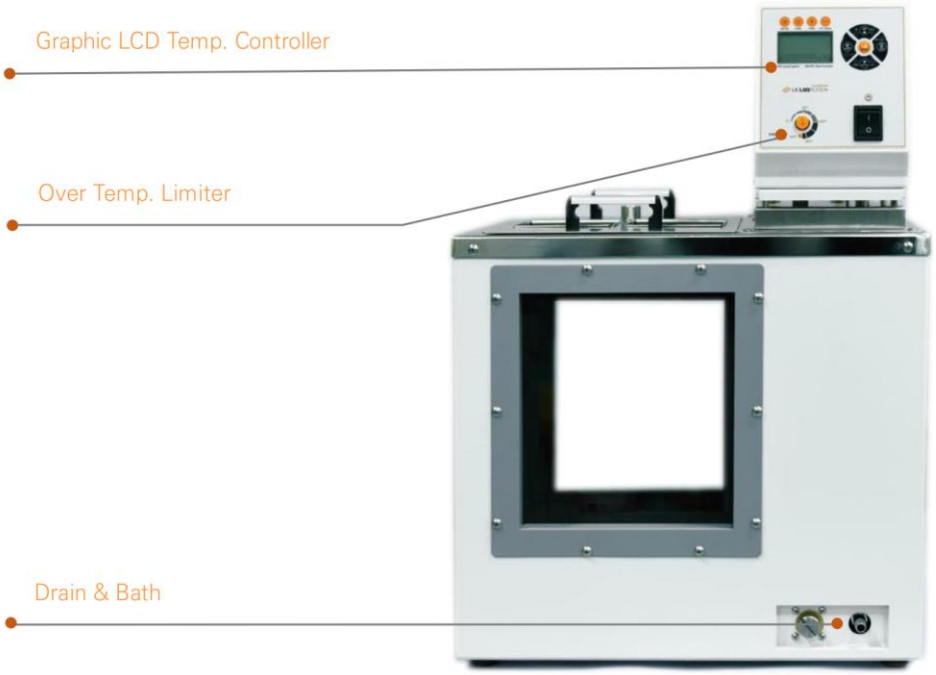


Precise Viscosity Water Bath

User Guide

Version 1.0

Model

HVB40P, HVB40H

www.lklab.com

LK LABKOREA

Thank you for purchasing the 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 marks as below for the occasion.

Indicates the situation requires user's attention.

Be careful when operating or controlling during usage.

[Warning Mark]

Indicates a dangerous situation.

Failure of this warning could result in serious injury of equipment damage.

[Attention mark]

Contents

1 Preparation

1.1 Introduction

This product is a precision constant temperature bath designed for viscosity measurement. It has been developed with various features and safety devices to maximize user convenience and safety. The product has the following characteristics

