Operation manual

[FORCED CONVECTION OVEN]

Model : OF-02G / 12G / 22G

Manual No : 00HAA0001159 (Version : 5.0)

JEIO TECH

Thank you for purchasing a Lab companion product. We always do our best to provide customer satisfaction. This unit is designed using our own new technology and materials.
This operation manual describes the performance of the unit and gives instructions for its correct use. All users must read this operation manual carefully before you use this unit. Please use within the recommended parameters as specified.

Please read this operation manual carefully before you use this unit. Especially, keep in mind and pay attention regarding safety secure

Safety Precautions

⚠DANGER	"Danger" means that the user may have serious damage and even die by wrong handling on this unit.
⚠WARNING	"Warning" means that the user may have serious damage by wrong handling on this unit.
⚠CAUTION	"Caution" means that the user may have not so serious damage and unit may have physical damage by wrong handling on this unit.

Contents

1. Purpose and specificity of this unit

1) Purpose

(1) Forced convection oven is used for rapid dry for glass ware test of thermal hardness and thermal variation.

(2) Forced convection oven is used for preheating before heating test and test of dry for architecture component and electric component and thermal durability.

(3) Forced convection oven is used for self life test of food in harshness condition, humidity remove, harden and soften test of food and chemical by heating, moisture removal in the sample and etc.

2) Specificity

(1) Forced convection oven is multi purpose instruments for Biotechnology, pharmacy, medical, chemical, and biology. This has firstly developed CLS (Custom Logical Safe)-Control system for convinces in use and safety to user.

(2) CLS-Control System means "Control system which has logical safety device specialized for individual model". Laboratory must have Thermal safety secure because there are a lot of inflammable reagent. This system is highest safety secure control device (patent no. 0397583 and 0328729) and makes the unit suitable for this kind of environment.

(3) This unit is designed to stop the Heater and Blower in order to protect the user from heat when its door opened while it works.

(4) This unit has insulation for high temperature in the outside of the inner chamber and inside of the door and also has Chamber Silicone door for high temperature therefore insulation is perfect and heat lose is very low.

(5) Triple observing window is good for insulation and observe. This is Optional

(6) Uniform temperature in the chamber is made by special design.

(7) Easy to lock door opening system is used.

(8) Safety circuit is used to protect the instrument from over charge and over temperature of the heater.

2. Installation

(1) Scope of delivery.

Main body(1set), Operation manual (1EA), Glass fuse (2EA), Shelf(2EA), Shelf guide(4EA), Communication CD(1EA), RS-232 Communication cable(1EA)

(2) This unit will work correctly on proper power supply. Please check power supply and ID Plate information are the same. User must use power supply connected earth and power cord must be connected to wall outlet supplying ground point.

⚠WARNING

We don't have any responsibility for accident and lose of personal and asset if the ground earth is not connected.

(3) Please install the unit in the flat place where prevent vibration and shock.

(4) Please let the unit avoid heat source and direct sun light and let the unit located in ambient temperature range in 5°C ~ 40°C relative humidity lower than 80%.

(5) Please don't install the unit where water and organic solvent is easily penetrates in the unit. They cause short circuit.

(6) Please don't install the unit in dangerous place. (Where there are flammable gas and explosive material)

(7) Please secure enough space for installation because the door of it opened 180°.

(8) Please secure enough space for installation. The blower is back side of the oven.

(9) Please don't install the unit near by machines generating strong high frequency noise.

(10) This unit is quite heavy. Please move the unit with proper moving tool or 2 people together.

⚠CAUTION

Please think about the safety of user and instrument when you find out a place to install.

3. Matters that require attention

(1) Please don't touch Power cord and electric part with wet hand.

(2) Please don't put explosive and flammable chemicals (Alcohol, Benzene and etc) inside of the oven.

(3) The samples inside of the oven are very hot when the oven is works and for a while after it stops. Please take safety glove when you touch samples.

(4) Please don't set flammable materials near by oven.

(5) Please don't pour water on the unit directly when you clean the unit.

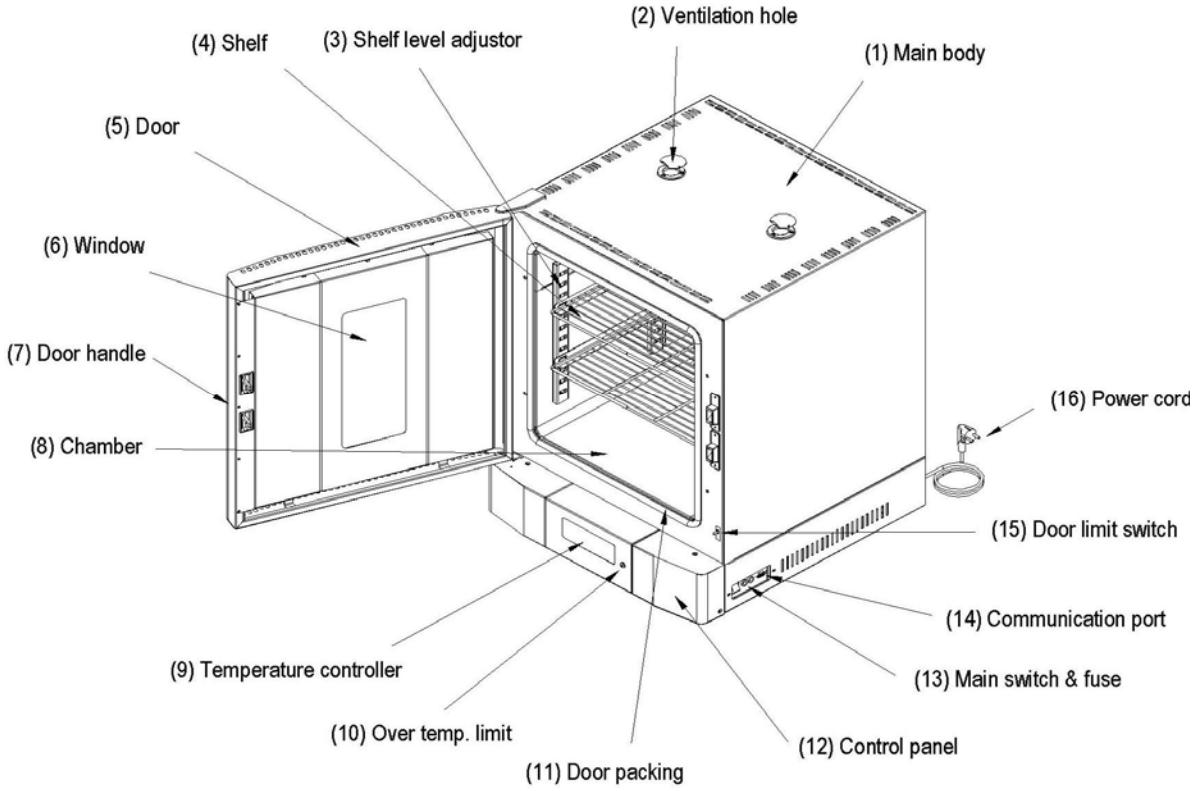
(6) Please don't put some conductive and flammable materials through ventilation or power supply port. It is dangerous and causing fire and electric shock.

