



Model Series YR0055
Horizontal Autoclave

Instruction Manual

Thank you very much for purchasing our Model Series YR0055 Horizontal Autoclave.

Please read the "Operating Instructions" and "Warranty" before operating this unit to assure proper operation. After reading these documents, be sure to store them securely together with the "Warranty" at a hand place for future reference.



Warning: Before operating the unit, be sure to read carefully and fully understand important warnings in the operating instructions.



OUR SERVICES

Benefits and Support

In Kalstein France, we take care of the full satisfaction of our customers, that is why we provide value-added services of the highest level based on our experience.



Online Inductions and Trainings

In any part of the world, receive your induction or training from our specialized team of engineers



Quick Response

Our work team is always available to response all your consults or questions, in order to support you in any situation.



#Letsgivemore ♥

Thanks to your purchase, a donation will be made to a non-profit foundation that fights against breast cancer and helps most vulnerable communities.



Technical Support

Enjoy of personalized advice for the correct preventive and corrective maintenance of your equipment, thanks to Kalstein's manuals and articles, special catalogues and video tutorials.



Delivery Logistics

We take care of all the necessary logistics for the dispatch of your goods, whether is by sea, land or air.



Kalstein Worldwide

With more than 25 years growing with our customers, Kalstein's multiformat and modern content, is now present in more than 10 countries and increasing.





Name and model

Horizontal Autoclave YR0055, YR0056, YR0057, YR0058

Use

It is applicable for the sterilization of unpacked solid instruments in stomatology, ophthalmology, operating room and CSSD department.

Technical Specification

Design pressure: -0.1/0.28mpa

Design temperature: 150°C

Max. working pressure: 0.23mpa

Vacuum limit: -0.08mpa

Temperature range: 105~136°C

Temperature display accuracy: 0.1°C

Pressure display accuracy: 1kpa

The volume of the products will be different according to the models. All the parameters of the models mentioned above are same except the volume.

This manual is applicable for the following products:

Model	Volume (L)	Chamber Dim (mm)	Overall Dim (mm)	Gross weight	Power (kw)
YR0055	100	380×710 (Φ×L)	1000×679×1600	310kg	11
YR0056	135	500×710 (Φ×L)	1110×750×1742	470kg	11
YR0057	185	500×950 (Φ×L)	1350×750×1742	540kg	11
YR0058	300	632×1000 (Φ×L)	1400×890×1780	830kg	17

Introduction

This manual is suitable for the installation, operation and maintenance of Kalstein's YR series horizontal steam sterilizer.

To bring the maximum performance into full play and ensure that the product operate safely, please read the manual carefully first and strictly comply with the requirements of installation, operation and maintenance mentioned in this manual.

The following symbols in the manual are used to get highly attention and caution:



Caution: Highly attention should be paid.



Warning: The cases possibly cause equipment damage.



Danger: The cases possibly endanger personal safety.

Please read each chapter carefully and fully understand it before any operation, maintenance on the product especially the contents with the above symbols.

Please properly keep this manual away from loss and damage.

The operator has responsibility to renovate the manual and complete the lost, damaged or unsuitable contents.



Caution

Anyone in any situation can not tear off any page from the manual. During the usage of the product, please do not hesitate to contact us if there is any inconsistent explanation or unmentioned cases. We will timely solve the problems and update or renew the manual for free. This manual booklet should be stored in dry and ventilated place without high temperature.

Product Information

- Scope of application: sterilization of medical liquid, instrument and dressing fabric in medical organizations, pharmaceutical factory, food factory and biomedical research institutes.
- Design life: Same as the design life of equipment body. Please refer to the related data of pressure vessel of the equipment.

(The design life is an estimated invalidation limit in standard working environment. It is unrelated to the failure rate during usage. Improper operation will accelerate the product damage).

- Packing and delivery requirements: Please comply with National Standard GB/T 191.
- Supplementary instructions: All information mentioned in this manual is only applicable for standard product. If you have any special requirements in product order please read the manual selectively according to the sales agreement of custom product.

1. The Sterilization Factor and Characteristics

The product adopts damp and hot steam as sterilization factor.

According to the specified sterilization process, the product, in the environment of high temperature, high pressure and high humidity with certain pressure and time, adopts saturated damp and hot steam as factor to sterilize the items which can be penetrated by steam.

2. Special Messages of the Product



Warning: The product is not applicable for bottled liquid with tight seal.
Please contact us to order special liquid sterilizer.



Danger: The bottle explosion that could endanger the personal and product safety may happen, if bottled liquid with tight seal is sterilized by this product.




Caution: Since the chloridion is the important factor of corroding stainless steel, if the items that contain chloridion are sterilized by this product please wash the chamber everyday by clean water to increase the product service life. Otherwise, the chloridion may corrode the chamber.




Warning: The improper operation (i.e. sterilize the items that contain chloridion without washing the chamber everyday) that decreases the product service life is not included into our warranty.



Caution: In order to adopt proper measures when you see the  sign in any place please consult the manual or other relevant document to clarify the potential danger.



Caution:  Indicates high temperature, please protect yourself from scald when you see this sign.

Brief Introduction

The hand-operated door sterilizer is applicable for medical liquid, instrument and dressing fabric in medical institution and pharmaceutical factory.



Warning: The product is only applicable for high temperature and humidity tolerance items not for oil or powder sterilization such as Vaseline.



Danger: Sterilization of bottled liquid with tight seal is forbidden since the bottle explosion that could endanger the personal and product safety may happen.

- The door of the product is equipped by radial door bolt mechanism. The sealing ring adopts silicon rubber with good temperature endurance and flexibility. The electromagnetic lock which installed in the middle of the door is qualified by National Bureau of Quality Technical Supervision. The door can not be opened in any case only if the chamber pressure is below 10Kpa.
- The upper device of the product adopts new type LCD to display graph, dynamic text and workflow, time, temperature, pressure and other parameters.
- The lower device adopts new type process control equipment.
- Pulse vacuum method is adopted to infuse the steam into chamber while discharge the air. The amount of discharged air from the chamber is above 99%.
- The models of one-door and two-door are available and the one-door product can be used to achieve segregation of contaminated and sterile area.
- The main control elements and valves are worldwide band that increase the

stability and reliability.



Caution: The items will probably be affected by the hot steam (134°C).

Technical parameters

Rated working pressure: 0.205mpa

Rated working temperature: 132°C 2

Pulse frequency setting range: 0~99 times

Sterilization time setting range: 0~7200s

Drying hour setting range: 0~7200s

Pulse range setting: positive 0~0.1mpa
negative -0.08~0mpa

Please refer to product installation diagram for other parameters.

Pulse range setting: positive 0~0.09mpa
negative -0.065~0.08mpa

Pressure controller setting: upper switching value: 0.23mpa
lower switching value: 0.21mpa

Water: softened water (0.15~0.3mpa)

Please refer to product installation diagram for other parameters.

Installation and Debugging



Caution: Proper installation is very important for product operation. Please do not neglect.

1. Product Unloading

Please pay attention to the following matters:

- Don't stand under the crane;
- Sufficient wide berth should be given around the lifting product;
- Use qualified crane;
- Keep the lifting product balanced;
- Pay attention to protect the packing plate.

2. Unpacking and Inspection

- After unpacking please check the consistency between the model number (written on the nameplate) and purchase order;
- Please check each part of the machine and make a record. Contact us if there is any problem.
- Please carefully check the links and fastening parts whether they are loosing after a long distance transportation. If any, make the fastening for them.
- Please check and record the spear parts.

3. Installation

For the product you ordered, please feel free to request the installation diagram from

us. Installation should be done under the instruction of specialist by qualified workers.

Warning: We are not responsible for any danger or product disfunction caused by improper installation

1) Preparations and requirements before installation

- Space required: Considering the operation and maintenance of the equipment, the height of the space should be no less than 2.9m. The distance between the wall and the sides of the autoclave should be no less than 0.5m. For conveniently carrying the product, the depth of loading and unloading direction should be no less than 1.5 times of the product.
- Groundsill: If installed on the ground , the ground surface must be tamped and planished. If on the second floor or above, please consider whether to strengthen the floor.
- Airiness and heat dissipation: In order to assure the equipment work normally in comfortable working condition , please fix a suited airiness system that controlled the temperature in the range of 15 ~35°C and humidity below 85% around the autoclave.
- Dewatering: The diameter of the drain pipe should be wider than the product water outlet. Please make sure the drain pipe fixed in the sewer and not connected with other pipe in the building. Otherwise the drain water from the product may affect other rooms.



