Vertical Auto-Clave 150L - Commercial Pressure Sterilizer

MODEL: ACV-150L

USER'S MANUAL

⚠ **Alarm: To ensure safe use of this device, carefully read the user manual in its entirety before starting. Follow all operating procedures exactly as outlined in the manual. Failure to do so may result in damage to the device or pose risks of injury and danger due to improper operation.**

Important Notice

Alarm: To ensure the safe use of this device, carefully read the user manual before starting. Each operating procedure must follow the steps outlined in the manual. Failure to do so may result in damage to the device or pose risks of injury or danger due to improper operation.

0.1 Premises

Thank You for Choosing Our Vertical Pressure Steam Sterilizer!

- This manual provides step-by-step instructions for safe operation. Please read it thoroughly before use to ensure safety.
- If you have any questions or encounter any issues, feel free to contact us. We are committed to providing the best possible service.
- Necessary spare parts and repair information will be provided promptly as needed.

0.2 Safety Instructions

1. Read Carefully: Review this manual thoroughly to understand all warnings, precautions, and operational requirements before using the sterilizer.
2. Inspect the Device: Ensure the sterilizer is in good working condition and that all safety features are functional before operation.
3. Follow Instructions: Operate the sterilizer strictly within the scope of application and as outlined in the manual. Improper use may result in equipment damage or sterilization failure.
4. Safety Features: The sterilizer is equipped with safety features to prevent injury and protect the equipment. Operators must familiarize themselves with these features before operation.
5. Operator Requirements: The operator must be trained in the equipment's performance, working principles, and sterilization process. The manual should be carefully read and fully understood before use.
6. Maintenance Personnel: Maintenance must be performed by qualified personnel with

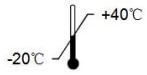
relevant experience and professional repair capabilities.

7. Pressure Vessel Classification: This equipment is classified as a Type I Pressure Vessel and must comply with National Pressure Vessel Regulations. A responsible person should ensure proper and safe use of the equipment.
8. Continuous Monitoring: While designed with safety in mind, the operator must regularly monitor the equipment's working status during operation.
9. Electrical Connection: The connection between the user's power supply and the sterilizer must comply with relevant national electrical safety standards.
10. Voltage Fluctuations: If voltage fluctuation exceeds ±10%, the sterilizer may not function properly.
11. Electromagnetic Compatibility (EMC):
    - The sterilizer complies with GB/T18268.1-2010 Electromagnetic Compatibility Requirements for laboratory equipment. Ensure the sterilizer operates in an EMC-compliant environment.
    - Avoid placing the sterilizer near strong radiation sources (e.g., unshielded RF), which may disrupt normal operation.
    - Evaluate the electromagnetic environment to ensure optimal performance.
12. Regulatory Compliance: The sterilizer is designed and manufactured in compliance with GB4793.1-2007 standards and meets all relevant safety requirements.
13. Door Gasket Replacement: Replace the door gasket based on the frequency of use, aging, or sterilization conditions. If undamaged, the gasket may continue to be used; otherwise, it should be replaced promptly.
14. Service Life Limitations: Use the sterilizer and accessories only within their specified service life. Regularly inspect for wear and replace damaged components to avoid safety risks.
15. Environmentally Responsible Disposal: Dispose of accessories and the sterilizer after their service life in accordance with national and regional environmental regulations. Prevent pollution or safety hazards.
16. Water Quality Requirements: Use water that meets the specifications outlined in Appendix A of YY 1007-2010.
17. Safety Valve Testing: Regularly test the safety valves according to national regulations.

18. Electrical Safety Precautions: Always disconnect the sterilizer from the power supply before replacing a fuse or performing electrical repairs. Use replacement fuses that match the specifications provided in this manual.
19. Circuit Check: Confirm the circuit switch status before operating the sterilizer. If a malfunction occurs, immediately disconnect the main power supply.
20. Proper Grounding: To prevent electric shock, ensure the sterilizer is properly grounded. Do not modify or remove the grounding protection wire or terminal, as this may compromise safety.
21. Hot Surface Caution: Avoid contact with areas marked "hot-proof" or near the exhaust port to prevent burns.

