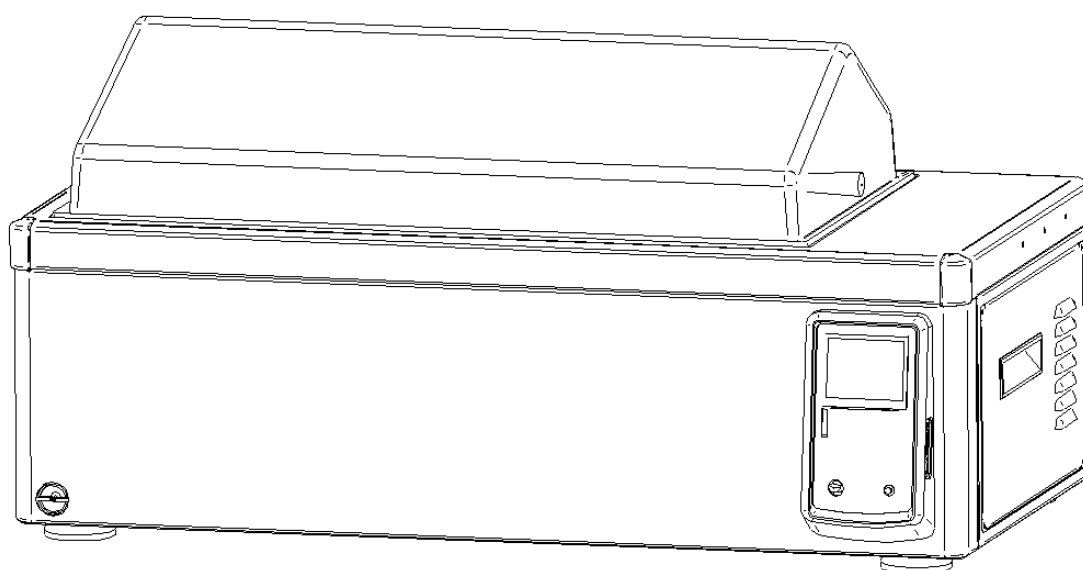




User Manual

Shaking Water Bath

Model: BS2-10, BS2-15, BS2-20, BS2-30

Manual no.: 4105KL002 Version : 4.0



WARNING

Please read this user manual carefully before using the product. Users should operate the product according to the operating instructions contained in this user manual. Users should be aware of cautions and warnings for your safety. Failure to follow these guidelines may result in serious injury or damage to your property.

Thank you for purchasing JEIOTECH's products.

JEIOTECH Co., Ltd. is committed to offer the customer service including product sales, Technical support, and follow-up management. If you have any question about this user manual, please contact our sales department.

Quality Management System ISO 9001



ISO 9001 is a standard that defines the requirements for a Quality Management System (QMS). It ensures the suitability of implementation in order for suppliers to continuously provide products and services that meet the buyer's requirements. JEIOTECH Co., Ltd. obtained ISO 9001 certification from Korean Foundation for Quality (KFQ) since 1998 to provide better service.

Under this certification system, we design, develop, produce and sell a wide range of products related to chemical engineering, environment and life. We also provide reliability testing equipment for electrical and electronic engineering. (Dryer, incubator, constant temperature and humidity chamber, constant temperature water tank, low temperature circulation tank, heat exchanger, stirrer, etc.)

You can download the above image by visiting the following JEIOTECH site.

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1 Safety

1.1 How to Use this User Manual

This user manual is intended to protect the users from unexpected events and effectively operate the device. It contains important information for safe use and maintain the production functions. Please be familiar with the warnings and cautions described in this manual.

Please place this manual near the instrument for easy access at any time so that new users can know how to use it safely and correctly.

1.2 Symbols Used in this User Manual

This manual contains signal word panels, safety symbols, and non-safety symbols. This user manual describes the degree of danger with signal word panels, safety symbols, and non-safety symbols to minimize the operators' damage. Please make sure to be familiar with the followings before using the instrument.

- (1) This manual contains warning and caution signs for users to operate this instrument correctly and safely and prevent unwanted accidents.
- (2) The signal panels are defined and categorized according to its importance and risk.
- (3) Please operate the instrument after you are fully aware of the precautions.

Signal Word Panels	Contents
	Indicates a hazardous situation which, if not avoided, will result in death, fatal injury, or property damage
	Indicates a hazardous situation which, if not avoided, could result in death, serious injury, or property damage

 CAUTION	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury
NOTICE	Notifies you careful actions that are not relevant to your injury

1.3 Safety Signs

Prohibition



Please do not expose it to direct sunlight.



Do not install the instrument in places where there is a risk of high humidity or leakage.



Beware not to with acids or organic solvents.

Warning



Never add explosive or flammable chemicals (alcohol, benzene, etc.) into the instrument.



Do not disassemble the instrument or attempt to repair it yourself.



Be careful of electrical shock and electric shock.



Hot surface

1.4 Exemption from the product disclaimer

- (1) We do not guarantee this instrument except as prescribed in our quality guarantee conditions.
- (2) We are not liable for any direct or indirect damage to instrument even due to unpredictable defects or natural disasters.

1.5 Warnings for safe use of the instrument



Please be fully aware of all the safety labels.

Do not remove or damage the attached safety labels.

Do not transfer the instrument while the instrument is in operation.

Do not separate the black and red power cords or while the instrument is in operation.

Do not install the instrument where flammable gas may leak.

Do not store or use flammable gas near the instrument.

Do not operate the instrument where an explosion may be occurred by organic evaporation gas.

Before installing the instrument, you should check the power voltage, phase, and capacity displayed on the ID label and connect them correctly.

Make sure to use grounded power. If the power is not grounded or poorly grounded, it may cause a hazard risk to an operator or the instrument.

Be careful not to let moisture, organic solvents, dust, corrosive gases enter the instrument.

Do not expose the instrument to direct sunlight.

Do not expose the instrument to direct heat sources.

Do not install it in places where there is a high humidity or risk of leakage.

Please install the instrument in a solid and flat place.

Be careful not to block the ventilation that is placed on the side of the instrument.

Do not use the instrument in an environment with smoke or metal dust.

Do not use the instrument if a strange sound, smell, or smoke occurs from the device.

Do not disassemble the instrument or attempt to repair it yourself other than those described in this user manual.



1.6 Cautions for safe use of the instrument

 CAUTION
Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

After use of the instrument, be sure to turn off the power switch and unplug the power.

Avoid placing heavy things over the power cord or the cord be pressed by the instrument.

Make sure the power plug is accurately tightened so that it is not be shaken. Never touch it with wet hands.

Do not put conductive or combustible objects into the ventilation of the instrument.

Do not pour water into the instrument.

Do not apply shock or vibration to the instrument.

Do not install the instrument near devices that generate strong high frequency noise.

Artificial heart pulses or magnetic data devices may affect the instrument.

Do not wash the instrument with solvent-type strong detergent, and use a soft cloth.

When cleaning the instrument, be sure to unplug the power cord.



Beware of electrical shock and electric shock.



Please wear gloves.

2 Functional Description

2.1 Introduction of the Instrument

This multi-purpose Water Bath is intended to the multi-purpose water bath can be used in various fields such as medicine, chemistry, and biology. It can adjust temperature and shaking levels independently with enhanced convenience and safety functions.

2.2 Features

2.2.1 Enhanced performance

- (1) The bath can maintain a uniform temperature. The stirring movement is supported with 200 rpm round trip at the same time.
- (2) The instrument structure is optimized in stable stirring under high-load conditions. The low-centered design minimizes noise and vibration, enabling stable stirring even under high load conditions.