Caution: The drain pipe should be installed downward from the product water outlet; otherwise the sterilizing and drying results will be affected by undischarged condensate water. In the case that a drain pipe is connected with more than one product, please notice that the water flow of this drain pipe should be larger than the total of each product water flow. The material of the drain pipe should be thermostable, corrosion-resistant and aging-resistant. Please adjust the foundation bolt to ensure that the water outlet is the lowest point.



Warning: Only the softened water is allowed for the product build-in steam generator.

- Electrical source: The standard product is AC 380v and three phases with five wires. Three of the wires are active line, one is zero line (light blue) and another is ground line (yellow and green). Also, a power box is required on the right or back wall of the equipment, in which a 3 phase breaker and a one phase breaker are needed.

To ensure person and equipment safety, please join a wire with the ground and reliably join the wire marked “ground “in the control cable with ground.



Danger: The hull of product and steam generator must be safely grounded.



Warning: Please install the leakage protection to avoid safety problem during installation.

All the pipe lines should be well fixed. Cautions:

- ① Installation is not allowed in a place of conductive particles, corrosive gas, and inflammable gas.
- ② Installation should avoid any places with possible electrical shock and vibration.
- ③ Places of high temperature, high humidity or accessible to rain are not suitable for installation.
- ④ Places of high magnetic intensity are not allowed, either.

2) Product positioning

- Move the product to certain position. Do not injure the trim cover during moving.
- Take the documents out from the packing bag and carefully store them.

3) Balance adjusting

Please adjust the balance after positioning the product.

4) The connection of water, power and steam

Please connect the water and power with the product accordingly. To avoid leaking, filling material should be used in the layup of the pipe. Keep the product away for any leaking pipe.



Warning: The earth wire must be grounded!

Debugging

4. Debugging

According to the relevant standard, the program of the product is partly set before sale and the program parameters could always be modified if necessary. Please refer to Chapter 5 for detailed parameter setting.



Caution: Parameter modification is allowed during debugging.

Mechanical Features and Operating Principles

The product is made of chamber body, door, frame, pipe line system and control system. The sterilizing effect is achieved by steam (medium), high temperature and pressure.

1. The Main Body

- The main body adopts double jacket structure to keep certain temperature inside the chamber that decreases the condensate water.
- The chamber adopts imported anti-corrosion stainless steel, which welded and polished by professional welding and polishing machine, to keep the chamber surface smooth and corrosion-resistant.
- The outer board adopts good thermal insulating material which could decrease the thermal radiation effectively.

2. The Door

The door is made of door board plate, bolt and lock, gasket rubber, hinge plate, door

cover, hand wheel, pressure safety lock and control elements.

① Door opening direction

- For the double-door sterilizer, the front door is installed on operating end and the back door is on the other end of the sterilizer.

Double-door sterilizer opening direction:

Front door: open to right hand side Back door: open to left hand side

Single-door sterilizer opening direction: open to left hand side

② Door cover removing

Firstly, remove the lid in the middle of the hand wheel, and then twist down the screw in the middle of the decoration cover plate to remove the hand wheel base.

Remove the screws on top left and bottom right of the door cover. Now hold the cover and lift it to take it off.

③ Bolt and lock

Turn the hand wheel manually to lock the door. The door equipped with 9 bolts to support door locking. The bolt gaskets are well adjusted before sale, please do not readjust it.

- Door closing

Shut the door and turn the hand wheel clockwise. The bolts will be plugged into the front cover plate. Keep turning the hand wheel until “click” is heard then continue turning it a circle or half to fully close the door.

It is forbidden to turn the hand wheel when the door is open!

- Door opening

Turn the hand wheel anti-clockwise to open the door.

Caution: The door can be open only if the chamber pressure is same as atmosphere pressure!

- The door switch

The switch, which acted by bolts oppressing, is installed in the door cover. For the double-door sterilizer, there is one such switch on each door. Before start the system, please make sure both doors are well closed. Otherwise the system will not be started.

- ④ Pressure safety lock

The door equipped with double-proofed connection. There is a travel switch on the bottom left of the door plate to control the door opening and closing. The electromagnetic lock will acted by starting the system. In this case the door can not be opened until the sterilization is finished (chamber pressure $\pm 10\text{kpa}$).

- ⑤ Bolt permanent seat (back)

The bolt permanent seat (manual door), which has been used for two years and above, will probably be damaged. This mostly due to improperly open or close the door. Please avoid any improper operation on the door.

- ⑥ Gasket rubber

- Structure

It is an annular rubber processed by specific technique. Its composition, design, proper installation and maintenance are fairly important for its service life. We adopt high quality rubber material, which has better stability and reliability, to ensure the

gasket works effectively in high temperature condition.

- Working principle

The gasket rubber, which is fixed on the sealing ring seat, is pushed to the front sealing plate when the door is closed.

- Maintenance

Although the material and design of the gasket rubber has been fully considered, the following factors still can affect the rubber service life. Please carefully read these factors and avoid during the operation.

To protect the gasket rubbers from high temperature please shut the master pressure valve timely and open the door after each working shift.

Take the gasket rubber off and clean it with alcohol once or twice a year. Put it back when it gets dry.

During the usage, please protect the rubber from any tough item to avoid sealing invalidation. Regular cleaning will well affect the gasket rubber.

- Invalidation

The rubber becomes tough and has no flexibility. Reticular lines are found. There is fissure on the rubber or it has already been damaged.

Caution: Please carefully judge whether the gasket rubber is invalidation. The judgment mostly depends on the experience of the operator.

- Un/installation

When it is necessary to take out the gasket rubber, please make sure all the programs are terminated. Simply plug the rubber into the sealing groove to install it.

Since the perimeter of the rubber is larger than of the groove, it is required to fix the rubber evenly.

Tip: Two people will be better to fix the gasket rubber.

⑦ Faults and elimination

Phenomena	Reasons	Correct Operation
1. The door can not be opened.	<ol style="list-style-type: none">1. Residual pressure in the chamber.2. The program is running.3. The chamber temperature is higher than the allowable limit.4. Electromagnetic lock faults.	<ol style="list-style-type: none">1. Wait till the chamber pressure back to zero then open the door.2. Terminate the program.3. Wait till the temperature decrease to allowable limit then open the door.4. Check the electromagnetic lock and the wiring.



2. The door can not be closed.	1. The door is displaced and prolapsed. 2. The bolts are not in position. 3 Drive system damage. 4 One of the bolts is blocked.	1. Adjust the position of front sealing plate. 2. Turn the hand wheel to have the bolts back in right position. 3. Check the drive system. 4. Adjust the position of bolts holder and the height of the gasket.
Phenomena	Reasons	Correct Operation
3. Steam leaking.	1. Sealing gasket damage. 2. The door is not fully closed.	1. Change the sealing gasket. 2. Adjust the door position after chamber exhausting.

M;① Jacket air admission pipeline

For those products with build-in steam generator, the steam is generated by heating

the softened water in the generator. The steam enters into the jacket through the outlet (on the top of the steam generator) and the connector (on the bottom of the chamber). The steam in the jacket protects the chamber from cold air and maintains the chamber temperature at a certain level, so that the steam condensation is decreased effectively.

- The following configurations are adopted to fully develop the function of the steam generator:

The main body of the generator adopts high quality seamless steel tube and welded by professional welding technique.

The electrical-heated tube is made of stainless steel tube which has small volume and long service life.

The water pump is high quality heat resisting pressure pump which has small volume and good reliability.

The water level is controlled by three probes (“high” “medium” and “low”). The glass water level indicator is installed on the outer decoration cover to show the water level of each working stage.

- The steam generator is equipped with the following auto-control functions:

Automatic water adding. The water pump will work automatically when the water level has been under “high level” for three minutes. It also automatically stops adding water as soon as the water reaches “high level”.

Automatic pressure control. The power will be shut automatically if the pressure of the steam generator rises up to the upper limit. The power will not be switched on

until the pressure decreased to the lower limit.

Automatic switch off. In any case of that the water level decrease to “low level”, the pump is switched off automatically to protect the electrical-heated tube.

Automatic overpressure self-protection. In any case of that the pressure exceeds the upper limit, the safety valve will release the pressure automatically to protect the operator and product.

② Chamber air admission pipeline

The steam enters into chamber from the jacket through valve F2.

