



Forced Convection Oven

User Guide

version 1.0

Model
LO-FS050, LO-FS100, LO-FS150, LO-FS250

Thank you for purchasing product of LK Lab Korea co.,Ltd.
This User Guide describes your product's function,
operation and safe use.
Please read carefully and keep them in mind before you operate
products.
In case some parts which need extra care for users,
we put some mark as below for the occasion.



[Warning Mark]

This is mark for Dangerous Situation.
If users ignore this, it might cause of serious personal
injury or damage for products.



[Attention Mark]

This is mark come up with the situation which needs
extra care.
When users recognize this sign, they have to operate more
carefully.

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1. Preparation

1.1 Instruction

This Oven designed Chemical, Biological, Medical, Pharmaceutical and many other purposes.

This Oven can be used for drying many kinds of Glassware and Samples, Samples Thermal Denaturalization, Dry Sterilization and test for measuring life at harsh environment, with excellent performance.

With various function and safety devices installed, designed for users' convenience and safety as the biggest priority of this Oven.

1.2 Feature

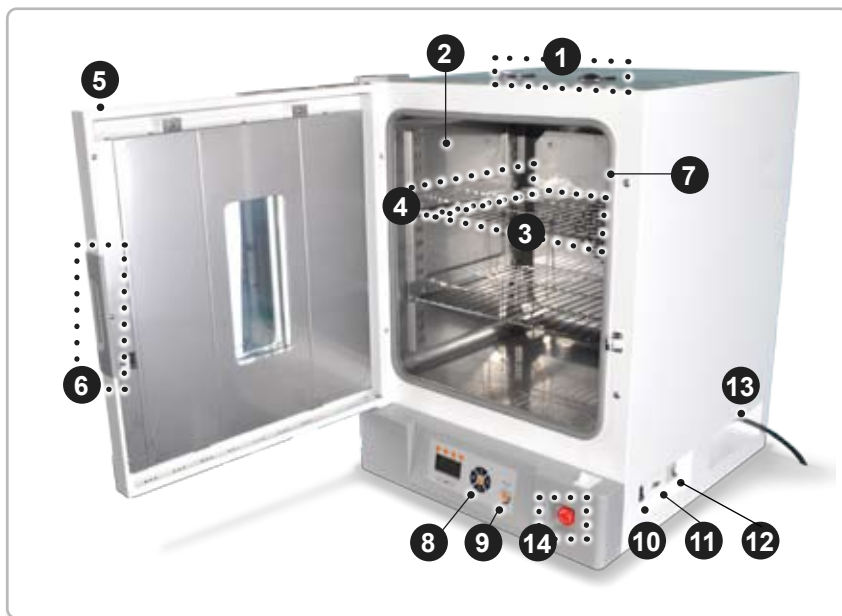
1.2.1► Function and Convenience

- Heat Flow Circulation method, provide to equivalent temperature distribution inside chamber.
- 5 steps of Flow Control prevent spreading of samples inside.
- Triplication tempered glass window provide convenience observation inside during operation.
- Graphic LCD Display provide handy operation and control.
- Program designed to control at multiple temperature.
(10 step control available)
- PID control system with high performance microprocessor provide quick and precision temp. control.
- By Auto Tuning installed provide automatic calculation of PID value based on test environment.
- Available to get the result or data of test from OVEN to PC with RS485 connection.

1.2.2► Safety

- User can promptly shut down equipment with 'Emergency Stop Button'.
- Double over heated safety device installed.
(1st Controller Alarm, 2nd Forced Shut Out Circuit)
- No running of Heater and Fan during door open.
- With appearance of disorder, alarm activated with buzzer and message displaying.
- Product's status can be checked with Optional Tower Sign Lamp.

1.3 Structure



[Forced Convection Oven]

[1] Vent Hole

[2] Chamber

[3] Shelf

[4] Shelf rail

[5] Door

[6] Door Handle

[7] Door Packing

[8] Temperature Controller

[9] Over Temp. Limiter

[10] Power Switch

[11] Communication Port

[12] Earth Leakage Breaker

[13] Power Cord

[14] Emergency Switch

[1] Vent Hole

removing hume may occur during sample treats.

[2] Chamber

space for treat made with stainless.

[3] Shelf

2 type as wire and perforated, used for put on the sample inside chamber.

[4] Shelf rail

used for fixing shelf, adjustable of height of shelf.

[5] Door

insulation between inside and outside of chamber, prevent overheated of surface.

[6] Door Handle

handle to open and close the door.

[7] Door Packing

packing for high temperature resistant seal the chamber.

[8] Temperature Controller

use for controlling temperature inside.