(7) Circuit and electric component used in this unit are developed by Jeio tech. Please don't try to repair by yourself. Wrong combination of electric part may cause fire. You must ask to official Jeio tech dealer or distributor in your region.

⚠DANGER

Don't put explosive and flammable materials inside of the chamber.

4. Name of each parts



(1) Main body

Made by iron plate and painted.

(2) Ventilation hole

It changes air volume of ventilation. It's very hot, please wear safety glove when you need to adjust it. The safety gloves must be dry. Wearing wet gloves causes burning and electric shock.

(3) Shelf level adjustor

Shelf level is easily adjustable by the size of sample.

(OF-02→8 levels, OF-12→12 levels, OF-22→14 levels)

(4) Shelf

It's made by Stainless steel wire. It's easy to clean and ventilation is good. The surface of it is electrically polished therefore it has beautiful face good anti-corrosion.

(5) Door

There are air barrier between door surface and insulation of the door. Therefore the surface of the door is cool.

(6) Window (option)

Observing glass is made by triple glass therefore it's easy to observe.

(7) Door Handle

It is Door handle for door opening.

(8) Chamber

It's made of stainless steel and there are Blower, Heater, Temp. sensor and Temp. regulator inside of the chamber.

(9) Temperature Controller

This has a Micro processor (CPU) which has Digital PID Auto tuning function. It also has temperature compensation function for temperature sensor and the highest class safety level control system such as heating volume controller.

(10) Over temp. Limit.

If the heater temperature rises higher than set temperature it cut the power of the temperature controller, makes the over temperature LED blinking and alarming beep sounds. If you resume the operation, please set knob of it about 15% higher than set temperature and press Start/Stop switch ones then check run led of temperature controller is on.

(11) Door packing

A silicone rubber for high temperature keeps high air sealing.

(12) Control panel

Controller and electric component are there.

(13) Main switch & Fuse

This is the switch for main power. Fuse protects the instrument from electric shock. Please check out correct power supply when you replace Fuse.

(14) Communication port

User can monitor and control the unit via RS-232C protocol interface through COM1 or COM2 port to computer device. The control values can be stored and printed out.

(15) Door limit switch

It's installed inside of the unit. The Logic IC of this switch put off the main switch. This cut off all 2 phase currency in the instrument therefore heater and blower stops for safety of user. Door LED blinking to indicate the door is opened. If the door is opened more than 1 minute then the alarming buzzer sound in order to inform the user that the door is opened for a while. (Restart the equipment by pressing START/STOP button after closing the door)

(16) Power cord

It is a cord that supplies the main power.

5. Controller

1) Specificity

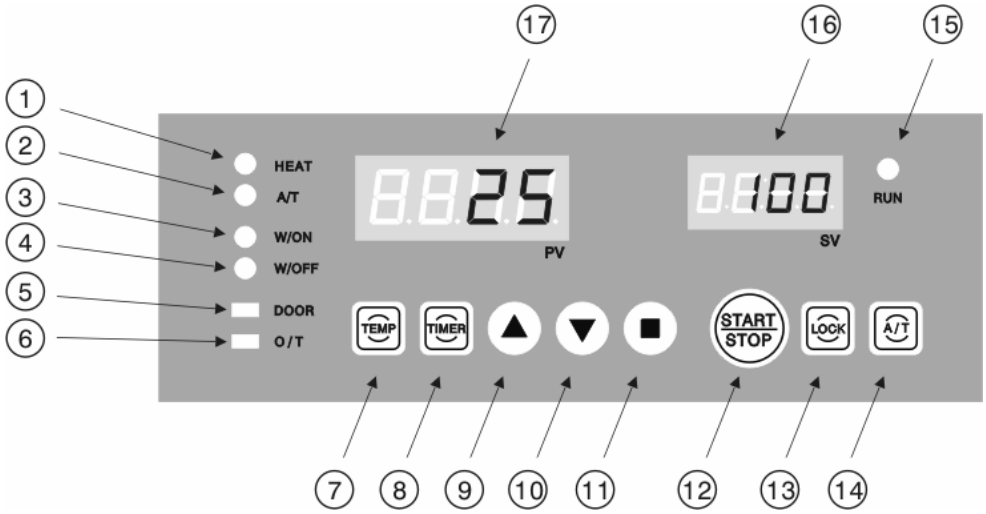
(1) CLS-Control System temperature and heater output are controlled in Main CPU which can do precise PID calculation. All control for safety is conducted by selective functional Logic IC which is installed separately. This is designed to conduct safety performance against any electric and electronic shock on the unit.

(2) CLS-Control System shuts down all 2 phase power supply to each part immediately and informs user instability by audio and visual device then keeps in safe mode until all instability conditions removed.

(3) CLS-Control System gives user two choice, one is resume operation of the unit and another is keeps the unit in standstill when the unit operation were terminated by power failure and then recovered.

(4) CLS-Control System, the safety device designed to keep very small amount of currency (only 5V, 10mA) in contact point. This makes durability of contact point very long.

2) Name and operation



(1) HEATER LED

It shows Heating function is “ON”

(2) Auto Tune LED

Flickering begins on Auto-tuning.