③ Drain pipeline

The condensation water released out from the outlet, which is on front bottom of the chamber, through the electromagnetic valve, ball valve and one-way valve.

④ Air exhaust pipeline

The steam from the chamber is exhausted through the outlet (on front bottom of the chamber), filter, electromagnetic valve and one-way valve.

Both the air exhaust and admission pipeline use the same electromagnetic valve.

⑤ Water supply pipeline

The purified water flows into the steam generator through the filter, water-adding electromagnetic valve and water pump. The normal water enters into vacuum pump through pump valve for water circulation.

⑥ Pressure control pipeline

The product equipped with pressure controller, pressure transmitter, platinum thermistor (PT100) and jacket and chamber pressure gage.

- Pressure controller

It is applicable for controlling the working pressure within certain range. The controller is adjustable.



Caution: The pressure controller is well adjusted before sale. If necessary, only licensed operator can readjust it.

- Pressure transmitter

Please refer to the relevant information 5.4.

- Platinum thermistor (PT100)

Please refer to the relevant information 5.4.

- Safety valve

It is applied for safety protection when the pressure is above the upper limit.

- Pressure gage

It is the indicator of the chamber and jacket pressure.

3. The Structure Principles of the Control System

The control system consists of the master controller, monitor, micro thermal printer, electromagnetic valve, pressure controller, pressure transmitter, indicating light and gages.

- ① Front control panel

It is installed on the front cover. The monitor, printer and key switch are included.

- Monitor (UCD-T57)

- displays diagrams and dynamic text

- convenient touching-screen

- good communication function

- Pinter

- high quality printing

- low consumption

- small volume

- records start time, operating frequency, operator number, program type, and all program parameters.

② Back control panel

It is only available for double-door sterilizer. It is equipped with five indicating lights and a chamber pressure gage.

- Indicating lights

- operating (green)

- door closed (yellow)

- door locked (yellow)

- alarm (red)

- terminal (green)

③ Master control cabinet

- Master controller

- powerful function
- the main element adopts American large scale integration chip
- high reliability
- superior to traditional PLC
- higher cost performance and easy to use
- it is widely used in controlling industry
- power: 24VDC; working environment: 0~55°C

The equivalent circuit of this controller consists of the following four parts:

a. Input

- accepts operational order
- accepts all types of information of controlled object
- controls the operation and exchanging of program

b. Control

- it is customer-editing program
- the controlling program is stored in ROM

c. Output

- drive load by program execution directly or through intermediate relay

d. Analog quantity exchanging

- five-way analog quantity input
- twelve-digit exchanging accuracy
- exchange the standard current signal into digital quantity (i.e. temperature and pressure)



Caution: The earth wire must be reliable grounding to avoid temperature and pressure fluctuation.

- Buzzer

The buzzer alarms if any improper operation happens, or the termination of the sterilization.

- Indicating lights

-operating (green)

-door closed (yellow)

-door locked (yellow)

-alarm (red)

-terminal (green)

- Fuse base

-The base equipped with fuse which is used for protecting the control system from excessive current.

- Inline pump relay

- Heating tube contactor

- ④ Electromagnetic valve



The control system outputs the signal to control the electromagnetic valve.

- ⑤ Pressure controller

-The contactor will be shut off if the pressure of steam generator reaches upper limit.

-The contactor will be turned on if the pressure of steam generator decreased lower limit.

⑥ Pressure transmitter

The chamber pressure signal will be exchanged into 4~20mA current signal firstly, then into digital signals (i.e. chamber pressure value).

⑦ Platinum thermistor (PT100)

- Working principles

There is linear relation between PT100 and the temperature within certain range. At normal temperature (20°C), the resistance value of PT100 is 107.79 Ω . The resistance value is transferred from PT100 to temperature transmitter. The analog quantity accepts the value and transferred to the touching-screen after exchanging the value signal.

⑧ Pressure gage

Please refer to the relevant information in 5.3.

4. The Operating Principles of the Control System

The master control chip of the control system adopts high-integrated chip and touching-screen monitor as human-computer interface. The collection of temperature and pressure signal achieved by analog standard module:

-The controller exchanges the resistance value signal, which is transferred from PT100, into acceptable digital quantity;

-The pressure transmitter exchanges the pressure value signal into 4~20mA current

signal.

The advantage of analog quantity control is that the continues changing of temperature and pressure could be simply inspected and clearly displayed on the screen.

Please careful adjust and set gage parameters according to specific requirements before operation. Please refer to Chapter 6 for parameter setting.

① Power supply

Turn the key switch to “1” position to get 220VAC power supply.

② Door controlling

-turn on the power switch

-turn the hand wheel to close the door

-the travel switch works to transfer signal

-the front door screen displays that the door is closed

-the back door indicator light is on

Note: the back door indicator is only equipped in double-door sterilizer. Steam generator controlling

Chamber air admission controlling Pulse heating controlling Chamber air exhausting

Drying stage

Program termination

5. The Outer Plate

The entire outer decoration plate adopts carbon steel with spraying plastics (stainless steel is also available to order). During the usage, the plate could always

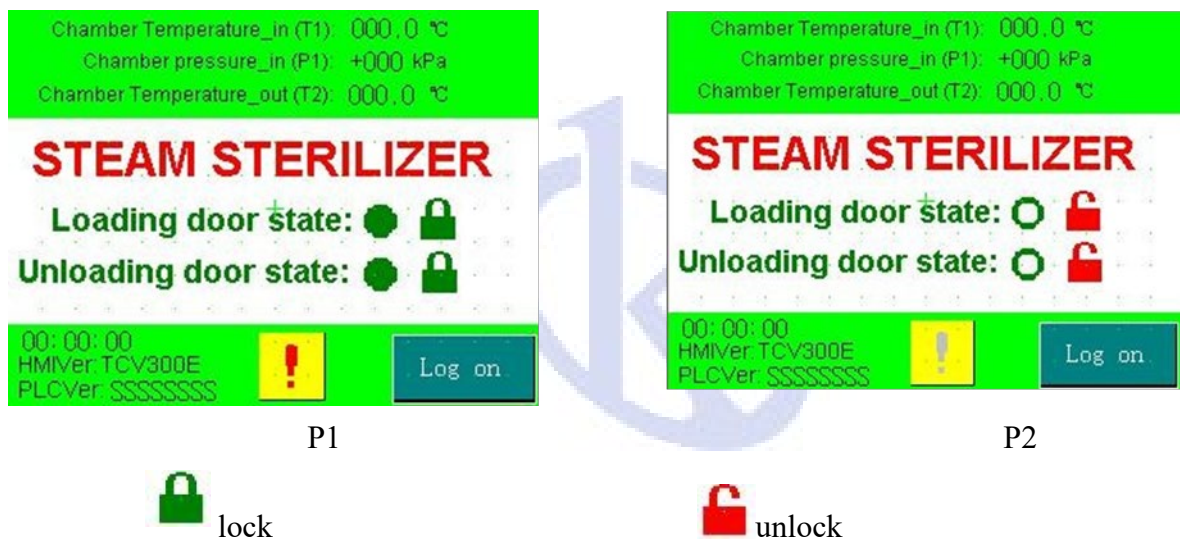
be removed if required.

Operation

After installation and debugging according to chapter 4, please turn on the power and water supply. Switch the key to “1” to initiate the product self-checking. The process of self-checking will be displayed on the screen.

Suggestion:

If the control system works abnormally please restart the system to check whether it is under interference.



In the initial display, the two pictures above show the status of unlock and lock.

In the initial display, the chamber pressure (kpa) and temperature (°C) are showed on the top of the screen. The second line of information shows the current time. The display screen and PLC program number are showed on the bottom left corner. The “Log on” button is on the bottom right corner.



Warning: After sterilization for bottled liquid, do not open the door until



the chamber temperature is below 80°C (in the area that below 1000m altitude) and the pressure is back to 0. Then slightly open the door (keep 10mm gap) and wait for 10 minutes. Now open the door widely and take out the bottled liquid. Please follow this regulation during the liquid sterilization!

1. Operating Instructions

- Key parameters instruction:

Sterilization temperature and time are the key parameters. During the sterilization the control system is applied to keep the temperature between upper limit (+3°C) and lower limit (set by operator).

Notice:

In the case of that the load, packing, temperature are same, the result of long time sterilization is better than the short time one. The test can only be used for the short time sterilization. The parameters setting could be modified according to specific conditions but biological testing is required after any modification. The results of the test should be qualified.