0.3 Explanation of symbols

Some symbols and codes are used on the sterilizer's shell or in this manual or on the outer carton instead of the text description. The explanation is as followed:

symbols	instruction
	Fragile items (the transport package containing fragile items, handling with care)
	Keep Up (the transport package should be straight up during transport)
	Avoid wet (the transport packages should be kept in dry)
	Temperature limit (the temperature range during the transport package should be maintained)
	Alternating current
	Protective grounding/ (Protection conductor terminal)
	Disconnect (the main power supply) / (cut (power))
	Switch on (main power) / (connect (power))
	Caution, shock hazard / (electricity danger)
	Caution scalds
	Be careful, Dangerous / (NOTE! See random file)
PT/TT	Pressure/temperature test

Vertical pressure steam sterilizer manual

1. Introduction

The vertical pressure steam sterilizer consists of the shell, sterilizing drum, steam generator, control system, and power supply system.

Referred to hereafter as "sterilizers," these devices are designed to sterilize articles using saturated steam.

The sterilization chamber is constructed as a single-layer structure and is equipped with an integrated steam generator for steam production. The unit releases steam from the lower side of the chamber to facilitate air exchange. The cover is sealed with tightened bolts, and the entire sterilization process is digitally controlled for precision and efficiency.

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2. Scope of Application

This sterilizer is designed for use in clinical institutions to sterilize medical devices, dressings, glassware, and solution media using saturated steam.

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3. Items Not Suitable for Sterilization

This sterilizer should not be used for items that cannot withstand high temperatures, high pressure, or moisture. Ensure all items are compatible with the sterilization process before use.

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4. Normal Working Conditions

- Ambient Temperature: +5°C to +40°C
- Relative Humidity: ≤85% RH
- Atmospheric Pressure: 70 kPa to 106 kPa
    - *Note*: The operator should consider the influence of local atmospheric pressure on parameter settings.
- Power Supply: AC 220V ± 22V, 50Hz ± 1Hz
- Water Quality: The water used should meet the specifications outlined in YY 1007-2010 Appendix A to ensure it does not interfere with the sterilization process or cause damage to the sterilizer or items being sterilized.

5 Basic parameters

Table 1. Basic parameter

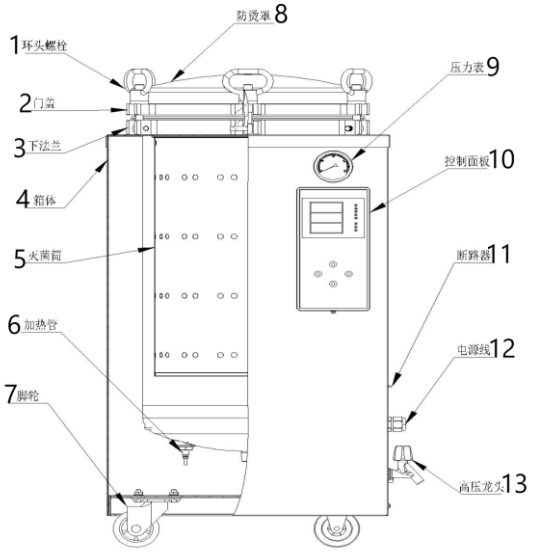
CODE	NAME	**LS-150LD**
1	CAPACITY	150L
2	MAX.WORK PRESSURE	0.22MPa
3	MAX.WORK TEMP.	134℃
4	Heat average	≤±1℃
5	TIMER RANGE	0～99MIN
6	TEMP.RANGE	0～134℃
7	POWER / VOLTAGE	6000W /AC220V.50Hz
8	SAFETY	WATER LACK、OVER CURRENT、OVER PRESSURE
9	DIMENTION	660×640×1130 （mm）
10	TRANS DIM.	730×730×1290 （mm）
11	WEIGHT	G.W.138Kg / N.W.111Kg

6 CHARACTERISTICS

- The sterilizer features a **pressure/temperature controller** with a pressure setting range of **0.07 to 0.22 MPa**, corresponding to a saturated steam temperature range of **115°C to 134°C**.
- A **built-in timer** ensures precise operation by automatically controlling the sterilization duration.
- **Safety mechanisms** include a safety valve and pressure gauge, along with a relief valve that automatically releases pressure when it exceeds the maximum allowable limit.
- The sterilizer is equipped with an **immersed electric heating tube** featuring an **anti-dry function**. If the water level falls below the specified minimum, the sterilizer automatically shuts off the heating power and activates an alarm for user notification

7 CONSTRUCTION

1.ring head bolt
2.door cover
3.lower flange
4.box
5.sterilize
6.heating tube
7.caster
8. anti scald cover
9. pressure gauge
10. control board
11. circuit breaker
12. power cord
13. high pressure tap



8. Preparation

8.1 Installation

Equipment Placement

a) Place the sterilizer on a flat, stable surface.

b) Ensure adequate clearance from walls:

- Left wall: At least 30 cm.
- Back wall: At least 20 cm.
- Right wall: At least 80 cm.

  c) Important:
- Do not position the steam vent of the safety valve too close to power outlets.
- Ensure the vent is unobstructed to allow safe discharge.

