BIOBASE®

# BKM Series Table-top Steam Autoclave
# BKM-Z18B/24B
# User Manual

**Jinan Biobase Biotech Co., Ltd**

**Version 2019.01**

BIOBASE®

# Preface

Thank you for chosing our autoclave, please read the operation manual carefully before using it.
Safety Tips:

 This sign indicates internal earthing protection of the machine.

Scald-proof

 This sign can be seen after opening the door.

Important safety tip

 This prompts the operator this part is the important safety information.

Security considerations：

Please read the safety warnings and precautions provided in this user guide to ensure that you use the autoclave safely. If you do not follow the instructions provided in the manual, the protection offered by the equipment may be damaged.

1. Use a separate protective earthing power socket of three holes 220V/10A, and make sure the protective earthing terminal to a realiable connection.
2. Insert the autoclave power plug completely into the power socket, and do not use the power other than those sepecified.
3. Do not use wet hands to pull the plug.
4. Do not damage, modify, stretch, or excessively bend or twist the power cord, but also do not put heavy objects on the power cord.
5. Do not place the autoclve on an unstable table, such as a shaky table, ramps or the will-shake position.
6. Do not block or cover the autoclave door, air vents,or heat-sink window.
7. Do not put anything on the autoclave.
8. If you find autoclve is smelly or unusual noisy in the using process, immediately turn off the power. Then please contact your local dealer or our sales and service department
9. If the autoclave is not to be used for a period of time, the power cord plug should be power off and remove the battery of the main board.

10. Do not place the autoclave near the heat source.
11. The LCD screen may work unstablely if there is interference in the power grid when the equipment is in use. The operator can equip it with a voltage regulator in order to solve the above problems.
12. Autoclave package (or product) must be accompanied by chemical indicator.
13. Autoclave is not suitable for sealing liquid, the product that is not resistant to high temperature and high pressure.

BIOBASE®

# 1.Introduction

This sterilizer is composed of control panel, sterilization chamber, sealing door.

In the sterilization process, the temp. error is 0~3℃ between Max temp. and preset temp. The timing error should be less than 10% of the preset value.The sterilizer has 121 or 134℃set program.

This sterilizer has good sealing effect, the sterilization effect is accord with the standard 4.15 terms.

The electrical safety performance should be accord with the requirements of the registration product standard appendix H & J.

The pressure volume is accord with the national standard GB 150 requirements.

Accord with the registration standards of BKM series small steam sterilizer.

**Classify**

By anti electric shock type: I equipment

Equipment is not AP or APG type

By running pattern: continuous operation

**Application range**

It is mainly used in medical institution where users need to sterilize various surgical instruments, dressings, glassware, and injection equipment.

**Note**: make sure the sterilizer is well grounded when using

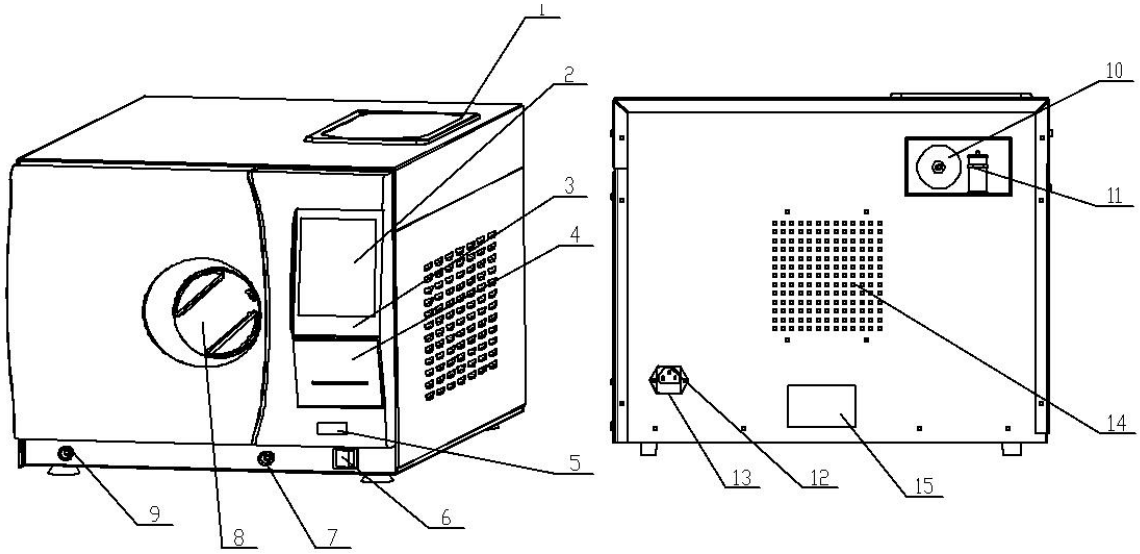
| | |
|---|---|
| Model | BKM-Z18B |
| Capacity（L） | 18 |
| Model | BKM-Z24B |
| Capacity（L） | 24 |

# 2. Technical parameters

(1) Chamber Size:Φ247mmx470mm
(2) Power:AC220V±22V，50/60Hz±1Hz
(3) Consumption:1950VA
(4) Sterilization Temp.:121℃/134℃
(5) Power Fuse:F10A/250V
(6) Water Consumption:0.5L~2.5L
(7) Ambient Temp.:5~40℃
(8) External Size(W*H*D):700x500x430mm
(9) Net Weight:53Kg
(10) Noise:＜60dB

Use Environment

(11) Relative Humidity:Max 80%, no condensation
(12) Atmospheric Pressure:76Kpa-106kpa




1. Distilled water tank 2. LCD screen 3. Button panel 4. Printer
5. USB data hole 6. Power switch 7. Distilled water outlet 8. Door handle
9. Condensate tank drain 10. Air filter 11. Safety valve 12.Power socket
13. Insurance tube 14. Condensator 15. Label

# 3.Package

| Number | Name | Quantity |
|---|---|---|
| 1 | BKM-Z24B Autoclave | 1 |
| 2 | Instrument tray | 3 |
| 3 | Instrument rack | 1 |
| 4 | Instrument tray disk folder | 1 |
| 5 | Drain（Each 60cm） | 1 |
| 6 | User manual | 1 |
| 7 | Fuse（F10A/AC250V） | 1 |
| 8 | Solenoid Fuse（F3A/AC250V） | 1 |
| 9 | Board Fuse（F1A/AC250V） | 1 |
| 10 | Door seals | 1 |

# 4.Installation

* The autoclave must be placed in a horizontal work surface
* Leave at least 10cm around the autoclave, at the top of at least 30cm, around maintain good ventilation
* Don’t cover the sterilizer doors or vents, don’t place near the source of radiation
* Don’t put in the liquid splashing place
* Don’t be near any heat source

# 5. Operation

## 5.1 Preparation

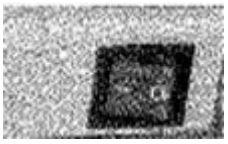
### 5.1.1 Open the door

When the first time use, remove the instrument tray,instrument rack and other accessories from the chamber, then remove the packaging.