The following table indicates the 13 programs set in the sterilizer. Please choose according to your requirements.

Code	Type	Temp. of Ster.	Time of Ster.	Time of drying	Pulse
1#	Fabric	132	600	480	3
2#	Instrument	132	600	480	3
3#	Rubber	121	1200	480	3

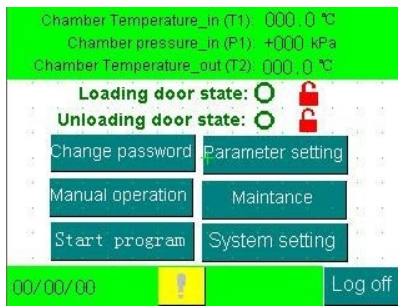
4#	Rapid	134	210	210	1
5#	Liquid	121	1200	----	0
6#	Preheating	121	210	210	1
7#	User-define d1	132	600	480	3
8#	User-define d2	132	600	480	3
9#	Lumen	132	600	480	3
10#	BD	134	210	480	3
11#	PCD	134	210	480	3
12#	Leakage	Vacuum test: maintain stage 300s, test stage 900s			
13#	Drying	----	0	900	0

a) Operation

Enter into starting up menu and click landing.



The system has set administrator, process technician and 8 operators, the password of administrator and process operator is 149, and the administrator's holds the highest operating authority.



P 5

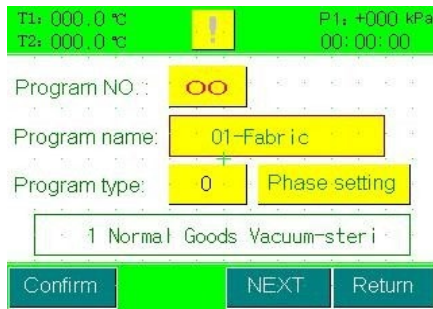


P 6

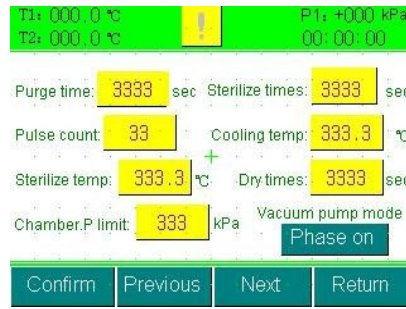
P4~P6 display the interfaces operated by operator, process technician and administrator.

□ Parameter setting for different authorities

- Operator: Operators can log on without password. The password could always be set or change by operators. Operators are only given the authority to choose and start the program.
- Process technician: Process technicians can change their password. P10 is the program choosing interface after log on. Choose a program and press “Edit” to enter P7. Some of the parameters could be changed. See P7 and P8. Also, the sterilization time, pulse frequency, temperature, chamber pressure upper limit, cooling temperature and drying time could always be changed.
- Administrator: Administrators hold the highest operating authority. They can modify and print the parameters (as picture 9). The following printing parameters can be set: print interval, FO print, language, report printing. Administrator can also modify the password both of process operator and operators.



P 7



P 8



P 9



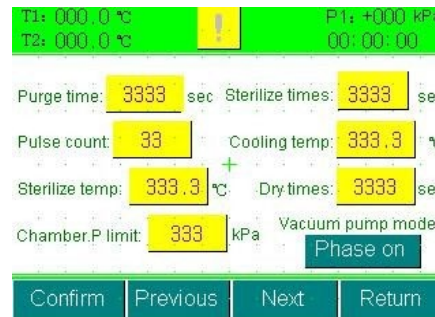
P 10

③ Choose and start program

Choose program start or setting to enter into startup interface (see P11). Under this status, administrator and process technician can set some of the parameters by pressing “Edit” button. Click start to initiate the program.



P 11



P 12

④ System maintenance



After log on as administrator, click “maintenance” button to enter into time setting (see P12). Please click “save” then “back” after modification. MAC and IP setting is necessary only if the product monitored by computer.

Notice:

Please contact us to adjust the parameters if the atmosphere pressure at your area is not standard.

2. Parameter Setting

① Program parameter setting

Process technician could change the parameters under the status of P7 and P8.

Please refer to the following setting range:

Displacement time:	0~7200s.	System default	300s
Pulse frequency:	0~99.	System default	3 times
Sterilization temperature:	0~150°C	System default	132/134°C
Sterilization time:	0~7200s		
Cooling temperature:	50~130s	System default	105°C (not for liquid)
Drying time:	0~7200s		
Chamber pressure limit:	0~300		

Displacement time---It is a temperature rise period during liquid program. The steam enters into the chamber to displace the cold air.

Pulse frequency---The purpose of pulse is that vacuum the chamber before



sterilizing the items. The sterilization result depends on the vacuum degree, while the vacuum degree depends on the pulse frequency and amplitude.

Sterilization temperature---The setting of this temperature should according to specific items and manufacture technique. Different temperature has different effect on items. Increase the temperature to shorten the sterilization, while decrease the temperature to extend it.

Sterilization time--- The setting of this time should according to specific items and manufacture technique.

Caution: Over time sterilization has negative effects on items!

Drying time--- The setting of this time should according to specific items and manufacture technique. To dry the items, high temperature from the chamber and vacuum pump work together to support heat and maintain the vacuum degree in the chamber.

Chamber pressure limit---It is the maximum value of chamber pressure. It is affected by jacket pressure. The setting of this pressure is according to the relation between saturated steam pressure and temperature. The sterilizing effect can not be reached if one of the following happens: steam over saturated or unsaturated, inconsistency between temperature and pressure.

② System parameter setting

- Vacuum breaking and exhausting limit

The service staff will adjust the parameters if the local atmosphere pressure is not

standard.

- Pulse upper/lower limit

This parameter is applied for U series product. Please contact the service staff if necessary.

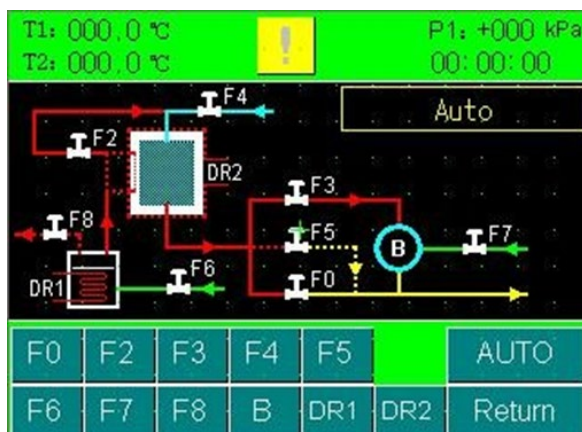
- Time setting

Set the time under System Maintenance options finish by pressing Save.

3. Hand Operation

Hand operation only can be used by process technician and administrator (see P 13). Click the button “auto” to switch to manual operation; click each part to modify the status. “B” indicates vacuum pump as the picture shows. TMQ.C series has no vacuum pump valve, recycling water valve and Circular valve.

Caution: It is forbidden to keep heating pipe DR1 and heating film DR2 stay in manual status for long time. The pump can not work long without water.

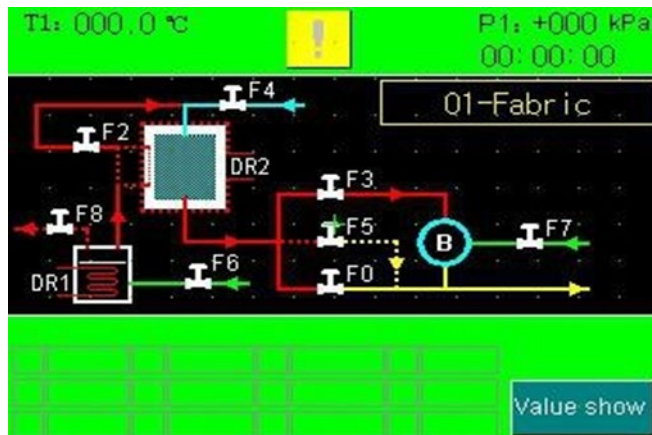


P 13

4. Program Running

Log on and choose a program then click Start. Click Edit to change the parameters if

necessary.



P 14

- a) Firstly, print the title of the report then enter into the preparation stage. The program (except liquid program) includes the following procedures: Preparation, Pulse, Heating, Sterilization, Exhausting, Drying and Terminate. The liquid program includes Preparation, Displacement, Heating, Sterilization, Exhausting and Terminate.
- b) During the operation, the parameters of each procedure can be monitored by clicking “value show”.