1.2 Feature

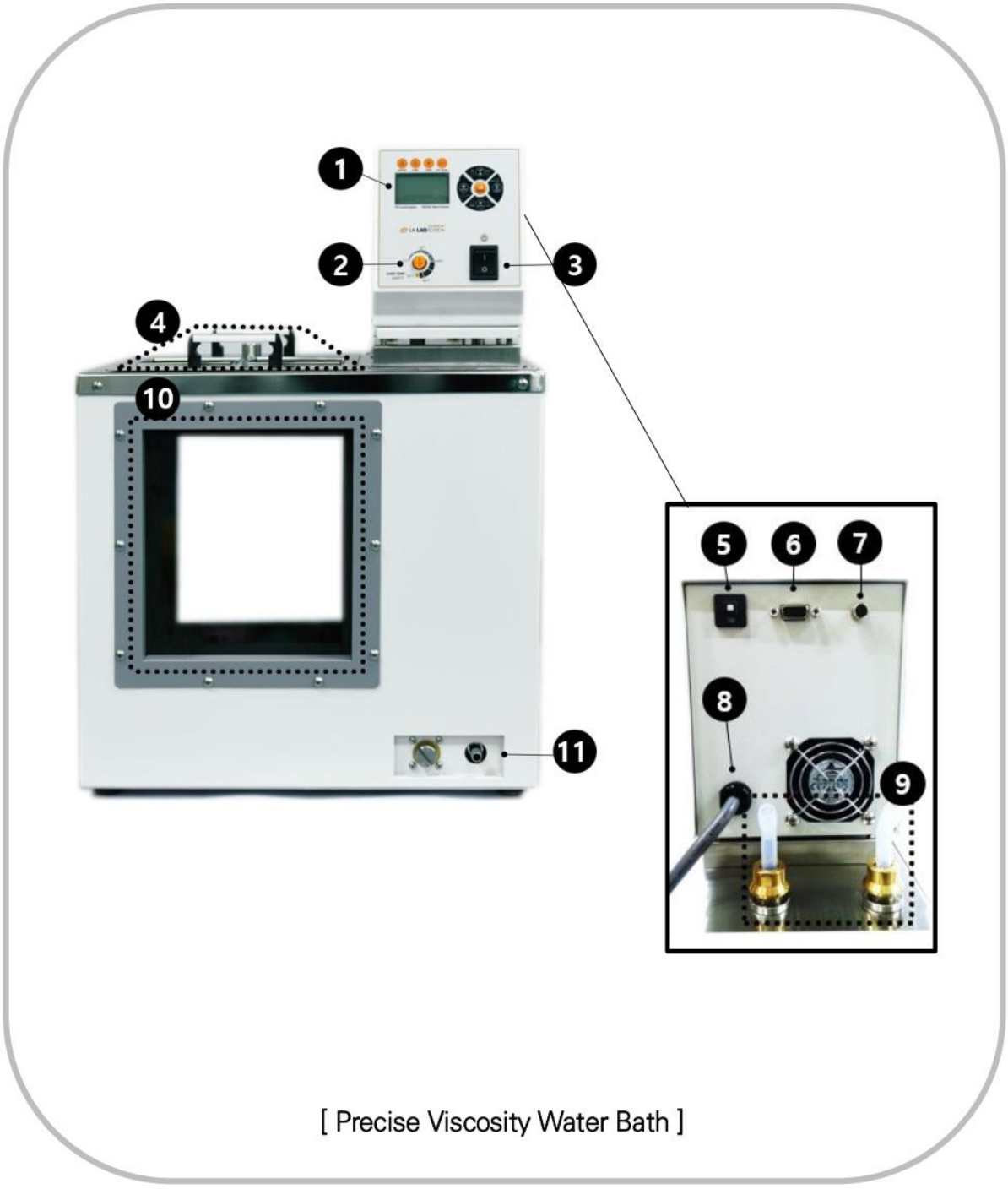
1.2.1 Performance and Convenience

- Precise temperature control with a resolution of 1/100 °C.
- Equipped with a Graphic LCD Display Controller for easy and convenient operation.
- Features an AUTO TUNING function that automatically calculates PID values based on the experimental environment, allowing for quick and convenient temperature control.
- Experimental data can be freely transmitted to a PC via the RS485 communication port.
- Transparent windows on the front and back facilitate easy observation of samples.
- By connecting a cooler (optional) to the cooling line, low and precise temperature control can be achieved.
- Offers 10 levels of bath flow rate adjustment.
- Internal circulation function maintains uniform temperature within the bath.

1.2.2 Safety

- The Low Water Alarm prevents overheating due to insufficient solution.
- Equipped with a dual over-temperature safety device (primary controller over-temperature alarm and secondary over-temperature cutoff circuit).
- In the event of an abnormal situation, alerts are provided via a buzzer and messages displayed on the screen.

1.3 Structure



[Precise Viscosity Water Bath]

[1] Temperature Controller

Used to adjust the temperature.

[2] Over Temp. Limiter

Disconnects the heater power to prevent overheating if the temperature exceeds the set limit (set 10% higher).

[3] Power Switch

Main power ON/OFF switch.

[4] Bath Cover

Keep closed during low or high-temperature operations.

[5] Circuit Breaker

Overcurrent protection circuit breaker.

[6] Communication Port

RS485 communication port.

[7] External Sensor Port

Port for connecting external sensors.

[8] Power Cord

Power cord supplying power to the device.

[9] Cooling Port

Port used for connecting a cooler for low-temperature control.

[10] Transparent Window

Window for observing the interior of the device.

[11] Drain

Used to discharge the solution inside the bath.

1.4 Installation

1.4.1 Product Components

Main Body 1ea, User Manual 1ea, Tray Holder 2ea

1.4.2 Product Installation Environment

- Avoid direct light.
- Place where with less vibration and flat surface.
- 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.
- Do not install in a confined space.

- Install in an environment with an ambient temperature between 5°C~40°C.
- Install in an environment with an ambient humidity of 80% or lower.

1.4.3 Power Connection

- Set power switch and earth leakage breaker to OFF.
- Connect the compressor cable.
- Connect and plug the cord to power socket.

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

- Must use power supply point that completely ground connected.

1.4.4 Initial Setting

- Fill the bath with solution (distilled water).
- Connect the circulation IN/OUT.
- Set the Over Temp. Limiter.