(3) Wait On Timer LED

This is the LED indicating operation start time. The LED is blinking when the timer works and the LED off when the timer is in waiting condition.

(4) Wait Off Timer LED

This is the LED indicating operation stop time. The LED is blinking when the timer works and the LED off when the timer is in waiting condition.

(5) Door open LED

The LED is on when the door is open.

(6) Over heating alarm LED

If the heater temperature rises higher than set temperature it cut the power of the temperature controller, makes the over temperature LED blinking and alarming beep sounds. If you resume the operation, please set knob of it about 15% higher than set temperature and press Start/Stop switch ones then check run led of temperature

(7) Temp. button.

This button is for temperature setting.

(8) Timer button.

This button is for timer setting.

(9) Up button.

This button is for increasing set value.

(10) Down button.

This button is for decreasing set value.

(11) Enter button.

This button is for saving value after varying set value.

(12) Start/Stop button.

This button is for start/stop of unit and for resuming operation after removing some unstable factors when operation is terminated because of it.

(13) Lock button.

This is lock the controller buttons.

(14) Auto Tune button.

The auto tune begins if you press this button for 1 second.

(15) RUN LED

This LED indicates Work/Stop state of unit. It turns on when the unit runs and turns down when the unit stops

(16) SV display

This display is for showing set temperature and showing remaining time when the timer function is activated.

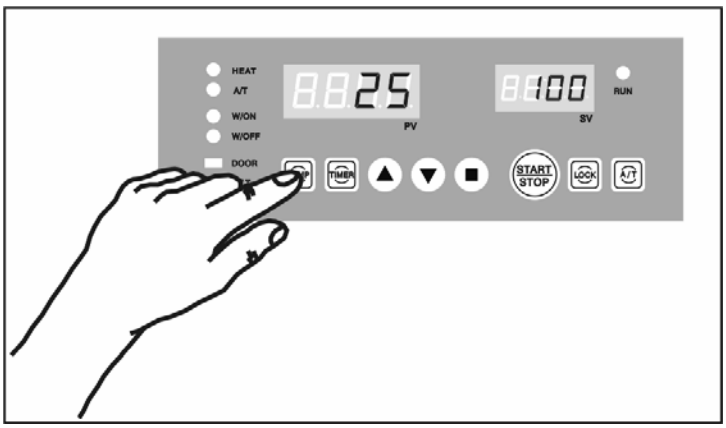
(17) PV display

This display is for showing present temperature.

3) Temperature setting way

(1) Press TEMP button.

Set temperature value (SV) is blinking. This means you can vary set value.



(2) Press ▲ ▼ button to vary digit number and press ■ button when you save the value.

(3) It goes back to previous state without saving if you don't touch any button for 10 seconds.

(4) Press TEMP button again when it is in SV set state then following additional functions are activated.

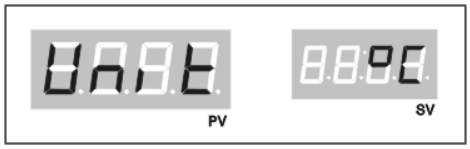
4) Additional function of TEMP button

(1) Favorite values can be stored at Sv.1, Sv2, Sv3 for each operation.

Press TEMP 2 times and set temp. values by pressing ▲ and ▼, and conclude the setting by pressing ■

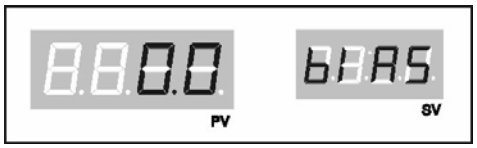
Set temperature is saved on memory and set temperature varies Sv1, Sv 2, Sv 3 are applied the same.

Press TEMP button repeatedly then Sv1, Sv2, Sv3 are shown and temperature unit set mode shown by pressing 5 times repeatedly.



(2) This is a function vary the unit of temperature value.

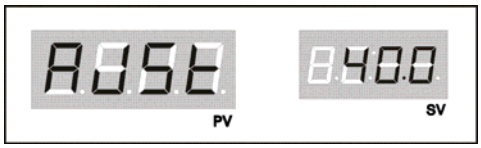
Initial display is ℃ and it can be varied ℃ and ℉ by pressing ▲ and ▼ buttons.



(3) Next mode is shown by pressing TEMP 6 times.

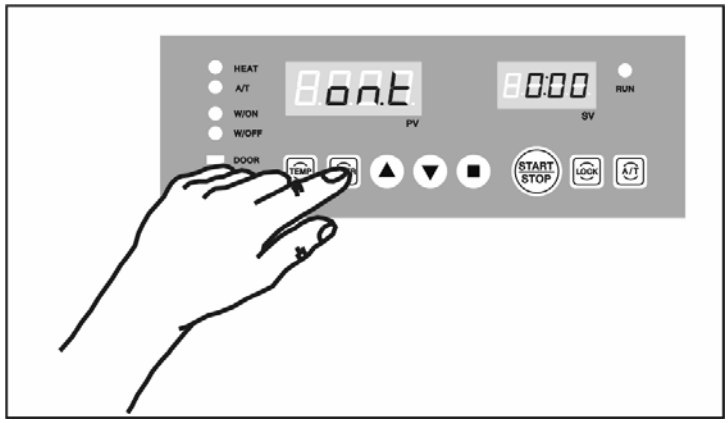
This compensates the temp. value errors.

Requested values are put on PV display. Move to the next mode by pressing ▲ and ▼ buttons.



PV is put on the SV display and can be set as exactly as shown on thermometer. Set the value by pressing ▲ and ▼ , and conclude the setting by pressing ■

5) Timer set way



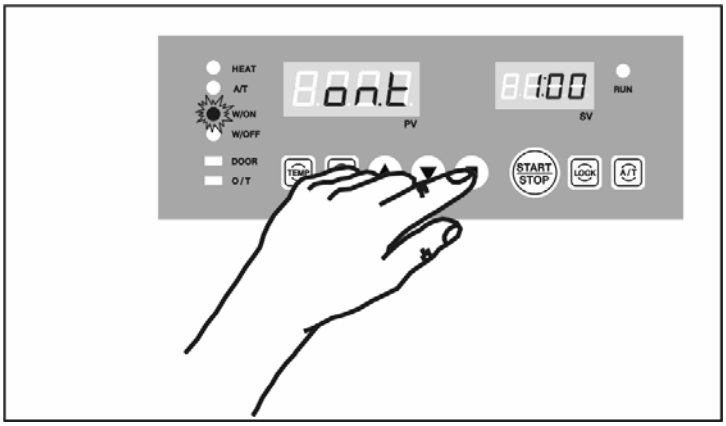
(1) Press TIMER button.

