

# User Guide

## Autoclave, Steam Sterilizer



LVE040, LVE060, LVE080, LVE100

Version : 0.0

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# 1 Safety Precautions and Warnings

## 1.1 Safety Sign Explanation

It describes the safety signs used in this manual and affixed in the main product.



Indicates the situation requires user's attention



Indicates the cautions situations which may result in personal injury or property damage.



Indicates the risk of electric shock



Indicates the risk of burns caused by vapor



Indicates the risk of pinching hands



Indicates the risk of burns caused by high temperature surfaces.

## **2 Product Components and Information**

### **2.1 Product Information**

This is an Autoclave, Steam Sterilizer, which is available to sterilize a product at high temperature and high pressure within short time by filling the high-pressure steam in the chamber. It is appropriate for sterilizing the laboratory instruments, lab glassware and cultures, and wastes.

This product has a feature as following.

#### **■ Safe and Convenient Door**

- Provide triple lock construction and automatic locking system at high temperature for safe use.
- Space efficiency by upward door-opening structure. No need side spaces.
- Safe for use due to low temperature surface made of low thermal conduction plastic (ABS) material.
- Convenient to use by opening the door with one touch.

#### **■ Convenient Controller Operation**

- Automatically perform the entire process such as heating, pressurization, sterilization, and exhaust by only the initial sterilization temperature and time settings.
- Able to Save and use the 9 sterilization processes (temperature and time setting)
- Check current process and progress status through controller screen.

#### **■ Proven Performance**

- Proven product by standard of KS P 6102 standard (High-Temperature pressure autoclave for medical use)
- Available to precise control within  $\pm 1^{\circ}\text{C}$  at  $121^{\circ}\text{C}$ .
- Available to precise control within  $\pm 0.1\text{bar}$  at pressure  $2.1\text{bar}$ .

#### **■ Excellent Safety**

- Prevent heater from overheating due to insufficient water by installed water level sensor.
- Equipped with overheating protection device and pressure safety valve.
- Condensed emitting vapor directly to Exhaust Tank not emitting directly to outside, only small amount of vapor can be released to outside.

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- Discharging vapor condenses and discharged directly into exhaust tank, and only small amount of vapor is discharged to the outside.

- Vapor discharging alarm function available.

### ■ Other Function

- Able to record the temperature through recorder. (Recorder Type).

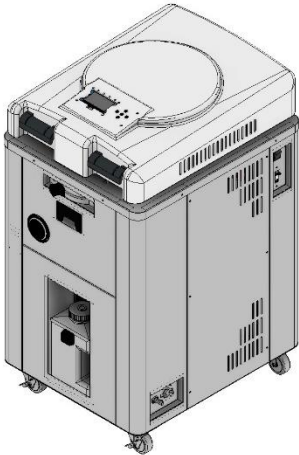
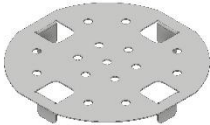
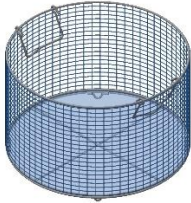
- Basically included 2ea of wire basket and Exhaust Tank for each model.

- Require separate industrial Plug lines for installing LVE80 and LVE100 models.