- Use a viscosity solution that can be circulated. (Using solutions with high viscosity may cause equipment failure.)

2 Operation

2.1 Naming and Function of Temperature Controller

[1] Graphic LCD

Displays the device status and various data.

[2] Run Lamp

Illuminates when the device is in the Run state.

[3] Heater Lamp

Flashes to indicate the output level of the heater.

[4] Timer Lamp

Illuminates when the device is in Timer Run state.

[5] A.T Lamp

Illuminates when in Auto Tuning mode.

[6] Up Key

Used to increase the set value and to set Fix mode.

[7] Down Key

Used to decrease the set value and to set Program mode.

[8] Shift Key

Used for moving the set value position and for Auto Tuning.

[9] RUN / STOP Key

Used to start/stop the device and to save the set values.

[10] Mode Key

Used to switch between menus.

[11] MODE Indicator

Includes FIX MODE and PROGRAM MODE.

[12] Message Window

Displays messages related to the device status.

[13] PV Indicator

Displays the current temperature value.

[14] SV Indicator

Displays the target temperature value.

[15] TIMER Indicator

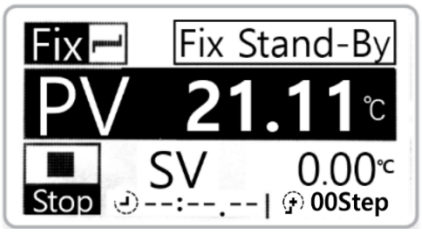
Displays the remaining time during TIMER operation.

"--.--.--" indicates the timer is off.

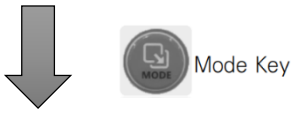
[16] RUN / STOP Indicator

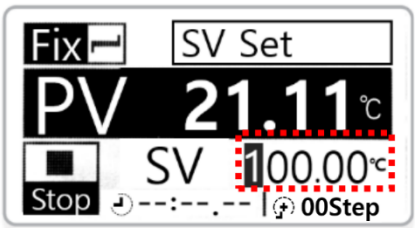
Displays the operating/stop status of the device.

2.2 Program Mode Setting

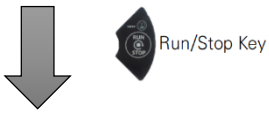


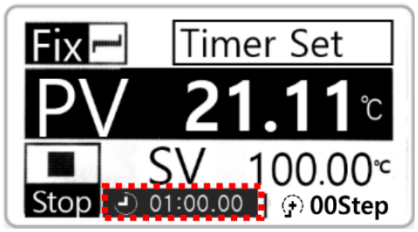
Main Menu Screen



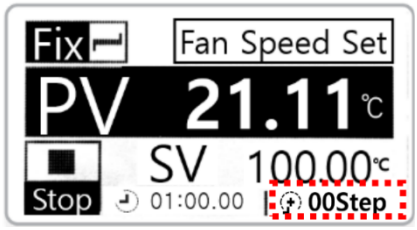


Setting Temperature(SV)



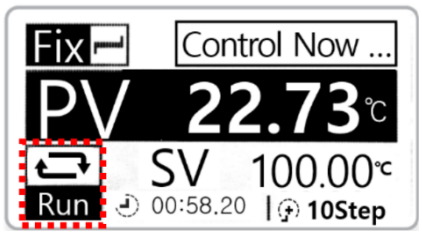


Timer Setting



Setting Pump (Recommended to use 10 steps)

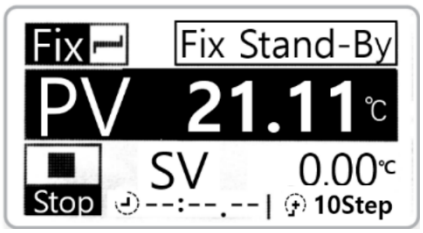
(3 seconds)



Start Running

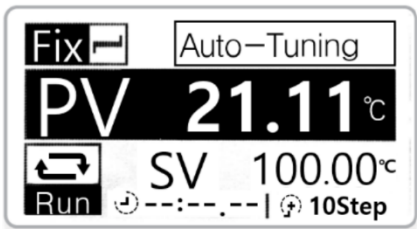
2.3 Other Functions

Auto-tuning allows the device to automatically calculate the optimal P.I.D. Gain for the experiment environment, enabling more accurate and faster experiments. The calculated Gain is automatically stored, so experiments under the same conditions require only one tuning. Auto-tuning can only be started in the running state.



Fix Control Mode

Key (press for 3 seconds at the same time)



Start running with an Auto-tuning message.