Power Connection

a) Ensure the power supply meets the following requirements:

- Single-phase AC 220V ±10%, 50Hz.

  b) The equipment must be reliably grounded.
- If the power outlet lacks a ground connection, use a separate grounding conductor to properly ground the unit before connecting the power.

Warnings

1. Only connect the power cord to a designated power switch. Avoid twisting or pulling the power cord, as this may cause damage, loosen connections, or create fire and electrical shock hazards.
2. Always ground the equipment securely. Do not connect the ground wire to inappropriate materials such as plastic pipes, gas pipes, or water pipes.

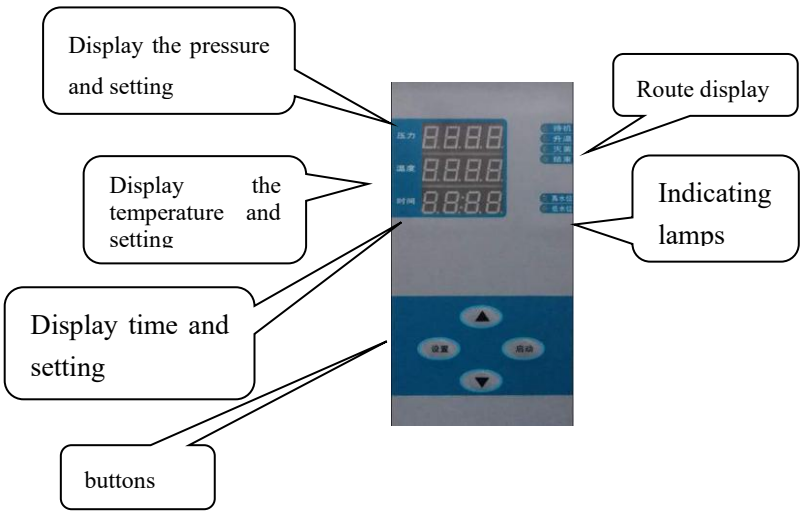
8.2 Preparation Before Use

a) Verify that the power supply matches the product's specified requirements.

b) Arrange items to be sterilized on the sieve plate in an orderly manner, leaving appropriate gaps between packages. Suggested package dimensions: 20 cm x 20 cm x 10 cm.

- Dressings and textiles should not be tightly packed to allow effective sterilization.

  c) Prepare a sterilization indicator (e.g., a chemical indicator card or biological indicator) to monitor the process.



9. The operation instruction

9.1 Control Board Instructions

The operation panel is illustrated in Pic. 2.

Display Functions

- **Nixie Tube (Upper Row): Displays the pressure in kilopascals (kPa).**
- **Nixie Tube (Middle Row): Displays the temperature in degrees Celsius (°C).**
- **Nixie Tube (Lower Row): Displays the time in minutes (min).**
- **Cycle Indicators: Displays the current sterilization cycle stage, including:**
  - **"Standby"**
  - **"Heating"**
  - **"Sterilizing"**
  - **"End"**
- **Water Level Indicators: Shows the status of the water level:**
  - **Low Water Level: The "low water level" indicator lights up.**
  - **High Water Level: The "high water level" indicator lights up.**
  - **Intermediate Level: If the water level is between high and low, the "low water level" light flashes.**

Other Functions

- **Overload Protection Power Switch: Located at the bottom of the sterilizer, it protects the device during standby mode (see Pic. 1).**
- **Drain Knob: Located at the lower part of the sterilizer, it is used to discharge water from the container (see Pic. 1).**

9.2 Parameter Settings and Operation

Setting Parameters

When the unit is in standby mode (indicated by the "Standby" indicator being on), press the SET button. The second nixie screen will flash, indicating the sterilization temperature setting. Use the "▲" or "▼" keys to adjust the sterilization temperature value.

Press the SET button again, and the third nixie screen will flash, indicating the sterilization time setting. Use the "▲" or "▼" keys to modify the sterilization time.