5. Attention matters in Sterilization

- Please keep supervising the product during the operation.
- Manual operation should be done by full skilled and qualified operator only.
- Turn off and restart the product to check the system if the display screen does not work.



Caution: When operate the sterilization which below 132°C, please manually decrease 40kpa on the pressure controller upper limit of the steam generator. For example, when you operate the sterilization which is 121°C, it is required to manually adjust the steam generator pressure controller to 130-150kpa, otherwise the chamber temperature may exceeds 121°C during the sterilizing stage.

Attention matters for liquid sterilization:

* To avoid explosion or scald accident, please strictly comply with the following rules:

- The liquid should not be sealed.
- Liquid can only be sterilized by liquid program. To avoid explosion or liquid ebullition, it is forbidden to vacuum the chamber after air exhausting.
- After sterilization for bottled liquid, do not open the door until the chamber temperature is below 80°C (in the area that below 1000m altitude) and the pressure is back to 0. Then slightly open the door (keep 10mm gap) and wait for 10 minutes.

Now open the door widely and take out the bottled liquid.

- Avoid bump, shake and crash when handle the bottled liquid.

Fault Analysis and Elimination



Caution: Please always be aware of the leaking in any part of the product.

1. Analysis and Elimination of Common Fault



Phenomena	Possible reasons	Correct operation
1. The screen doesn't work when power is turned on.	1 The screen power is not on. 2 The fuse is broken. 3 No 24v power.	1 Check the text power. 2 Change the fuse. 3 check the 24v power.
2. The program does not initiate.	1The door is not closed. 2 Alarm is not eliminated.	1 Close the door. 2 Check and eliminate the alarm.
3.Screen communication failure.	1 The communication port is broken. 2 Poor connection.	1 Check the port and change the communication line. 2 Restart the product.
4. Pump disfunction.	1 Vacuum pipe leaking. 2 The flow control valve is not well adjusted. 3 Water pressure is low or no water. 4 Pressure transmitter fault. 5 The one-way valve of the chamber dewatering pipe is damaged. 6 Condensate in the pipe line. 7 Pump-out valve or pump is not on. 8 Pipe dirt. 9 Altitude problem.	1 Check the connection of all pipe and do a pressure test. 2 Adjust the flow control valve. 3 Check the water supply. 4 Check or change the pressure transmitter. 5 Repair or change the one-way valve. 6 Check and clean all the pipes and valves. 7 Check the electromagnetic valve or pump. 8 Clean up the dirt. 9 Adjust the pressure prameters.
5.Over loud pump noise	1 No water supply. 2 The water inlet ball valve is not well adjusted. 3 Pump dirt. 4 High circulating water pressure	1 Check the water supply. 2 Turn down the ball valve slightly. 3 Clean up the pump dirt. 4 Adjust the ball valve.
6. Pump does not work.	1 No power. 2 Pump damage.	1 Check the pump power. 2 Change the pump.
7. Electromagnetic valve doesnot work.	1 Coil fault. 2 Loose wiring.	1 Check the valve coil. 2 Check valve wiring.
Phenomena	Possible reasons	Correct operation
8. High jacket pressure but low chamber pressure or	1 The chamber dewatering valve is not adjusted. 2 Pipe leaking.	1 Adjust the dewatering valve. 2 Check the leaking. 3 Reset the chamber pressure



F2 can not be opened.	<ol style="list-style-type: none">3 The chamber pressure limit is too low.4 Electromagnetic valve damage.5 Loose wiring.	<p>limit.</p> <ol style="list-style-type: none">4 Check the electromagnetic valve.5 Check the wiring.
9. Low heating rate.	<ol style="list-style-type: none">1 The primary heater works slowly.2 Less pulse or displace time.	<ol style="list-style-type: none">1 Check the primary heater.2 Increase the pulse or displace time.
10. The temperature is low when the pressure is ready.	<ol style="list-style-type: none">1 Hydrops in the dewatering pipe.2 Less pulse time.3 Low chamber pressure.	<ol style="list-style-type: none">1 Adjust the working frequency of the dewatering valve.2 Increase the pulse time (defaulting set is 3 times).3 Increase the chamber pressure limit according to the actual temp.
11 Temperature indicates 0 or 200.	<ol style="list-style-type: none">1 Platinum thermometer is unconnected.	<ol style="list-style-type: none">1 Connect the platinum thermometer.
12. Pressure indicates -100	<ol style="list-style-type: none">1 Pressure transmitter is unconnected.	<ol style="list-style-type: none">1 Connect the pressure transmitter.
13 Temperature and pressure fluctuate.	<ol style="list-style-type: none">1 The earth line is not well grounded.2 Strong magnetic filed around the product.	<ol style="list-style-type: none">1 Ground the earth line.2 Check the source of the magnetic filed.
14. The inconsistency between temperature and pressure.	<ol style="list-style-type: none">1 The temperature is not adjusted	<ol style="list-style-type: none">1 Adjust the temperature.
15 Water level detecting errors of the steam generator.	<ol style="list-style-type: none">1 Wrong wiring of the water probe.2 Water probe damage.	<ol style="list-style-type: none">1 Check the wiring.2 Change the water probe..
16 Low temperature alarm.	<ol style="list-style-type: none">1 Air inlet valve blocked or air outlet valve leaking.2 Air is not fully discharged.	<ol style="list-style-type: none">1 Check and clean the valve.2 Increase the chamber pressure upper limit or pulse and displace time.



17 Steam generator injection over time.	1 Water shortage in the water tank	1 Fully inject the water into the tank
Phenomena	Possible reasons	Correct operation
	2 Inlet water filter blocked. 3 Steam generator water level sensor fault.	2 Check the filter element. 3 Change the water level sensor.
Phenomena	Possible reasons	Correct operation
	4 Inlet water filter blocked. 5 Steam generator water level sensor fault.	4 Check the filter element. 5 Change the water level sensor.
18 Chamber over pressure.	1 Chamber pressure transmitter fault. 2 Poor PT100 temperature collections. 3 The valve does not work well.	1 Check the electric circuit and change the transmitter. 2 Contact the supplier to modify the deviation. 3 Clean the valve and filter.
19 Chamber transmitter fault.	1 The PT100 is not wired. 2 PT100 temperature fault.	1 Check the electric circuit and rewiring the PT100. 2 Check the PT100.
20 Chamber over heat.	1 The valve does not work well. 2 PT100 temperature fault.	1 Clean the valve. 2 Check the PT100.
21 Back door panel indicator light does not work	1 Loose wiring. 2 The lamp damage or fuse	1 Rewiring. 2 Change the lamp or fuse.
22 The inconsistency between front and back door pressure indicator.	1 Pressure inaccurate. 2 Pressure damage indicator indicator	1 Revise the pressure indicator. 2 Change the pressure indicator.
23 Possible disfunction for the build-in steam generator:		
● No power in	● The wire is not connected. ● Control switch damage.	● Fix the wire. ● Change the control switch.

<ul style="list-style-type: none">• No water in	<ul style="list-style-type: none">• Water level electrode fault.• Water inlet valve fault.• Water pump damage.• Water level relay damage.	<ul style="list-style-type: none">• Repair.• Repair.• Change.• Change.
---	--	---

2. Analysis and Elimination about “Wet Package”



Caution: “Wet Package” means the weight of the dressing package becomes 3% larger after sterilization.

- Loading problem

Condensate water seeps into the dressing package caused by chamber overload.

Check the package and take out the wet ware if any.

- Poor water flow in dewatering pipe line

Check the pipe line whether there are too many bends or dirt blocked in the pipe.

- Chamber dewatering pipe one-way valve damage

The water may flow back into the chamber during the drying procedure that makes the package wet.

- Insufficient drying time

Increase the drying time and observe the drying results.

- Negative pressure does not reach the standard Check according to the table mentioned in 7.1.

3. Analysis and Elimination of Unqualified Sterilization



Caution: Three important factors of sterilization: saturated steam, sterilization temperature

and time.

- Item cleaning

Check the cleaning procedure whether it accords with CSSD working process strictly to ensure the cleaning quality.

- Item packing

Do not pack the item too tight. The air permeability of packing material will affect the cold air discharge and steam penetration.

- Loading rules

The items should be rightly placed to keep the steam flow well.