[9] Over Temp. Limiter

the temperature go over the set temperature, shut out the power of heater immediately to prevent overheat, user need to set 10% higher temperature from actual treat.

[10] Power Swtich

on/off switch for main power.

[11] Communication Port

RS485 communication port.

[12] Earth Leakage Breaker

block overcurrent and electrical short.

[13] Power Cord

supply electronic power to equipment.

[14] Emergency Switch

for immediate stop in emergency situation.

1.4 Installation

1.4.1▶ Contents of product(with delivery)

Main Body(1set), Power Cord(1ea), Wire Shelf(2ea),
Shelf Rail(4ea), User Guide(1copy)

1.4.2▶ Installation Environment

- Avoid direct light.
- Place where with less vibration and flat surface.
- Maintain the temperature of surrounding area the product placed between 5 to 40℃.
- Maintain the humidity of surrounding area the product placed below RH 80%.
- Avoid the place where may occur flammable gas.
- Avoid the place where may occur noise and high frequency.
- Avoid the place where may occur overcurrent or water leak.
- Avoid the place where may occur corrosive gas or dust.



/ Must place where temprature between 5 to 40℃ and humidity under 80%

1.4.3▶ Connecting of Power

- 1) Set power switch and earth leakage breaker as OFF
- 2) In case the power cord is separated from main body, connect them first and plug the cord to power supply point(outlet)



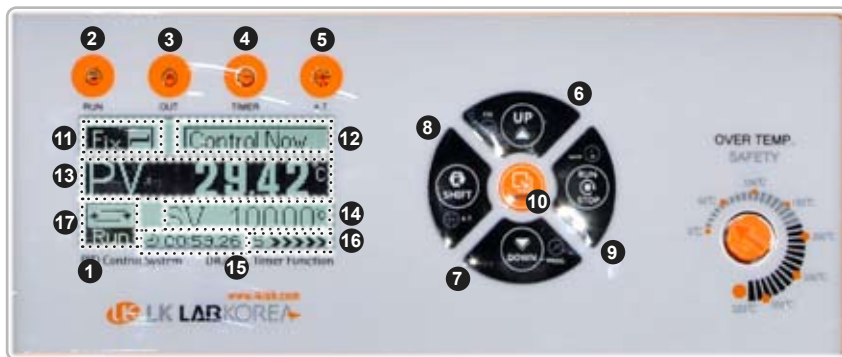
/ Before you plug to supply electronic power, please carefully check for electrical specification of equipment and considering the specification.

/ Must use power supply point that completely ground connected.

/ Do not touch the power cord with wet hand.

2. Operation

2.1 Naming and Function of Temperature Controller



[1] Graphic LCD

Available to check status of the equipment and display data.

[2] Run Lamp

Light on during the equipment operates.

[3] Heater Lamp

Display quantity of output with flickering.

[4] Timer Lamp

Light on during operate with timer.

[5] A.T Lamp

Light on during operate with auto tuning.

[6] UP key

Use for increasing of set value and set of Fix Mode.

[7] Down key

Use for decreasing of set value and set of Program Mode.

[8] Shift key

Use for moving the position of set value and set of Auto-Tuning Mode.

[9] Run/Stop key

Use for operating, stop and set values.

[10] Mode key

Use for changing menu.

[11] Display Mode

User can select one between FIX(one temp.) and Program(multiple temp.) Mode.

[12] Message Displaying Window

Display of the message related status of the product.

[13] PV Display

Display current temperature of equipment.

[14] SV Display

Display target temperature the user set.

[15] Timer Display

Timer display remain time for operation "--.--"-- means timer off.

[16] Fan Speed Display

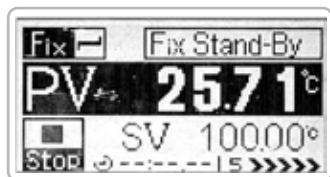
Display Step of inner circulating fan(available to set 0 to 5).

[17] RUN/STOP Display

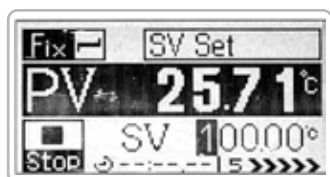
Display the status RUN or STOP.

2.2 FIX MODE(one temp. operation) / Operation Method

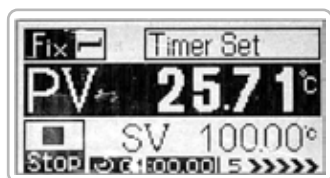
Check the mode status and if not set as FIX MODE,
press 'UP KEY' for 3 seconds to change FIX MODE.