* Once Auto Tuning is complete, it will control the device at the set temperature.

* To stop Auto Tuning, press and hold the Shift key and RUN/STOP key simultaneously for 2 seconds.

- During Auto Tuning, the temperature may exceed the set temperature.

3 Maintenance

3.1 Maintenance After Use

- After the experiment is complete, set the Power Switch to OFF.
- If the device becomes contaminated, unplug the power cord and clean the affected areas with an alcohol-based solution.
- When not in use for an extended period, unplug the power cord and clean the device before storing it.
- Please clean the compressor condenser inside the lower cover once a month.

- **Do not use strong acid, strong base, or volatile solution when cleaning**
- **Dry completely after cleaning**

3.2 Disorder & Solutions

3.2.1 If the Device Does Not Power On

- Please check the power supply.
- Ensure that the circuit breaker on the side of the device is in the ON position.
- Verify that the Power Switch on the side of the device is set to ON.
- Check that the Power Cord is securely connected.
- Check circuit breaker for the outlet to which the device is connected is turned ON.
- If the device still does not operate normally after performing all these checks, please contact our Customer Service department.

3.2.2 If the Device's Circuit Breaker Continually Trips

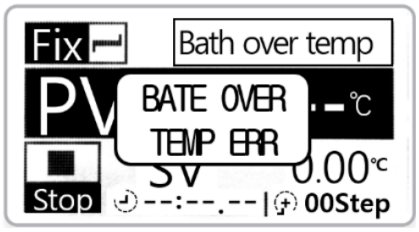
- Please contact our Technical Service department.

3.2.3 If Temperature is Not Controlled

- Please check if the Over Temp. Limiter set 10% higher than set value.
- Please ensure that the compressor cable is securely connected.

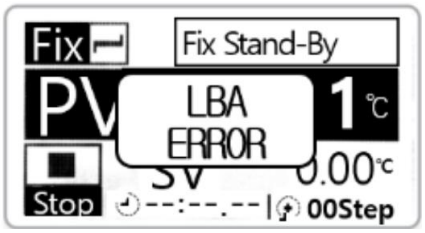
- Execute Auto Tuning.
- Set the pump to 10 levels.
- If still not working after those solution above, contact our Technical Support Department.

3.2.4 Error Message



<Over Temp. Error>

Occurs when the temperature exceeds the device's operating range. Stop the device and wait for the temperature to drop. Once the temperature has decreased, press the Mode Key to return to normal operation.



<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 the event of a service issue, please contact our Technical Support Department or the point of purchase for repairs. Disassembling the device or replacing parts on your own may result in voiding the warranty.
- Repairs cannot be processed for damage that exceeds normal operational limits.

3.3 After Sales Services

3.3.1 Warranty Period

The warranty period is one year from the date of purchase. After one year, free warranty repair services will no longer be available, and you will be responsible for any repair or parts replacement costs. During the warranty period, you can receive service from LK Lab Korea's Customer Service department or the point of purchase.

3.3.2 Warranty Exclusions

Situations Not Covered by Warranty Warranty service will not be provided for damages caused by fire, flooding, contamination due to improper use, use of incorrect power supply, operation under abnormal conditions, or damage resulting from improper handling or misuse.

3.3.3 How to Request Warranty Service

To request service, please contact our customer service department or the point of purchase. Include your contact information along with a detailed description of the product's symptoms. After submitting your service request, we will send you an estimate. Please review the estimate and decide whether to proceed with the repair. If we do not receive a response within two weeks after submitting the estimate, the product will be returned to you.

4 Specification

Cat. No.		B04-01-220	B04-01-225
Model		HVB40P	HVB40H
Capacity		21 L	
Controller	Control	PID Control, Auto-tuning	
	Display	GLCD (Graphic LCD)	
	Resolution	0.01℃	
	Timer	Run start / Wait start (99 hr 59 min)	
Temperature	Range	Ambient +10 ~ +100℃	Ambient +10 ~ +150℃
	Accuracy	±0.1℃	
	Uniformity	±0.1℃ at 50℃	
Size	Interior	w370×d200×h310 mm	
	Exterior	w440×d275×h600 mm	
	Top Open	w95×d95 mm, 2ea	
Electric Supply	Power	1 Phase, 220VAC, 50/60 Hz	
	Max Consumption	2.2 kW (10 A)	2.5 kW (11.4 A)
	Power Line	Standard Plug	
Other	Drain	1/4" Hose Nipple male	
	Cooling IN / OUT	for 9 mm Silicone Tubing	
Safety		Over Temp. & Current Protection, Automatical Fault Sensing System	

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User Guide

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