- Air residual

The sterilization result depends on the amount of air discharged. Please check whether the sterilizer works normally.

- Sterilization temperature

Check the consistency between the temperature of the package and the temperature displayed. Check the correspondence between the chamber pressure and temperature. Slightly increase the chamber pressure and observe the result.

- Sterilization time

Check the rationality of the sterilization time. If necessary, please extend the sterilization time.

- Sterilizer fault

Check according to the table mentioned in 7.1.

- Improper testing method



Retesting or change another batch of reagent.

4. Unsolvable Problems

After sufficient analysis and troubleshooting, you may possibly have some unsolvable problems. Now you need the following preparation work:

- Record the product series model number (e.g 20106447 YR0056).
- Make a record for all the operation faults and inspection or adjustment history.
- Contact our after-sale service center.

Maintenance

1. Inspection and Changing of Safety Valve

In order to prevent the safety valve from blockage, it is necessary to release the steam through it once a month.

Operate a sterilization cycle according to the manual

Allow a pressure of approximately 0.21Mpa to build up in the chamber.

Pull the ring of the safety valve using a screwdriver, and lift the safety valve for 2 seconds. Switch off the power supply to interrupt the operation, and exhaust steam from the chamber.

Wait until the pressure goes down to zero, then open the door Change the safety valve

This operation should be done only by professionals

- 1) Remove the fixing screws and take down the safety valve from the base.
- 2) Replace it with a new one (be sure the valve opens at a pressure between 0.25

MPa-0.26Mpa).

- 3) Testing all the work process.
- 4) Please verify the opening and closing pressure of the safety valve yearly.

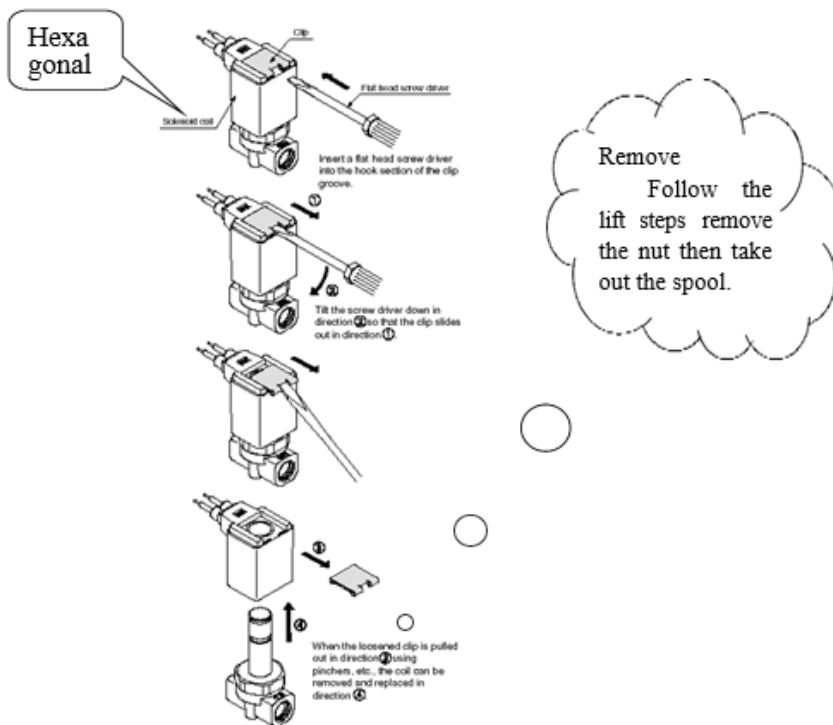
2. The Procedures of Changing Electric Heating Tube

- 1) This should be done only by professionals
- 2) Take down the back cover of autoclave
- 3) Take down the wires on the heater of steam generator.
- 4) Remove the heater
- 5) Replace the damaged one with a new heating element.
- 6) Reconnect the wires.
- 7) Install the back cover of autoclave.
- 8) Testing all the work process.



3. The Cleaning of Electromagnetic Valve

- 1) Remove the outer cover of the autoclave
- 2) Pull out the stainless press slip on top of the electrical magnetic valve with a screwdriver.
- 3) Pull up the ring coil of electrical magnetic valve.
- 4) Open the valve body with the spanner.
- 5) Clean the sundries on the valve center with clean water.
- 6) Restore the electrical magnetic valve.



4. The Cleaning of Water Filter and Drainage Filter

- 1) The water feeding filter is used for preventing dirt enter into the steam generator.
- 2) The drainage filter is used for preventing enter into the inside pipeline and the magnetic valve
- 3) Remove the net and gland of filter with wrench
- 4) Clean the net of filter with pure water
- 5) Re-install the filter

5. The Changing of Water Level Monitoring Device

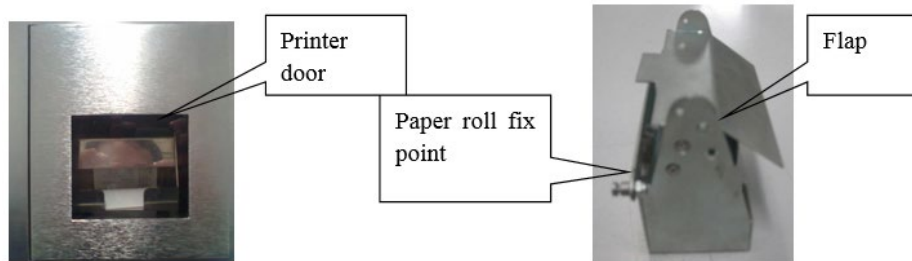


Caution: Be sure power is cut off

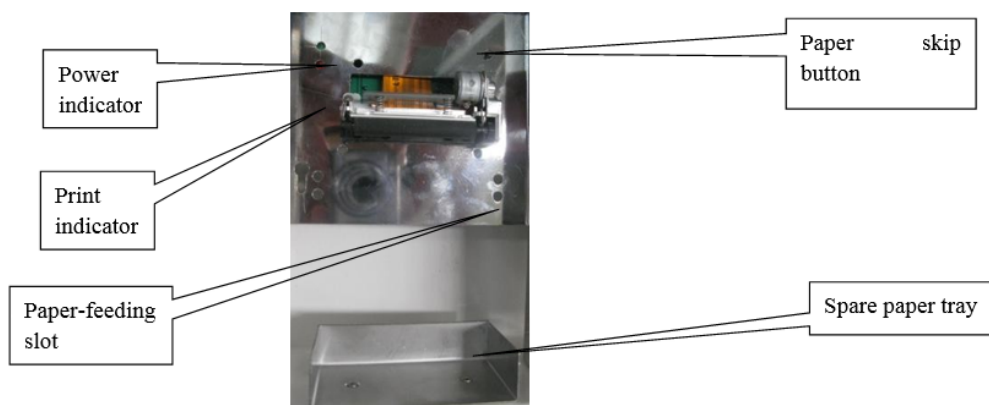
1. Remove the back cover of Autoclave.

2. Remove the connection wires from the detection device.
3. Take off the detector.
4. Replace the damage one with a new water level detector.
5. Re-install the detector and connect the wires.
6. Restore the back cover.
7. Test all the cycle procedures.

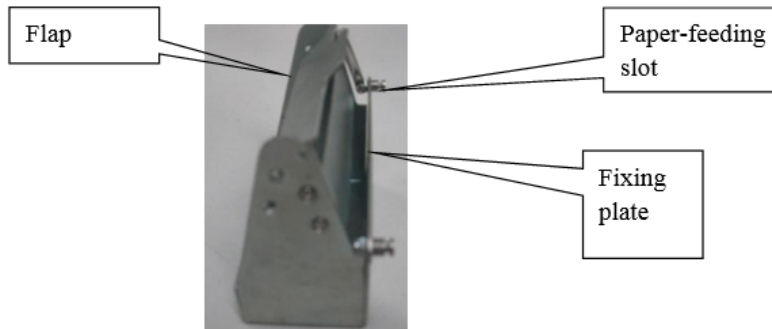
Printer operation and maintenance.



Press the bottom right corner of the printer door to open it. To take out the paper slot please press the flap and simply lift the paper slot.



Please feed the paper between the flap and fixing plate



Other Terms

1. Self-Protection

During the sterilization, the staff should have self-protection awareness and measures to avoid accident and personal injury.



Caution: Since the product works in the high temperature condition, please protect yourself from scald.