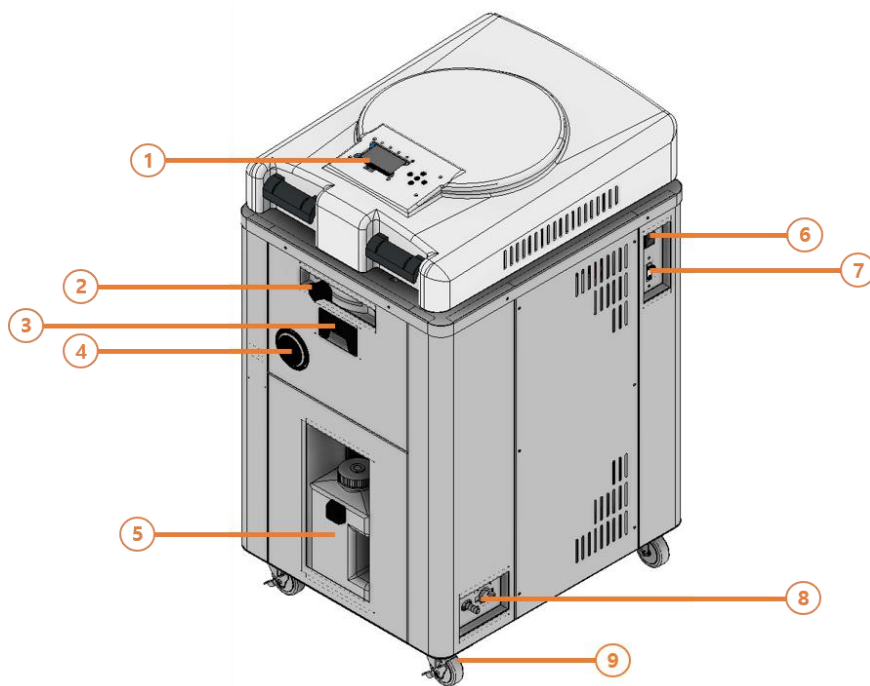
### <Product Specification>

| Model       |                         | LVE040                                                |  | LVE060             |  | LVE080             |  | LVE100             |  |
|-------------|-------------------------|-------------------------------------------------------|--|--------------------|--|--------------------|--|--------------------|--|
| Capacity    |                         | 45L                                                   |  | 65L                |  | 85L                |  | 105L               |  |
| Controller  | Control                 | PID Control                                           |  |                    |  |                    |  |                    |  |
|             | Display                 | GLCD (Graphic LCD)                                    |  |                    |  |                    |  |                    |  |
|             | Pattern                 | 9 ea                                                  |  |                    |  |                    |  |                    |  |
| Temperature | Range                   | 110 ~ 123 °C                                          |  |                    |  |                    |  |                    |  |
|             | Uniformity              | ± 1.0 °C                                              |  |                    |  |                    |  |                    |  |
| Pressure    | Sterilization at 121 °C | 2.1 bar (Absolute Pressure)                           |  |                    |  |                    |  |                    |  |
|             | Gauge Range             | 0~3 bar (Gauge Pressure)                              |  |                    |  |                    |  |                    |  |
| Size        | Exterior                | w400×d370<br>×h550                                    |  | w700×d370<br>×h550 |  | w400×d410<br>×h590 |  | w700×d410<br>×h590 |  |
|             | Interior                | Ø350×h420<br>mm                                       |  | Ø350×h600<br>mm    |  | Ø450×h460<br>mm    |  | Ø450×h600<br>mm    |  |
| Material    | Interior                | Stainless Steel 304                                   |  |                    |  |                    |  |                    |  |
|             | Exterior                | Powder Coated Steel                                   |  |                    |  |                    |  |                    |  |
| Electric    | Voltage/Frequency       | 220V 50/60Hz                                          |  |                    |  |                    |  |                    |  |
|             | Current                 | 9.0 A                                                 |  | 13.6 A             |  | 18.2 A             |  |                    |  |
|             | Power Line              | Standard Plug                                         |  |                    |  | Industrial Plug    |  |                    |  |
| Safety      |                         | Over Temp. & Over Pressure Protector, Low Water Alarm |  |                    |  |                    |  |                    |  |

## 2.2 Product Components

| Product Name | Image                                                                               | Quantity |
|--------------|-------------------------------------------------------------------------------------|----------|
| Main Product |    | 1 ea     |
| Heater cover |  | 1 ea     |
| Basket       |  | 2 ea     |
| Exhaust Tank |  | 1 ea     |
| User Guide   |  | 1 ea     |

## 2.3 Product Structure



① Temperature Controller

A Temperature controller that allow to check the control status and sterilization process through LCD screen.

② Door Lock

A device for door locking before starting to drive. Door is locked when turning it all the way to the right. Door is unlocked when turning it all the way to the left.

③ Door Catch

Open up the door with the door catch pulled forward if the door locking system is unlocked.

④ Pressure Gauge

Display chamber pressure

⑤ Exhaust Tank

A place gathering the condensate and exhaust the steam.

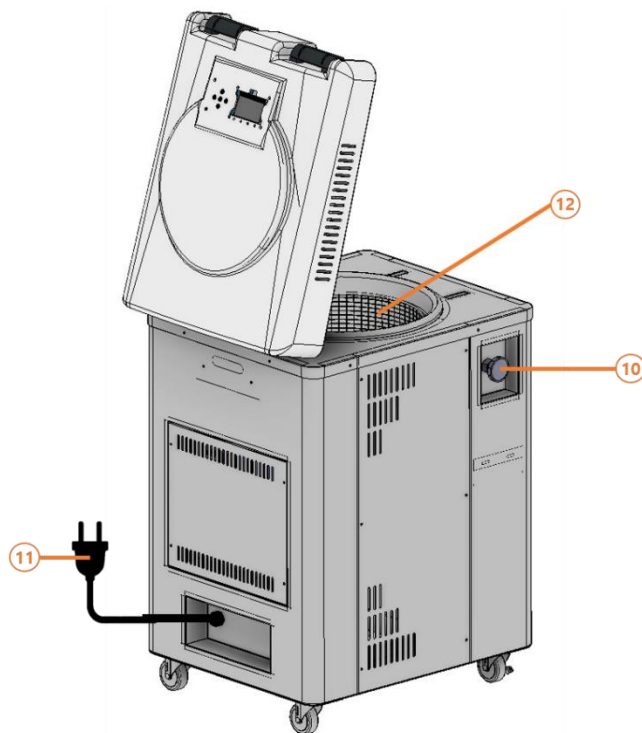
⑥ Power ON/OFF Switch

⑦ Circuit Breaker

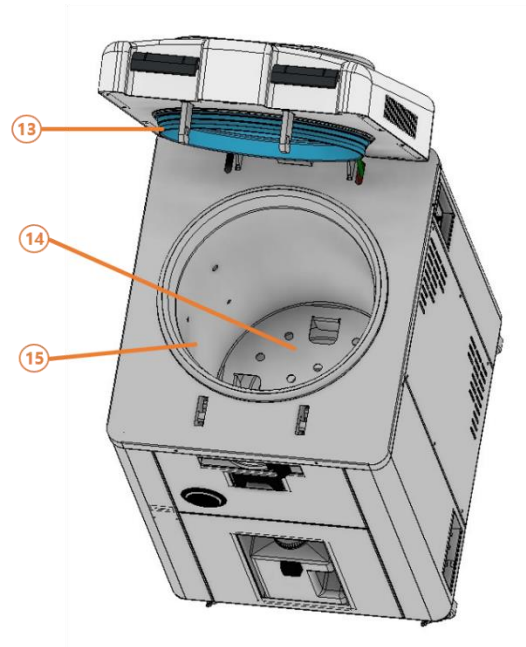
⑧ Drain Valve & Port

A Device for draining internal water in the chamber. Open the valve and drain the water through the port.

⑨ Wheels



- ⑩ Manual Exhaust Valve  
A Valve that allows to cancel the pressure by a user at random. Internal steam is discharged through Exhaust Tank when the autoclaves is opened under pressurization.
- ⑪ Power Cord  
LVE080 and LVE100 models come with a dedicated plug and socket.
- ⑫ Basket  
Accessory to put a target product for sterilization. All autoclaves come with 2ea wire baskets as standard.



- ⑬ Door Packing  
A packing that seals the chamber and door.
- ⑭ Heater Cover  
A cover that covers up the heater located at the bottom of the chamber.
- ⑮ Chamber  
A space where sterilization is proceeding with high temperature and high pressure.