· Fix Mode Stand-By



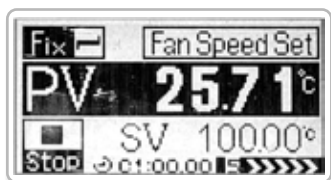
· SV Set Mode
- Set SV Value.



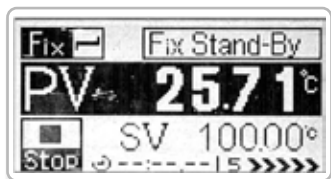
· Timer Set Mode
- Set Time Value.



Operation Method Continued ►



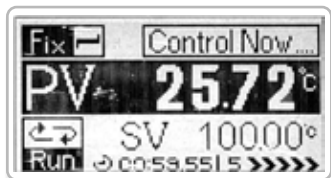
- Fan Speed Set Mode
- Set Speed Value.



- Fix Mode Stand-By



2sec.



- Start Operation



/ Lower setting of fan speed can cause for bigger temperature difference inside chamber.

2.3 Program MODE(multiple temp. operation) / Operation Method

Check the mode status and if not set as PROGRAM MODE, press 'DOWN KEY' for 3 seconds to change PROGRAM MODE.



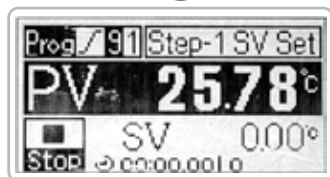
· Program Mode Stand-By



· End Step Set mode

- Set number of steps.

As number of steps set, user can set temperature steps.



· Step-1 SV Set mode

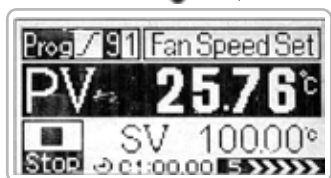
- Set SV Value for Step - 1.



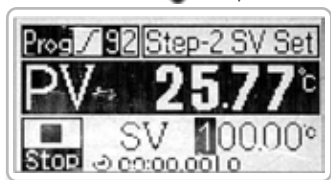
Program Mode Setting Method Continued ►



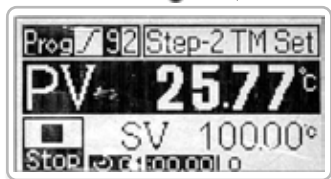
- Step-1 Timer Set mode
- Set time value for Step - 1.



- Step-1 Fan Set Mode
- Set speed value for Step - 1.

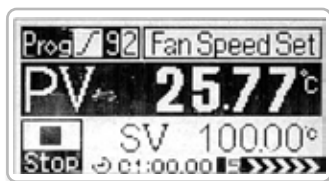


- Step-2 SV Set mode
- Set SV Value for Step - 2.



- Step-2 Timer Set mode
- Set time value for Step - 2.

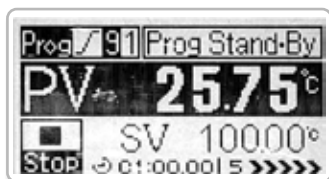
Program Mode Setting Method Continued ►



- Step-1 Fan Set Mode
- Set speed value for Step - 2.

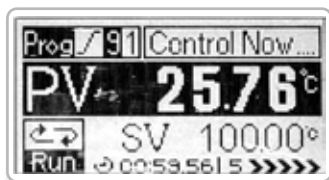


- With same method, set values till the last step
(in order of temp., time, fan speed)



- Program Mode Stand-By

2sec.



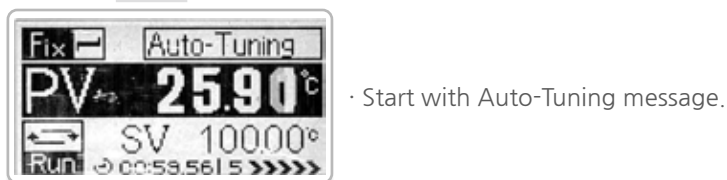
- Start Operation

2.4 Additional Function

Auto Tuning is provide the best value for P.I.D Gain after calculation with considering treat environment automatically, so that user can experiment more accuracy and quickly.

Calculated Gain value is saved automatically, if user wish to same experiment once again, the user need only tuning once.

Auto Tuning is only available during RUN session.



- * After the Auto-Tuning, the equipment will operate with set temperature.
- * In case stop Auto-Tuning, apply Shift and RUN/STOP for 2 seconds at the same time.