9.2 The Quality Guarantee of Sterilization

① Guarantee the cleanliness of the items to be sterilized.



Caution: The sterilization effect cannot be achieved without cleaning.

② Control the quality of water used in the sterilizer.

③ The environment of sterilization room

-the ground of the room must be even and smooth

-keep the operation area clean and dry all the time

-the wall of the room must be clean and even

-ventilating device must be installed

④ Item preparation

- the dressing fabric should not be packed tightly
- 10mm gap should be left between packages
- the total volume of the packages should not exceed 90% of the chamber volume
- please use special sterilization container
- the volume of the sterilizing package should not exceed 30cm*30cm*50cm
- the package should be taped on by chemical indicating tape with indicating card inside

⑤ Clean the chamber

- wipe the chamber with neutral detergent before cleaning it by water, and then wipe the chamber by dry cloth
- clean up the chamber filter mesh

3. The Inspection of Sterilization Results

The method of inspection consists of three types: physical, chemical and biological.

a) Physical inspection

- Gage inspection

The build-in printer could record the parameters that displayed on the screen for result inspection use.

- Stationary point thermometer inspection
- Thermocouple inspection

b) Chemical inspection

- Chemical indicator

There are three types of indicators (115°C, 121°C, 132°C) are available for result inspection. Take the indicator out of the package after sterilization and compare it with standard color. The sterilization is qualified if the color is darker than the standard color.

- Chemical indicating tape

The tape will turn into black if the package has been sterilized.

Note: “Black tape” does not indicate that the package is sterilizing qualified.



Caution: Chemical indicator/tape must be qualified by hygiene institution.

Must use before expiration date!

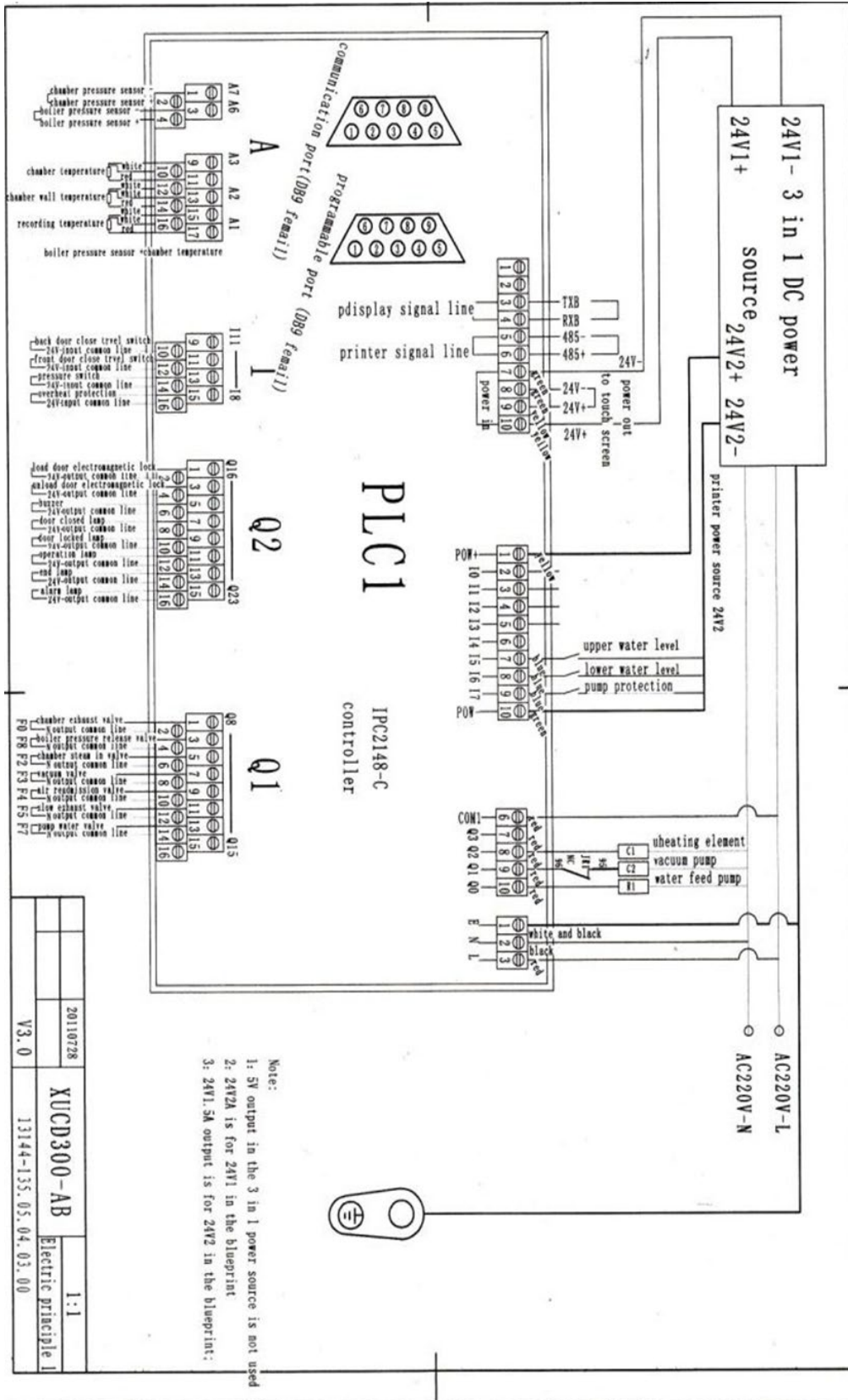
- c) Biological inspection

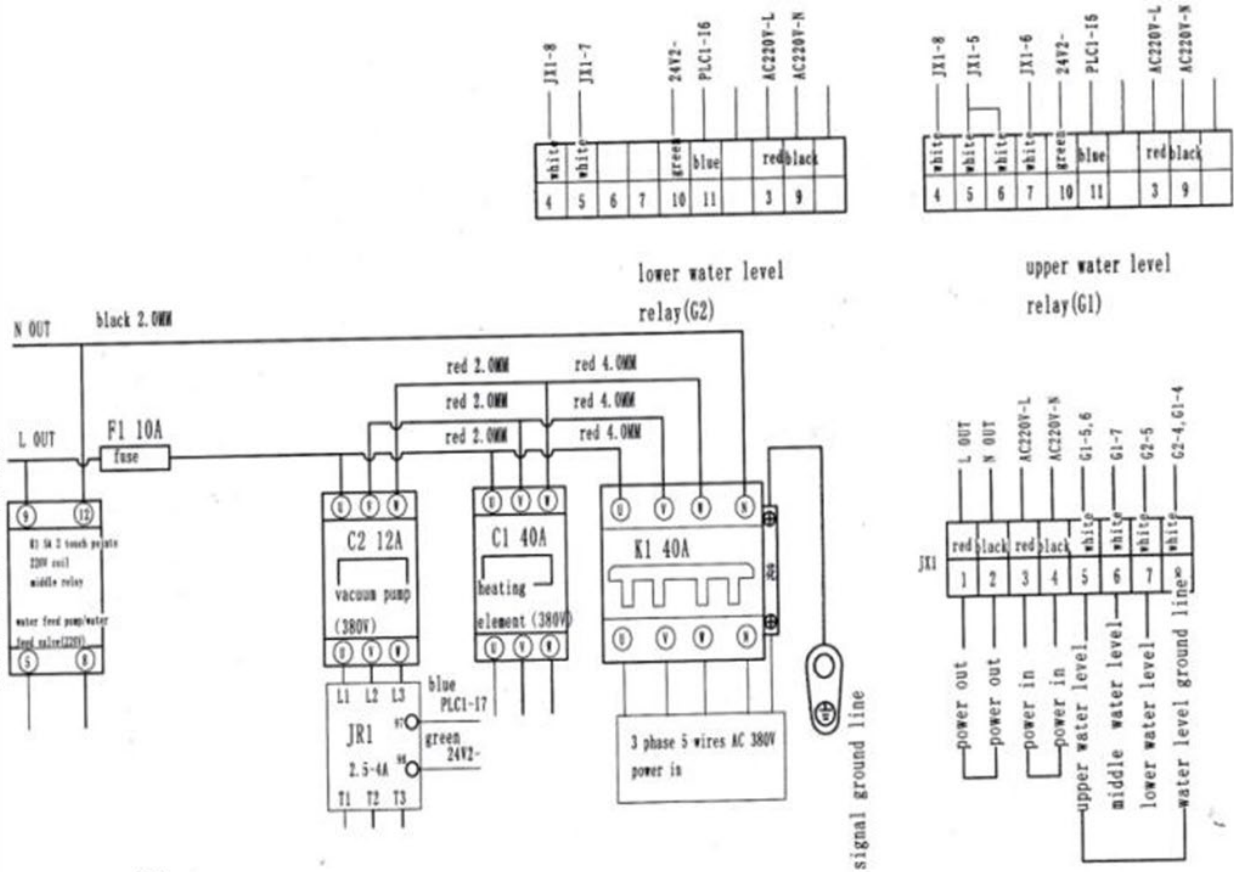
4. Energy Saving and Environment Protecting

The design of the product has already considered the energy saving and environment protecting before sale. However, for customer special requirement, it is necessary to adjust the program. For better energy-saving effects, you are welcome to contact us for program adjustment technical support.