Press the SET button once more, and the first nixie screen will flash, indicating the exhaust setting. Use the "▲" or "▼" keys to toggle the exhaust setting after sterilization.

Finally, press the SET button again to save the parameter settings.

Parameter	Minimum value	Maximum valve	Defaults	Remark
Sterilizing temperature	105℃	134℃	132℃	
Sterilizing time	0	599mins	30mins	
Exhaust	0	1	1	0-no exhaust，1-exhaust

Parameter maintenance setting method:

When the unit is in standby mode, press the "▼" key five times to access the parameter settings. The colored words below will be inactive. The pressure display screen will show the serial number, while the temperature display screen will show the corresponding setting value. Press the **Start** button to scroll through the serial numbers.

P1.	Parameter	Minimum value	Maximum value	Default	remarks
2	Cold air releasing temperature	100	110	103℃	
3	Cold air releasing time	0	5	1 second	
4	Cold air releasing cycle	0	180	60 seconds	
5	The second time for release the cold air	0	500	120 seconds	
6	The interval time between two times releasing the cold air	0	600	120 seconds	
13	The temperature for open the exhausting valve	90	105	102℃	
16	the time limit of the pressure release	1	20	10mins	
21	pressure compensation	-20.0	20.0	0KPa	
22	temperature compensation	-20.0	20.0	0℃	
23	if with the pressure sensor	0	1	1	0- no ,1- yes
24	Model selection	0	5	0	0-vertical electro-mechanical

9.3 Sterilization Work Process Description

9.3.1 Preparation

1. Open the lid of the container, remove the drums, and manually add distilled water until it reaches the high-water level.
2. Turn on the power and activate the power breaker switch.
3. Confirm that the "Standby" indicator light is on and the "High Water Level" indicator is illuminated.
4. Arrange the items to be sterilized:
    - Place items on a sieve plate in an orderly manner, leaving appropriate gaps between packages.
    - Recommended package dimensions: **20 cm x 20 cm x 10 cm**.
    - Ensure dressings and textiles are not tightly packed.
    - Place a sterilizing indicator (chemical or biological) with the items.
5. After placing the drum back into the container, close the lid and tighten the handwheel clockwise until the lid is securely closed. Do not overtighten, as this may damage the rubber gasket.
6. Set the sterilization parameters (refer to the parameter settings section for detailed instructions).

The sterilization time and temperature should be adjusted according to the requirements of the items being sterilized. Refer to **Table 2** for guidance on sterilization time and temperature settings.

Table 2 Sterilizing time setting

Items	Sterilizing time （min）	Pressure （MPa）	Temperature （℃）
Rubber	15	0.1~0.11	121
Textile	15~50	0.1~0.22	121~134
Instrument	8~40	0.1~0.22	121~134
Glass ware	10~40	0.1~0.22	121~134
Bottled fluid	20～40	0.145	121～126

9.3.2 Heating

- Press the **START** key to begin the heating process. The **HEAT** indicator lamp will illuminate.
- **Note**: Heating is permitted only if the water level is at the specified high level.

9.3.3 Sterilizing

a) The **Sterilizing** indicator lamp will light up during this phase.

b) When the temperature in the inner chamber reaches the set value, the timer begins counting down in seconds.

Once the set temperature is achieved, the sterilization process starts, and the countdown timer operates until completion.

9.3.4 End

- When the sterilization time reaches zero, the process is completed.
- The internal chamber will begin exhausting steam, and the temperature will decrease.
- The buzzer will sound when the temperature drops to **102°C**, and the pressure gauge needle will return to zero, indicating that sterilization is complete.
- Wait for 1 minute before opening the lid. After **20–30 minutes**, carefully remove the sterilized items.
- Once the items are removed, turn off the power.

9.4 Troubleshooting the Sterilization Cycle

9.4.1 Possible Issues During the Cycle

a) You can query the operating parameters during the sterilization cycle.

b) If needed, press the "▲" or "▼" key during sterilization to reset the program and return to **Standby** mode.

c) If an overload occurs, the overload protection power switch will automatically cut off the power.

- Eliminate the fault, reset the overload protection switch, and then restart the sterilization process.

Note: When sterilizing fluids or liquids in glass containers:

- Do **not** exhaust the steam immediately after sterilization.
- Rapid exhaustion can cause the liquid to boil over, potentially resulting in spills or glass breakage.