Timer (On Timer / Off Timer) is shown on PV and time is shown on SV. Set time by pressing ▲ ▼ button and save and finish by pressing ■ button.

(2) W/ON LED turns on with Beep sound after finishing wait on timer set.

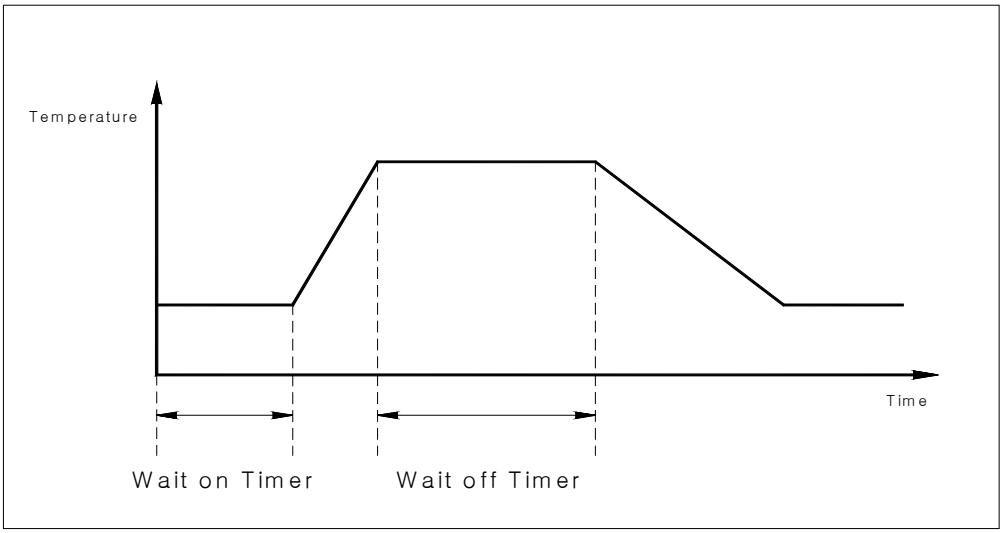
(3) Press TIMER button one more time. You can set wait off timer.

Set time by pressing ▲ ▼ button and save and finish by pressing ■ button.



(4) W/OFF LED turns on with Beep sound after finishing wait on timer set.

(5) The function of Timer is as follows.



① Wait On Timer

- The unit begins to work after time passed programmed on Wait On Timer.
- Maximum is 99hr 59mim. and minimum is 1min.

② Wait Off Timer

- The unit stops after time passed programmed on Wait Off Timer since SV and PV meet.

③ Combination of Wait On Timer & Wait Off Timer.

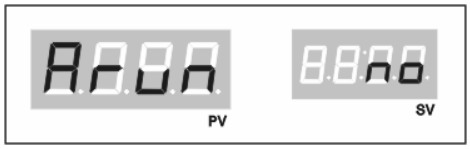
- The unit works as picture above

(6) Timer set deactivation

Press START STOP button in order to deactivate timer function then LED turns off and set timer deactivated (Both On/Off timer deactivated). If you want only one timer set time of timer for 0 then the timer is deactivated.

6) Additional function of TIMER button.

Press TIMER button once again on wait On/Off Timer function then following additional function displayed.



(1) This is selection of unit state after power failure. If you set yes the unit will run or else the unit will not run after power failure situation finished.

7) Auto Tuning

Perform Auto Tuning in order to get precise and rapid temperature control. PID value saved automatically after Auto Tuning.

(1) Set temperature you want.

(2) Press A/T button for a while(3seconds) then Auto Tune shown display like right hand side picture and A/T LED blinking.

(3) Auto Tune time is various according to installed environment. LED turns off after finishing Auto Tune and Present temperature & Set temperature meet.

8) Lock Function.

This is to lock controller buttons.

(1) Press LOCK button for a while (3seconds), then Lock function is set with Beep sound and the unit wouldn't corresponding any more key pressing.

(2) In order to deactivate this function please Press LOCK button for 3 seconds again.

(3) This protects improper pressing of the controller buttons while operation.

6. Maintenance of this unit

(1) Turn off the main power switch and pull out a power plug from wall outlet.

(2) Remove all liquid in the bath.

(3) Wash with soft cloth containing neutral detergent.

(4) Wash with soft cloth containing distilled water.

(5) Dry with dry cloth.

(6) Don't use organic solvent.

(7) If user try to clean this unit with other method not mentioned on this manual please contact us in order not to damage to the unit.

(8) Put on Safety glove for harmful chemicals and Safety Mask for harmful gas and then wash out pollutant with dried cloth when harmful chemicals and gases are spread out on the unit.

7. Action for malfunction

1) Check points when the unit doesn't work.

(1) Check out power supply.

(2) Check out fuse if off.

(4) Check out Run LED on display is off. Please press Start / Stop button if it is off.

(5) Please check the power is out.

2) Malfunction check list.

Malfunction symptom	What to check and what to do.
Buzzer sound continuously(1)	If Door is opened, Press START/STOP Switch once and check out Run LED turns on.
No temperature control.	Check if there are machines generating strong high frequency noise near by the unit. Check if Some contaminants are in the control panel. Do Auto tune again.
Air circulation is not made in the chamber	Check the door switch (open and close the door 2~3times) Check the blower works correctly
Abnormal sound	Check the Impeller of blower is OK inside of the chamber. Open the back plate of the instrument and Check the Impeller of Blower touches any part.
No power	Check the Main power Switch is on. Check the power supply is on in the room. Check the power failure. Check the fuse is OK
Temperature wouldn't rise	Check the RUN LED is on. Press the START/STOP Switch once if the RUN LED is off. Check the door is opened.
Buzzer sound continuously(2)	Check the Over temp. limit is set lower than current set value of the temperature. If it is, please set the value of the Over temp. limit at least 15% higher than PV. Press the START/STOP Switch once and the check the RUN LED.