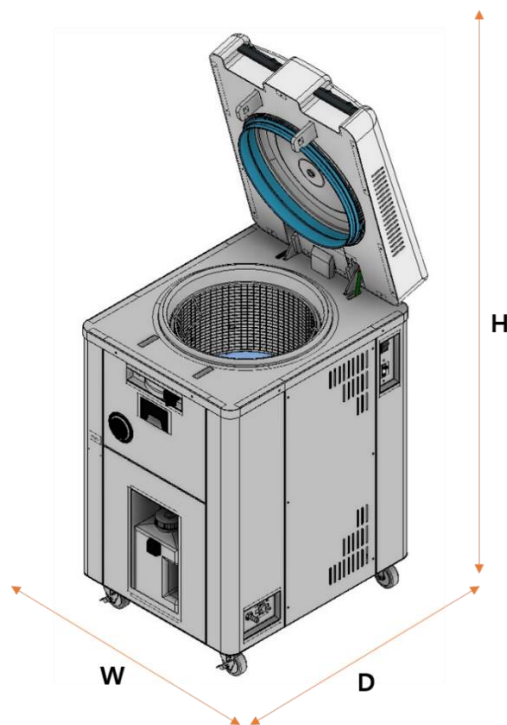
### 3 Product Installation

#### 3.1 Installation Environment

- Ambient Temperature: within a range of 15 °C ~ 32 °C
- Humidity: under 80 %
- Altitude: Lower than 2000m
- A place where is no strong high frequency noise
- A place not directly exposed to sunlight
- A place where is no combustible gas leak
- A floor or table where the product is installing must be flat(horizontal)
- Well- ventilating place

#### 3.2 Product Installation Space

A required space to install the product is as follow.



| Model  | W (mm) | D (mm) | H (mm) |
|--------|--------|--------|--------|
| LVE040 | 700    | 900    | 1500   |
| LVE060 | 700    | 900    | 1600   |
| LVE080 | 800    | 1000   | 1500   |
| LVE100 | 800    | 1000   | 1600   |

### 3.3 Product Move and Fixation

- ① Place the autoclave in suitable place for installation.
- ② Fix the wheels with locks mounted on two front wheels( push to the way "ON")



- Please avoid to place the autoclave where frequently entering by people, because the autoclave that generates high-temperature and high-pressure steam.
- Please avoid to place the autoclaves around power outlet or electrical appliances susceptible to moisture.
- The wheels must be secured after installation.

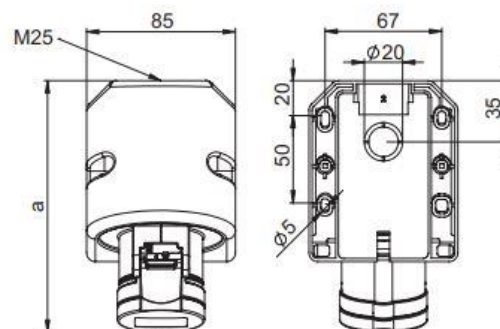
### 3.4 Power Outlet Installation

#### 3.4.1 LVE040, LVE060 Models

- ① Please check the power line specification from the product label attached on the rear.
- ② Turn OFF the power switch and circuit breaker which is located in the right side of the product.
- ③ Connect the cord suitable for the power line specification by loosening the power line located on the rear.
- ④ Turn ON the power switch and circuit breaker.

#### 3.4.2 LVE080, LVE100 Models

- ① Check the power line specification from the product label attached on the rear.
- ② Install power socket and connect the power that meets to specification.



Power Socket (Model: 123-6, Manufacturer: PCE)

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- ③ Turn OFF the power switch and circuit breaker which is located in the right side of the product.
- ④ Connect to the power socket by loosening the power line located on the rear.
- ⑤ Turn ON the power switch and



- Power sockets must be installed by qualified personnel.
- Connecting power that is unsuitable for required specifications may cause damage to the instrument and the human body.
- Must use the instrument alone (Exclusively). Due to the high current capacity of the autoclave, there is a risk of fire due to over-current when using the same power with other instrument.
- Make sure to connect the ground

### 3.5 Exhaust Tank Water Supply.



Take out the Exhaust Tank and press the release button to separate it from the tube.



Open the Lid of the Exhaust Tank and fill the water up to Min. level shown in the picture. Steam is discharged through the water in the exhaust tank, and the amount of steam discharged to the outside is reduced.

## 4 Product Driving Preparation

### 4.1 Door Open



- ① Turn on the Power switch and circuit breaker.
- ② Unlock the door lock by turning it all the way to the left.
- ③ Lift up the door with pulling the door catch forward



- The door Lock system will not open with turned off the device. Please unlock the door lock system after turned on the device.

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### 4.2 Chamber Water Supply

- ① Check if the drain valve is closed.
- ② Open the door and fill in the water up to the height of the heater cover.



- Please use the distilled water for supplying water

### 4.3 Sterilizing Target Product Loading

- ① Load the sterilizing target product inside of the basket.
- ② Evenly attach sterilization indicator
- ③ Be aware of following precautions when loading the sterilizing target product.



#### **Precautions for loading the sterilizing target product.**

- Ensure sufficient space for steam to penetrate between sterilizing product. Failure to penetrate can cause incomplete sterilization.
- Must use the basket for loading the sterilizing target product.
- Make sure to open the cap for a product with a cap, or use a dedicated cap.
- Load the product by sufficient opening the entrance of the product (e.g. bag type)
- Load upside down or lay down for the products with depth such as beaker, flask, and test tube. If stand and load containers with depth inside, it leads steam failure to penetrate and finally it may cause of incomplete sterilization.
- Check if the heat resistance temperature of the sterilizing product is over 130°C
- Prevent to wetting the sterilizing product which material is of cloth by loading it on the top of the basket.