### 5.1.2 Connect the power

Insert one end of the wire in the power socket and connect the other end to the socket on the back of the autoclave

**Note:The power supply outlet must be reliably grounded,connecting wires must be reliable and secure.**



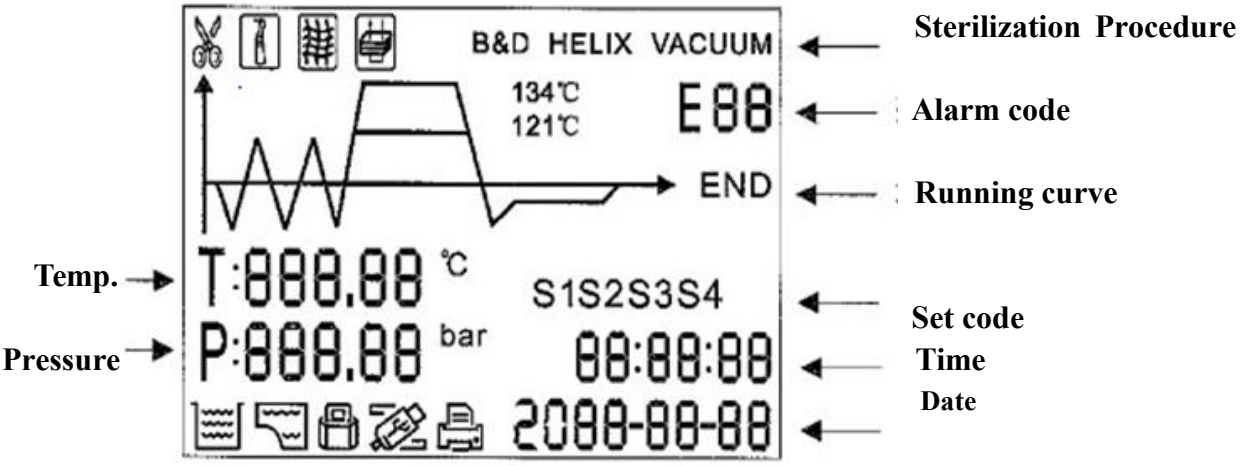
### 5.1.3 Turn on the power

Press the power switch, after power is connected, LCD will show.

The system will display the position of the door, the water level, the current program, date, time, etc.

If the system self-test found the problem, the alarm will be issued.

**Picture description**




Flashing indicates water tank lack water

Flashing indicates water tank exceeds the max level

Flashing indicates condensate water tank exceeds the max level

 Twinkling shows door unlocked, constant lighting shows door locked

 Constant lighting indicates the output function of USB is working

 Constant lighting indicates the print function is working

**5.1.4 Adding distilled water**

Removing the water storage cover of autoclave from its top as shown, you can directly pour water into it as you can see water storage. When reach the highest water level, Will twinkle with beep. Please stop adding water. 

Attention: water level should not over the vents of water storage.

## 5.2 Preparation of the equipment

In order to get a better effect of sterilization and protect sterilization items, please operate as follows:

1、make sure that different mental instrument puts on different mechanical disk, or isolate them totally.

2、You'd better to insert sterilization paper and medical cotton between instruments and mechanical disk in order to avoid being touch directly, if the material is not stainless steel.

3、Ensure every instrument get sufficient space

4、Containers like glass cup and tube etc should put down or invert for avoiding water accumulation.

5、Every mechanical disk is not supposed to overload(please find in appendix)

6、Do not fold up mechanical disk for using, or place it directly in the cavity of the sterilizer

7、Please use handheld instrument every time you fetch instrument

8、Every instruments should be packed independently, if several devices must be packed in a bag

9、Each package bag to be sealed

10、Ensure that sterilization with the paper side up, the plastic side down

 Please try to sterilize after using sterilized package for extending storage time


## 5.3 Sterilization procedure choice

### 5.3.1 Interface display

Interface displays real-time temperature, pressure
Sterilization status, time, and
The alarm code.

### 5.3.2 TEMP Button

Choose the temperature of sterilization

### 5.3.3 PROGRAM Button

Choose the program of sterilization

### 5.3.4 START/STOP Button

Using this button to start sterilization procedure, if push this button in 3second, you can terminate the program. Pushing this button in 10 seconds after trouble solved can delete the display of wrong equipment information.

### 5.3.5 choosing program

Pushing TEMP button to choose the temperature of sterilization, and PROGRAM button for choosing the way the sterilization. The procedure can be seen in appendix 2.

 Solid instrument

 Packaging instrument

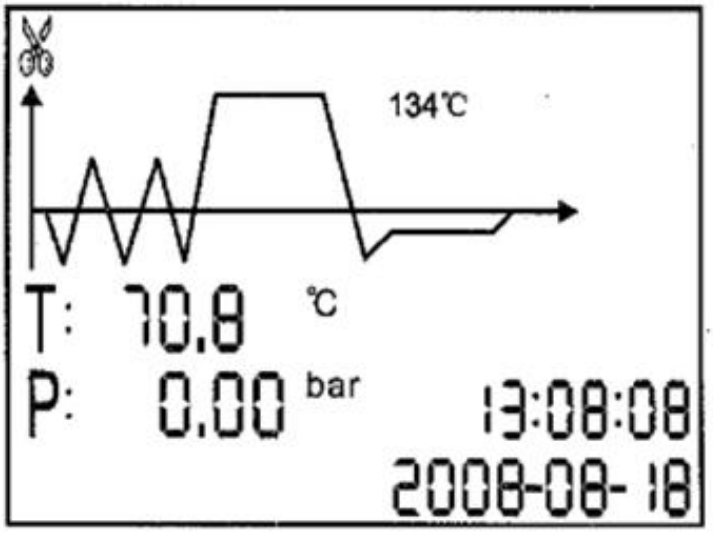
 Fabric

 Enhanced sterilization

B&D B&D TEST

HELIX HELIX TEST

VACUUM VANCUUM TEST




## 5.4 Program operation

Put items need to be sterilized into the cavity of sterilizer, please use handheld instrument

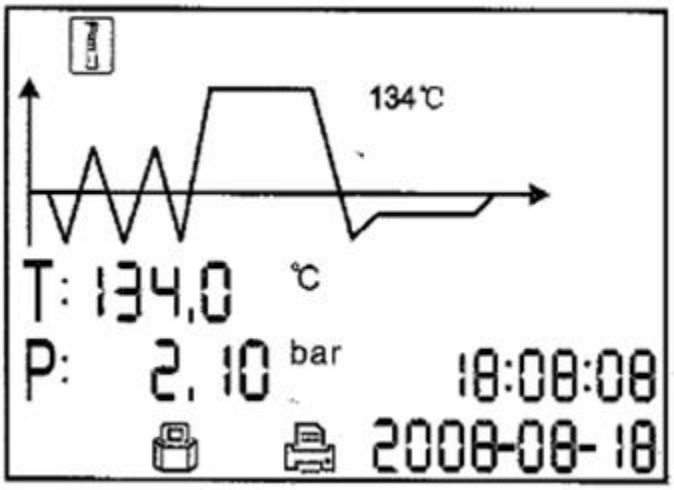
### 5.4.1 Close the door

Close the door after items is in, then revolving door handle clockwise to the maximum position

ATTENTION: Door handle must be to the right of the maximum position, otherwise the door may be opened and the emergence of the door is forced to open

### 5.4.2 Start the sterilization process

The sterilizer will start to work automatically when start button pushed.
Total time is about 15-60minutes(please find in appendix 2)

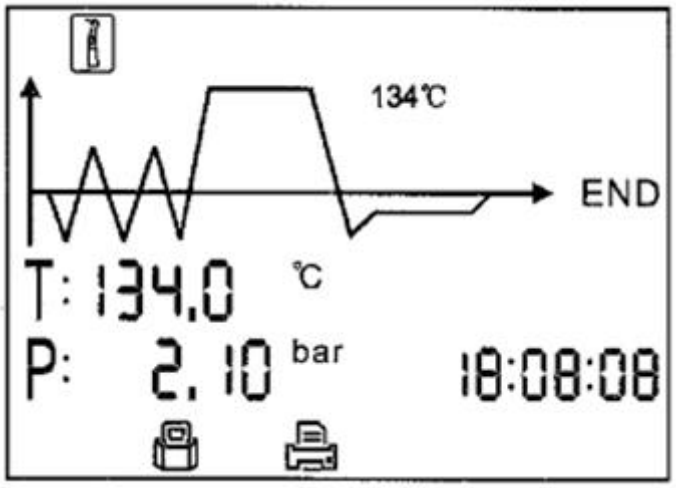



Hereby display total Time for sterilization, When entering the sterilization holding time or the drying process, display the countdown

Attention: when the door is not closed to its right position,  will twinkle, at this time, the starting program won't work although starting button is pushed.