☞ If you can't recover the instrument please call a repair service.

8. Warranty criterion

1) Warranty service duration

It covers for 1 year since you purchase the unit and then after the duration you need to pay for service parts.

Please contact your authorized Jeio tech dealer when you need warranty service.

You have a right to repair, replacement and payback within the warranty service duration.

2) The case user can't get warranty service

Damages on unit caused by fire and natural disaster like flood, earth quakes aren't covered by warranty service. Damaged by over voltage and abnormal conditional usage aren't covered by warranty service.

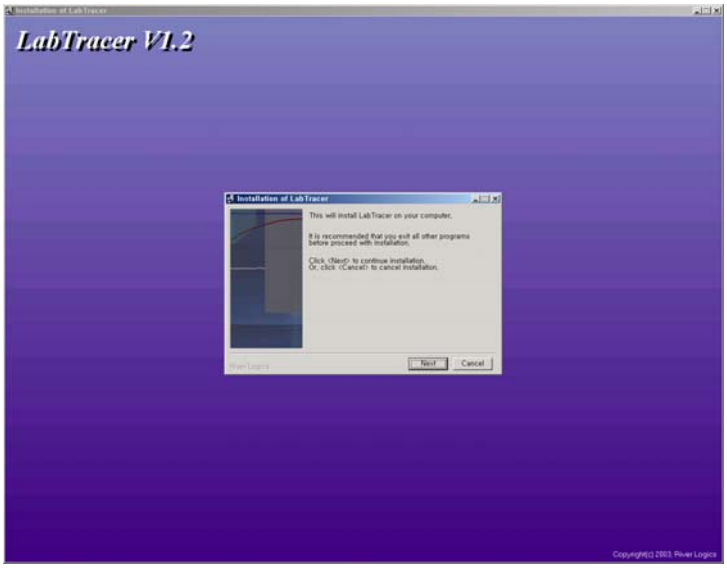
9. Specifications

Model		OF-02G	OF-12G	OF-22G
Chamber volume		60L	102L	151L
Permissible environmental condition		Temperature 5℃ to 40℃ Maximum relative humidity 80% Altitude up to 2,000m		
Temperature	Range	Amb.+10℃ ~ 250℃		
	Uniformity	±1℃ at 100℃		
	Accuracy	±1℃ at 100℃		
	Controller	Digital PID auto tuning		
	Sensor	K-CA		
	Heat up time	100℃ Within 15 min		
Material	Internal	Stainless steel, 0.8t		
	External	Steel, 0.8t power coating		
	Shelves	Stainless steel wire, electro polished		
	Insulation	Mineral wool (50mm)		
	Door gasket	High temperature grade foamed silicone rubber		
	Viewing window (Option)	Tempered safety glass, three fold, 5t		
	Ventilation slide	Stainless steel, dia 38mm×2EA		
Safety device		CLS(Custom Logical Safe)-control system, Class II		
Over temp. limit		Hydraulic over temp. limit		
Heater		Incoloy sheath 230VAC/1000W 120VAC/800W	Incoloy sheath 230VAC/1400W 120VAC/1000W	Incoloy sheath 230VAC/1700W 120VAC/1200W
Size (W×D×H)	Internal(㎜)	400×360×420	480×410×520	550×460×600
	External(㎜)	577×642×760	657×692×870	727×742×974
	Window(㎜)	5t×150×280	5t×150×380	
Electric requirement		230VAC 50/60Hz, 4.4A	230VAC 50/60Hz, 6.1A	230VAC 50/60Hz, 7.4A
		120VAC 60Hz, 6.8A	120VAC 60Hz, 8.4A	120VAC 60Hz, 10.1A
Weight(net)		53kg	63kg	72.5kg

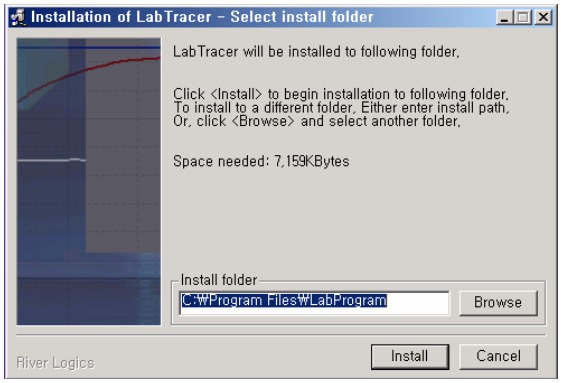
10. Install Lab Tracer

(1) Insert Installation CD and the software starts installation automatically.

(In case of no automatic running, run “SETUP.exe” file in CD.)



(2) Click “Next” button to choose destination of installation. (Default folder recommended)



(3) Click “Install” to start installation.

(4) Lab Tracer icon will be created on desktop after installation successfully.

(5) To start Lab Tracer, double click the icon.

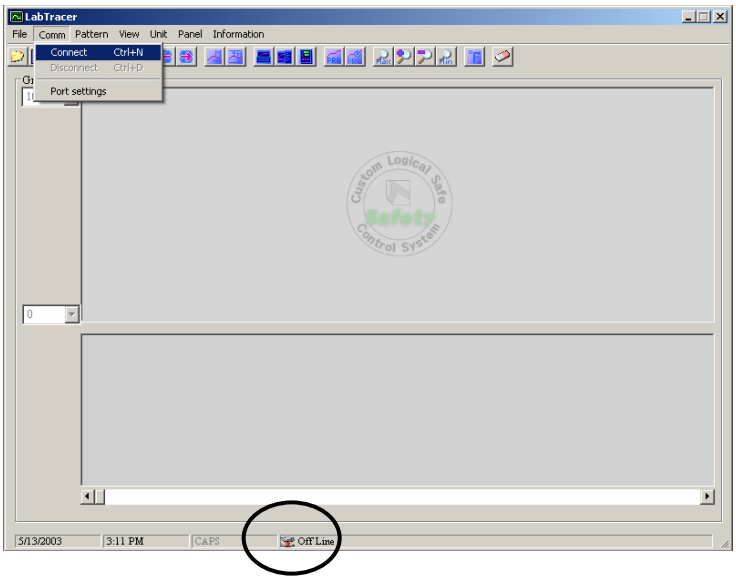
Standard	Recommend
Beyond Microsoft Windows 98	Microsoft Windows 2000, XP
CPU : Beyond P-II 233	CPU : Beyond P-III 300
RAM : Beyond 32M Byte	RAM : Beyond 64M Byte

Caution : If Windows 95 or 98 OS system is installed, time delay can arise between measuring time.