### 4.4 Door Lock

- ① Check if there is foreign substance at door packing.
- ② Close down the door until you hear a clicking sound.
- ③ Check if the door is fully closed.
- ④ Lock the door lock by turning it all the way to the right.
- ⑤ Check if the manual exhaust valve is closed.



- Be careful not to hand pinch when close the door.



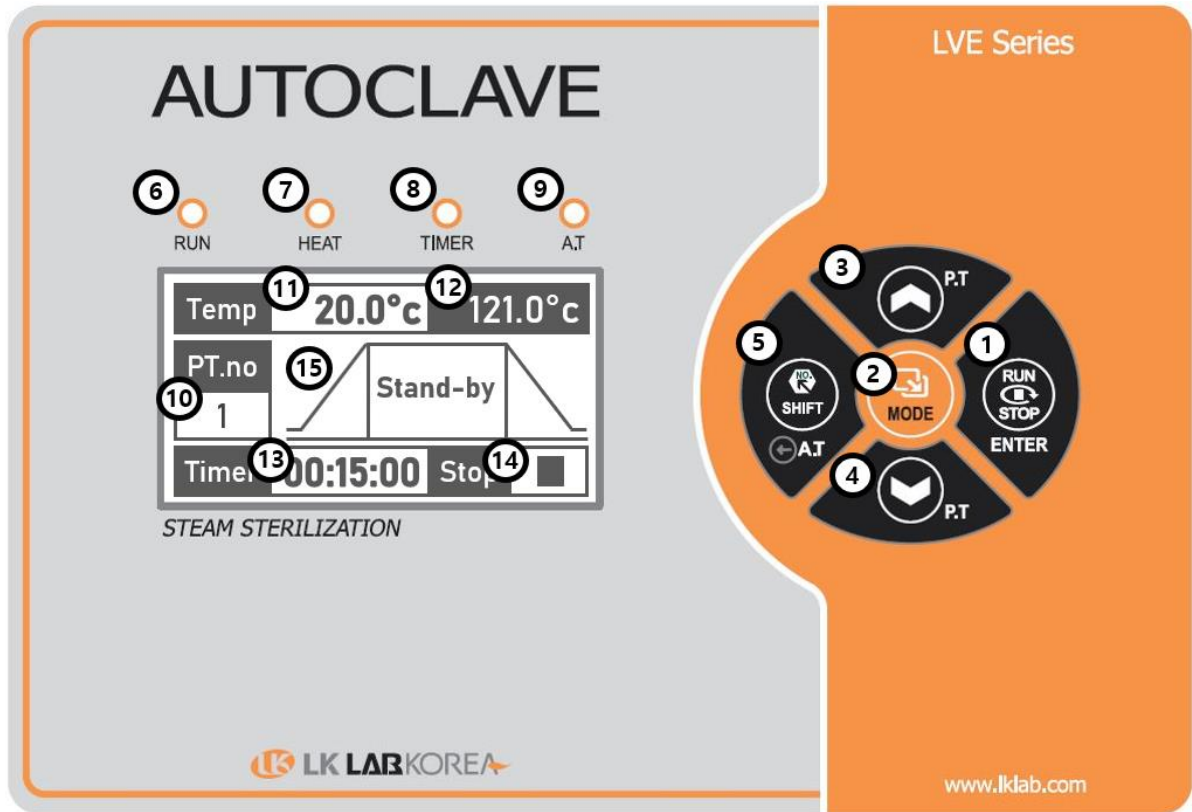
- Make sure the manual exhaust valve is closed. Failure to close this valve may cause the heater to overheat due to insufficient of water.



- After using the autoclave, the door may not close well due to internal pressure when the internal temperature of the chamber has risen. Use the autoclave after close the door by pressing hard, or after make it lower the internal temperature of the chamber.

## 5 Product Driving

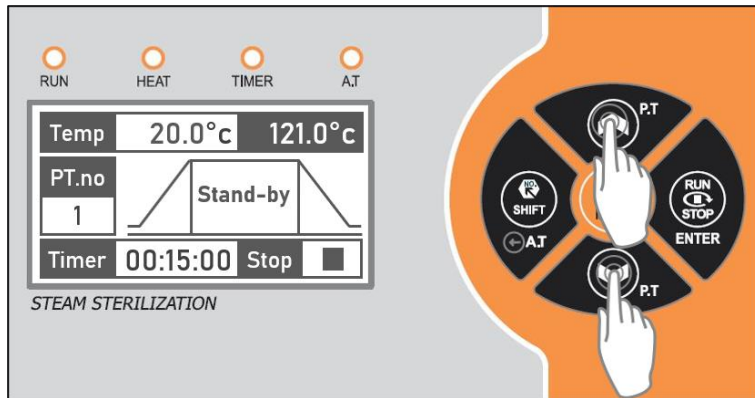
### 5.1 Controller Configuration



- |                              |                                 |
|------------------------------|---------------------------------|
| ① RUN/STOP/ENTER Button      | ⑨ Autotuning Lamp               |
| ② MODE Button                | ⑩ Patter Password               |
| ③ UP/Pattern Change Button   | ⑪ Current Temperature           |
| ④ DOWN/Pattern Change Button | ⑫ Sterilization Temperature     |
| ⑤ SHIFT/Autotuning Button    | ⑬ Sterilization Time            |
| ⑥ RUN Lamp                   | ⑭ Run/STOP Status               |
| ⑦ Heater Output Lamp         | ⑮ Sterilization process display |
| ⑧ Timer Lamp                 |                                 |