2.2.2 Enhanced user Convenience

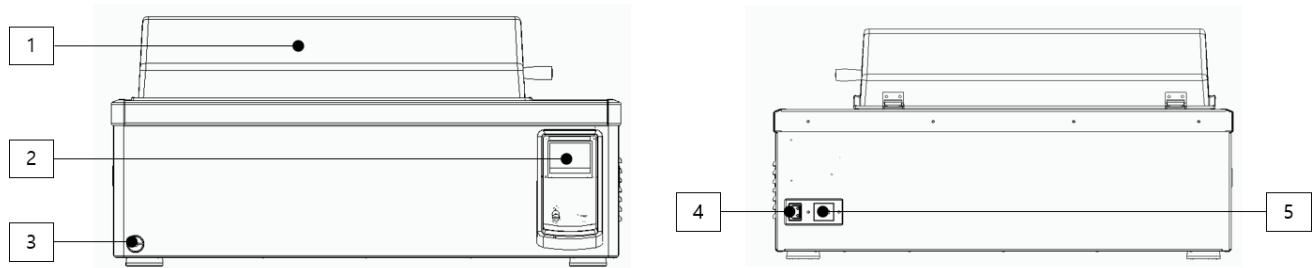
- (1) Your bath is operated with an intuitive touchscreen display. It enables you to monitor the operation status more intuitively with a convenient user interface.
- (2) The shaking operation is controlled with a timer that enables you to check the operating time. You can set up the timer up to 999 hours and 59 minutes.
- (3) Drain valve placed on the left side of the instrument enables you to discharge liquids generated during the bath operation.
- (4) You can observe the samples inside the bath in real time through the Transparent Viewing Cover (TVC) even with the cover is closed.
- (5) You can conveniently monitor the instrument from your own PC that is connected with conventional RS 232 port or even with USB. If you buy LC GreenBox, the wireless control will be available for your convenience.
- (6) The embedded automatic power outage recovery function returns the instrument back to its previous operating state automatically even after a power outage.

- (7) An alarming system notifies you the maximum water level of the bath. If the water level is adequate, the system will ring the alarm to support you research.

2.2.3 Enhanced Safety

- (1) The stirring movement with smooth start and stops operation minimizes the sample leakages.
- (2) We eliminated an unnecessary movement due to instrument shaking. The instrument will stop the stirring operation when the device is overloaded or run with high RPM.
- (3) The embedded BLDC motor minimizes the instrument vibration and maintains the stability even when it reaches high RPM.
- (4) The overheat prevention system (Patent No. 10-0397583, Korean Patent System) protects the researchers from unwanted accidents which may be caused by instrument overheat.

2.3 Structure



(1) Transparent Viewing Cover

The transparent viewing cover lets the researchers to observe the samples inside the bath in real time during the operation without opening the cover.

(2) Controller

The touch PAD of the main controller enhanced the intuitiveness and convenience to set the temperature, shaking operation, and general environment.

(3) Drain Valve

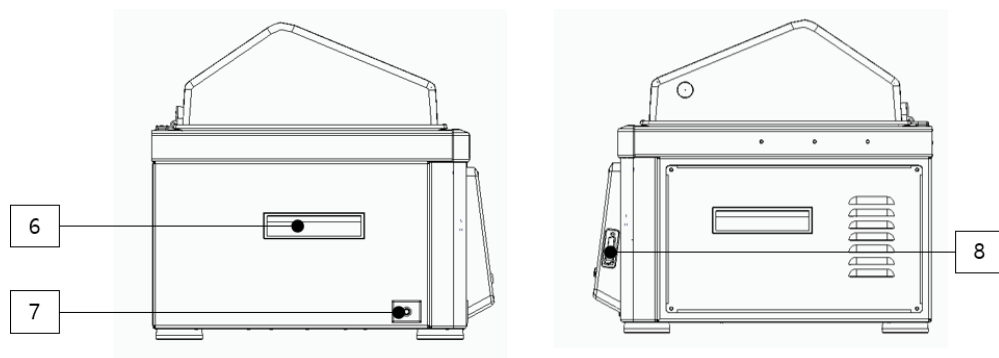
The liquids collected inside the bath can be drained out once you connect a draining tube to the drain port located at the bottom left side of the body and then open the drain valve.

(4) Main power cord

This is an outlet (220 voltage) for power connection.

(5) Earth leakage breaker

The breaker protects the instrument by cutting off the power when overcurrent or overvoltage is applied instantly.



(6) Moving Handle

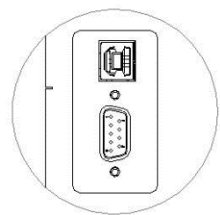
The moving handle enables you to transfer the instrument conveniently.

(7) Drain Port

The drain port drains out the liquids collected in the bath.

(8) Computer Interface

You can monitor and control the shaking water bath from a computer or smart devices by connecting them via USB port or RS232 port. If both of the ports are connected at the same time, a device connected via USB port will be recognized with a higher priority.



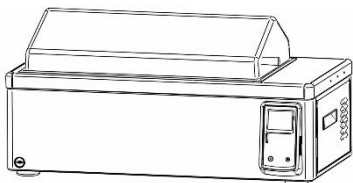
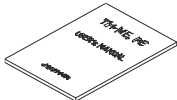
3 Installation

3.1 Unpacking and Checking the Shipping Damage

- (1) Please check the package if there is any damage before unpacking the instrument.
- (2) Please unpack the instrument carefully.
- (3) Before use, please check if there is any shipping damage of the instrument.
- (4) If you find any problem of the instrument, please contact the JEIOTECH sales department or the seller.

3.2 Checking the Product Components

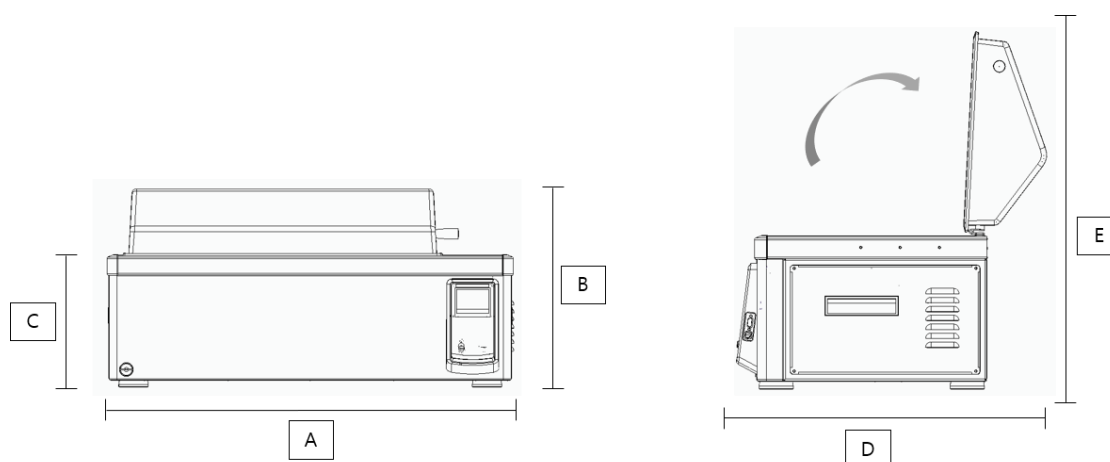
- (1) After unpacking, please check the following list of the accessories. The ID label has the information of the instrument model. Please make sure the instrument is what you have ordered.
- (2) If the delivered instrument does not match what you've ordered, or if there is any damaged or missing part, please contact JEIOTECH or seller immediately.

Item	Figure	Quantity	Description
Main Body		1	BS2 body
Power Cord		1	—
Operation Manual		1	—

3.3 Checklists Before the Installation

3.3.1 The Minimum Space Requirement for Installation

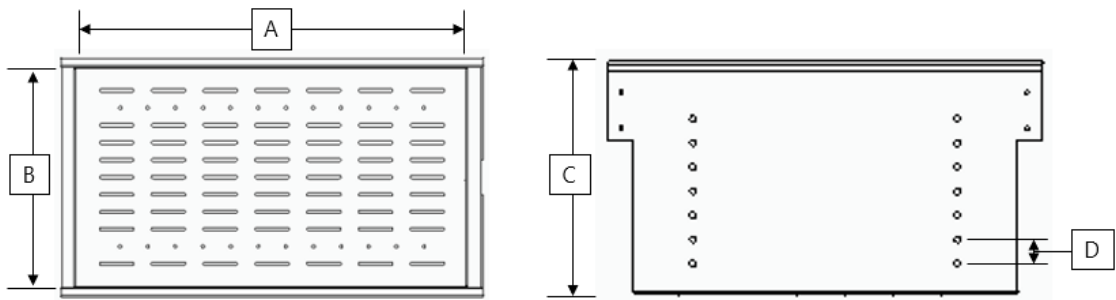
In order to figure out the space for installation, you should consider the whole size of the instrument and the radius of rotation of the transparent cover. In addition, the space for the power cord on the back of the main body should be considered. Please check the size of each model as shown below.