**5.4.3 Sterilization finished**

At the end of a sterilization, program will display END. If you are already connected to the printer, then the printer will print sterilization information. When the screen displays the pressure to "0", you can open the sterilizer door and remove sterilized items.




 Make sure to use a handheld instrument tray gripping items from being burned.

### 5.5.4 Drain Valve

1 The connector is inserted in need drainage fittings

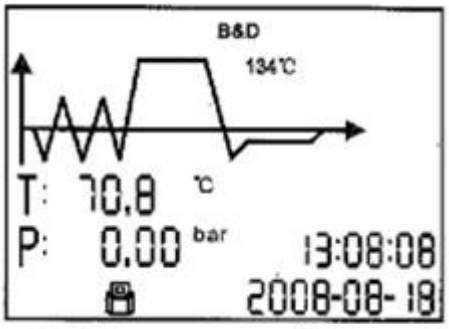
2、After plug into position, the outer collar automatically lock (pictured)

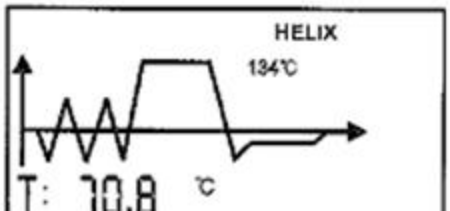
3、After the water drained by hand to push the outer wall of the big head, small head will automatically pop up (Figure)

4、After the small head pop up, loosen the outer wall of the large head, automatically reset.

## 5.5 Test Program

5.5.1 Press PROGRAM key，choose“B&D”test program。
5.5.1.1 put ”B&D”test paper into the chamber of autoclave
5.5.1.2 Start the program and start working, at the end, check the test paper to see whether reached sterilization.



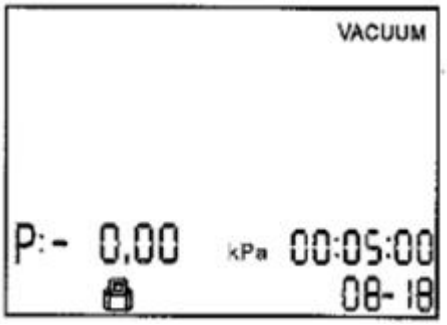



**5.5.2 Choose HELIX test program**

5.5.2.1 put HELIX test paper into HELIX test tube。

5.5.2.2 Put HELIX test tube into the chamber of autoclave，and press START to start program。

**5.5.2.3** After sterilization is complete, check the test paper to see whether it reach requirements

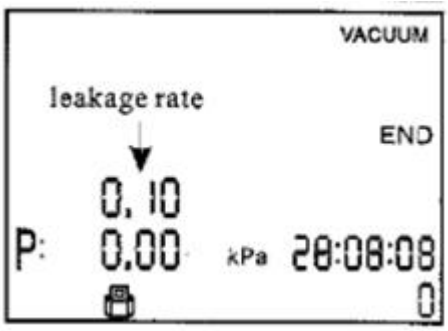



**5.5.3** choose VACUUM test program

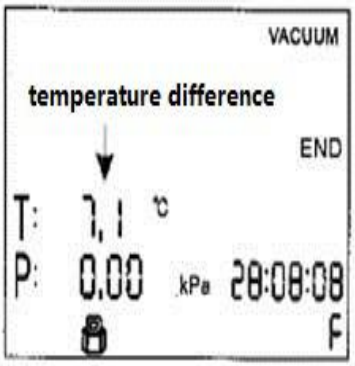
**5.5.3**.1 close the door，start program。

**5.5.3.2** Results will be displayed after the sterilization.

**5.5.3.3** According YY0646 requirements, within 10 minutes, the air leakage rate of no more than 0.13kpa / min, if meets the requirements, the interface will show "O", Otherwise, it displays "FAIL4", indicates failure




**5.5.3.4** If during the test, the temperature fluctuations more than 3 degrees， "FAIL2" will show, representing the void. You need to wait for sterilization chamber to cool, and then doing it again.



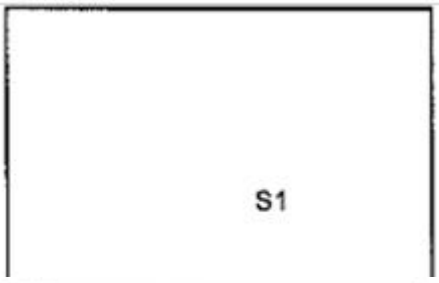

**Note**：Vacuum test program must be run when the sterilization chamber is in cold state . Otherwise there will be running more than 3 degrees temperature fluctuations Situation.

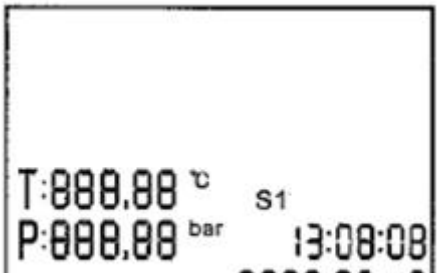
# 6 Advanced Settings

## 6.1 Enter setup interface

6.1.1 Press on START，open the main power。 After the buzzer sounds Enter the setting interface.

6.1.2 press PROGRAM，choose setup state S1,S2,S3,S4



Press START to enter the relevant setup state。

## 6.2 S1 State

On S1 state， you can adjust time and date.

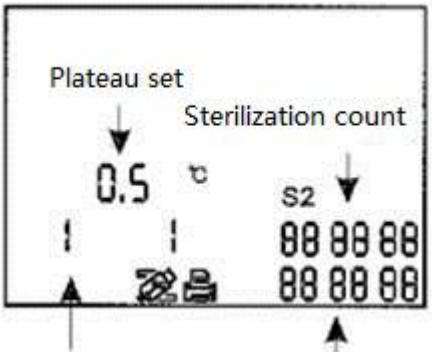
6.2.1 After entering the state, the default selected hours of high, the bit display, press the PROGRAM key, the selected flash will move to the next number.

6.2.2 Press TEMP, number flashing will add 1, and 0-9 cycles.

6.2.3Adjustment is completed, press the START button, the adjusted value is saved.

## 6.3 S2 State

**6.3.1** In this state, you can view Sterilization count and equipment number, but you can't change it




**6.3.2 Set the highland set**

If you use at high altitudes, you need to set the following highland setting parameters：

1.0>h>0.5km, 0.5;1.5>h<1.0km,1.0

2.0>h>1.5km,1.5;2.5>h>2.0km,2.0

3.0>h>2.5km,2.5;3.5>h>3.0km,3.0

4.0>h>3.5km,3.5;4.5>h>4.0km,4.0

note：Standard atmosphere 100 KP, every rise by 0.5 km above sea level, the pressure drop 5 kpa.

If you set parameter value exceeds 2.0, you need to re-evaluate the sterilizing effect, you can extend the time to improve sterilization Sterilization.

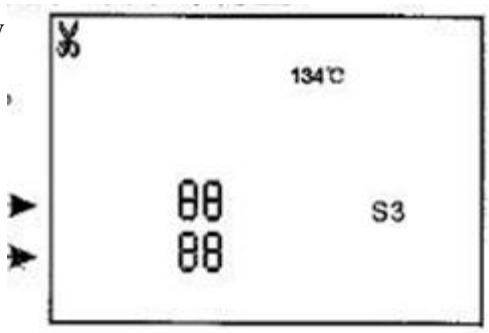
**USB** The factory code

**6.3.3 Print and USB Settings**

1 open the function，0 close the function。To the left of the parameter indicates

USB。The right of the parameters indicates the printer.

