Muffle Furnace

User Guide version 1.0

Model

LF-MS230, LF-MS350, LF-MS513

LF-MS550, LF-MS627

www.lklab.com

LK LABKOREA

LK Lab Korea co., Ltd. +82-(0)31-572-4952

Thank you for purchasing this product

from LK Lab Korea co., Ltd.

This user guide provides explanations of function of product,

user manual and cautions.

Be sure to read this manual thoroughly before using this product.

Particular attention should be paid

to the used of the following warnings.

Indicates the situation requires user's attention.
Be careful when operating or controlling during usage.

[Caution]

Indicates a dangerous situation.
Failure of this warning could result in serious injury of equipment damage.

[Warning]

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1. Preparation

1.1 Product Introduction

This product is an electric furnace used for drying with high temperature and used for sintering experiments. This product is suitable for drying and calcination, ash content measurement, new material and ceramic sintering experiment.

Various functions and safety are maximized for user's convenience and stability.

Tish product has the following features.

1.2 Product Features

1.2.1 Product Performance and Convenience

- Special fire-resistant molding heater was used to prevent from heater corrosion due to steam and gas contract
- Temperature rise fast and even distribution chart can be shown by applying 3 surface heater method
- This product includes ducts for internal steam and gas exhaust
- Graphic LCD Display Controller is equipped for easy and convenient to use
- Built-in Auto Tuning function that can calculate PID valve automatically which helps easy and fast to control the temperature of experience
- Experiment temperature can be controlled quickly and conveniently with PID control system with high- performance microprocessor for fast and precise temperature control
- Experiment data can be transferred to PC easily through RS485 communication port

1.2.2 Safety

- Status of product can be displayer with Sign Tower Lamp. (Option)
- Dual high temperature safety device installed.
  (1st controller over-heating alarm and, 2nd temperature shut-off circuit)
- In case of abnormal situation, buzzer and message will notice the situation to user.

1.3 Product Structure

[Muffle Furnace]

[1] Temperature Controller

Use for controlling temperature inside.

[2] Over Temp. Limiter

If the temperature is going over the set temperature, shut the power of heater so that prevent over heat.

[3] Door

Insulation between inside and outside.

[4] Door Handle

A handle to open/close the door.

[5] Vent Hole

Hole that exhausts fume when processing the sample.

[6] Power Switch

ON/OFF switch for main power.

[7] Communication Port

RS485 communication for computer connection.

[8] Circuit Breaker

Breaker of overcurrent.

[9] Power Cord

Supply the power to equipment.

1.4 Product Installation

1.4.1 Product Component

Main Body (1 EA), User Guide (1 EA)

1.4.2 Product Installation Environment

- Avoid direct sunlight
- Install at a flat place with low vibration
- Do not install in a place where flammable gas may leak
- Do not install in a place where strong and high frequency noise may occur
- Do not install the product where there is a risk of water leakage or short circuit
- Do not install the product where there is high corrosive gas or dust
- Do not install the product in an enclosed area

-Install this product at an ambient temperature of
5 to 40 degrees.
-Install in a place where the ambient humidity is 80% or less.

1.4.3 Power Connection

- Set the power switch to OFF
- If the power cord is disconnected from the main body, connect with main body first then plug into the outlet.

-Supply power according to product specification
-Must use a grounded power source

2. Usage

2.1 Name of controller and its function

[1] Graphic LCD

Available to check status of the equipment and display data.

[2] Run Lamp

Light on during operation.

[3] Heater Lamp

Displaying output of the heater with flashing.

[4] Timer Lamp

Light on during timer is operating.

[5] A.T Lamp

Light on during auto-tuning.

[6] Up Key

Use for increasing of set value, setting of Fix Mode and setting of EXT. Sensor Mode.

[7] Down Key

Use for decreasing of set value, setting of Program Mode and setting of INT. Sensor 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] MODE Display

User can select one between FIX Mode and PROGRAM Mode.

[12] Message Displaying Window

Display of the message related status of the product.

[13] PV Display

Display current temperature of the equipment.

[14] SV Display

Display target temperature the user set.

[15] TIMER Display

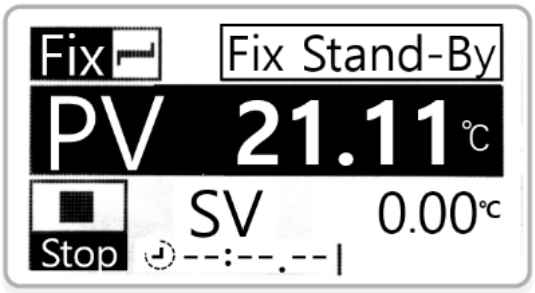
Timer display remain time for operation "--.--.--" means timer off.