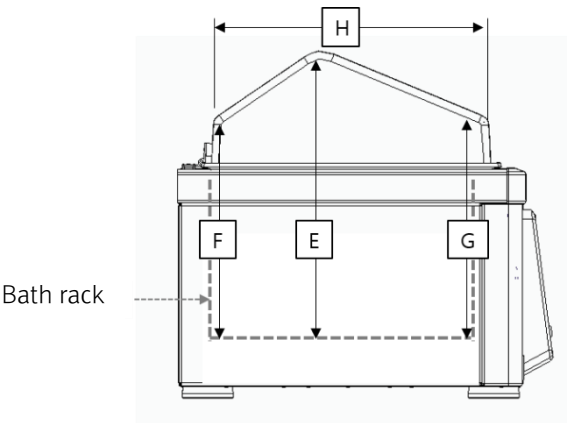
Dimension Model	A	B	C	D	E
BS2-10	474 mm	426 mm	285 mm	539 mm	615 mm
BS2-15	594 mm	426 mm	285 mm	539 mm	615 mm
BS2-20	746 mm	426 mm	285 mm	539 mm	615 mm
BS2-30	882 mm	426 mm	285 mm	591 mm	665 mm

3.3.2 Required space (Bath rack)

Please check the dimensions of the required space as shown the picture below.



Description		BS2-10	BS2-15	BS2-20	BS2-30
A	Width of the bath rack	143 mm	263 mm	415 mm	565 mm
B	Height of the bath rack	269 mm	269 mm	269 mm	319 mm
C	Depth of the bath rack	192 mm	192 mm	192 mm	192 mm
D	Distance between the holes	20 mm	20 mm	20 mm	20 mm



Description		BS2-10	BS2-15	BS2-20	BS2-30
E	Rack bottom to the cover top	335 mm	335 mm	335 mm	335 mm
F	Rack bottom to the cover top	252 mm	252 mm	252 mm	252 mm
G	Rack bottom to the cover top	252 mm	252 mm	252 mm	252 mm
H	Width of the cover	332 mm	332 mm	332 mm	382 mm

3.3.3 Environment Requirement for the Installation

To operate the instrument safely and effectively, you should place it in a proper environment such as humidity, temperature, and altitude as shown in the following list.

WARNING



- The instrument should be installed on a solid and flat floor equipped with a safety laboratory facility.
- Do not install the instrument in a place where combustible gas may leak.



- Do not expose the instrument to direct heat sources or direct sunlight.



- Please maintain the ambient temperature between 5 °C~40 °C (41 °F~104 °F).



- Please maintain the relative humidity below 80%.



- Please keep the altitude of the instrument installation below 2,000m (6562ft) above sea level.

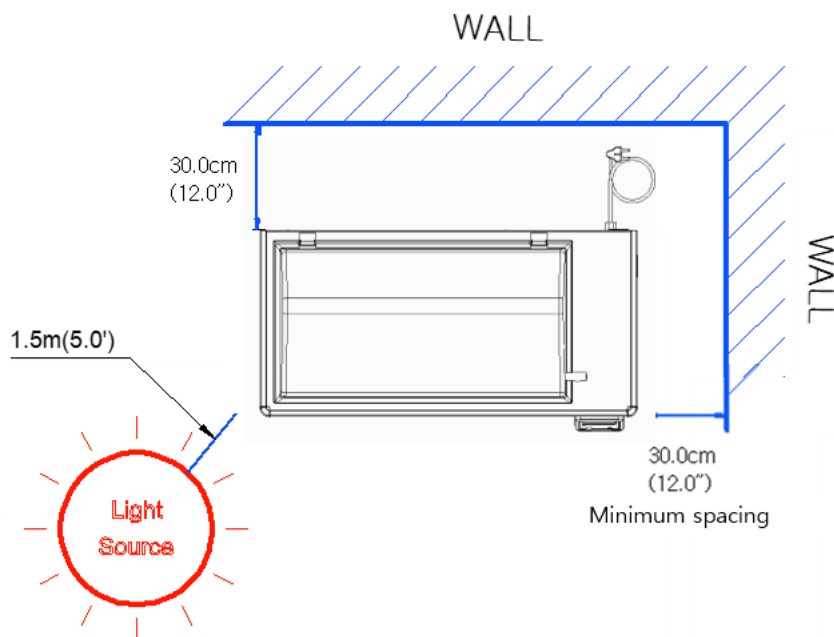


- Be sure to use grounded power.
-

3.4 Instrument Installation

3.4.1 Precautions for Installation

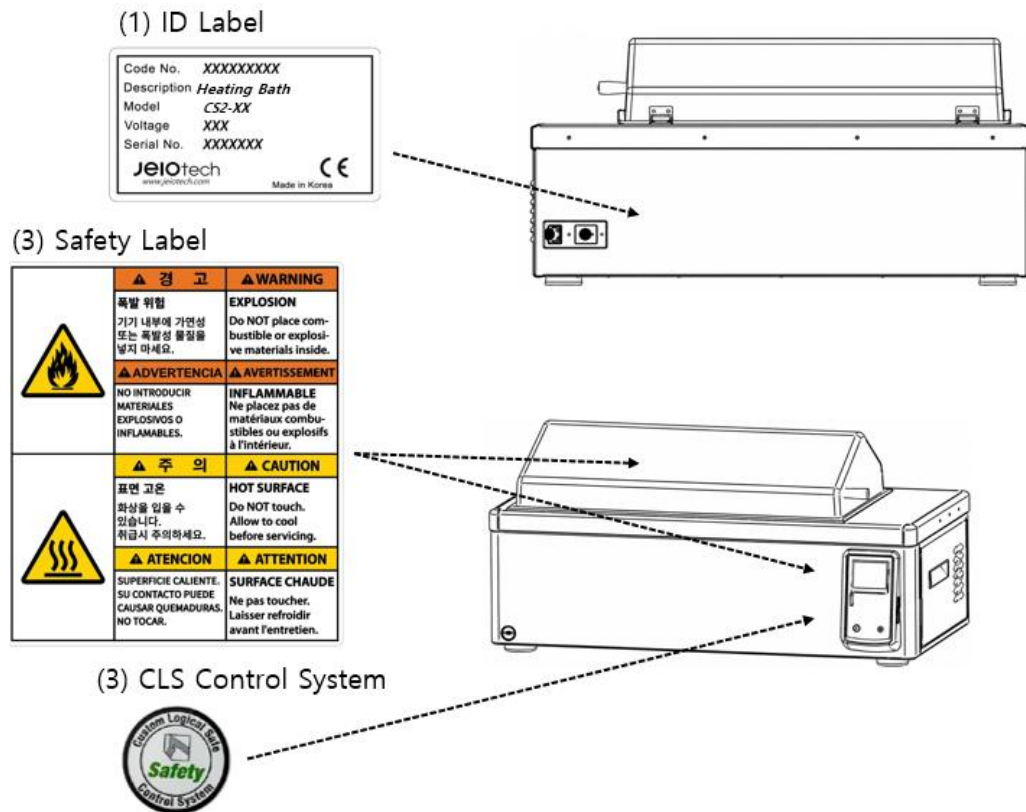
- (1) The temperature of the installing place should be room temperature (below 30 °C and below 80%RH), and used away from heat sources.
- (2) Since Transparent Viewing Cover will be opened upward, please ensure that there is enough space for installation (Refer to Chapter 3.3)
- (3) Please install the instrument on the flat place, and do not apply any shock.
- (4) There should be more than 1.5m distance between the instrument and lighting furniture, and should be 30cm space from wall.
- (5) Make sure to keep the horizontality of the instrument to avoid unexpected noise and vibration.



⚠ CAUTION

- Do not pour water onto the controller that may lead to a failure.
-

3.5 The Labels attached to the Instrument



1) ID Label

An ID label of the basic information is attached on the panel of the rear side of the instrument. Before using it, please check the voltage, phase, and capacity of the power indicated on the ID label.

2) Safety Label

Safety labels are attached to the instrument to provide important information about potential risks or how to avoid them.

3) CLS Control System

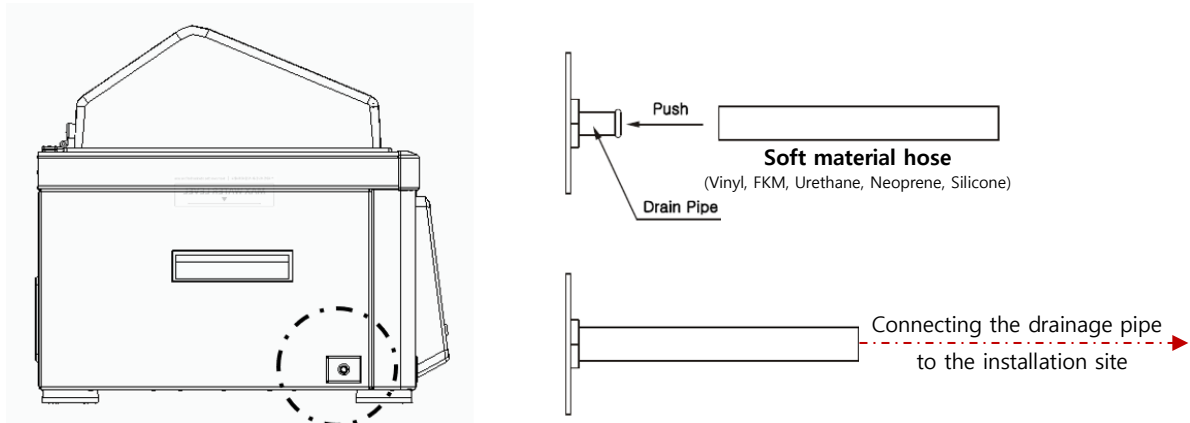
It is a label that certifies that the CLS-Control system, the highest safety level control device is applied.

