



USA Lab Vertical Autoclave

ACV-150L



Safety Precautions and Explanations

At USA Lab, safety is our number one priority. The following information provides guidelines for safety when using USA Lab equipment. Any piece of machinery can become dangerous to personnel when improperly operated or poorly maintained. ALL employees operating and maintaining USA Lab equipment should be familiar with its operation, thoroughly trained, and Instructed on the best safety practices.

Most industry accidents are preventable through safety awareness.

Training

It is the responsibility of the customer to ensure that all personnel who will be expected to operate or maintain the equipment. Participate in training and instruction sessions to become trained operators. All personnel operating, inspecting, servicing, or cleaning this equipment must be properly trained in the operation and machine safety. **BEFORE** operating this equipment, read the operating instructions in this equipment manual. Become thoroughly familiar with the machinery and its controls.

Safety

- Never leave the equipment running unattended and use this equipment only for its intended purpose.
- Ensure that all power sources are turned off when the machine is not in use. This encompasses electrical and pneumatic power.
- Read the manual for any special operational instructions for each piece of equipment. All USA Lab authored manuals are typically included with each device as well as posted online.
- Know how the equipment functions and understand the operating and halting processes.
- Wear the appropriate personal protective equipment for the task.
- When working on or around all equipment, avoid wearing loose clothing, jewelry, unrestrained long hair, loose ties, belts, scarves, or articles that may be caught in moving parts. Keep all extremities away from moving parts. Entanglement can cause death or severe injury.
- For new equipment, check input voltage and compare with the equipment voltage rating. DO NOT supply the incorrect power to any equipment for any reason whatsoever. Electrical specifications for your machine are printed on the machine tag. A properly grounded receptacle is required for safe operation regardless of voltage requirements.
- Keep the equipment operating zone free of obstacles that could cause a person to trip or fall toward an operating machine. Keep fingers, hands, or any part of the body out of the machine and away from moving parts when the machine is operating.
- Any machine with moving parts and/or electrical components can be potentially dangerous no matter how many safety features it contains. Stay alert and think clearly while operating or servicing the equipment. Be aware of operations and personnel in your surroundings. Be attentive to indicator lights, warning lights, and/or operator interface screens displayed on the machine and know how to respond.
- Do not operate machinery if you are fatigued, emotionally distressed, or under the influence of drugs or alcohol.
- Know where the FIRST AID SAFETY STATION is located.
- Know where the FIRE EXTINGUISHING EQUIPMENT is located.
- Never sit or stand on the machine or on anything that might cause you to fall against the machine.
- Rotating and moving parts are dangerous. Keep clear of the operating area. Never put any foreign object into the operating area.
- Use proper lifting and transporting devices for heavy equipment. Some types of equipment can be extremely heavy. An appropriate lifting device should be used.
- Use caution when moving portable equipment. In some cases, the machinery can be heavy and/or may be top heavy. Portable equipment can gain momentum during transporting and must always be controlled.

Symbols and Warnings

Below are examples of commonly used symbols and what they mean.

Understand them and their potential consequences.



High Voltage or Electrical Hazard



Explosive Hazard



Not User Serviceable



Flammable Hazard



Hot Surface or Steam Hazard

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1 Safety Instructions and Features

1.1 Safety Instructions

Use Distilled Water or Reverse Osmosis Water ONLY. Any elements, sensors or switches damaged due to using tap water, WILL NOT BE COVERED UNDER WARRANTY.

The use of Personal Protection Equipment (PPE) is REQUIRED.

Follow all federal, state and municipal laws, codes and ordinances.

Please make sure the power connection is correct and well-grounded. (see the technical parameters for details)

Apply a rag to wipe the parts clean after washing away stains; do not use hard objects / abrasives.

Do not use flammable, corrosive or explosive substances on, in or near the equipment.

Do not run the heating element without water.

If there is a problem, do not continue to use the heater. Call us immediately.

1.2 Purposes and features

The primary purpose of an **autoclave** is to **sterilize** materials by using **high-pressure saturated steam** to kill all forms of microbial life, including bacteria, viruses, fungi, and resilient spores. This process, known as **moist heat sterilization**, works by denaturing microbial proteins through a combination of heat and pressure, making it the gold standard for ensuring sterility in laboratories and healthcare settings.

Key applications include:

- **Medical Sterilization:** Decontaminating surgical instruments, glassware, and medical waste to prevent infections.
- **Laboratory Safety:** Sterilizing culture media, labware, and biohazardous waste to maintain aseptic conditions and ensure accurate experimental results.
- **Industrial Use:** Sterilizing pharmaceuticals and performing processes like rubber vulcanization where precise heat and pressure are required.