[16] RUN / STOP Display

Display the status RUN or STOP

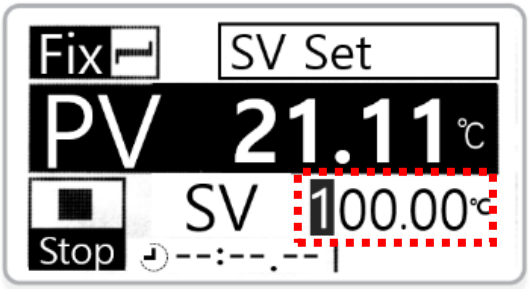
2.2 Driving Method

2.2.1 How to Set



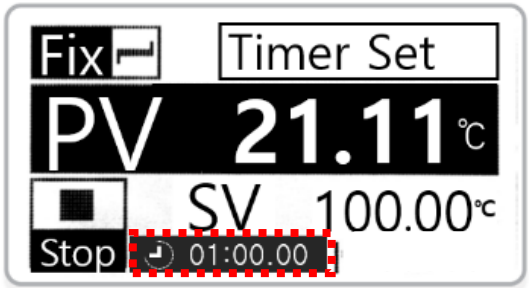
- Main Menu

Mode Key



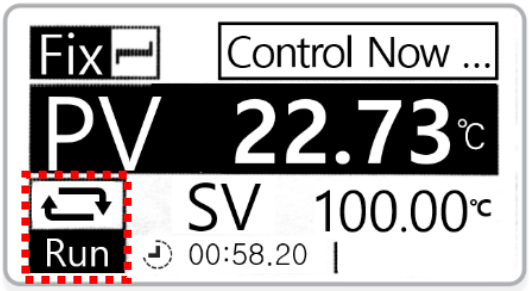
- Set the temperature

Run/Stop Key



- Set the Timer

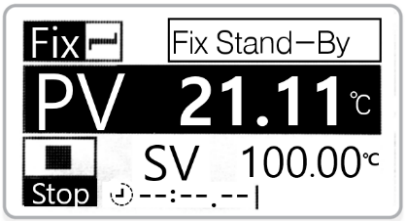
Run/Stop Key (3초)



- Start operating RUN

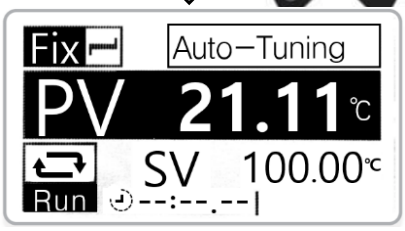
2.2.2 Auto Tuning Function

Auto Tuning is provide the best value for PID 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.



* Fix Control Mode

Press these buttons at the same time for longer than 3 seconds



* Start with Auto-tuning message

* After the Auto tuning, the equipment will operate with set temperature.

* In case stop Auto-tuning, apply Shift and RUN/STOP at the same time.

When Auto-Tuning is activated, temperature can be raised above the set temperature.

2.3 Set for Over Temp. Controller

When the temperature reaches higher than Set temperature of Over Temp. Controller, heater power turn off automatically in order to prevent from overheating

2.3.1 Over Temp. Controller

[1] Function key (Shift key)

[2] UP key

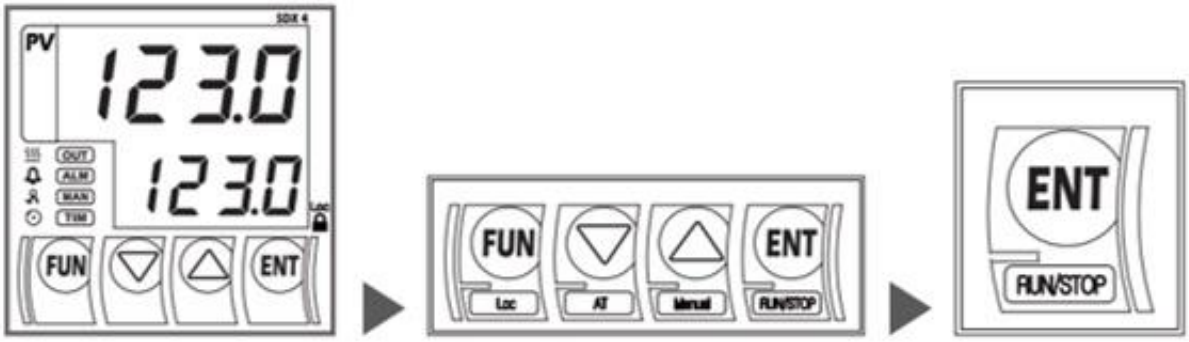
[3] Down key

[4] ENT key (save key)

[5] Current Temperature

[6] Over Heating Cutoff Temperature

2.3.2 How to Set Overheat Cutoff Temperature



Initial Screen

Using the arrow keys to set the overtemperature shutdown

Save by pressing ENT key

When Auto-Tuning is activated, temperature can be raised above the set temperature.

3. Maintenance

Management after use

3.1

- Turn off the power Switch to OFF when experiment is done.
- If the main body becomes dirty, unplug the power cord then clean the contaminated Area with alcohol.
- If the product is not in use for a long time, unplug the power cord and wipe it clean to store.