For safe operation, all users must check the safety label before using it and read [Warnings and Cautions for safe use of the instrument](#) carefully to understand the relevant safety guidelines.

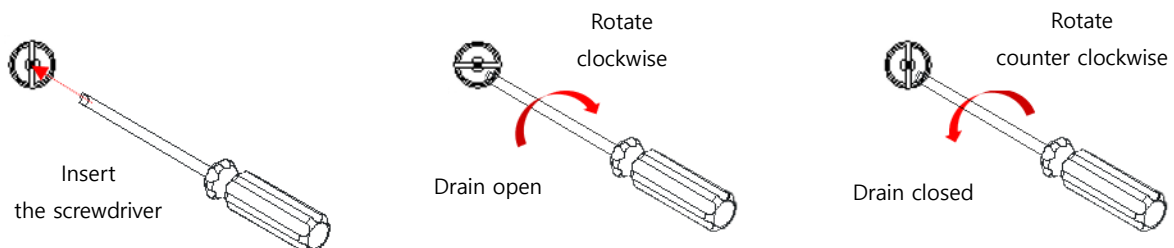
If the safety label is damaged, please ask the JEIOTECH branch or seller for a new label.

3.6 Connecting Drain

In case draining the collected liquid out is needed, please refer to the following figure to connect the drain hose of soft material within Ø8mm of internal diameter.



NOTICE



- Please use a straight-line driver to open the drain valve that is located in front of the instrument.
- When the valve is closed, turning clockwise opens the valve and turning counterclockwise closes the valve.

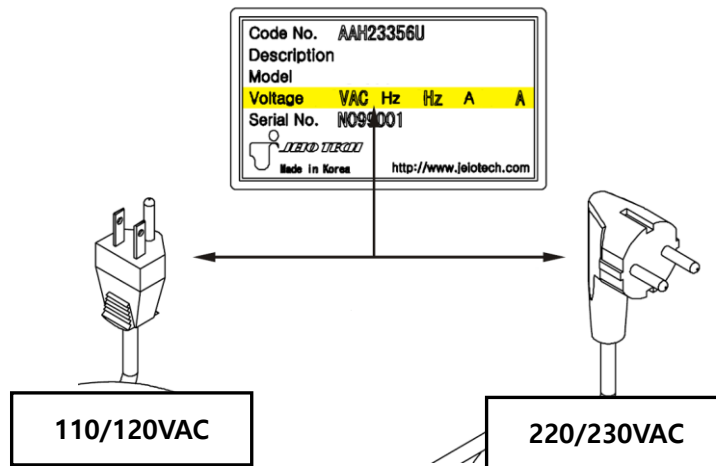
CAUTION

- When opening the drain port, please wait until the condensed water inside the bath is cooled down, since there may be a risk of burns if the heated water suddenly pours out.
- After fix the tubing tightly and open the drain valve slowly.



3.7 Connecting the Power

Instruments manufactured by JEIOTECH is equipped with a single-phase ground plug. Please check the instrument's identity label as shown in the figure below and use the appropriate plug according to the using voltage. The voltage is $\pm 10\%$ of the applied voltage.



WARNING

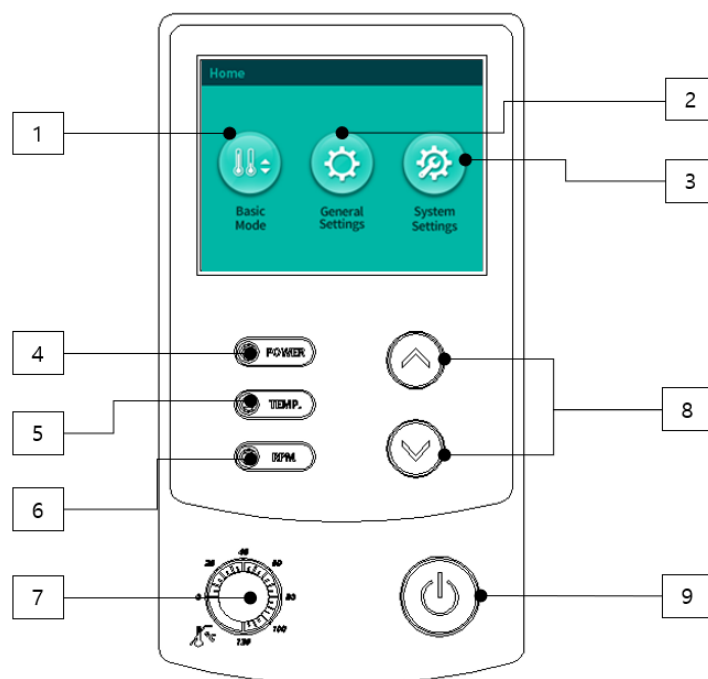


- Please check the voltage, phase, and capacity before installation, and make sure to connect them correctly.
- Never use the multiple tabs.
: If an overcurrent occurs, there is a risk of damage/ fire to the cable or device.
- Make sure to use grounded power.
- Make sure to use the grounded power.

4. Operation

4.1 Buttons and Functions of Control Panel

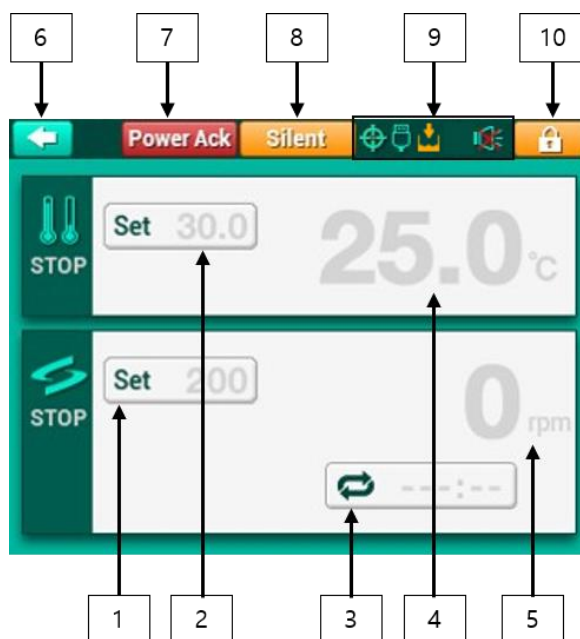
The components of the control panel are 3.5inch Touch Display, Rpm up & down, and power membrane button. If the power is applied, you will see the screen as shown below.



1	Basic Mode	It moves to the main screen window to operate the equipment.
2	General Settings	You can save the basic settings through this function.
3	System Settings	You can change the value of the main parameters related to operate this instrument. Please read carefully this manual before operation.
4	Power ON indicator	Indicates when the power is applied to the instrument.
5	Temp. Control ON indicator	Indicates the instrument is in temperature controlling status.
6	Shaking Control ON indicator	Indicates when the bath is in stirring operation. It turns off when the timer is set.
7	Temp. Limit Dial	This is a dial-type button set the limitation of the temperature for the bath. If it deviates from the set temperature range, the operation of the equipment will be stopped to protect the instrument and sample.
8	rpm Up & Down button	It speeds up or down the stirring rpm.
9	Power button	It turns off the instrument.

4.2 Using Controller

You can set the operation of the instrument via the main display as shown below.



1	Set RPM	It displays the value of RPM. If you enter the desired value, you can set the value of the RPM.
2	Set Temperature	It displays the set temperature. If you enter the desired value, you can set the value of the temperature.
3	Set Timer	It displays the time information of the stirring operation. If you enter the desired value, you can set the timer. If the timer is not set, the cumulative time is indicated. (The maximum value of the setting time is 999 hours and 59 minutes)
4	Actual Temperature	It indicates the current temperature of the instrument.
5	Actual RPM	It indicates the current stirring speed.
6	Back	If you would like to go back to home screen from the main screen, press this button. You can enter setting value only when the operation is stopped.