11. How to use Lab Tracer.

(1) Connection for communication

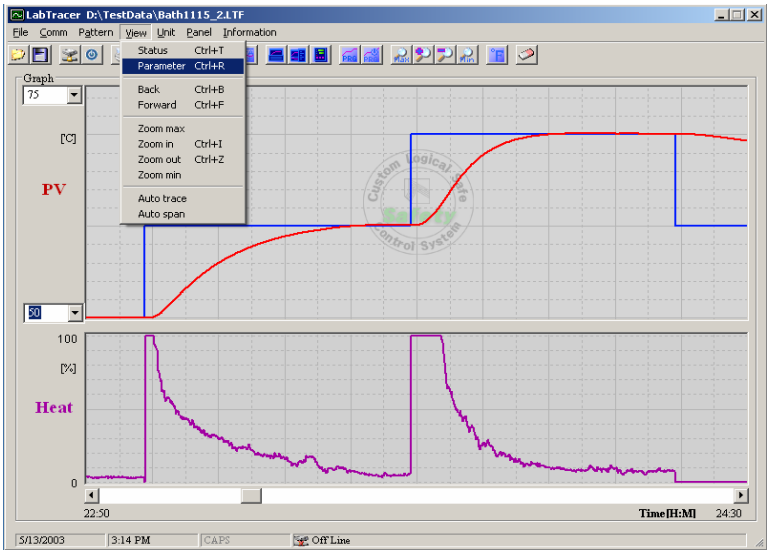
Click **Comm → Connect** and your PC and equipment start connection of communication. (In case of no connection, click **Comm → Port** and try to other ports.)



"On Line" displays on the bottom of the software, once communication is connected successfully. The window consists of 2 separate windows. Window on the top displays Temperature set point and actual temperature and window on the bottom displays output value of heating in graph mode.

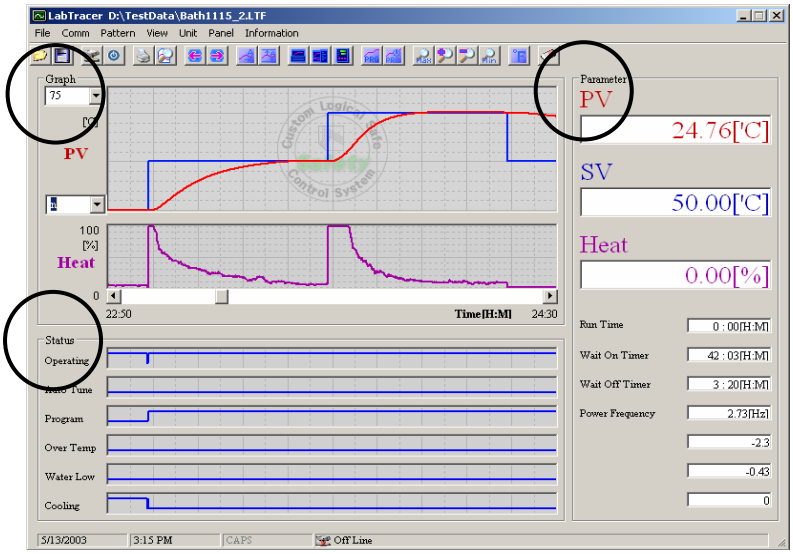
(2) View

① If you click **View → Parameter,** window displays actual temperature, temperature set point and output of heating by graph and figures.



② If you click **View → Status,** additional separate window appears below showing actual temperature and set point window. Operating, Auto Tune, Program, Over Temp., Level, and etc display on this window.

The following picture is a monitoring window after choosing Status and Parameter in View menu.



User can monitor operating process through three divided interfaces. (Graph, Parameter, Status)

☞ **Graph** displays;

Actual temperature (Red line) and set point (Blue line) on the top of separate interfaces.

☞ **Status** says that;

- **Operating** represents the unit is Running.

  If blue line is Hi, the unit is On(operating). If blue line is Low, the unit is Off.

- **Auto Tune** displays whether the unit performs Auto Tuning or not.
- **Program** displays whether the unit is in programmable mode or not.
- **Over Temp**. displays over heating condition of a unit.
- **Water Low** displays whether Water Level works or not.

  In case water is at the low level, blue line is Hi position and low position under normal condition.

- **Cooling** displays whether compressor works or not.

③ Parameter interface has following values;

☞ PV is actual temperature.

☞ SV is temperature set point.

☞ Heat is output value of heating element.

☞ Run Time says operating time after you press  button.

☞ Wait On Timer, Wait Off Timer displays remained time from setting time.

☞ Power Frequency displays frequency of current power.

(3) Menu icon

ⓐ ⓑ ⓒ ⓓ ⓔ ⓕ ⓖ ⓗ ⓘ ⓙ ⓚ ⓛ ⓜ

ⓐ File Open (Ctrl + O)

To open saved graph.

ⓑ File Save (Ctrl + S)

To save proceeding graph.

ⓒ Connect (Ctrl + C)

To connect unit and PC via RS-232 communication.

ⓓ Disconnect (Ctrl + D)

To disconnect RS-232 communication.

ⓔ Exit (Ctrl + X)

To terminate Lab Tracer.

ⓕ Print (Ctrl + P)

To print saver graph or proceeding graph. (refer to p30)

ⓖ Preview

To preview before printing.

ⓗⓘ Scroll icon

To scroll graph.

ⓙⓚ Auto Trace On/Off

If you want to fix and monitor the last point of graph on the center of windows, Click Auto Trace.

ⓛⓜ Auto Span On/Off

Set Y axis(temperature range) of graph manually or automatically. You can put values of range if you choose manual.