Users must not modify the factory code, the code set up and follow maintenance




## 6.4 S3 state

**6.4.1** This state is to adjust the sterilization time and drying time

Press PROGRAM to choose program.
Press TEMP to choose sterilization temperature.
Press START again to adjust the sterilization time and drying time

**6.4.2** Press TEMP to change value
Press PROGRAM to choose the value need to change.

**6.4.3** press START to save and out.

**6.4.4** sterilization time range 1-60
Drying time range 0-20

The adjustment of the drying time is refers to the adjustable part of the drying time.

Drying time points fixed drying time and adjustable drying time . Fixed time of about 7 minutes.

Note: Unless it is necessary, we do not recommend users to easily adjust parameters.

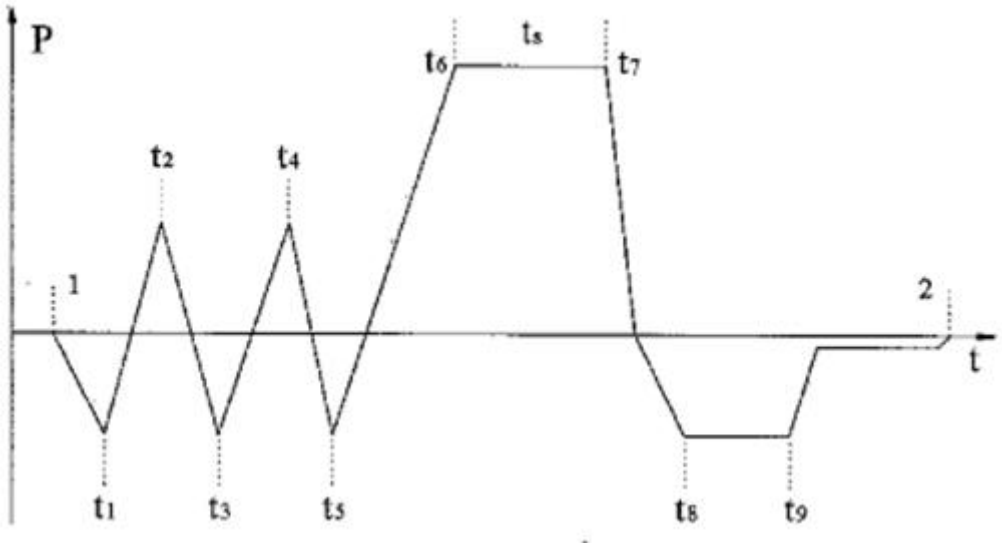
## 6.5 S4 is set up for the manufacturer, the user must not to adjust the Settings.

## 6.6 Printer（Optional）

**6.6.1** The printer is installed in the front of the autoclave.

**6.6.2** The sterilization data will be printed automatically upon the selected program finishes.

Sample of the printed sterilization data




Program：WRAPPED
Temperature:134
Pressure：210.0kpa

Vacuum Num：3
Dry Time：10Min
Ster Time:4.0Min
Start Time:05:38:12/88.1°C
T1:05:40:03/84.7°C/-70.0kpa
T2:05:42:23/101.8°C、52.0kpa
T3：05:44:15、79.4 °C/-70.0kpa
T4:05:46:21/108.5°C/50.3kpa
T5:05:49:49/91.6°C/-70.0kpa
T6:05:57:34/134.5°C/229.3kpa
TS:134.5°C/225.2kpa ( Average temperature/ Average pressure )
MAX.Temperature:135.0°C ( Maxmum temperature )

Program:Vacuum test
Tp: 1 °C
P1：-70kpa

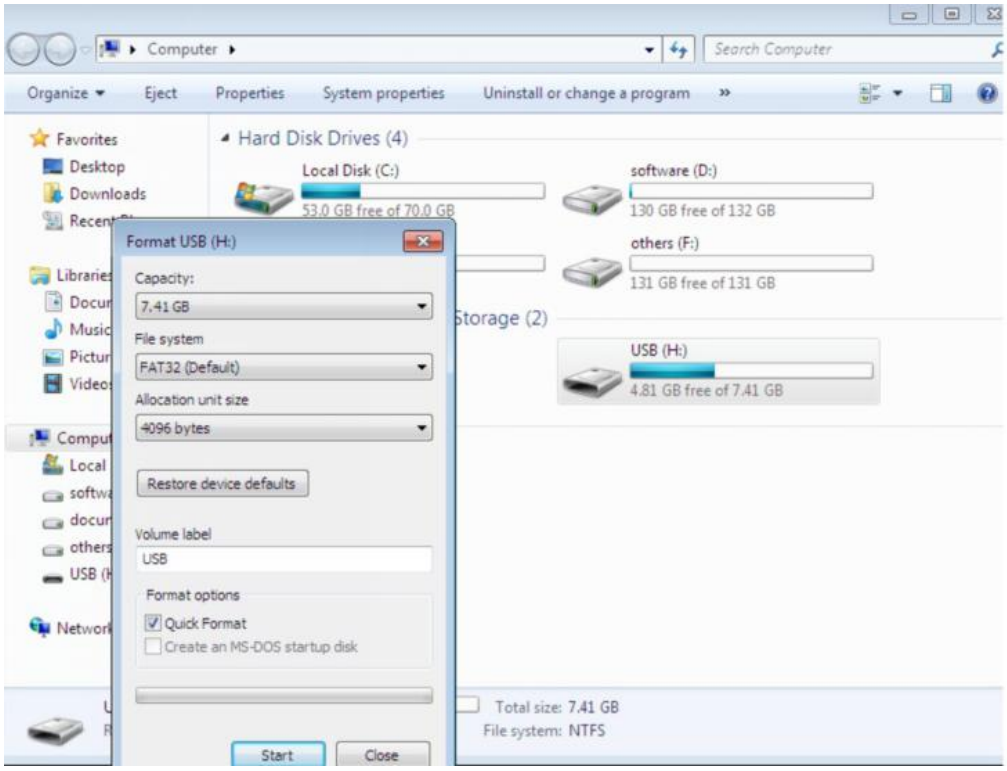
P2：-69.0kpa
rate of pressure rise:0.1kpa
Start Time:08:22
End Time:09:01
Date:2011-06-30
Test Value ： Success
S/N: BK000010
Operator

MIN.Temperature：134.0°C ( Minimum temperature )
MAX.Pressure:230.4kpa (Maxmum pressure )
MIN.Pressure:220.4kpa (Minimum pressure )
T7：06:00:10/134.5°C/223.8kpa
T8:06:03:36/110.7°C/-60.2kpa
T9:06:06:22/102.3°C/-60.2kpa
End Time:06:10:34/71.3°C
Cyele No：0015 （Times of Sterilization）
Ster Value：Success （Sterilization Result）
Date：2011-06-30
S/N：BK000010
Operator

## 6.7 USB Port


**6.7.1** Plug the USB disk to the port on the front of the autoclave
**6.7.2** Data transfer is completed when the screen indicates "END".

Note: The disk must adopt FAT32. Hard disks are not accpeted.




# 7 Maintenance

| Maintenance Required | Operation |
|---|---|
| Daily | Cleaning the door gasket and the mating surface |

| | |
|---|---|
| | Cleaning the ourside of the door |
| Weekly | Cleaning the water reservoir |
| | Cleaning the inner chamber |
| Every 3 to 6 months<br>(Every 200 operations） | Changing the air filter |
| Yearly | Changing the door gasket |

## 7.1 Cleaing the distilled water reservoir by using medical disinfectant or distilled water

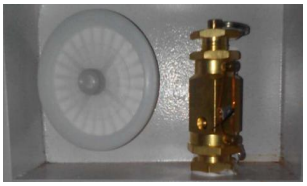
1.Drain the water reservoir out and wipe out the fouling by using no-shedding cloth dipped with medical disinfectant or distilled water.