7	Power Ack	The "Auto Restart" function is useful when the power is blocked and recovered. When the power is applied again, the system remembers the previous state of the instrument. The "Power-Ack" button will appear to indicate the system has recovered from black out. If the instrument was in stirring operation, the time will change the color in red. If the user changes to value or touches the "Power Ack" button, it will disappear.	
8	Silent	When the instrument has a problem during the operation that needs a special care, the alarm will be activated. If you touch the "silent" button, the instrument will stop ringing for a while. If the problem is not solved, the system will alarm again.	
9	Status Bar		If the stirring operation is stopped with a normal process, the platform will be always stopped at an identical location. This sign indicates that the platform is stopped at the expected location. If the system fails to stop the system at the location, it will appear with a yellow color.
			This instrument can be connected to a computer via USB port and RS232 port. This sign displays that the instrument has been connected to a computer. Report Only :  / Slave Mode : 
			This sign indicates that there is insufficient water in the bath.
			This sign indicates the system sound has been muted. This function is designed for the users who want a quiet environment. You can set it in the "General Settings" menu.
10	Lock	This function blocks the input of the control panel from a careless use. When you touch this button, the screen will show you this icon  to let the users know that the entering keys has been locked. To unlock	

		this function, the user should touch this button twice continuously 
--	--	--

4.2.1 Temperature Control

(1) Starting the temperature control

To control the temperature, please touch the "Set Temperature" button of the main display when the temperature control is in the STOP state, then the "Temperature Settings" window will appear. Please enter the desired temperature value via the touch pad and press the "START" button. The font of the set temperature and the current temperature of the main display will change into dark green color.

(2) Stopping the temperature control

To stop the temperature control, please touch the "Set Temperature" button of the main display. Once the "Temperature Settings" window appears, please press the "STOP" button. The font of the set temperature and the current temperature of the main display will be changed into grey color.

(3) Changing the set temperature

You can change the temperature while the bath is shaking. To change the temperature value, please press the "Set Temperature" button. Once the "Temperature Settings" window appears, please enter the temperature value, then press the "Enter" button.

NOTICE

- You can either change the temperature value in whole number part or fractional part. Please touch the desired value via the numeric keypad.
- Press the ESC button to exit the "temperature settings" window without changing the value.
- If there is no user input in the temperature setting window for 10 seconds, the "temperature settings" window automatically appears.
- From the "temperature settings" window, you can also check the current temperature and stirring speed. (Refer to the top right corner of the settings window)

-
- When the temperature value is changed during the shaking operation, the operation will not be stopped.
-

4.2.2 Controlling the Shaking Operation

(1) Starting the Shaking Operation

To start the shaking operation while the instrument is idle, please touch the button "Set RPM" of the main display. Once the "Shaking Speed Settings" window appears, please enter the shaking speed via the numeric pad, then press the button "START." The shaking operation will be started with the green colored font of the current shaking speed and the target shaking speed.

(2) Stopping the Shaking Operation

To stop the shaking operation of the instrument during the operation, please press the button "Stop." Then the instrument will be stopped with the grey color of the current speed and the target speed.

(3) Changing the Shaking Speed

To change the value of the shaking speed, please press the button "Set RPM" of the main display. Once the "Shaking Speed Settings" window appears, please press the target value of the shaking speed, and press the button "Enter." You can change the target speed even when the instrument is in operation.

NOTICE

- If you would like to cancelling the shaking speed settings, please press the button "ESC" to exit the settings.
 - If there is no users' input for 10 seconds, the speed settings window will be disappeared automatically.
 - You can check the current bath temperature and the speed even with the "shaking speed settings" window.
 - Even if the shaking speed has been changed, the operation will not be stopped or changed.
-

 CAUTION

- If you would like to exchange the samples, please wait until the platform stops its operation completely.
-

4.2.3 Shaking Timer

The timer is designed to only work for the stirring operation. When you set the timer during the stirring operation, it automatically stops with an alarm sound once the timer is reached to the set time. If you set the timer when the instrument is stopped, the display will show you the set time. If you do not set the timer while the instrument is stopped, the display will show you "--:--". If you set the timer during the stirring operation, the remaining time of the stirring operation will be displayed, and if the timer is not set, the cumulative elapsed time will be shown.

(1) Turning ON the Timer

Please press the button "Set Timer" of the main display. If the current timer is set, the display will show you the sign "Timer OFF", otherwise, it will show you the sign "Timer ON." To set the timer, please press the button "Timer On," then enter the value of the stirring timer via the numeric keys. Press the button "Enter" to complete setting the timer.

(2) Turning OFF the Timer

Press the "Set Timer" of the main display. If the current timer set, the display will show you "Timer OFF", otherwise, it will show you "Timer ON." To turn off the timer, please press the button "Timer OFF" and press "Enter" to turn off the timer. Now, you will see the "--:--" of the main display.

(3) Changing the value of "Set timer"

Press the button "Set Timer" of the main display. Once the timer is ON, you can change the timer value via the numeric key pad. Press the button "Enter" to complete setting the timer. Now, you will see the changed value of the set timer on the main display.

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- If you change the set timer while the timer is running, the timer is reset with the new value calculating the elapsed time. If you would like to restart the timer completely new from the initial value, please turn OFF the previous timer and then set the new timer.
 - You can set the timer in "hour" and "min" unit separately. Please touch the target unit and then enter the desired value via the numeric key pad.
 - You can cancel setting the timer and exit the "timer settings" window without changing the timer by pressing the button "ESC."
 - If there is no input for more than 10 seconds in the "timer settings" window, the timer setting is automatically canceled and exit the window.
 - You can check the bath temperature and the stirring speed from the "timer settings" window.
 - If the timer is running, the remaining time less than 1 minute as shown in "mmm:ss" type.
-

4.2.4 Warnings and Auto Stop

This function detects abnormal conditions and notifies them to the users to handle the exceptional cases.

4.2.4.1 Warnings

The instrument generates audiovisual alarms and a button "Silent" will be shown in the main display while it keeps the operation. If you press the button "Silent," it will zoom for the first fifteen minutes. If the problem is not solved even after fifteen minutes, the alarm will be ringing again.



1	Temp. Deviation	The red-colored "Temp. Deviation" appears when the difference between the set temperature and the current temperature is greater than the allowable temperature gap that is set by "System Settings." Checking the temperature gap starts after the current temperature reaches the target temperature. It generates an alarm when the gap is out of the allowable range.
2	RPM Deviation	The red-colored "RPM Deviation" appears when the difference between the target stirring speed and the current stirring speed is greater than allowable speed gap that is set by "System Settings." Checking the temperature gap starts after the current temperature reaches the target

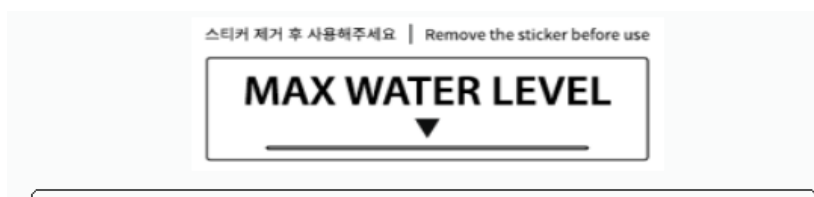
		temperature. It generates an alarm when the gap is out of the allowable range.
3	Water Level	Audiovisual alarms will notify the users when water is insufficient, and temperature control and stirring control will not be performed.

NOTICE

- If you set the Sound as "OFF" state in General Settings, the "Warning" alarms will not be ringing.
- The "Warning" mark will disappear if the current value reaches the target value and maintains this state for a certain period of time.
- The Deviation alarm will be initialized for the following cases.
 - Reset the target values
 - Stop the operation and recover it (Door open, Stopping the operation, etc.)
- If you initialize the deviation, the temperature deviation check will restart if the target value is not reached in 4 hours. The speed deviation check will restart if the target value is not reached in 10 minutes.
- You can set the deviation allowance gap between the target value and the current value in the "System Settings" menu.

⚠ CAUTION

- If you use silicone oil or other substances besides water in the tank, it may cause damage to the main components of the equipment, making it difficult to use.
- If the water level is insufficient during the operation, the instrument will stop the operation. If the water level is not supplied in three minutes, an alarm will notify the users.
- The sticker as shown in the image below is attached over the maximum water level guideline. For the safe use of this instrument, please check the maximum water level of the tank. You can remove it before use.



