



Graphic LCD Temp. Controller

Circulation IN/OUT

Over Temp. Limiter

Drain & Bath



# Refrigerating Bath Circulator

## User Guide

version 1.0

### Model

LC-LT208, LC-LT212, LC-LT222, LC-LT230  
LC-LT408, LC-LT412, LC-LT422, LC-LT430  
LC-HT412, LC-HT422



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 Circulator designed Chemical, Biological, Medical, Pharmaceutical and many other purposes.

This Circulator can be used for controlling temperature and cooling. With various function and safety devices installed, designed for users' convenience and safety as the biggest priority of this Circulator.

## 1.2 Feature

### 1.2.1► Function and Convenience

- Controlling temperature by external circulation system.
- Temperature control as 1/100 resolutions.
- Temperature control of other equipment available with External sensor.
- Strong hydraulics and flux by BLDC Motor Pump.
- Operate easily and convenience with Graphic LCD Display Controller.
- Programmable temperature control installed(upto 10 steps).
- PID Control System by high performance microprocessor afford to faster and more precision Temp control.
- Auto tuning function installed by self-calculating PID value based on research environment afford easier and more convenience control of temperature.
- Data can be exchanged with RS485 Communication port.

### 1.2.2► Safety

- Low Water Alarm inform when the level of water is too low.
- Double over temperature safety device installed.  
(1st Controller Alarm, 2nd Overtemperature shutdown circuit)
- Abnormal Situation Occurs, buzzer and message will notice the situation to user.



## 1.3 Structure



[Low Temp. Circulating Water Bath]

[1] Temperature Controller

[2] Over Temp. Limiter

[3] Power Switch

[4] Bath Cover

[5] Lower Cover

[6] Drain

[7] Circulation IN/OUT

[8] Circuit Braker

[9] Communication Port

[10] External Sensor Port

[11] Power Cord

[12] Compressor Cable



**[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.



/ Must be set 10% more that temperature need for the purpose.

**[3] Power Swtich**

on/off switch for main power.

**[4] Bath Cover**

Must be closed during operation with high or low temperature.

**[5] Lower Cover**

Pull out with knob on the lower part on the cover, there are drain valve and condenser inside.

**[6] Drain**

Use for draining solutions inside the bath. To open this valve, rotate to clockwise.



/ Before draining, please check the temperature of solution.  
User might get burned.

**[7] Circulation IN/OUT**

IN & OUT Fitting during circulation.



/ Please check if the fitting is connected rightly before use.



**[8] Circuit Braker**

Breaker of overcurrent.

**[9] Communication Port**

RS485 communication for computer connection.

**[10] External Sensor Port**

Port for External sensor.

**[11] Power Cord**

Supply the power to equipment.

**[12] Compressor Cable**

Power Cable for compressor.



## 1.4 Installation

### 1.4.1▶ Contents of product(with delivery)

Main Body(1set), Power Cord(1ea), Compressor Cable(1ea),  
User Guide(1 copy)

### 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.



/ Place where within 5~40℃ of temperature and below 80% of humidity.

### 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.

### 1.4.4▶ Initial Setting

- 1) Fully fill the solutions into the bath
- 2) Connecting circulation IN/OUT.
- 3) Set the value of Over Temp. Limiter.

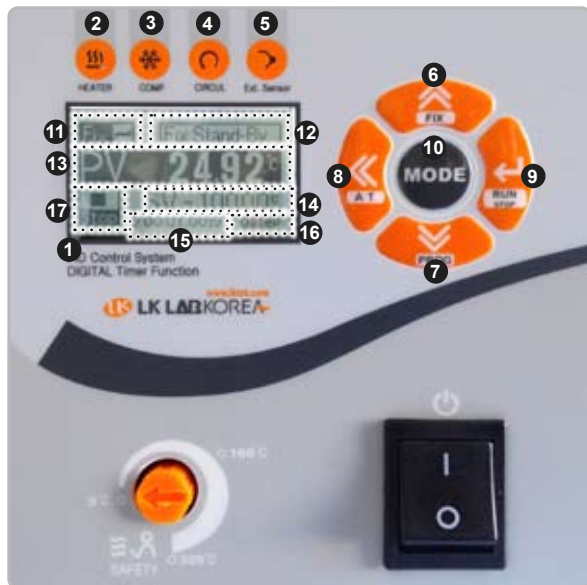


/ Using the solutions with affordable viscosity of circulation.  
Using high viscosity solution may cause failure of the equipment.