ⓝ ⓞ ⓟ ⓠ ⓡ ⓢ ⓣ ⓤ ⓥ ⓦ ⓧ ⓨ

ⓝ To display Status interface. (Ctrl + T)

ⓞ To display Parameter interface. (Ctrl + R)

ⓟ Panel View

When you click Panel View, the same appearance of display panel of unit pops up and you can control the unit by the pop-up window.

ⓠ Set Pattern of Program Run.

Set Pattern of Program Run and makes unit in a programmable operation.

Maximum number of pattern is 100 during 99hour.

⚠CAUTION

- Program function can be controlled only by PC.

ⓡ Program Run.

Program Run must be set in the main unit.

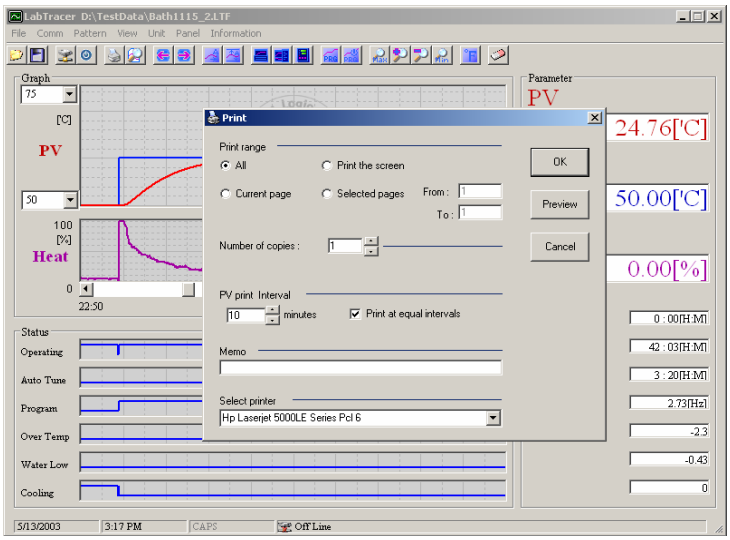
ⓢ ~ ⓥ Zoom In/Out.

ⓦ ~ ⓧ To convert temperature scale from ℃ to ℉ or vice versa.

(Note: Temperature scale of main body is not changed even though you convert temperature scale from Lab Tracer. To changer temperature scale of main body, you must change setting value of controller in main body.)

ⓨ To erase graph.

(4) Print



① Print range

- All : Print a total page.
- Print the screen : Print the current screen. (In case Graph, Status, Parameter Frame on the window, they are printed. If not, they are not printed.
- Current page : Print a page of the currently main screen.
- Selected pages : Print selected page(s).

② Number of copies

- Maximum number of copies are 100 by scrolling up and down button.

③ PV print interval

- If you tick this option, PV and SV are printed in text mode.

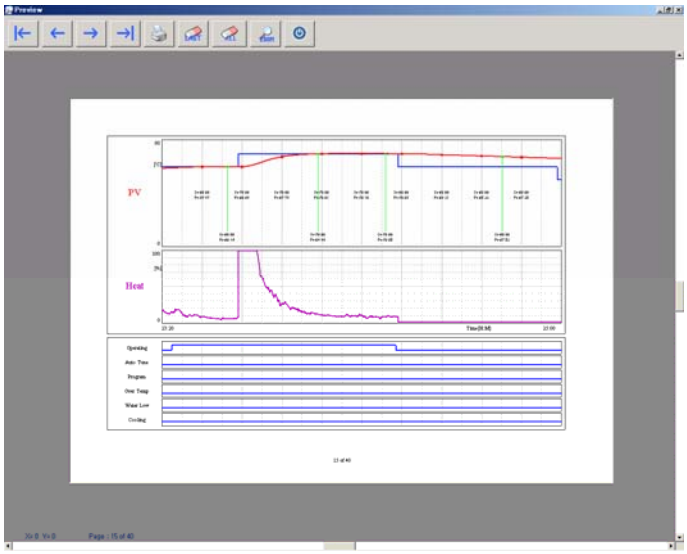
④ Memo

- Can write brief memo on print. Maximum to 60characters.

⑤ Select Print

- Can choose a printer.

(5) Preview and print



In case Print at equal intervals is ticked, PV and SV is printed in a regular interval(see above)

when you see preview and printing. If user wants to check a certain point, move curser to the point and click. Green line with PV and SV will be printed on the copies. (see above)

① Last Point Delete 

- Delete last set point.

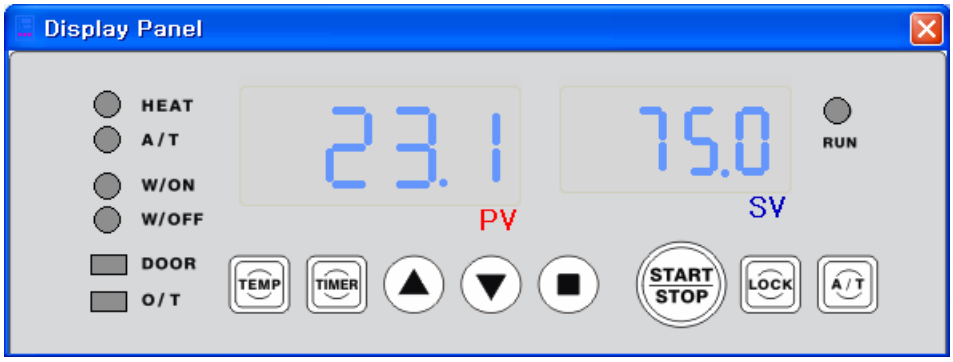
② All Point Delete 

- Delete all set points.

③ Zoon in / out 

- Zoon in or Zoon out.

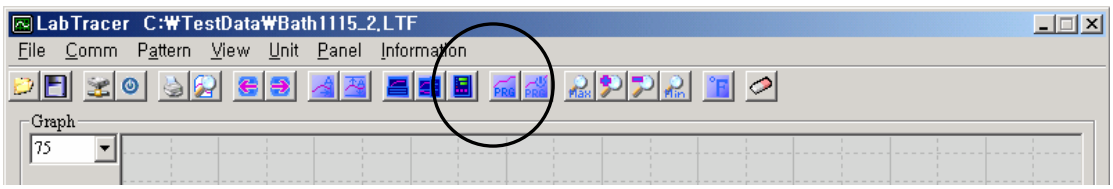
(6) Display



Performance of Display window is same as that of main display panel.