## 5.2 Sterilization Temperature, Time, and Pattern Setting

### 5.2.1 Sterilization Patter Choose

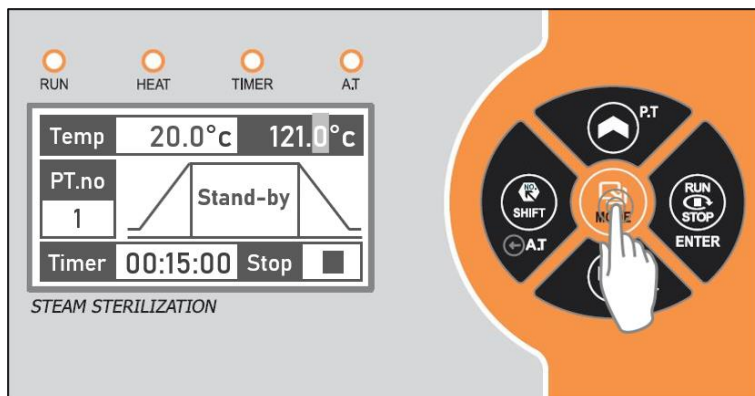


Sterilization Pattern can stored from 1 to 9.

Designate sterilization temperature and time for each pattern.

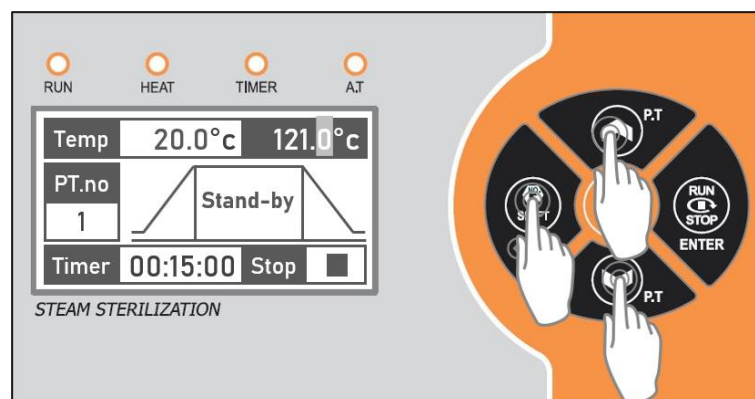
Choose the pattern you want after changing the PT.no (Sterilization patter number) by pressing the P.T UP/DOWN button.

### 5.2.2 Setting for Sterilization Temperature and time of the pattern



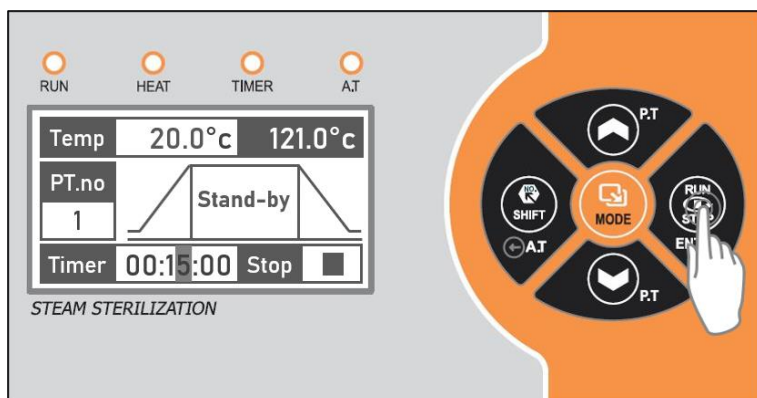
① Enter to Sterilization Temperature Setting

Press MODE button to enter sterilization temperature change mode



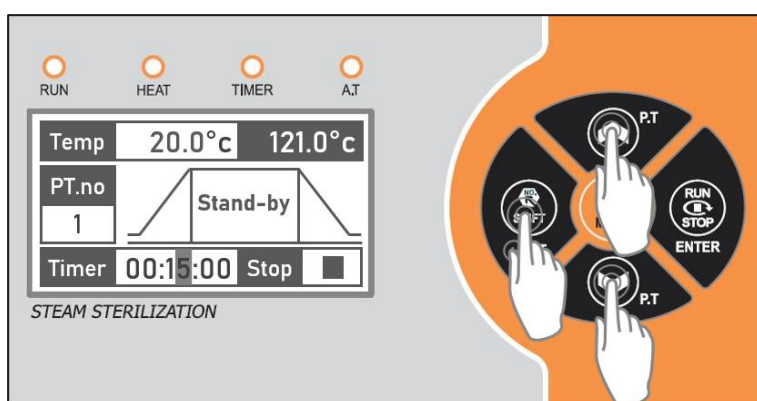
② Sterilization Temperature Setting

Set the sterilization temperature by using the UP, DOWN, SHIFT buttons.



## ③ Enter to Sterilization Time Setting

Press ENTER button to finish the temperature setting and enter to time setting mode

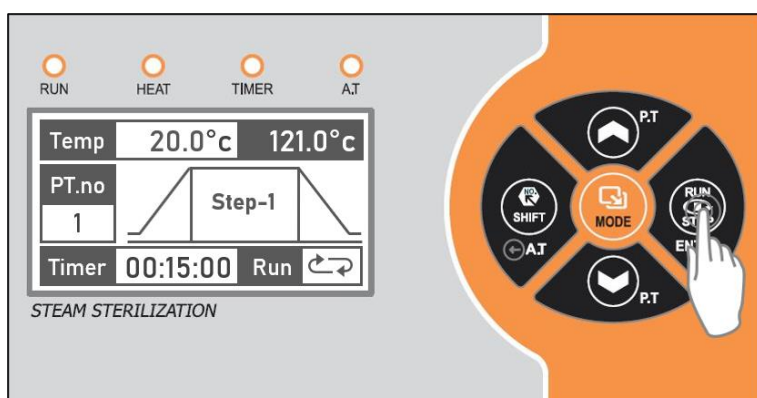


## ④ Sterilization Time Setting

Set the sterilization time by using the UP, DOWN, SHIFT buttons.