## 7.2 Cleaning inner chamber

**7.2.1** Remove trays and racks
**7.2.2** Clean up by using no-shedding cloth dipped with distilled water or medical disinfectant.
**7.2.3** Clean the trays and racks using the same method as mentioned in 7.2.2

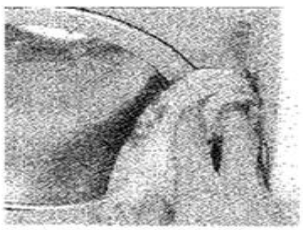
## 7.3 Changing air filter

**7.3.1** Air filter is in the back of the autoclave (as shown in the picture)
**7.3.2** Pull out the filter
**7.3.3** Change the filter
**7.3.4** Connect the new filter to the tube and push it back to the hole.



## 7.4 Cleaing door gasket and the mating surface

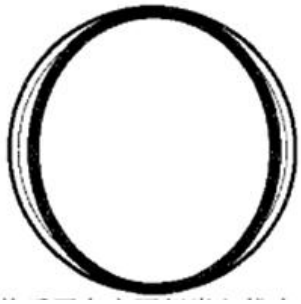
Clean up the door gasket and the mating surface using no-shedding cloth dipped with distilled water.



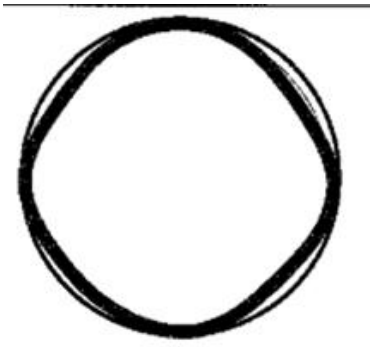
## 7.5 Changing door gasket

**7.5.1** Open the door of the autoclave.
**7.5.2** Remove the gasket
**7.5.3** Clean up the mating surface
**7.5.4** Wet the new gasket
**7.5.5** Install the new one by following steps

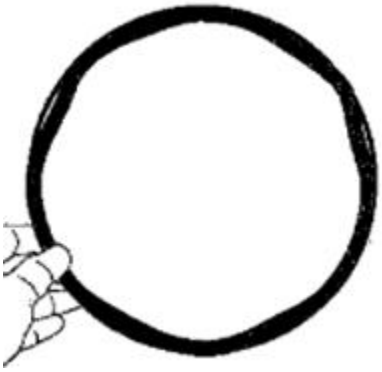
1. Embed the 2 spots (up and down)equably into



2. Embed the 2 spots (right and left) equably into groove



3. Embed the other parts by diagonal way.



4. Press the gasket equably by hand.

Notice：Before changing the gasket, ensure that the sterilizer is cool, in order to

avoid scald.

## 7.7 Replacing Fuse

1. Turn off the main power supply

2. Unplug the power line, discharge the fuse holder with a screwdriver

3. Replace a same type fuse

4.Install the fuse holder back

# 8. Transportation and Storage

**8.1** Shut off the power switch, unplug the cord, and make the sterilizer been cooled down completely.

**8.2** Drain water from reservoir and the condensate collector completely

**8.3** Conditions For Transportation And Storage：

Temperature：-20——+55

Humidity：<85%

Atmospheric pressure：50kpa-106kpa

# 9. Alarm

| CODE | CODE DESCRIDTIONS | DISPOSE |
|---|---|---|
| E1 | Steam gener ator is overheating | Check steam generator whether disconnected |
| E2 | Inner temperature overheating | Check the internal temperature sensor whether disconnected |
| E3 | Outer wall temperature overheating | Check the outer wall of the sensor whether disconnected |
| E4 | Heating failure | Check whether the leak |
| E5 | Stress release failure | Check the exhaust valve whether blocked |
| E6 | Open the door after the program start | Check whether the door handle is turned to the maximum position |
| E7 | overtime | Check whether the leak |
| E9 | Constant temperature and pressure failure | Check the storage tank whether have enough water<br>Check whether the leak |
| E13 | Vacuum fail | Check the vacuum pump and vacuum valve is working |
| E20 | Process terminated by manual | Turn off the power,turn the power recovery |

# 10.Safety Device

## 1.Fuse

protect the entire device to prevent overload

Action：Cut off current

**2. Thermal Fuse**

Prevent short circuit and transformer overheating

Action： Cut off current of the transformer.

**3.Safety Valve**

Prevent overpressure

Action： Release pressure, when there is overpressure

**4. Jiggle Switch**

Ensure the door closed completely, avoiding safety risk.

**5.Temperature Protector(Exterior)**

Prevent overheating of Exterior heater

Action：Cut off current when the temperature is too high.

**6. Temperature Protector(Steam Generator)**

Cut off current when the steam generator temperature is too high.

**7. Pressure balance system**

The system will automatically balance pressure differential of inner and outer.

## Appendix I

**Adding water suggestions**

| Item | Water supply | Condensation residue |
|---|---|---|
| **Evaporated residue** | **≤10mg/L** | **≤10mg/L** |
| **Silica** | ≤1mg/L | ≤1mg/L |
| **Iron** | ≤0.2mg/L | ≤0.2mg/L |
| **Cadmium** | ≤0.005mg/L | ≤0.005mg/L |
| **Lead** | ≤0.05mg/L | ≤0.05mg/L |
| **Other heavy metals** | ≤0.1mg/L | ≤0.1mg/L |
| **Chloride** | ≤2mg/L | ≤2mg/L |
| **Phosphate** | ≤0.5mg/L | ≤0.5mg/L |
| **Electric conductivity** | ≤15us/cm | ≤15us/cm |
| **PH value** | 5-7.5 | 5-7.5 |

| | | |
|---|---|---|
| **Appearance** | Colorless, clean, no precipitation | Colorless, clean, no precipitation |
| **Hardness** | ≤0.02mmol/L | ≤0.02mmol/L |