Appendix 1 Attached Technical Drawings

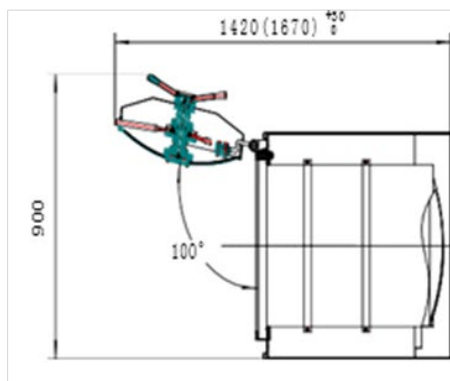
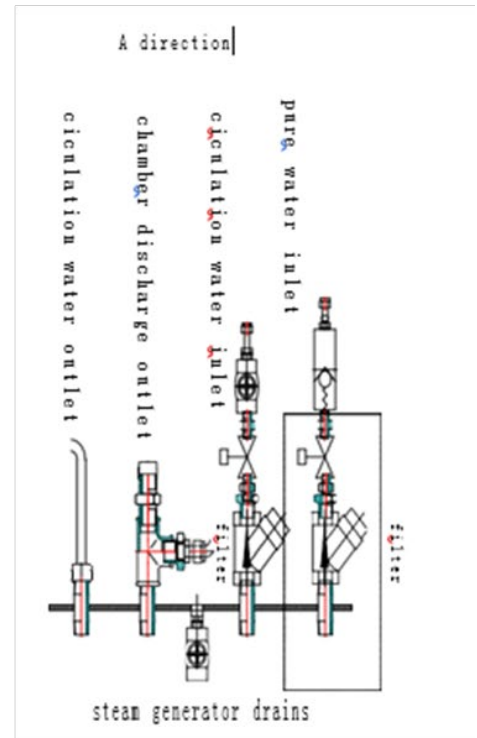
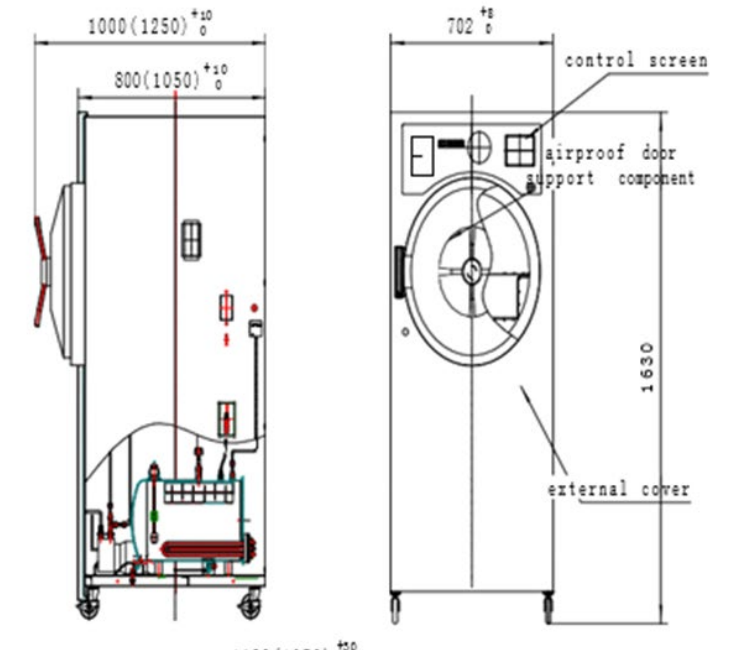




Note:

1: Permanent touch points 95 and 96 on overload relay must be connected in series to A1 and A2 on the contactor coil respectively

20130728	XUCD300-AB	1:1
		Electrical principle 3
		13144-135.05.04.04.00



Pure water:

- ◆ conductivity no less than $15 \mu\text{S}/\text{cm}$
- ◆ chlorine content less than $2\text{mg}/\text{l}$
- ◆ PH value 5-7
- ◆ hardness less than $0.02 \text{ mmol}/\text{l}$
- ◆ temperature $\leq 45^\circ\text{C}$
- ◆ source pressure $\leq 0.05 \text{ Mpa}$

Note: Steam must be generated from pure/ distilled water to ensure no contaminant. Power source: ◆ Power no less than 10KW ◆ $380\text{V}/50 \text{ Hz AC}$ with ground connection

Soft pipes are equipped for circulation water outlet, chamber discharge outlet, circulation water inlet and pure water inlet, specification: 1.2m, Rc 1/2 interface.

steam generator drain outlet can be connected with pipe for join to f R1/4.

Drainage: lead the drainage pipe separately on a sink then out of the room, no sharing with other pipes in the room, otherwise exhaust steam during operation will



affect other room. If there a reseveral drain out lets, separate them one by one.

Water: connect the vacuum pump to tap water source (≤ 25 °C, pressure 0 .0 5- 0. 10 MP a, if pressure of the water source is less than or more than this range, adjust the pressure before start the machine. A pressure gauge of 0- 0, 4M Pa and a valve should be connected on the water supply pipe line for viewing the water source pressure.

Note: Don't use water of higher hardness, otherwise the function of the pump and condenser will be affected.

Power source: AC 38 0V of 3 phase 5 lines. one zero-line (blue), one ground line (green and yellow) Loading capacity of power source and the cable from customer should be bigger than that required on the machine.

A power sources witch box should be installed on the right or right back wall of the machine, with a 3 phases witch (or a circuit breaker) and as using the phases witch (or circuit breaker).

Appendix 2 Operation specification

Preparation before Operation:

- Add softened water or pure water into clean water tank and circulating water tank in accordance with the requirements, and connect the power supply for this equipment.
- Connect the control-purpose power supply, turn the power switch of sterilizer to “1” side, and make proper preparation for operation of the program.
- Mark the B-D testing paper with the name or code of operator and date, place it into the sterilizer, start the B-D testing program, and monitor whether this equipment leaks and whether this equipment works normally.
- Set in order the parcel to be sterilized, make sure that it is not bound too tightly, paste the chemical indicator tape on it, and place the chemical indicator card in the chamber.

Operation of Sterilization:

- After the B-D testing is successfully carried out, open the front door, place the article to be sterilized into the sterilizing chamber, and make sure that there is clearance between every two parcels and no parcel contacts with inner wall or door plate.
- Close the front door, select the appropriate sterilization program in light of the article to be sterilized, inspect whether the sterilization parameters are correct, and start the program.



- In the course of sterilization, the operator may not get far away from this equipment, but shall closely observe the operation of equipment. If any abnormal situation is found, please handle it in time, so as to prevent the occurrence of any accident.
- Monitor the sterilization effect and properly make and retain the record, so as to ensure the traceability.
- After the sterilization is completed and the pressure in sterilizing chamber returns to zero, open the rear door and take out the article.
- After taking out the sterilized article from the sterilizer, put it in an appropriate place, so as to prevent the secondary contamination.

Works after Operation:

- Open the door, turn the power switch to “○” side, and cut off the control-purpose power supply and main power supply.
- Discharge the residual water in water tank, or discharge the water in accordance with the required interval.
- Discharge the residual water in steam generator (or fully discharge the water accumulated in evaporator in accordance with the required interval).
- After the works are completed every day, please keep the inside and outside of sterilizer clean, clear away all dirt from the chamber, carry out simply maintenance once a week, and carried out thorough maintenance once a month.

Notices:



- No article which has been sterilized may be placed together with unsterilized articles.
- The articles which have been successfully sterilized shall be marked with sterilization date and qualified sign.