9.4.2 Common faults and troubleshooting

Faults	troubleshooting	remark
01	the sensor in the chamber is in malfunction.	
02	the pressure sensor in the chamber is broken.	

10. Safety Features

This sterilizer is equipped with the following safety features:

10.1 Water Shortage and Overheat Protection

If the water level in the container is insufficient or no water is present, the heating tube may overheat. To prevent this:

- The sterilizer automatically cuts off the power supply.
- Action Required:
    1. Turn off the power immediately.
    2. Wait until the pressure inside the chamber returns to zero before opening the cover.
    3. Add water to the chamber, close the lid securely, and tighten all bolts.
    4. Turn on the power breaker switch. Once the high-water level indicator is displayed, the sterilization process can resume.

10.2 Overvoltage Protection

If the inlet voltage exceeds AC 280V, the sterilizer automatically shuts off the heating power.

- Action Required:
    1. Turn off the power.
    2. Check that the power supply has returned to the normal range (AC 220V).
    3. Restart the sterilizer once the voltage is stable.

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11. Precautions and Maintenance

Alarm: Operators must follow the provisions of The Regulation on Safety Inspection of Special Equipment and the Inspection Procedure for Pressure Vessels in Use to ensure safe operation.

11.1 General Precautions

- Read this manual carefully before use.
- Operators should have the necessary knowledge and responsibility to strictly follow the operational steps outlined in the manual.
- Regular maintenance is essential to keep the unit in good condition, ensure proper functioning, and prevent accidents.

11.2 Water Level Maintenance

- Always ensure there is sufficient water in the container, keeping it at the high-water level.
- Note: Excess water may affect the drying of textiles.

11.3 Air Removal Before Heating

- Follow the prescribed method to eliminate cold air from the chamber before heating; failure to do so will compromise sterilization results.

11.4 Avoid Mixing Different Items

- Do not sterilize different types of items (e.g., textiles and solutions, or rubber and instruments) in the same cycle, as this may affect sterilization efficiency.

11.5 Sterilizing Solutions

- Solutions must be placed in high-temperature-resistant glass bottles or vessels.
- Avoid overfilling; fill only 1/2 to 3/4 of the bottle's volume.
- Seal the bottle mouth with gauze. Avoid using stoppers without a through-hole (e.g., rubber or cork stoppers).
- Place the glass bottle inside a protective container before placing it in the sterilization chamber to prevent damage or breakage.

11.6 Daily Cleaning

- After each sterilization cycle, drain the water from the container.
- Dry the sterilizer and clean any water stains to ensure proper sterilization and extend the equipment's lifespan.

11.7 Removing Water Deposits (Incrustation)

- If water deposits cannot be removed through routine cleaning, use the following solution:
    - Mix 0.75 kg of caustic soda and 0.25 kg of kerosene in 10 liters of clean water.
    - Pour the solution into the container and let it soak for 10–12 hours.
    - Rinse thoroughly with clean water afterward.

11.8 Sterilization Testing

- Verify sterilization results regularly using a stationary point thermometer, sterilization indicators, or biological methods to ensure reliability.

11.9 Pressure Vessel Safety

- As a pressure vessel, the sterilizer must not be subjected to impacts or operated at excessive pressure.
- If the pressure exceeds the maximum allowable limit and the safety valve fails to release it:
    - Immediately stop using the unit.
    - Inspect and replace the safety valve as needed.
    - Do not resume use until the safety valve is verified to be functioning correctly.
    - Have the safety valve and pressure gauge verified annually by the local Technical Supervision Bureau.

11.10 Gasket Maintenance

- Inspect gaskets frequently for signs of wear, deformation, or aging. Replace them immediately if needed.

11.11 Fuse Replacement

- Replace the fuse only with a model and specification that matches those provided in the manual.