## Appendix II

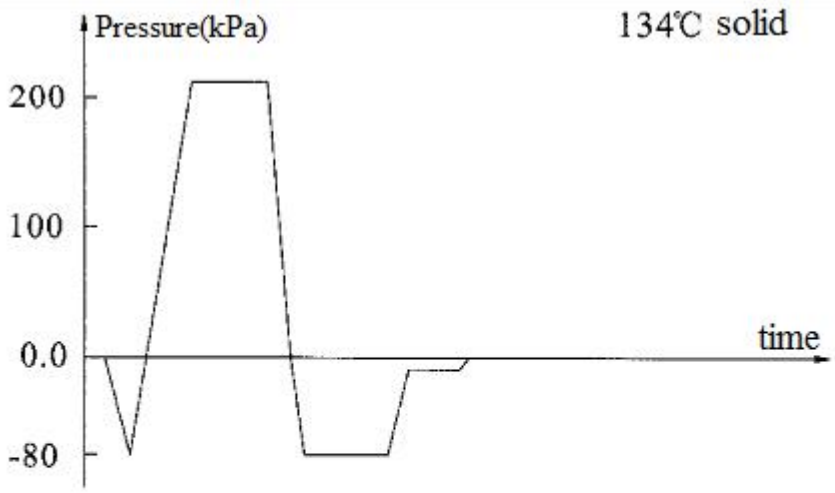
### Sterilization Procedure

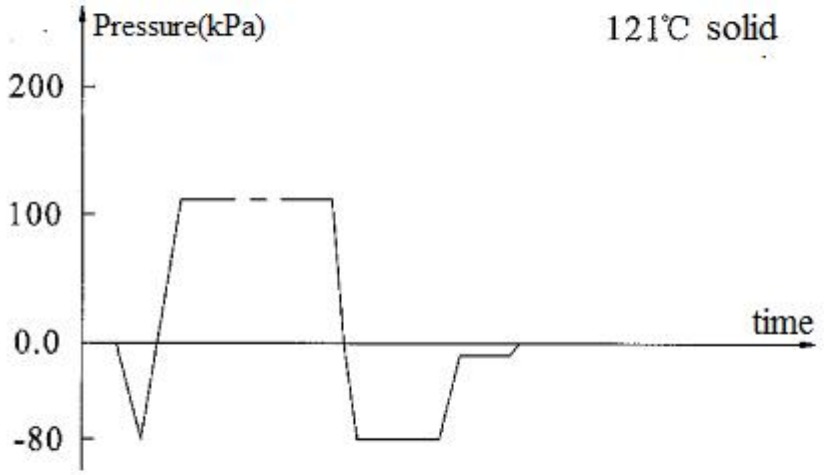
| Procedure | Temperature（℃） | Pressure（kpa） | maintain time(minute) | Total time（minute） | Instrument type | Max capacity of each tray（kg） | Max capacity（Kg） |
|---|---|---|---|---|---|---|---|
| Solid instrument | 134 | 210 | 4 | 40~70 | Encapsulate solid load without package | 1.3 | 4.5 |
| | 121 | 110 | 20 | 55~85 | | 1.3 | 4.5 |
| Packaging instrument | 134 | 210 | 4 | 55~70 | Hollow equipment without package | 1 | 3 |
| | 121 | 110 | 20 | 55~85 | Single package solid instrument | 1 | 3 |
| Fabric | 134 | 210 | 4 | 50~80 | Porous item without package | 0.4 | 0.3 |
| | | | | | Porous goods with single packing | 0.3 | 0.9 |
| | | | | | Porous goods with double packing | 0.25 | 0.75 |
| | 121 | 110 | 20 | 60~90 | Hollow | 1.25 | 4.5 |

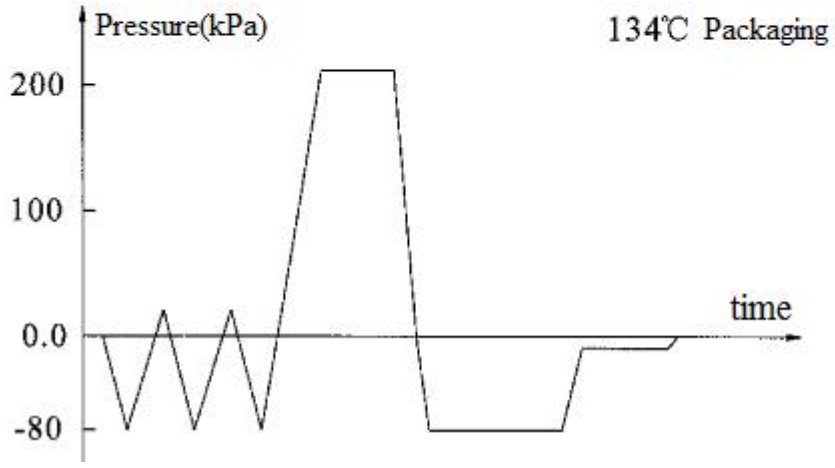
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | equipment with single packing | | |
| | | | | | Solid or hollow load with double package | 0.6 | 1.5 |
| Strengthen the sterilization | 134 | 210 | 18 | 55~85 | Porous goods without packing | 0.4 | 1.2 |
| | | | | | Porous goods with single packing | 0.3 | 0.9 |
| | | | | | Porous goods with double packing | 0.25 | 0.75 |
| | | | | | Hollow equipment with single packing | 1.25 | 4.5 |
| | | | | | Solid and hollow with double package | 0.6 | 1.5 |
| B&D test | 134 | 210 | 3.5 | 35~55 | — | — | |
| HELIX test | 134 | 210 | 3.5 | 35~55 | — | — | |
| Vacuum test | — | — | — | 15~20 | — | — | |

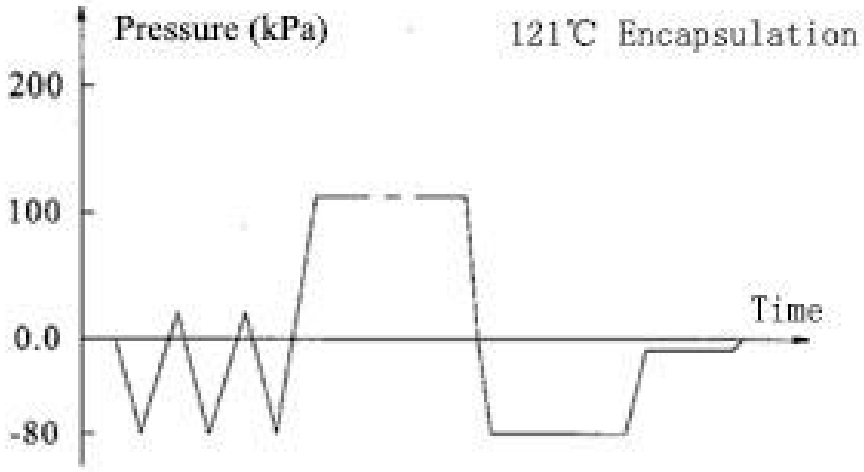
The highest temperature of 134℃ sterilization procedure is 137℃.

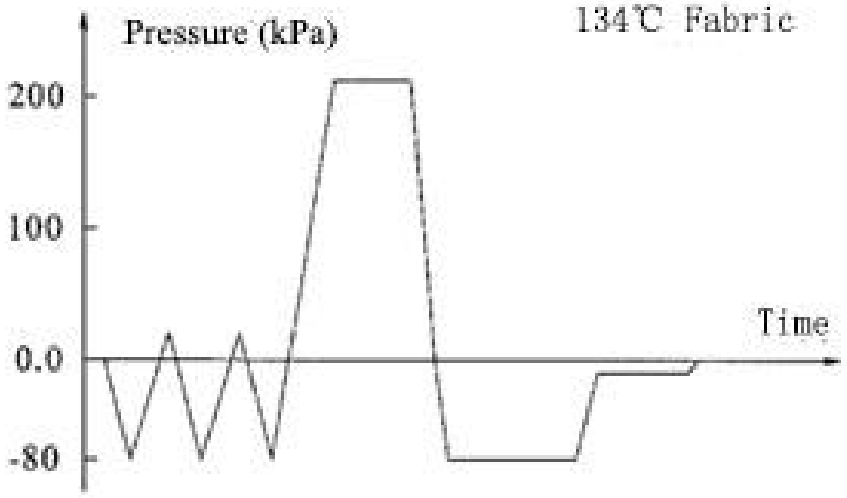
The highest temperature of 121℃ sterilization procedure is 124℃.