4.2.4.2 Faults

The Fault Alarm stops the instrument automatically and notify the users to protect the instrument and the operators. There are three types of fault alarms: Temperature Limit, Sensor Fault, and Over Current shutdown.

1	Temperature Limit	The mechanical and electrical stopping system was operated that is place on the righthand side of the instrument. The temperature inside the chamber is out of set range. We stopped the operation to protect the instrument and samples. Please check the set temperature range of the limiter.
2	Sensor Fault	The operation of the instrument is stopped due to a temperature sensor problem of the main controller.
3	Over Current	The operation is stopped to protect the instrument due to overcurrent. The main causes include heavy stirring and object entrapment during the stirring operation.
4	Liquid level low	When there is no liquid in the equipment tank or the liquid level is low, the operation stops to protect the equipment. To restart, please fill the tank with liquid up to the maximum level guide line.

4.3 General Setting

In General Settings, you can change the environmental settings of the operation. If you touch the "General Setting" button on the home screen, the following items will be listed, and you can explore the items by touching the mark "<" or ">" at the bottom left and right.

1	Shaking Direction	This function is not available for this instrument.
2	Temperature Unit	You can select the temperature unit in Celsius or Fahrenheit.
3	Lock	You can select if you want to lock the instrument in the main display.
4	System Sound	The system can be muted.
5	LCD Brightness	You can control LCD brightness.
6	LCD Auto Dim	The power saving function dims the LCD automatically when there is no user's input.
7	Dim Brightness	You can select the brightness when LCD is in a sleeping mode. Please use this function when LCD Auto Dim is activated.
8	Dim Time Out	You can choose a waiting time for entering the LCD's sleeping mode.
9	Auto Restart	This function can be selected when power outage compensation is required. When power is forcibly cut off and supplied during the operation, it restores the system to the previous operating state. (Time information will not be restored.)
10	USB (RS232)	This instrument can be connected to an external PC via a USB port and an RS232 port. When connecting to the PC, the connection mode can be selected in two types. – Report Only: The instrument only reports data to PC about the current operating state. – Slave Mode: The PC controls the operation of the instrument.

4.4 System Setting

In System Settings, you can set the values of main operating parameters of the instrument. Please read carefully read this user's manual before changing the system settings. You can check the items you can select if you touch the button "System Settings" in the home screen.

1	Control Deviation Limit	You can set the allowable deviation value between the target value and current value for temperature and stirring speed.
2	External Start/Stop Key	There is an external membrane button "Start/ Stop key" in the control panel. It sets the function of this button.
3	Calibration	It calibrates the measured temperature and stirring speed of the temperature sensor installed in the instrument with the user's reference measurement. You can also correct the screen touch coordinates of the touch LCD.
4	Auto Tuning	Perform an update on the PID parameter for temperature control. Optimal temperature control can be performed for the main use temperature.
5	Operating Parameters	You can set the parameter values to check the errors and instrument operations.
6	Reset	You can factory reset the parameter values of the instrument.

4.4.1 Control Deviation Limit

Temperature control and shaking control settings allow you to set the allowable error between the set value and the actual value. You can also set a check period for the duration when the deviation exceeds the allowable error to trigger a warning alarm.

1	Temperature Deviation Limit	You can set the allowable gap between the target temperature and the actual value. Please use the key pad to enter the input values.
---	-----------------------------	--

2	Temperature Deviation Alarm Delay	It generates "Temperature Deviation Alarm" when the temperature difference between the target value and the actual value lasts for a certain duration of the time. This equipment generates a Deviation Warning alarm when the difference between the actual temperature and the set temperature is greater than the Deviation limit over the Alarm Delay period. Once the alarm occurs, even when the problem is solved and the actual temperature reaches the target temperature, checking activity is performed for a period of Alarm Delay time, and then the "Deviation Alarm" will be terminated.
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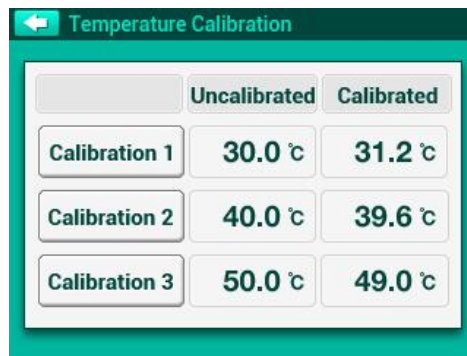
4.4.2 Calibration

You can set the environmental settings more accurately by calibrating the measuring temperature and the stirring speed sensors installed in this equipment with the user's reference value. In addition, correction of the touch screen's touching coordinates can be performed in this this function.

4.4.2.1 Temperature Calibration

You can calibrate the temperature sensor of the main controller to the users. This instrument can match the user's reference measuring instrument specifically at three temperature points. On the Temperature Calibration screen, you can check the calibration points of the equipment temperature sensor at three temperature points and the temperature values corrected by the user at each point.

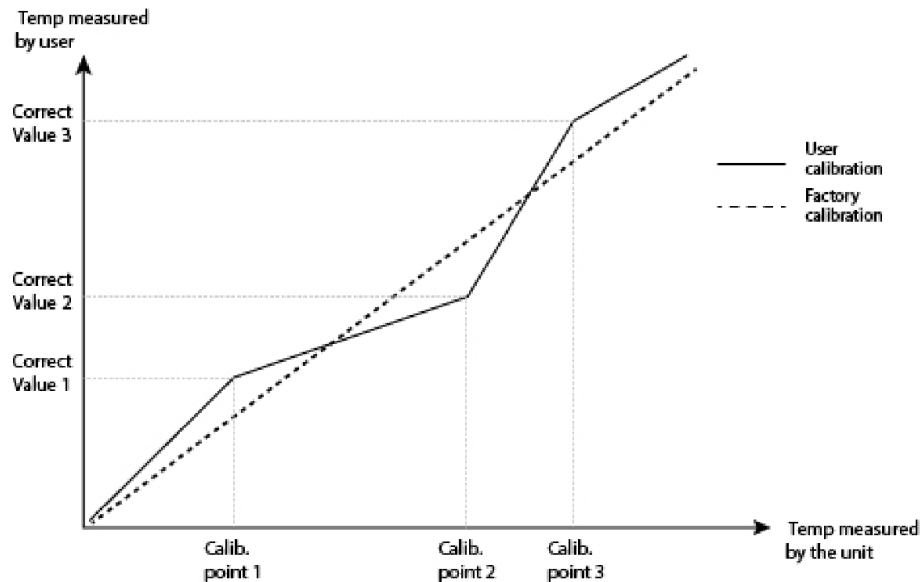
Among the three temperature points, please select the temperature point you want to change. Please touch one of the calibration points: 1, 2, and 3. And then, place the thermometer sensor at the desired location inside the chamber and then close the door.



	Uncalibrated	Calibrated
Calibration 1	30.0 °C	31.2 °C
Calibration 2	40.0 °C	39.6 °C
Calibration 3	50.0 °C	49.0 °C

- Place the sensor of the user's reference temperature gauge in the desired position within the desired tank and close the cover.
- Among the three temperature points, select the temperature point you want to change. Touch one of Calibration 1, 2, or 3.
- Touch the temperature under 'Set Temp.' to select the desired calibration temperature, then start the equipment.
- Wait until the temperature under 'Actual Temp.' converges with the set temperature. After the actual temperature has converged with the set temperature, touch 'Calibrated Temp.' to input the temperature value read by the reference temperature gauge.
- To complete the storage, touch the Confirm button. The equipment will stop temperature control.

From this point forward, the equipment will remember and display the current temperature inside the tank as the temperature read by the reference temperature gauge.



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- The instrument will stop controlling the temperature once the door is opened during the operation or the temperature exceeds the temperature limit.
- Since the temperature is calibrated at multiple points, it limits the user's input if the user enters two different temperature values at an identical temperature point.
- You can always check the calibrated temperature result through the "Uncalibrated" and "Calibrated." "Uncalibrated" represents the measured temperature point from the instrument, and the "Calibrated" represents the user's calibrated temperature by the user. In other words, the calibrated temperature is the user's reference measurement temperature, and the instrument displays the calibrated temperature.
- You can initialize each items' calibration from each of the Reset function of System Setting.

4.4.2.2 Shaking Speed Calibration

The instrument can achieve more accurate control of stirring speed with the reference stirring speed measurement. Similar to temperature calibration, it can calibrate the stirring speed at one point.