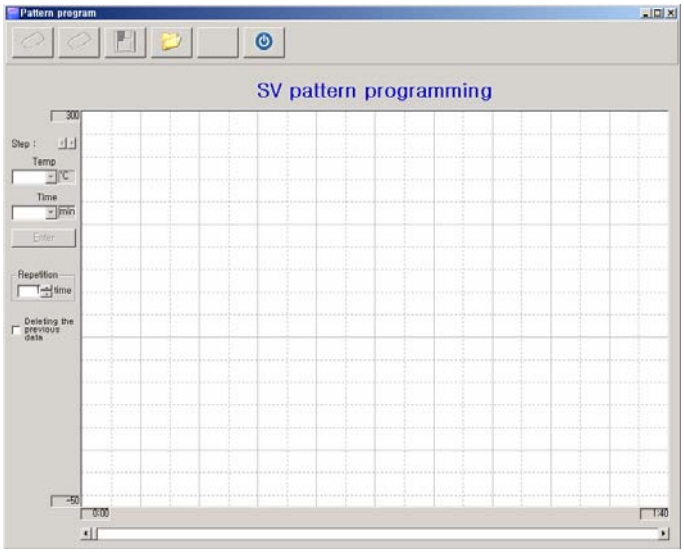
If communication via RS-232 between PC and main body is successful, user can control main body with your PC at a distance.

(7) Pattern Program



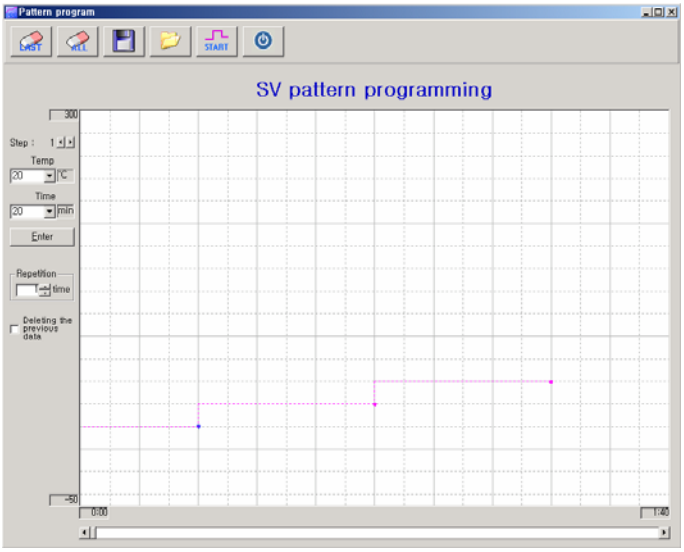
Pic 1. Main Lab Tracer

The following window will be open in case click PRG icon or **Pattern** -> **Pattern settings in menu.**



Pic 2. Pattern Program

In case you move mouse and click a certain point like pic 3., temperature set point and time, step number display on left side of window.



Pic 3. SV Pattern after clicking a certain point of window.

If you want to edit the selected point, Drag & Drop the selected step (blue color). It is very convenient to use short-keys when you want to change temperature and time. Because temperature can be adjusted 1 degree unit and time adjusted one minute unit.

① Short-key

↑ : Increase temperature by 1 degree.

↓ : Decrease temperature by 1 degree.

← : Decrease time by 1 minute.

→ : Increase time by 1 minute.

Alt + ↑ : Move an edit point to the right (the following step)

Alt + ↓ : Move an edit point to the left (a previous step)

Alt + ← : Move an edit point to the left (a previous step)

Alt + → : Move an editing point to the right (the following step)

② Last step delete 

- Delete last set step.

③ All step delete 

- Delete all set steps.

④ Pattern save 

- Save programmed pattern.
- File extension is PIT.
- Choose a folder and write file name. Then, click save button.

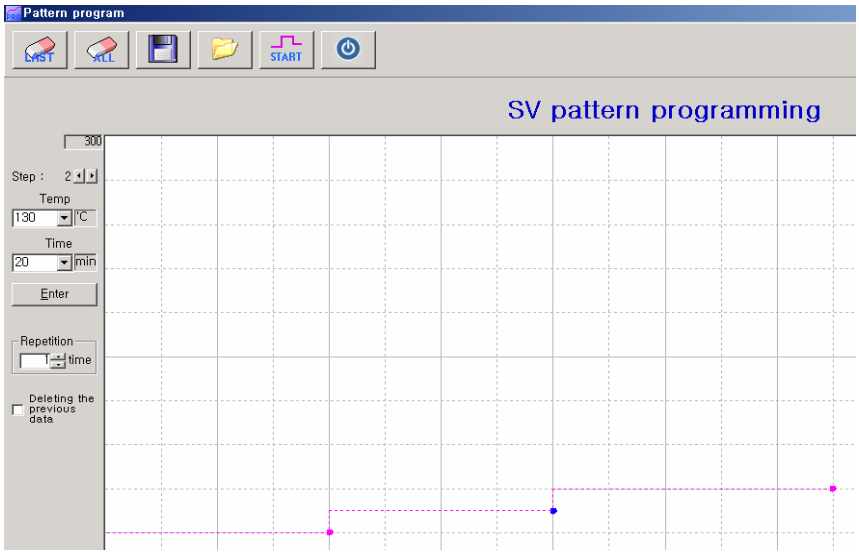
⑤ Pattern open 

- Choose a pattern file and click open.

⑥ Start 

- Click the START icon to operate unit after Pattern is set.

  Note: i) If the main body is under abnormal condition such as Door Open, Over Temp. and etc, the main unit will not work.



Pic 4. Step information and control option.

- If you put and set number of pattern repetition, the main body will work as programmed.
- If you tick **"Deleting the previous data"** and press start icon, previous data will be erased. Please, be cautious.

※ Caution

- Maximum operating time is up 99 hours.
- If you program total working time over 99 hours, the unit does not perform in Program Mode. Especially be cautious when you program pattern repetition.
- Please, be aware of specification and program time and temperature.
- If you program pattern over equipment performance, the units can not work properly.