enters the state of setting sterilizing time, meanwhile the window of time flash, temperature, and heating pilot light.
4) The push key increases the minute adding, the push key decreases the value less and keeps pushing the value adding or less continuously. (Useful time setting 1~99min 59sec.)
5) Push key SET, enter setting dry time state, meanwhile window of time flash and the heating pilot out, dry pilot light.
6) Push key increases the minute adding, push key decreases the value less, keep pushing the value adding or less Continuously (Useful time setting 1~99min 59sec.)
7) Push key SET, fulfill the task of setting sterilize temperature, time, and dry. meanwhile the window temperature and time stop flash, and the heat pilot out.

Start sterilizing

Push key ENT, and the screen  flashes and shows the water filling to the chamber, until the water enters the chamber wholly, and the pilot out. Then the program enters the sterilizing, and the window displays real chamber temperature, heating pilot, and time pilot light, when the temperature reaches the setting value, the heating pilot out, time window display back timing begins, and the heating pilot light and out while sterilizing.

sterilize end

When the back timing shows zero, the temperature is real value, and the sterilize ends the buzzer sound, this time push the key ▲or ▼ cancel the sound.

Dry

Open the door, make the door open about 1cm space, push the key DRY, and enter the state of dry, this time the drying time window shows back timing, and dry the pilot light and out.

9.6 Safety Protection Device

- The door is with the safety lock system if the door doesn't close tightly.
- During the sterilizing, the start switch is locked, and the steam will be released into the collecting tank.
- If it is forced to open the door, during sterilizing, the steam will automatically release the water into the collecting tank.
- Water-off & over-temperature protection. When the heating element is heating without water, the power supply will be cut.
- Over-current protection. If the current exceeds the rated value, the power broken circuit will cut power automatically.
- Over-pressure protection. If the inlet pressure＞AC280V.the over-pressure indicating lamp will be on, and it will cut off the main board power, and the buzzer sound. Cut off the power switch first, after the troubleshooting, the unit can be restarted.

- Safety valve. When the pressure exceeds 0.24Mpa, the sterilizer will automatically exhaust to drop the pressure.
- Over temperature protection. When the chamber's real temperature is ≥140℃, the power supply will be auto-cut.

10. Maintenance

- To ensure the reliability of the sterilization effect chemical indicating piece biological pieces must be put into the sterilization chamber, together with the: objects to be sterilized. After sterilizing, the sterilization effect can be checked.
- The safety valve is at the back of the unit.
- The safety valve must be checked once every year and replaced. If the safety valve malfunctions during use and the pressure keeps increasing, the power supply must be cut off directly to ensure safe use.
- The trap will be damaged after a long time of use, if the operator finds a difference in chamber pressure and temperature, the core should be changed. The rubber seal ring is easily aged. If aging causes leakage, the seal ring should be replaced in time.
- The temperature & pressure meter must be standardized every year.
- The machine must be kept clean, and protect the incrusts that occur on the surface, Kindly wash it with distilled water once a week.
- If the water tank use not often, Kindly clean it with distiller water before use; often use clean by distiller water every week.
- If the overheating protection is damaged, only required to change the small round cover at the bottom of the unit.

11. Troubleshooting

1) The door's pilot light and buzzer sound, heat the pilot out, and users can re-close the door and restart the machine.
2) Check the temperature and time users forgot.
   Push key SET while sterilizing, show instant setting temperature flash, useless users push a key▲ or▼ this time.
   Push key SET again, show instant setting time flash, useless users push a key▲ or▼ this time.
   Push key SET, recover the state of sterilizing, and the checking end.
   Operation error--- if users do not push the key SET, but push the key ENT, the buzzer sounds, just push the key ▲or ▼ stop the sound. Then reset the temperature etc according to item 4 above in the sterilizing operation.
3) Water lacks and overheats

   The buzzer sound in the course and the pilot  light tell the chamber that water is lacking and overheats, the machine will auto-release the pressure to zero, Users can shut down the power, and then restart the sterilizing operation.
4) Over current protection
   The over current occurs, and the fuse auto cuts out, users can deal with the trouble then restart and set the temperature and time, etc.
5) Emergency stop
   For an accident or mistake operation, users must stop the machine, push the key ENT, and the buzzer sound, just push the key ▲or ▼ stop the sound. Then reset the temperature etc according to the above in Sterilizing Operation.

Trouble	Possible Cause	Solve Method
E01	Water lack in the tank	Adding water into the collection tank
E02	The door is not closed tightly	Check if the door is closed tightly or if the door switch is damaged
E03	Temperature sensor malfunction	Check if the temperature sensor is loose or damaged
E04	Overheat the sterilizing	Check if the sterilizer lacks water or if the overheating Temperature is damaged

12. Circuit Diagram