Built from SUS304 stainless steel and optimized to reach 32 PSI (0.22 MPa) and 134 °C, it sterilizes instruments, glassware, media, and grain spawn efficiently. Two stackable baskets simplify loading and unloading; adjustable temperature enables pasteurization workflows.

Multiple safeguards include a pressure-locking door, water-level sensor with automatic shutoff, and an over-pressure relief valve for safe, compliant operation.

1.3 Technical Parameters

Table 1

Model	150L Vertical Autoclave
Capacity	150 L / 160 qt
Material	SUS304 Stainless Steel
Power Requirements	Minimum Voltage 220V 60 Hz, 27 A (Single Phase) Acceptable input range - 220V - 250V
Heating Power	6 kW
Max Working Pressure	32 PSI (0.22 MPa)
Max Working Temperature	134 °C
Temperature Range	0 – 134 °C
Temperature Accuracy	<±1 °C
Interior Dimensions	20" Ø × 25" H
Exterior Dimensions	26.3" × 27.2" × 45.3"
Weight	300 lbs
Safety Features	Pressure-locking door, water-level sensor auto-shutoff, over-pressure relief valve
Baskets	Two stackable internal baskets

2 Diagrams

Lid Open:

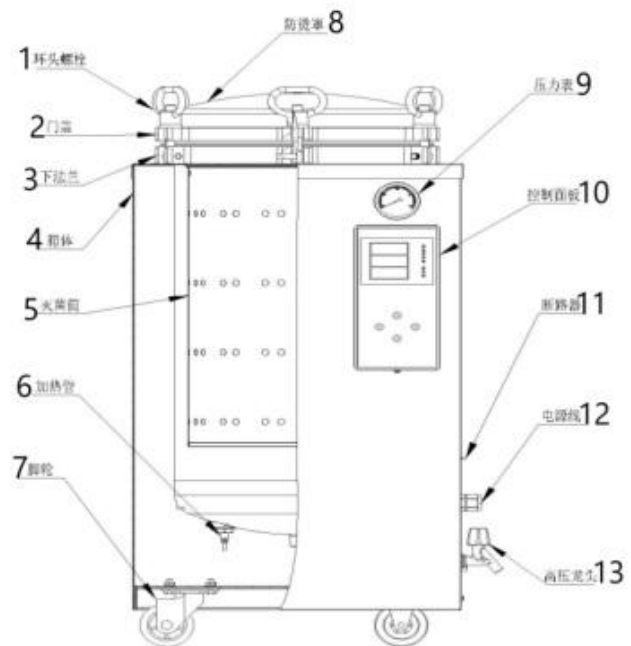


Baskets:

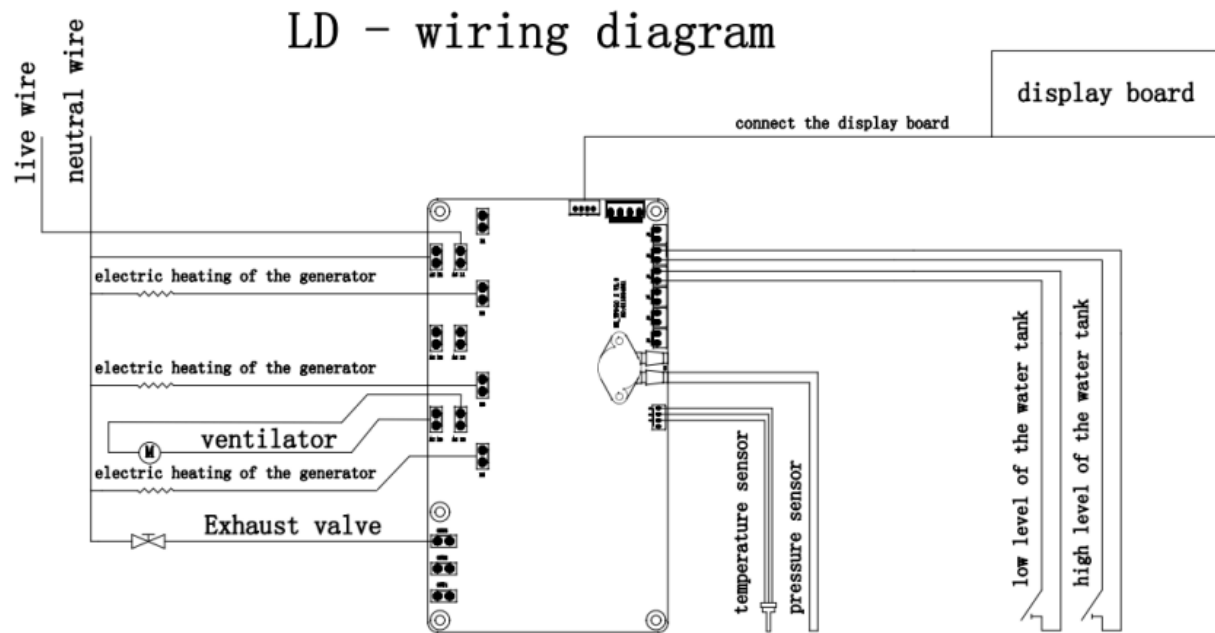


Components:

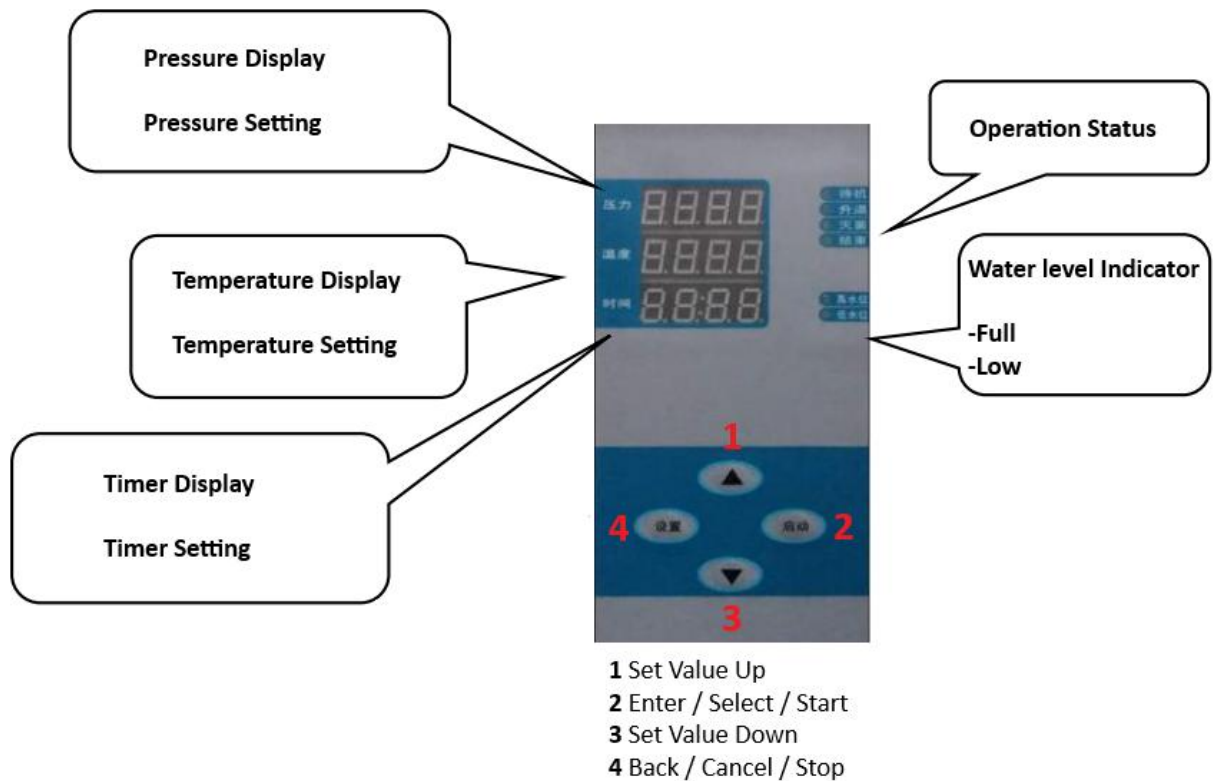
- 1.ring head bolt
- 2.door cover
- 3.lower flange
- 4.box
- 5.sterilize
- 6.heating tube
- 7.caster
8. anti scald cover
9. pressure gauge
10. control board
11. circuit breaker
12. power cord
13. high pressure tap



Wiring Diagram:



3 Control Panel Operation



Display Functions

- Pressure Display (Upper Row): Displays the pressure in kilopascals (kPa).
- Temperature Display (Middle Row): Displays the temperature in degrees Celsius (°C).
- Timer Display (Lower Row): Displays the time in minutes (min).
- Operation statuses display the current sterilization cycle stage in order:
 - o "Standby"
 - o "Heating"
 - o "Sterilizing"
 - o "End"
- Water Level Indicators show the status of the water level:
 - o Low Water Level: The "low water level" indicator lights up.
 - o High Water Level: The "high water level" indicator lights up.
 - o Intermediate Level: If the water level is between high and low, the "low water level" light flashes.