/ During Auto-Tuning, due to calculate, in order to reach set temperature Heater gives 100% output, so temperature go higher than set value

3. Maintain

3.1 Maintaining after Use

- [1] After treat, Power Switch and Earth Leakage Breaker have to be turned off.
- [2] If the equipment contaminated plug off the Power Cord and cleaning with Alcoholic liquid.
- [3] If the equipment would not be used for a long time, plug off the Power Cord and cleaning and store the equipment.



/ Do not use strong acid ,alkaline or volatility solution for cleaning the equipment.
Also completely dry the equipment after cleaning.

3.2 Disorder and Solution

3.2.1► Power On Disorder

- 1) Please check power supply.
- 2) Please check if Earth Leakage Breaker is 'ON'.
- 3) Please check if Power Switch is 'ON'.
- 4) Please check if Power Cord is well connected with main body.
- 5) Please check if the consent's breaker is 'ON'.
- 6) If no problem with the check list above, contact our Technical Support Department.

3.2.2► Earth Leakage Breaker is keep short continuously

- 1) Contact our Technical Support Department.

3.2.3 Temp. Control Disorder

- 1) Please check if the Over Temp. Limiter set 10% higher than treat value.
- 2) Please operate Auto-Tuning.
- 3) Please set the fan speed as 5 step.
- 4) If still not working after those solution above, contact our Technical Support Department.

3.2.4 Error Messege

- 1) Door Open



*When door remains open.

- 2) Sensor Open error



*Occur when there's some problem with sensor, contact our Technical Support Department.

- 3) LBA(Control Routine Breaking Down Alarm)



*Please set the Over Temp. Limiter set 10% higher than treat value. If the error message still comes up after set, contact our Technical Support Department.



- / In case apply A/S, user have to inquire to our Technical Support Department or Supplier of the equipment. If user randomly disassembles or changes parts inside, repair of equipment cannot be available.
- / Disorder or defective out of reasonable ranges, cannot be available to repair.

3.3 After Sales Service(A/S)

[1] Warranty

Warranty period is expired by 1 year after purchasing equipment. After 1 year, cannot get warranty repairing service. User has to pay for replacing parts or repairing work. Within warranty period, user can get service from LK Lab Korea's Technical Support Department or Supplier of the equipment.

[2] Exceptional Case of Warranty

Damage or defective by fire or inundation, carelessness usage, don't use standard liner power supply recommended, operation at abnormal condition, misuse or unskilled usage cannot be get warranty service.

[3] Applying A/S

Firstly, contact to our Technical Support Department or Supplier of the products and inform detailed sympathy with contact of user by mail or fax. After receipt of A/S inquiry, our technician quotes and user decides after get quoted. The product after 2 weeks from receipt of A/S inquiry without response will be return to the user.

Technical Support Department of LK Lab Korea Co.,Ltd: +82 31 572 4952

4. Specification

Cat. no.	Model	Type	Capacity
O01-02-020	LO-FS050	PID Controller	60 L
O01-02-024	LO-FS100		100 L
O01-02-032	LO-FS150		150 L
O01-02-040	LO-FS250		250 L

Cat. no.		O01-02-020	O01-02-024	O01-02-032	O01-02-040
Model		LO-FS050	LO-FS100	LO-FS150	LO-FS250
Capacity		60 L	100 L	150 L	250 L
Controller	Control	PID Control, Autotuning			
	Display	GLCD (Graphic LCD)			
	Resolution	0.01℃			
Fan Speed		1 ~ 5단			
Temperature	Range	Ambient +5℃ to +250℃			
	Accuracy at 100℃	±0.05℃			
	Uniformity at 100℃	±0.95℃	±1.25℃	±1.87℃	±1.92℃
Dimension	Interior (w×d×h)	400×350×420 mm	480×400×530 mm	550×460×600 mm	600×600×700 mm
	Exterior (w×d×h)	530×624×745 mm	610×674×870 mm	680×735×940 mm	830×875×1240 mm
Material	Interior	304 Stainless Steel			
	External	Powder Coated Steel			
Electric Supply	Power	1 Phase / 220VAC / 60 Hz			
	Max Consumption	900 W (4.1 A)	1.3 Kw (5.9 A)	1.8 Kw (8.2 A)	2.6 Kw (11.8 A)
	Power Line	Standard Plug			
Other	Wire Shelf	1 ea	2 ea		3 ea
	Vent Hole	ø38 mm×2 ea			

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소급당보일	2014년 04월 10일		
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[가입조건]		[사용약관]	
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대인, 대물 일괄 연간 총 보상한도:	₩ 100,000,000		
대인, 대물 일괄 1청구당 보상한도:	₩ 100,000,000		
자기부담금:	₩ 1,000,000		

[보험료 납입]	
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