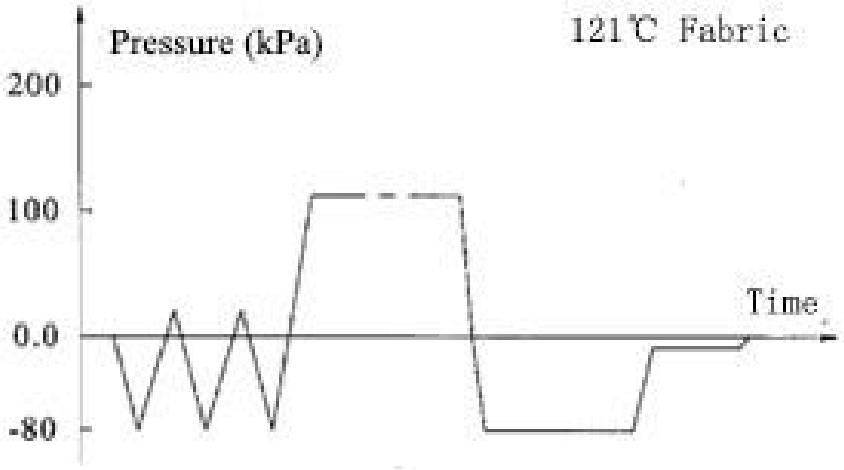

Pressure(kPa)
134℃ solid
200
100
0.0
-80
time

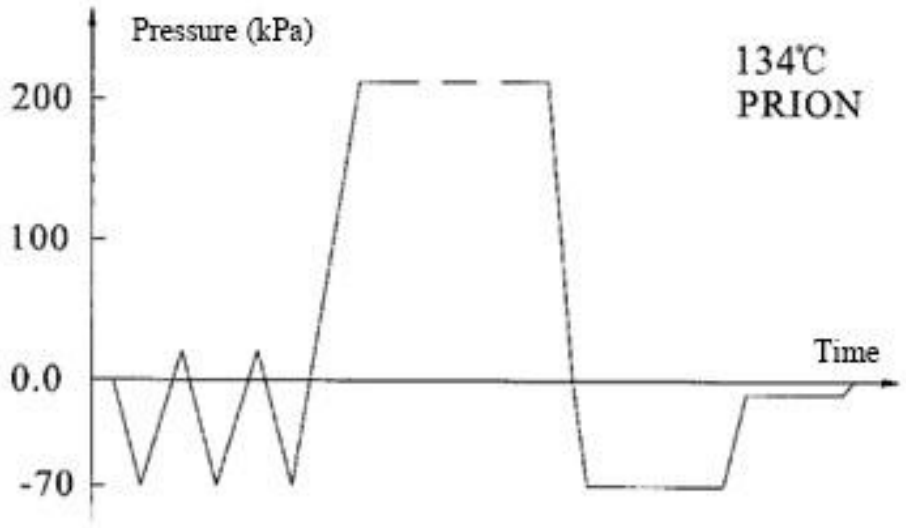

Pressure(kPa)
121℃ solid
200
100
0.0
-80
time

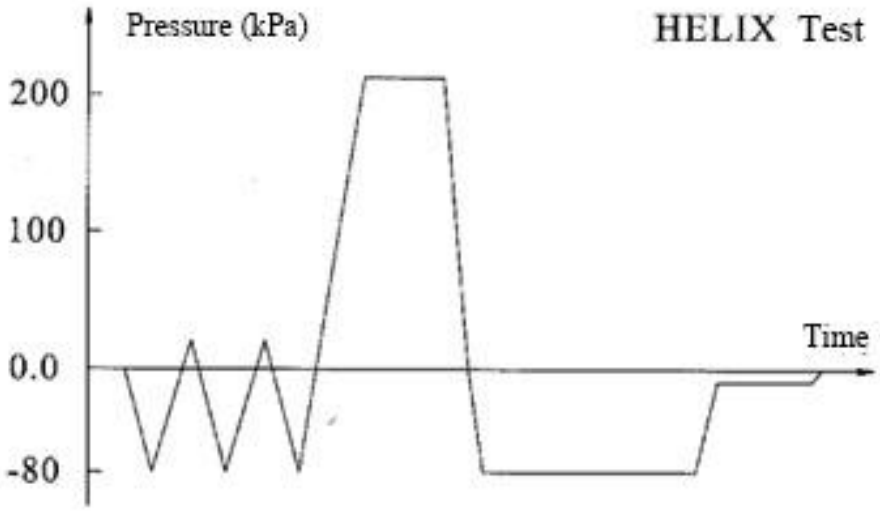

Pressure(kPa)
134℃ Packaging
200
100
0.0
-80
time

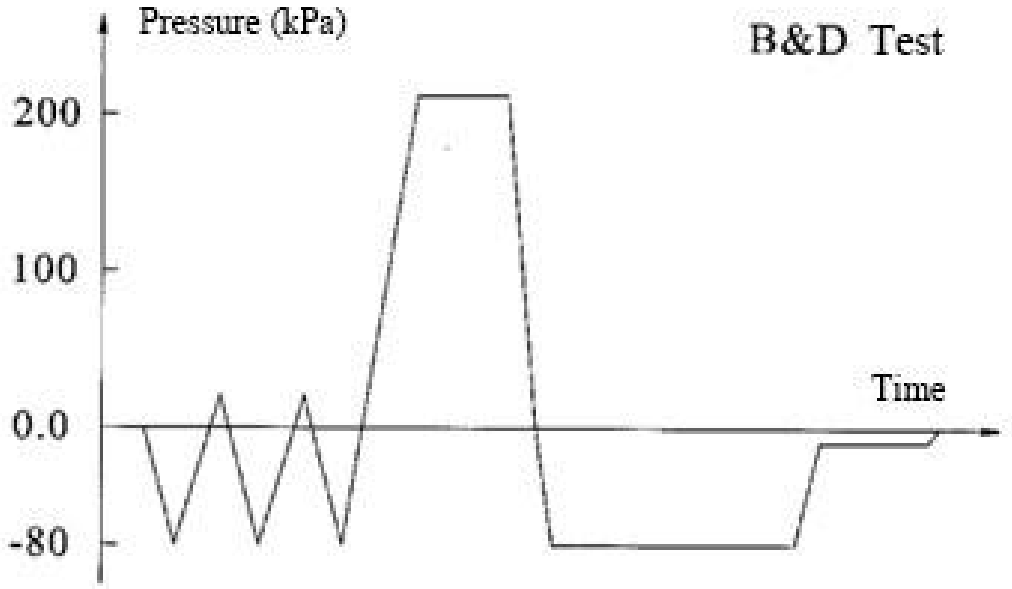

Pressure (kPa)
121℃ Encapsulation
200
100
0.0
-80
Time

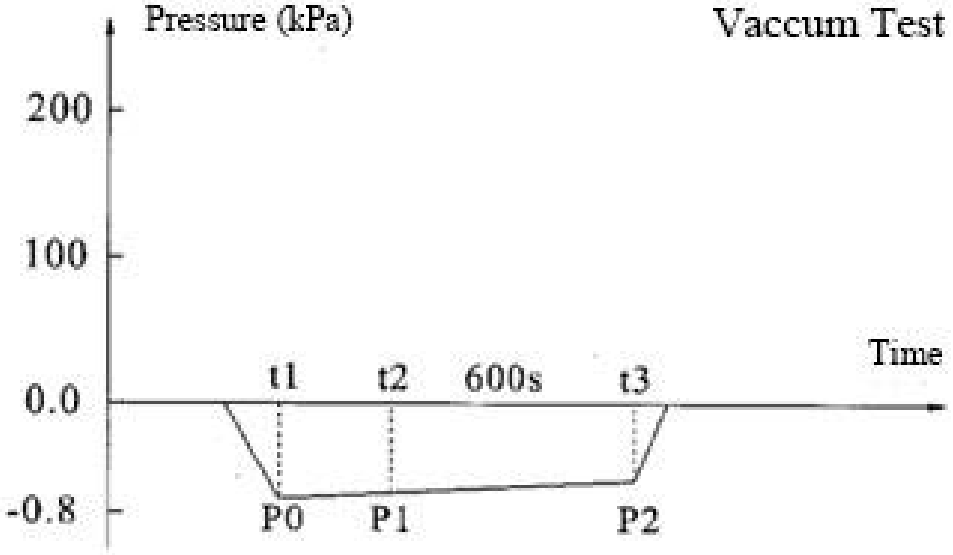

Pressure (kPa)
134℃ Fabric
200
100
0.0
-80
Time


Pressure (kPa)
121℃ Fabric
200
100
0.0
-80
Time


Pressure (kPa)
134℃
PRION
200
100
0.0
-70
Time

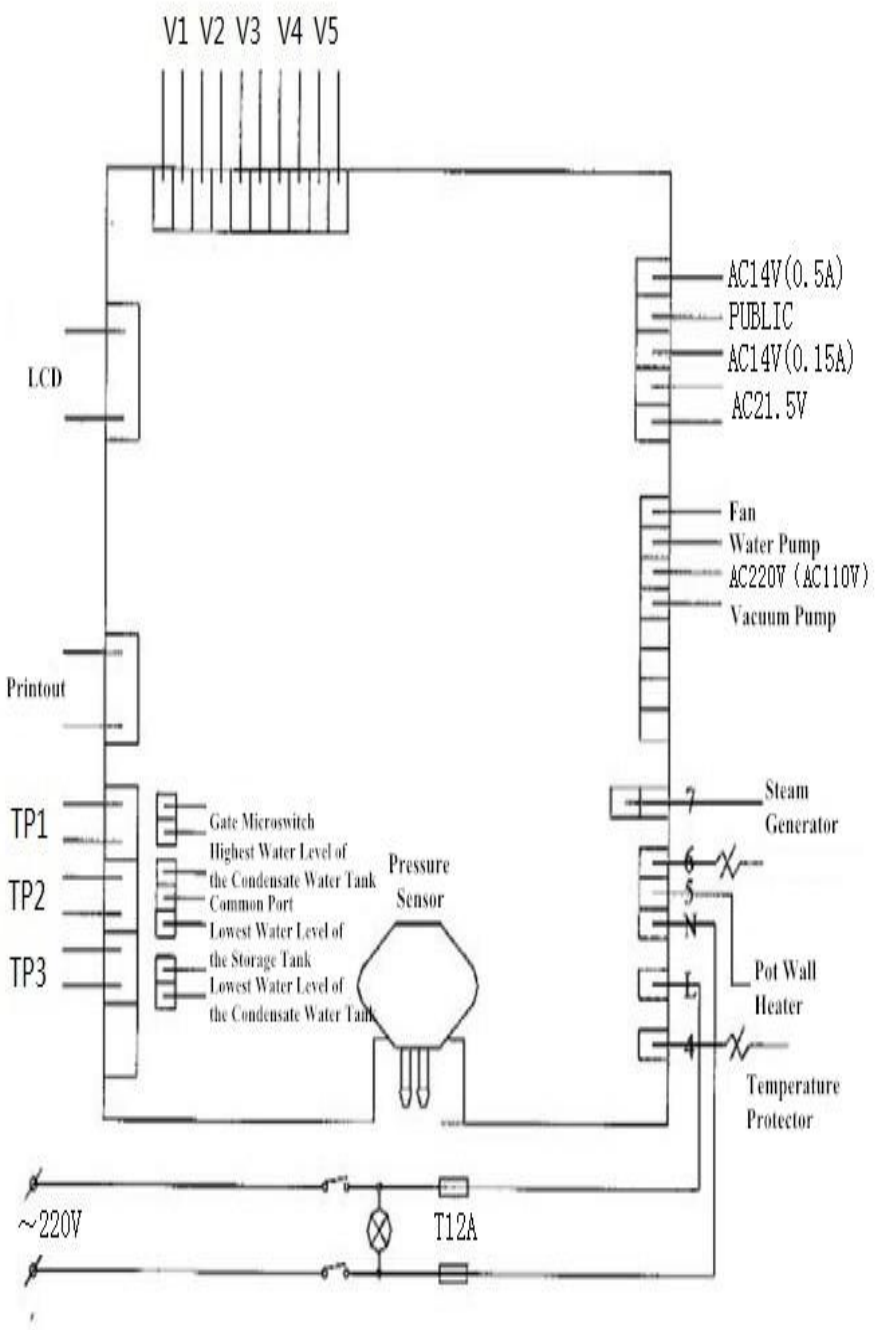