- To do this, please press the touch box labeled 'Set RPM.' Once you have selected the target stirring speed, operate the instrument.
- Wait until the stirring speed displayed on the 'Actual RPM' value reaches the target stirring speed.
- When the actual speed matches the target speed, press the 'Set RPM' in the touch box labeled 'Calibrated RPM' to input the stirring speed read by the reference stirring speed measure.
- To save the settings, press the 'Confirm' button.

From now on, the instrument will only remember the calibrated stirring speed and use it to control the stirring operation.

NOTICE

- When installing the reference measuring device inside the chamber, please install it carefully so that the instrument and the measuring device do not collide with each other. Also, please note that if the measuring device falls off during stirring operation, it can be very dangerous.
 - You can initialize items for each calibration in the Reset of System Settings.
-

4.4.2.3 Touch Screen Calibration

Due to instrument aging, there may be abnormalities in the touch coordinates of the touch panel. Accordingly, this instrument can calibrate the touch coordinates. As for the touch screen calibration process, please touch the cross-shaped mark displayed in the instrument three times. Repeat it twice. Touch the exact position according to the instructions and save it to calibrate the touch screen's coordinates.

4.4.3 Auto Tuning

It updates the parameter values of the PID control for temperature control. The optimal temperature control will be performed for the mainly using temperature. The instrument is set to perform temperature control when shipped from the factory. When using the instrument, if it fails to properly perform temperature control for the user's mainly using temperature, better temperature control can be performed by newly tuning temperature control parameters through Auto Tuning.

Please touch the temperature of "Set Temp." to set the mainly using temperature. Start parameter tuning by touching the button "START". You can always cancel tuning by pressing the button "STOP" during tuning. After tuning is completed, press the button "OK" to save it.

4.4.4 Reset

The instrument initializes the changed values of each item.

1	Temperature Calibration	It initializes the temperature calibration value.
2	RPM Calibration	It initializes the stirring speed calibration value.
3	Auto Tuning	It initializes the Auto Tuning values.
4	Touch Screen	It initializes the touch screen's coordinates.
5	Factory Default	It initializes all the parameter values.

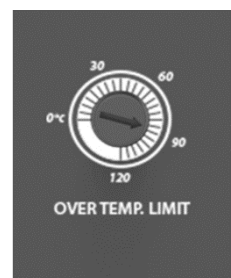
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- In Reset function of the System Settings, Auto Tuning parameters can be initialized as same as the factory shipment status. Upon initialization, the results of Auto Tuning performed by the user can be disappeared.

4. Safety Device

4.5.1 Over Temp. Limiter

In addition to the temperature sensor connected to the main controller, this instrument has an additional overheating preventing device. The overheat protector is located on the right side of the instrument. Please use a straight screwdriver to set the temperature at least 15% higher than the main target temperature. If the temperature inside the chamber reaches above this temperature, the equipment stops operating.



4.5.2 Earth leakage circuit breaker

In case a leakage current occurs in the instrument or an instantaneous overcurrent occurs, the short circuit breaker is operated to cut off the power.

5. Maintenance

5.1 Period for maintenance

Categories	Inspection Cycles				
	Daily	Weekly	Monthly	Quarterly	Yearly
Generals					
Power related					
Check the connection between instrument and the power	●				
Check damage of the power cord	●				
Cleanness of the exterior part		●			
Check the connection if the drain is connected				●	
Shaking Water Bath Related					
Check the target temperature and current temperature	●				
Check the bath interior for damage and cleanliness		●			
Auto Tuning				●	
Temperature Calibration					
Check the calibrated temperature value					●
Actual temp/displaying temp calibration					●
Checking the Sync operation if connected to the PC	●				
Check the Controlling and Timer function				●	
System Related					
Check the assembly between platform and other accessories	●				
Check the connection between platform and the stirring table	●				
Calibration of actual rpm/displaying rpm					●
Check the stirring operation's abnormalities			●		

WARNING

- Check the general, system(control), and electric wire related checklist according to the inspection cycle.
- If the inspection cycle are not followed, the manufacturer is not liable for any damage to the equipment or fire that may occur.

5.2 Cleaning the Instrument

- (1) When cleaning the instrument, please remove the power cord from the power outlet, and wipe it with a soft and dry towel. Please wipe the contaminated part only with alcohol solvent (methanol, ethanol) that has low boiling point applied to the towel.
- (2) Do not use acid solution, benzene, sharp things, soapy water, detergent, hot water, etc. It can cause discoloration or damage to the device surface. Rubber or plastic parts can change shape, denature, or discoloration. In particular, never use volatile substances. When using neutral detergent, make sure to wipe it clean with a dry cloth. And you have to dry it completely.
- (3) Do not pour water directly outside the device while cleaning the surroundings (especially socket and controller parts). It may short-circuit.
- (4) In the event of device cleaning or decontamination in other ways not specified in the manual, the user shall check with JEIOTECH and use the appropriate method not to damage the equipment prior to implementation.
- (5) When handling electrical components inside the device, it must be handled by a JEIOTECH employee or a person delegated by JEIOTECH.
- (6) If parts need to be exchanged, only genuine parts should be used.
- (7) Failure beyond normal limits cannot guarantee the technical repair.

WARNING



- Never soak the instrument inside the water, or pour the water into the instrument.
-

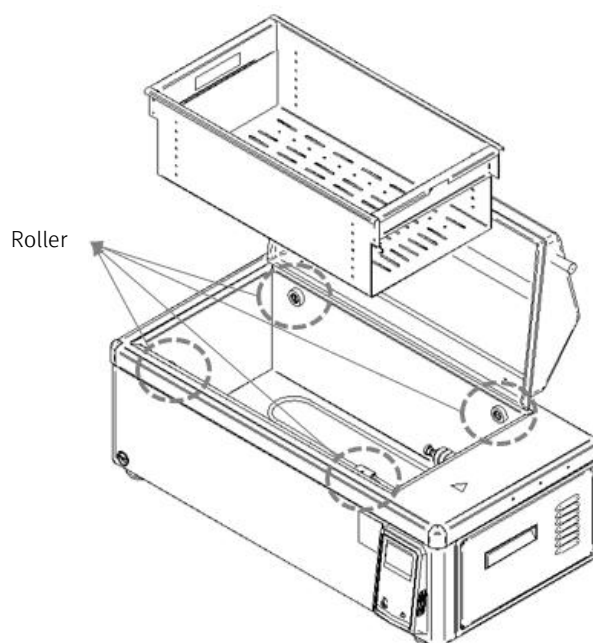
CAUTION



- Do not wipe the entire product with chlorine bleach or chlorine-containing detergent, abrasive, ammonia, iron scrubber, or low boiling point alcohol solvents (methanol, ethanol).
-

5.3 Changing the Bath's Roller (Wheels)

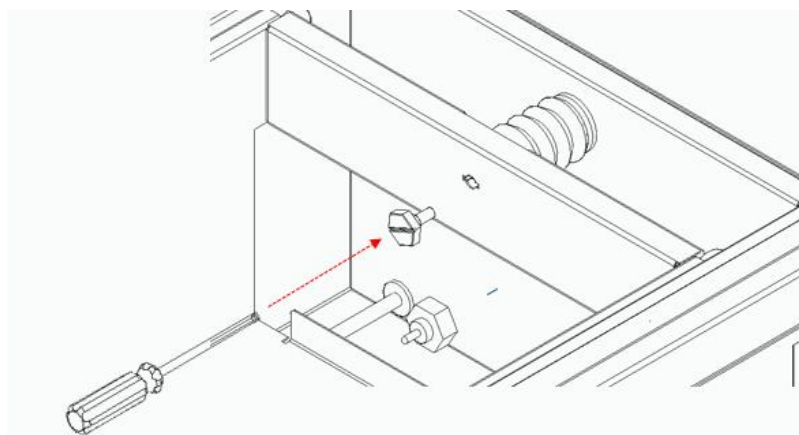
When the roller is worn out and the instrument is stirred, unexpected noise may occur or stirring may not be performed smoothly. In this case, the roller needs to be replaced. To purchase roller when replacement is required, please request them from the sales office or the seller.



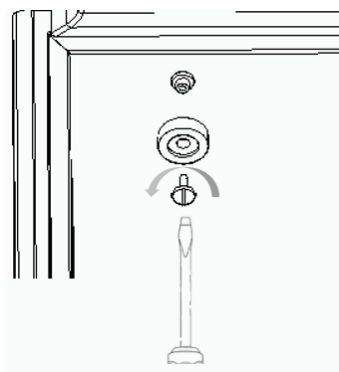
Four rollers are arranged under the water tank rack as shown in the figure above. Please follow the step-to-step guidelines to replace the rollers.