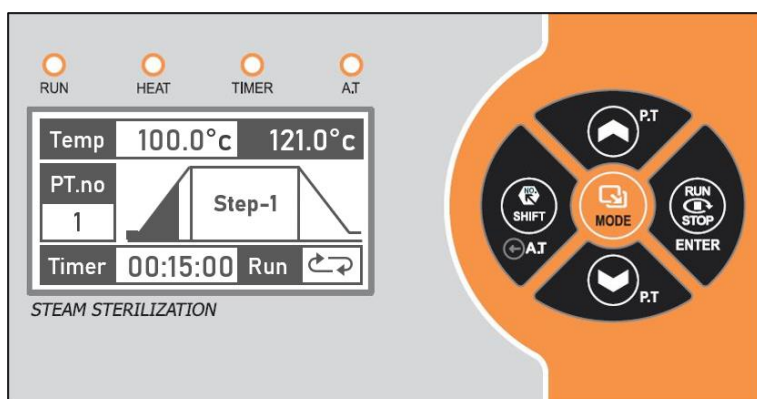
Press the ENTER button after setting, all the settings are completed and return back to initial screen.

## 5.3 Sterilization in Process



## ① Driving Start

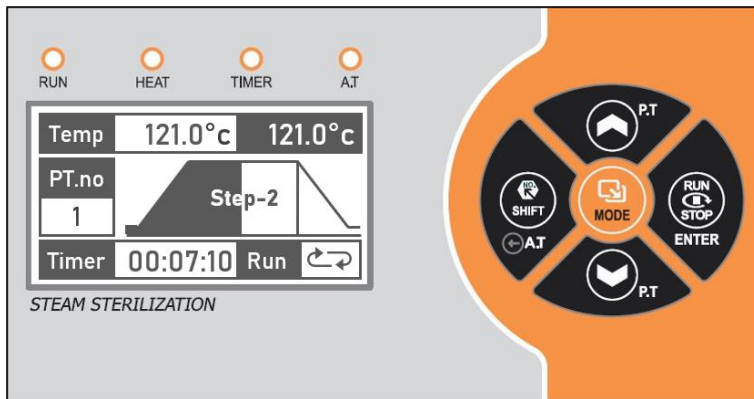
Driving start by pressing the RUN/STOP button during 2seconds on the initial screen.



## ② Heating and pressurization (Step-1)

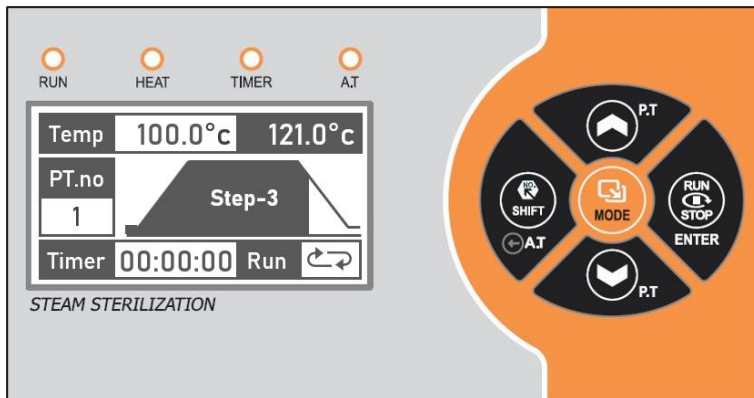
Fill the chamber with the water vapor by exhausting and heating the internal air inside of the chamber until before reaching to 100°C. Exhausting stopped and pressurization start once reaching to 100°C.

## Autoclave LVE Series



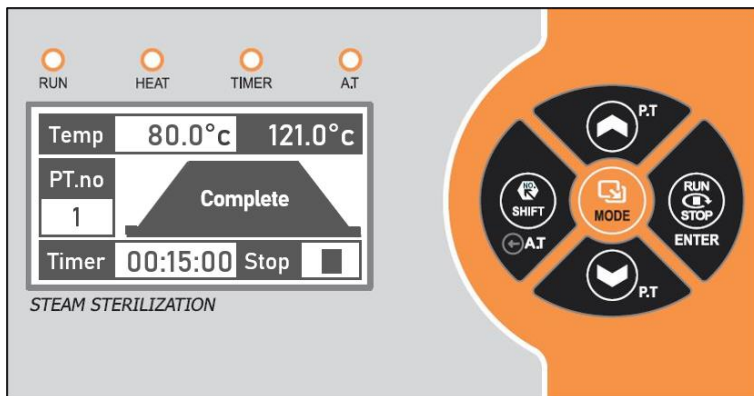
### ③ Sterilization(Step-2)

Sterilization start once reach to sterilization temperature. The timer starts to count and displays the remaining sterilization time.



### ④ Cooling and Exhaust (Step-3)

Cooling start after finished sterilization. Exhaust starts once reach to 100°C.



### ⑤ Completion

All sterilization processes are completed and the door locking system is unlocked after reaching 80 °C

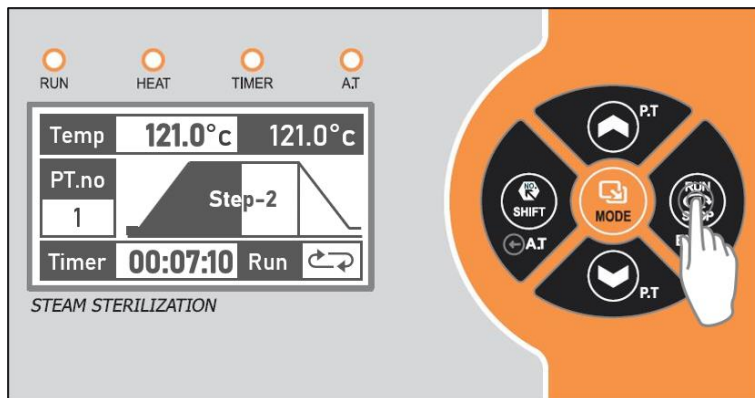


- The steam may be discharged through the exhaust tank during sterilization. Please be careful of burn.