Parameter Settings and Operation

When the unit is in standby mode (indicated by the "Standby" indicator being on), press the SET button.

The Second 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 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 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.

Other Functions

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

4 Preparing for Installation

- a) Verify that the power supply matches the product's specified requirements.
- b) Arrange items to be sterilized in the bucket 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.

5 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 230V -5%, +10% | 50/60Hz
- 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 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 properly. Do not connect the ground wire to inappropriate materials such as plastic pipes, gas pipes, or water pipes.

6 Operation

6.1 Operation Steps

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:
 - o Place items on a sieve plate in an orderly manner, leaving appropriate gaps between packages.
 - o Recommended package dimensions: 20 cm x 20 cm x 10 cm.
 - o Ensure dressings and textiles are not tightly packed.
 - o 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. Page 11).

The sterilization time and temperature should be adjusted according to the requirements of the items being sterilized. Refer to Table 2 (Page 15) for guidance on sterilization time and temperature settings.
 7. 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.
 - 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.
8. 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.

Table 2 Sterilizing time setting

Items	Sterilizing time (min)	Pressure (MPa)	Temperature (°C)
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

6.2 Troubleshooting

Troubleshooting the Sterilization Cycle

- You can query the operating parameters during the sterilization cycle.
- If needed, press the “▲” or “▼” key during sterilization to reset the program and return to Standby mode.
- 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.

Error codes

Faults	troubleshooting	remark
01	Voltage too low to start the system correctly	Correct the input voltage (220V to 250V)
	Temperature probe failure	Contact USA Lab for replacement
02	Pressure sensor failure	Contact USA Lab for replacement

7 Maintenance

This sterilizer is equipped with the following safety features:

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, then the sterilization process can resume.

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.

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.

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.

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.

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.

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.

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.

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.

Removing Water Deposits (Incrustation)

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

Sterilization Testing

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

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:
 - o Immediately stop using the unit.
 - o Inspect and replace the safety valve as needed.
 - o Do not resume use until the safety valve is verified to be functioning correctly.
 - o Have the safety valve and pressure gauge verified annually.

Gasket Maintenance

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

Fuse Replacement

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

Grounding

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

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.

8 Service

Our company provides limited warranty for any product with failures due to manufacturing quality within 12 months after the date of delivery on the premise of normal operation by users. Reasonable repair costs will be charged for damage caused by improper use. After-sales service Tel : (734) 855-4890 or sales@usalab.com

USA Lab reserves the right of ultimate interpretation of the instruction manual. Additionally, USA Lab is not responsible for damages or injuries caused by improper use; knowingly or unknowingly. Glassware is not covered under warranty. We ship all glassware products with additional care, but sometimes they arrive broken. If glassware arrives broken, please contact us within 3 days of receiving your product and we will either send you a brand new piece or send you a refund. Any glassware broken 3 days after or later will not be covered by warranty. Maintenance items such as seals and gaskets are not covered under the warranty. Thank you for understanding!

Return Policy:

We offer a 30-day return policy from when your package is delivered to your shipping address. By placing an order with USA Lab, you express that you have read and agreed to the following return policies.

- We do not accept returns for customized items. When purchasing a customized item, you agree that there are no returns due to the nature of the item(s) being specific to your needs.
- By default, a 15% restocking fee is applied on all items that are in original packaging and unused with no damage. This applies to all items returned within 30 days. No exceptions. You will be responsible for the return shipment unless deemed defective by USA Lab. In that case, we will pay for return shipment and replacement shipment costs.
- The item(s) must be returned in original packaging and in undamaged condition. The item(s) must have no signs of usage or wear including stickers, scratches, dents, resins, non-standard fluids, plant matter, or any other wear not representing a new, unused item. Products deemed defective with any signs of usage or wear will result in a 25% restocking fee.

- Once the returned item is received, tested, inspected, and processed, a refund will be issued. If your item(s) are in original packaging and unused, you will be refunded the initial purchase price with the 15% restocking fee deducted. If your item(s) are deemed damaged or used, you will be refunded the initial purchase price with the 25% restocking fee deducted.
- If an item has been deemed to be severely misused, modified resulting in catastrophic failure, operated anywhere but inside of a climate-controlled facility. A minimum of 25% restocking fee will be deducted from the refund.