Pressure (kPa)
HELIX Test
200
100
0.0
-80
Time


Pressure (kPa)
B&D Test
200
100
0.0
-80
Time


Pressure (kPa)
Vaccum Test
200
100
0.0
-0.8
t1
t2
600s
t3
Time
P0
P1
P2

# Appendix III

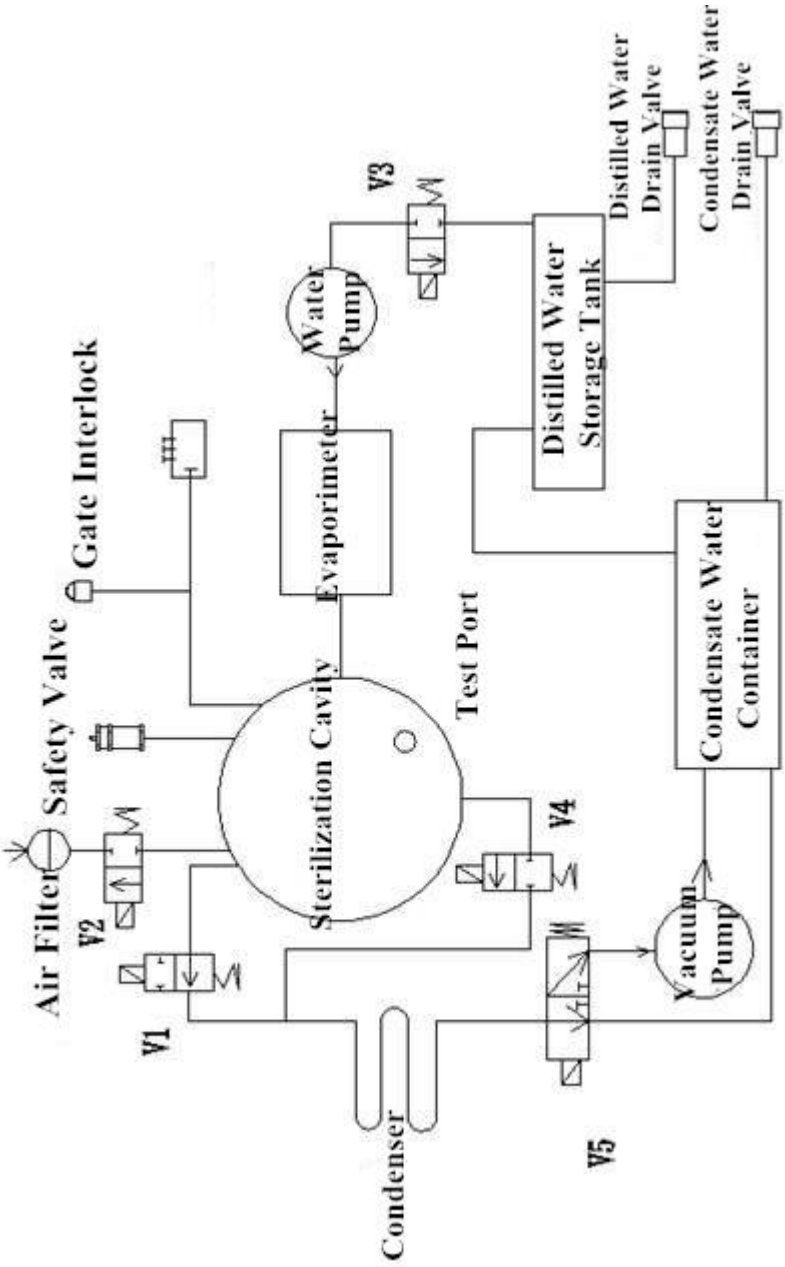
## Main board diagram



BIOBASE®

# Appendix IV

## Piping Diagram




V1: Drain Valve

V2: Intake Valve

V3: Water Pump Valve

V4: Drain Valve

V5: Vacuum Pump Valve

**BIOBASE GROUP**
Add:No.51 South Gongye Road,Jinan,China
Tel:0086-531-81219801
Fax:0086-531-81219804
E-mail: export@biobase.com service_sd@biobase.cc
Web:www.biobase.cc