## 2. Operation

### 2.1 Naming and Function of Temperature Controller



**[1] Graphic LCD**

Available to check status of the equipment and display data.

**[2] Heater Lamp**

Displaying output of the heater with flashing.

**[3] Comp. Lamp**

Light on during compressor is working.

**[4] Pump Lamp**

Light on during pump motor is working.

**[5] EXT. Sensor**

Light on during external sensor is working.

**[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(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] Pump Step Display**

Display level of pump operation(available to 0 to 10).

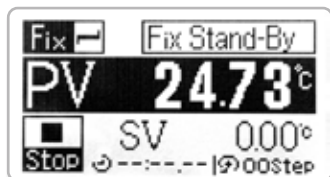
**[17] RUN/STOP Display**

Display the status RUN or STOP.

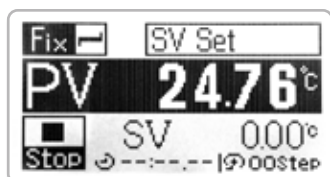


## 2.2 FIX MODE(one temp. operation) / Operation Method

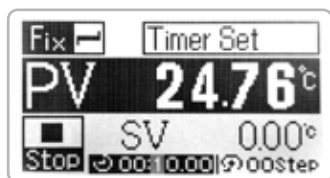
Check the mode status and if not set as FIX MODE,  
press 'UP KEY' for 3 seconds to change FIX MODE.



· Fix Mode Stand-By



· SV Set Mode  
- Set SV Value.

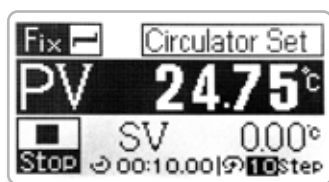


· Timer Set Mode  
- Set Time Value.

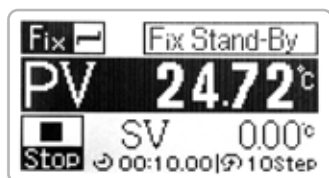


Operation Method Continued ►





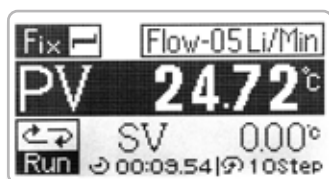
- Pump Speed Set Mode
- Set Speed Value.



- Fix Mode Stand-By



2 sec



- Start Operation



### 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.

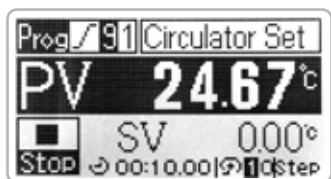


· Step-1 Timer Set mode  
- Set time value for Step - 1.



Program Mode Setting Method Continued ►





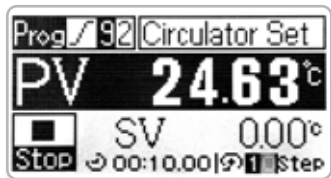
- Step-1 Pump Set Mode
- Set speed value for Step - 1.



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



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



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



Program Mode Setting Method Continued ►





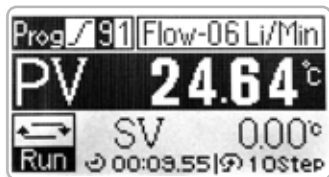
- With same method, set values till the last step.  
(in order of temp., time, fan speed)



· Program Mode Stand-By



2 sec



· 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 at the same time.



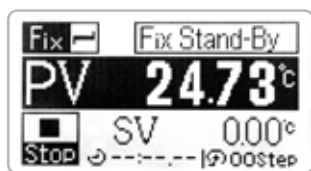
/ During Auto-Tuning, due to calculate, in order to reach set temperature Heater gives 100% output, so temperature go higher than set value..



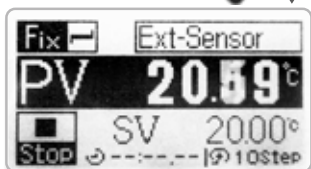
## 2.5 Using External Sensor

Controlling other equipment's temperature, use external sensor mode. Connect external sensor to the equipment and set the EXT.