-Crack may occur while using this product however the crack does not affect to product and it is not functional problem.
* Opening door in high-temperature may cause of serious crack.

-Do not use strong acid or strong alkali or volatile solution to clean this product.
-Perfectly dry after cleaning

3.2 Cause of abnormal problem and matter of management

3.2.1 If the product does not turn on

- Check the power supply.
- Make sure that short circuit breaker is ON which is located on the side of the main body.
- Make sure that the power switch is ON which is located on the side of the main body.
- Make sure that power cord is securely connected.
- Make sure that the breaker of the outlet is turned on which is connected to the main body.
- If all necessary action is made but still having a problem, please contact our A/S department.

3.2.2 If Circuit Breaker of main body constantly experiencing short-circuit.

- Please contact our A/S department.

3.2.3 If temperature control is not working

- Check if set temperature of over temp. limiter is 10% higher than the experiment temperature.
- If all necessary action is made but still having a problem, please contact our A/S department.

3.2.4 Error Message

〈Sensor Open Error〉

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

〈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.

-is product needs to be fixed, user must contact our A/S department or product purchased store to have it repaired. If disassemble the product or replace the parts on your own, it may not be possible to repair it.

-Damage beyond the normal fixing limit cannot be fixed.

3.3 Product A/S

3.3.1 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 A/S customer service from LK Lab Korea co., Ltd. or product purchased store

3.3.2 Exception from Warranty Period

Damage caused by fire or flooding, contamination due to unauthorized usage, not using liner power supply, usage during abnormal situation, misuse or malfunction will be the exceptions from receiving warranty service

3.3.3 How to receive A/S

First, contact our A/S department of product purchased store then enclose your contact information along with the detailed symptoms of the product that you are sending. You will receive a quotation of repair for you to make a decision for repairing. If we do not hear from you within 2 weeks of submitting your quotation, the product will be returned

A/S Department of LK Lab Korea co., Ltd. +82-(0)31-572-4952

4. Specification

Cat. No.	Model	Capacity	Heater	Temp. Range
F08-02-110	LF-MS230	3 L	1.9 kW	Max. 1100 ℃
F08-02-120	LF-MS350	4.5 L	2.9 kW	
F08-02-130	LF-MS513	12 L	4.6 kW	
F08-02-133	LF-MS550	14 L	5.1 kW	
F08-02-135	LF-MS627	27 L	6.1 kW	

Cat. No.		F08-02-110	F08-02-120	F08-02-130	F08-02-133	F08-02-135
Model		LF-MS230	LF-MS350	LF-MS513	LF-MS550	LF-MS627
Capacity		3 L	4.5 L	12 L	14 L	27 L
Controller	Control	PID Controller				
	Display	GLCD (Graphic LCD)				
	Resolution	1.0 ℃				
	Program	2 Pattern, 18 Segment				
Temperature		+200 to +1100 ℃				
Dimension (w x d x h)	Internal (mm)	130x250x90	150x300x100	250x300x160	250x350x160	300x300x300
	External (mm)	380x510x600	410x540x630	500x540x720	490x550x630	540x500x785
Electric supply	Power	1 Phase / 220 VAC / 60 Hz				
	Max Consumption	1.9 kW (8.6 A)	2.9 kW (13.2 A)	4.6 kW (21 A)	5.1 kW (23.2 A)	6.1 kW (27.8 A)
	Power Line	Industrial Plug				
Material	Interior	Ceramic Fiber Board				
	Exterior	Powder Coated Steel				
Other	Vent Hole	Ø20 mm				

KBIZ 중소기업중앙회

생산물배상책임보험 증권

증 권 번 호	P151400668
계 약 자	(주)엘케이랩코리아
주 소	[136-075] 서울특별시 성북구 개운사길 57 - 3(안암동5가)
피 보 험 자	(주)엘케이랩코리아
주 소	[136-075] 서울특별시 성북구 개운사길 57 - 3(안암동5가)
가 입 기 간	2014년 04월 10일 00:00 ~ 2015년 04월 09일 24:00 (증권발행지의 표준시 기준)

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[가입조건]

[생산물배상책임]

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대인,대물 일괄 1청구당 보상한도: ₩100,000,000

자기부담금: ₩1,000,000

[사용약관]

생산물배상책임(PL)단체보험 공제약관

생산물배상책임보험(Ⅱ) 보통약관 - 배상청구기준

날짜인식오류 부담보 추가약관

품질지적부담보특별약관

제재위반부담보특별약관

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※연 락 처 : 중소기업중앙회
손해공제부 (www.pikorea.com)
전화번호 : 1666 - 9988
팩스번호 : (0502) 397-0200

2014년 04월 09일

중 소 기 업 중 앙 회

회 장 김 기

@LKLABKorea

77-9, Toegyewon-ro, Toegyewon-myeon,
Namyangju-si, Gyeonggi-do, Korea
Tel. +82 31 573 4952
Fax. +82 31 527 4958

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