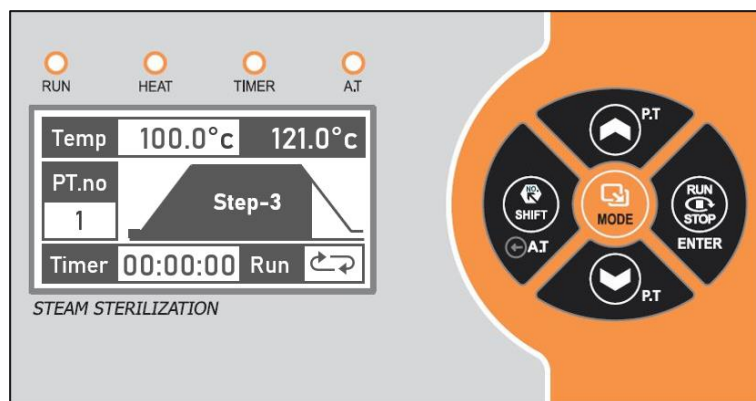
- The surface of the instrument may be heated during sterilization. Please be careful of burn.

## 5.4 STOP Sterilization in Process



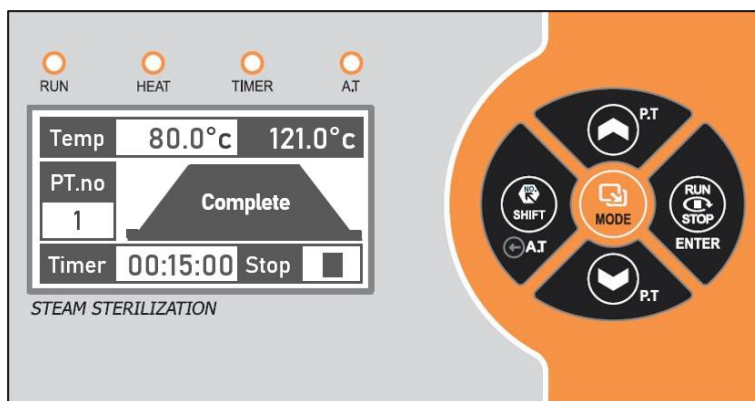
### ① Stop Autoclave

Press RUN/STOP button during 2 seconds.



### ② Heating and Pressurization STOP

Heating and pressurization will be stopped and move on to the Stop-3 stage.



### ③ Completion

All sterilization processes are completed and the door locking system is unlocked after reaching 80 °C

## 5.5 Sterilization Target Product Extraction

- ① Check if the pressure gauge is 0bar.
- ② Unlock the door locking system by pushing all the way to the left.
- ③ Open up the door with the door catch pulled.
- ④ Take out the basket.



- You may have a risk of burn due to steam when opening the door. Please make sure to wear the gloves, eye protection glasses, and lab clothes.

### 5.6 Drainage

- ① Check if the internal temperature of the chamber is under 50°C.
- ② Check if the pressure gauge is 0 bar.
- ③ Place the drain tray on the bottom of the drain port

Drain tray: 1052-94(LVE040, LVE060)

1053-94(LVE060, LVE100)

- ④ Drain the internal water in the chamber by open the drain valve
- ⑤ Close the valve after drained

Valve Open: 

Valve Close: 



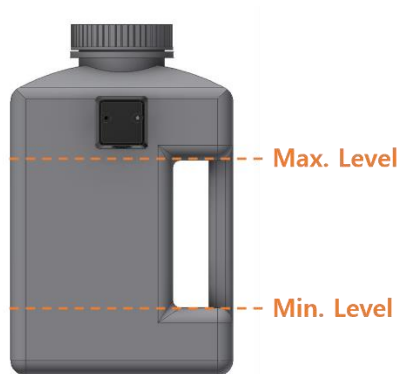
- **DO NOT OPEN THE DRAIN VALVE DURING DRIVING ON OR WHEN THE CHAMBER PRESSURE IS HIGH. IT MAY SERIOUS CAUSE OF BURN DUE TO DRAINING WATER AND STEAM.**

## 6 Maintenance

### 6.1 Water Replacement

- ① Replace the water immediately when the water inside chamber becomes contaminated or foreign substances are found.
- ② It may cause the corrosion of chamber or heater if using the water inside chamber repeatedly.
- ③ The water inside of the chamber should be drained if the autoclave is not used for a long time.

### 6.2 Empty the Exhaust Tank



- ① Empty the exhaust tank when the condensate are filled up to Max. Level
- ② Take out the Exhaust Tank and press the release button to separate it from the tube.
- ③ Empty the water up to Min. Level by opening the cap.
- ④ Close the cap and reattach it to the tube.



- Be careful of not to fold the exhaust tube. It may cause of incomplete sterilization if the internal air in the chamber is not exhausted well.



- Always fill the water in the exhaust tank more than Min. Level. It reduces the amount of the discharging steam while driving.

### 6.3 Manual Exhaust

- ① In case of necessary for user need or product repairs, open the manual exhaust valve to reduce the internal pressure in the chamber.
- ② STOP the running device
- ③ Rotate counterclockwise the manual exhaust valve to open up the valve.
- ④ Exhaust internal steam through exhaust tank.
- ⑤ Once completely discharged the steam, rotate clockwise the manual exhaust valve to close.



- High-temperature and high-pressure steam is discharged through the exhaust tank when the manual exhaust valve is opened. Please be careful of burn due to steam.



- Do not open the manual exhaust valve and drive the autoclave. This may cause the heater to overheat.

### 6.4 Cleaning

- ① Disconnect the power cord.
- ② Drain the water inside the chamber.
- ③ Remove the heater cover.
- ④ Wipe the contaminants using soft wet towel. In case of severe contamination, use a neutral detergent and wipe.
- ⑤ Rinse with cleaned water and drain it.
- ⑥ Wipe with dry cloth and completely dry.
- ⑦ Reinstall the heater cover and lock the drain valve.