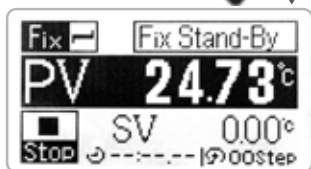
Sensor Mode, the equipment will operate by external sensor's input. Also available to operate Program Mode and Auto Tuning Mode, with same method as internal sensor mode.



· Stand -By Mode



· Ext. Sensor Mode  
- Change to Ext. Sensor Mode.



· Int. Sensor Mode  
- Change to Int. Sensor Mode.



/ Change the sensor is only allowed when the equipment is stop operating



## 3. Maintain

### 3.1 Maintaining after Use

- [1] After treat, Power Switch 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.
- [4] To clean once a month for the Compressor inside lower cover increase refrigeration efficiency.



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

Also completely dry the equipment after cleaning.

/ Using soft brush when you clean the Compressor Condenser.

### 3.2 Disorder and Solution

#### 3.2.1► Power On Disorder

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

#### 3.2.2► Earth Leakage Breaker is keeping 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 check if the compressor cable is fully connected.
- 3) Please operate Auto-Tuning.
- 4) Please set the pump speed as 5 step.
- 5) If still not working after those solution above, contact our Technical Support Department.

### 3.2.4▶ Error Messege

- 1) Low Water



\*When the water level in the bath is too low.  
Please fill solution in the bath more.

- 2) Sensor Open error



\*Occur when there's some problem with sensor.

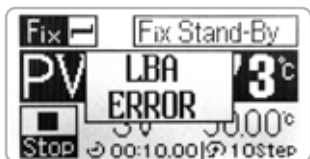
If you were used external sensor, please check if the sensor connected rightly.

If you didn't use external sensor, please check if the mode sets Int. Sensor Mode.

If not still not working after check, please 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.

## 4) Over Temp. Error



\*the message will be shown when there's over temperature than set temperature range. Please stop the operating and wait till the temperature gone down enough.  
temperature, the equipment's status will be back to normal.



### 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



/ 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.

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



## 4. Specification

Low Temp. Circulating Water Bath / - 20℃

Cat. no.	Model	Capacity	Temp. Range
B04-91-410	LC-LT208	8 L	-20℃ ~ +150℃
B04-91-420	LC-LT212	12 L	
B04-91-430	LC-LT222	22 L	
B04-91-440	LC-LT230	30 L	

Low Temp. Circulating Water Bath / - 40℃

Cat. no.	Model	Capacity	Temp. Range
B04-91-510	LC-LT408	8 L	-40℃ ~ +150℃
B04-91-520	LC-LT412	12 L	
B04-91-530	LC-LT422	22 L	
B04-91-540	LC-LT430	30 L	

Wide Range Circulating Water Bath

Cat. no.	Model	Capacity	Temp. Range
B04-91-560	LC-HT412	12 L	-40℃ ~ +250℃
B04-91-565	LC-HT422	22 L	

Horizontal Low Temp. Circulating Water Bath

Cat. no.	Model	Capacity	Temp. Range
B04-91-610	LC-LT308	8 L	-20℃ ~ +150℃

\* More detailed information is on Catalog and Website of LK Lab Korea.

\* Website: [www.lklab.com](http://www.lklab.com)

\* Inquiry for catalog available on our Website.



## 생산물배상책임보험 증권

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가입기간	2014년 04월 10일 00:00 ~ 2015년 04월 09일 24:00 (증권발행자의 표준시 기준)		
<b>[계약일반사항]</b>			
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소급당보일	2014년 04월 10일		
재판관할지역	대한민국	매출액	₩ 2,882,000,000
<b>[가입조건]</b>		<b>[사용약관]</b>	
<b>[생산물배상책임]</b>		생산물배상책임(PL)단체보험 공제약관 생산물배상책임보험(III) 보통약관 - 배상청구기준 납입인식오류 부담보 추가약관 품질저하부담보특별약관 재재위반부담보특별약관	
대인, 대물 일괄 연간 총 보상한도:	₩ 100,000,000		
대인, 대물 일괄 1청구당 보상한도:	₩ 100,000,000		
자기부담금:	₩ 1,000,000		
		<b>[보험료 납입]</b> 일시납	
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		납입보험료 : ₩ 1,827,000 (2014년04월09일)	

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 2014년 04월 09일  
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## Refrigerating Bath Circulator User Guide

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