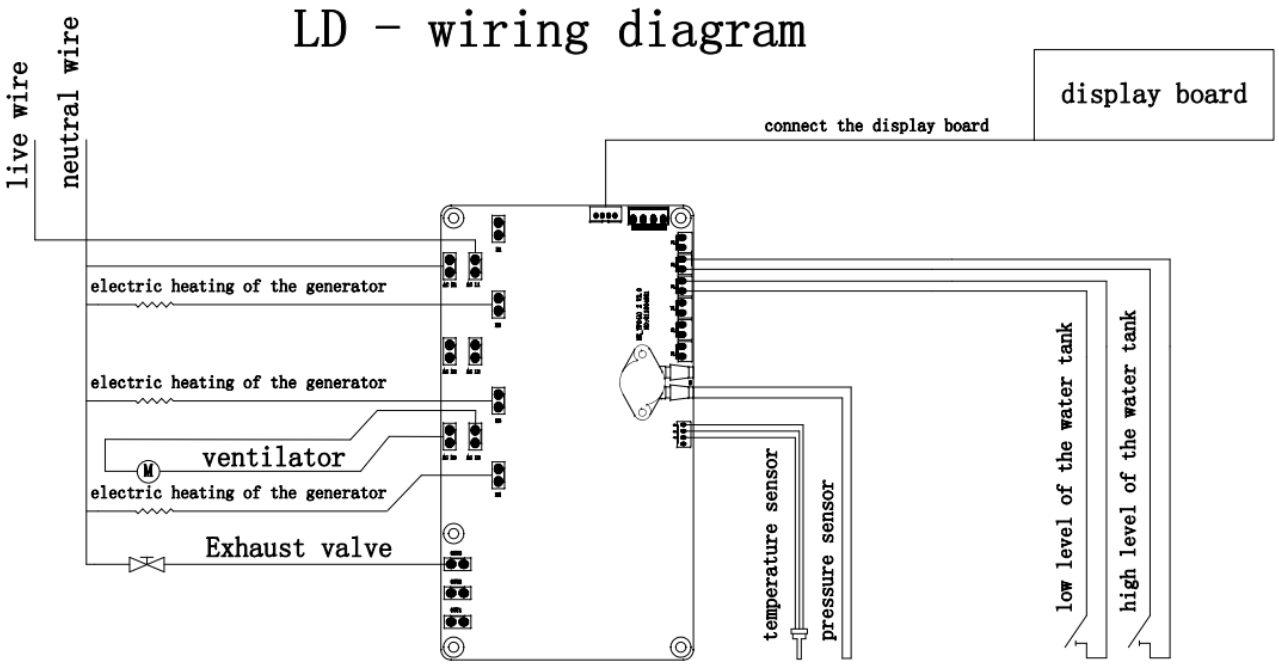
11.12 Grounding

- Ensure the sterilizer is properly grounded and verify that the power socket is grounded securely.

11.13 Cleaning and Storage

- Keep the unit clean and free from dust.
- For long-term storage, keep the sterilizer in a cool, dry, and ventilated area. Use protective measures to prevent dust accumulation.

12. Electric scheme



13 The breaker and the fuse capacity

a) Breaker rating current: 40A

a) Fuse specification ： F2 250V/1A ϕ5×20mm

16 Accessories and the package list

NO.	Name	Quantity	Marks
1	Main body	1	
2	Sterilizing baskets	2	
3	Sieve board	1	
4	Chamber handle	1	
5	Inner lid	1	
6	Exhausting tube	1	With one fix hoop
7	User’s manual	1	

Appendix 1:

BRIEF OPERATION STEPS

1. **Insert the Air Faucet**
    - Attach the air faucet securely into the quick-change connector.
2. **Connect the Power and Add Water**
    - Plug the sterilizer into a **220V power source** and turn it on.
    - Add water to the chamber until the high-water level lamp illuminates.
        - *Note*: Ensure the floating ball is fully submerged in the water.
3. **Set the Parameters**
    - While the unit is in standby mode, set the parameters as follows:
        - Press the **SET** button: The second nixie tube will flash, allowing you to set the sterilizing temperature (recommended: **132°C–134°C**).
        - Press the **SET** button again: The third nixie tube will flash, allowing you to set the sterilizing time (e.g., **30 minutes**).
        - Press the **SET** button once more: The first nixie tube will flash, allowing you to select whether air should be exhausted after sterilization.
4. **Start the Sterilization Process**
    - Press the **START** button to begin the sterilization process.
    - *Note*: If the unit has been used previously, it will default to the last mode. After completing step 2, you can proceed directly to this step.
5. **After Sterilization**
    - Once sterilization is complete, the equipment will automatically exhaust the air.
    - Open the cover only when the temperature display reads **102°C**.
    - Disconnect the power after removing the sterilized items.

Attention

1. Ensure the exhaust tube is securely fixed at both ends.
2. Use **distilled water** for optimal performance and change the water daily if using tap water.
3. Read the manual thoroughly before operating the sterilizer.