- Do not sprinkle water outside of the instrument.

### 6.5 Maintenance of Door Packing

- ① Please always check the door packing before using the instrument.
- ② Wipe with wet soft cloth if there are any foreign substances
- ③ If there is any damage, please request service to replace it.



- Please replace the door packing once a year.

## 7 Troubleshooting

### 7.1 Cause of Abnormal Problem and Matter of Management

| Abnormal Problem                               | Cause                                                                             | Solution                                                                        |
|------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Product does not power on                      | Invalid power supply is used that does not meet product specifications            | Check the specification on the product label and supply the correct power line. |
|                                                | Circuit breaker is turned off                                                     | Turn on the circuit breaker                                                     |
|                                                | Power switch is turned off                                                        | Turn on the power switch                                                        |
|                                                | Circuit breaker is shorted                                                        | Request to service                                                              |
|                                                | Power plug is not connected.                                                      | Correctly connect the power plug                                                |
| Circuit breaker in the building is shorted.    | A device that exceeds the allowable range from the building breaker is connected. | Only connect this product                                                       |
|                                                | Short circuit of the product                                                      | Request to service                                                              |
| Controller button inoperative                  | Controller is out of order                                                        | Request to service                                                              |
| Not reaching to the target temperature         | Manual exhaust valve is opened                                                    | Close the manual exhaust valve                                                  |
|                                                | Door open                                                                         | Completely close the door and correctly lock                                    |
|                                                | Foreign substance at door packing                                                 | Remove the foreign substance                                                    |
|                                                | Damage of door packing                                                            | Request to service. Replace door packing.                                       |
| Incomplete sterilization occurred              | Errors of temperature sensor                                                      | Calibrate the temperature sensor                                                |
|                                                | Errors of temperature controller                                                  | Calibrate temperature controller                                                |
|                                                | Closed lid of sterilizing target product                                          | Open the lid or use a dedicated lid                                             |
|                                                | Overloaded of sterilizing target product                                          | Free up enough space by reducing the sterilizing target product                 |
|                                                | Stand and load containers with depth inside.                                      | Lay down or load upside down containers with depth inside.                      |
|                                                | Exhaust tube is folded                                                            | Straighten up a folded tube                                                     |
| Unable to drain                                | Clogged of a drain pipe                                                           | Cleaning. Request to service                                                    |
| Leakage occurs elsewhere than the exhaust tank | A pipe fitting is damaged                                                         | Request to service.                                                             |
| Not moving of wheels when moving               | Fixed the front wheels                                                            | Unfix the front wheels                                                          |
|                                                | Wheel failure                                                                     | Request to service                                                              |
| Noise Occurrence                               | Exhaust system is out of order                                                    | Request to service                                                              |
| Door lock system is not unlocked               | Power is turned off                                                               | Turn on the power                                                               |
| Door lock system is not locked                 | Power is turned off                                                               | Turn on the power                                                               |

|                                            |                                         |                                               |
|--------------------------------------------|-----------------------------------------|-----------------------------------------------|
| Overheat of temperature inside the chamber | Open the manual exhaust valve and drive | Close the manual exhaust valve and drive      |
|                                            | Drive with opening the door             | Drive with closing the door                   |
|                                            | Damage of door packing                  | Request to service. Replace the door packing. |

## 7.2 Error Message

### ① LOCK ERROR

|       |            |                               |
|-------|------------|-------------------------------|
| Temp  | 20.0°C     | 121.0°C                       |
| PT.no | LOCK ERROR |                               |
| 1     |            |                               |
| Timer | 00:15:00   | Stop <input type="checkbox"/> |

Cause: Driving with not locking the door lock system

Solution: Driving with locking the door lock system correctly.

### ② LBA ERROR

|       |           |                               |
|-------|-----------|-------------------------------|
| Temp  | 20.0°C    | 121.0°C                       |
| PT.no | LBA ERROR |                               |
| 1     |           |                               |
| Timer | 00:15:00  | Stop <input type="checkbox"/> |

Cause: Not reaching to target temperature

Solution: Refer to 7.1 Cause of Abnormal Problem and Matter of Management (Not reaching to the target temperature)

### ③ TEMP LIMIT ERROR

|       |            |                               |
|-------|------------|-------------------------------|
| Temp  | 20.0°C     | 121.0°C                       |
| PT.no | TEMP LIMIT |                               |
| 1     |            |                               |
| Timer | 00:15:00   | Stop <input type="checkbox"/> |

Cause: Overheat of chamber and heater

Solution: Refer to 7.1 Cause of Abnormal Problem and Matter of Management (Overheat of temperature inside the chamber)

### ④ LOW WATER

|       |              |                               |
|-------|--------------|-------------------------------|
| Temp  | 20.0°C       | 121.0°C                       |
| PT.no | LOW<br>WATER |                               |
| 1     |              |                               |
| Timer | 00:15:00     | Stop <input type="checkbox"/> |

Cause: Lack of water

Solution: Check if the manual exhaust valve is opened, replenish water

## 8 Warranty

### 8.1 Free Warranty Period

The warranty period is 1 year from the date of purchase. After 1 year, warranty service without charges are done and user needs to pay for repair or replacement of parts. Within warranty period, user can receive warranty service from LK Lab Korea co., Ltd. or product purchased store.

### 8.2 Exception from Warranty Period

- ① Damage caused by natural disasters (such as fire or flooding).
- ② Fault caused by failure to comply with the instructions for use
- ③ In the case of repair or modification of the product by an employee of LK Lab Korea Co., Ltd. or by a person other than a designated company
- ④ Other failures caused by customer negligence

### 8.3 Technical Support

#### **Head Office**

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