Step 1: Disconnect the power by pressing the power switch.

Step 2: Separate the bath from the body by releasing the crank bolt. You can release the bol by rotating it counterclockwise.



Step 3: Release the fixing bolt of the worn roller and replace it with a new roller.



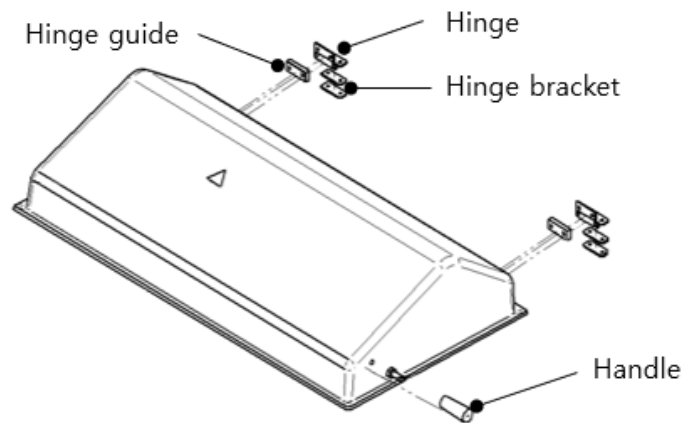
Step 4: Assemble the bath and the body by executing the process in reverse order.

⚠ CAUTION

- During the replacement of the tank rollers (wheels), please handle the tank with caution as the end sections of the tank edges may be slightly sharp, posing a risk of injury.
-

5.3 STS Cover Replacement

The BS2 model comes with a default transparent cover, but an STS cover is available as an optional purchase. Each cover is suited for specific purposes and environments, and users can replace them according to their needs. Follow the steps below to safely replace the cover.



- (1) The STS cover, handle, hinge, and hinge guide are all fastened with bolts. Ensure that everything is securely fastened.
- (2) Carefully detach the existing transparent cover from the product body.
- (3) To connect the detachable STS cover with the product body, align the fixed hinge bracket properly and fasten the bolts securely.
- (4) Repeat Step 3 for the other side's hinge and complete the assembly.

CAUTION

- Use the hinge bracket and hinge guide specifically designed for the STS cover. The bolt specifications for the transparent cover and STS cover differ, so ensure that you use the correct parts for each cover.
-

6. Troubleshooting

6.1 In case the instrument is not operating

Display Message	Description	Solution
Temperature Limit	The operation is stopped with to the mechanical or electronic temperature limiter's operation due to overheat inside the chamber.	Check the target temperature of the mechanical or electronic temperature limiting instrument on the right side of the instrument and check whether the controller is operating normally. It will restart after the temperature drops.
Sensor Fault	The operation of the equipment is stopped due to a problem with the temperature sensor of the main controller.	Please request technical support from the manufacturer or place of purchase.
Over Current	The operation of the equipment is stopped to protect the equipment due to the consumption of more than the amount of current allowed to the instrument.	Solve the problems such as overloading and clogging in the stirring system and restart it.
Water Level	The operation of the equipment is stopped due to lack of liquid inside the tank.	Feel free to fill the water tank with liquid within the maximum water level and restart it.

6.2 Procedure for handling others.

Trouble	Probable Cause & Solution
In case the power is not turned on	① Make sure the power plug is not separated from the power outlet. ② Make sure that the short circuit cutoff switch is activated. ③ Please check if there's a blackout. ④ If the above method does not resolve the problem, please request for a technical support.
The controller does not turn on even when the power switch is turned on	① Check the connection status of the power plug. ② Check the divider circuit breaker, restore it to its original state, and restart it. ③ If the display board or main board is defective, please request for a technical support. ④ If the power switch is defective, please apply for a technical support. ①

The temperature of the water tank does not reach the target value	① Please make sure if the Temperature control ON indicator is turned on. ② Please check if the ambient air temperature is too high or too low, and make sure to maintain the room temperature. ③ Please check if there is a difference between actual temperature and display temperature. If there is any problem, please request for a technical support. ④ If the heater is faulty, please request for a technical support. ⑤ In case the temperature is unstable, please execute the Auto Tuning according to the 4.4.4. ⑥ If the above method does not resolve the problem, please request for a technical support.
Stirring operation related abnormalities	① If the instrument shakes more severely than usual during the operation, please check the level of the instrument and level it if necessary. ② If the instrument vibrates severely or decelerates during operation, please make sure that the sample is not tilted to, and if necessary, rearrange the sample in a balanced position. ③ If overload is suspected, please check the maximum load for each stirring speed according to 3.4.2. ④ If stirring operation does not start even when the stirring start button is pressed, check the door switch. ⑤ If the stirring does not start even when the stirring start button is pressed, make sure that the timer is terminated and cancel the timer setting if necessary. ⑥ If the above method does not resolve the problem, please request for a technical support.

In case the noise is getting loud	① Please check the fixture of the platform or sample. ② Make sure that the weight of the sample is not tilted to one side and, rearrange the sample in a balanced position. ③ If the above method does not resolve the problem, please request for a technical support.
	① Check the condition of the roller (wheel) of the water tank. ② Check whether it is time to replace due to the wear of the roller (wheel), and please replace it if needed. ③ If the above method does not resolve the problem, please request for a technical support.

7. Accessories

This instrument can be connected to a variety of platforms as shown below.

Flask Clamp	Universal Platform	Dedicated Platform
		

Test Tube Rack	Spring Wire Rack
	

7.1 The maximum loadable capacity

7.1.1 Flask Clamp(STS) with universal platform

Cat. No.	Flask Clamp	Max. Mountable Flask Clamps			
		BS2-10	BS2-15	BS2-20	BS2-30
AAA23550	50ml	8	12	20	32
AAA23551	100ml	3	9	15	24
AAA23552	250ml	2	4	8	12
AAA23556	300ml	2	4	8	12
AAA23553	500ml	2	4	6	12
AAA23554	1L	1	2	4	6
AAA23555	2L	–	1	2	3
AAA23557	2.8L	–	1	1	2

NOTICE

- The Flask with 2.0ℓ and 2.8ℓ capacity can be used only when the Bath's cover is opened.

7.1.2 Universal Platform

Cat. No.	Model
AAA44521	BS2-10
AAA44522	BS2-15
AAA44523	BS2-20
AAA44524	BS2-30

7.1.3 Dedicated Platform

Cat. No.	Flask Clamps	Model
AAA44531	250ml x 2ea	BS2-10
AAA44532	500ml x 2ea	
AAA44541	250ml x 4ea	BS2-15
AAA44542	500ml x 4ea	
AAA44551	250ml x 8ea	BS2-20
AAA44552	500ml x 6ea	
AAA44561	250ml x 12ea	BS2-30
AAA44562	500ml x 12ea	

7.1.4 Test Tube Rack

Cat. No.	Description	Max. Quantity of Racks
AAA44581	ø8mm x 86 tubes	BS2-10 : 1ea BS2-15 : 2ea BS2-20 : 3ea BS2-30 : 4ea
AAA44582	ø10mm x 86 tubes	
AAA44583	ø12mm x 58 tubes	
AAA44585	ø16mm x 32 tubes	
AAA44586	ø25mm x 19 tubes	

7.1.5 Spring Wire Rack

Cat No.	Model
AAA44571	BS2-10
AAA44572	BS2-15
AAA44573	BS2-20
AAA44574	BS2-30

7.1.6 Flask with Spring Wire Rack

Flask Clamp	Max. Mountable Flask Clamps			
	BS2-10	BS2-15	BS2-20	BS2-30
50ml	5	16	22	38
100ml	3	9	15	22
250ml	2	5	8	14
500ml	2	4	6	8
1L	–	2	3	6
2L	–	1	2	3

7.2 STS Cover

This equipment can be equipped with an STS cover in addition to the standard transparent cover provided.

Cat. No.	Model
AAA4600	BS2-10 STS Cover
AAA4601	BS2-15 STS Cover
AAA4602	BS2-20 STS Cover
AAA4603	BS2-30 STS Cover

8. Appendix

8.1 Technical Specifications

Model		BS2-10	BS2-15	BS2-20	BS2-30
Spec.		BS2-10	BS2-15	BS2-20	BS2-30
Bath volume(L/cu ft)*		17 ℓ (0.6)	26 ℓ (0.9)	37 ℓ (1.3)	55 ℓ (1.9)
Temp. (°C/°F)	Range	Amb.+5 to 100°C (Amb.+9 to 212°F)			
	Stability at 37°C with 30rpm (bath fluid : water)	0.1°C	0.1°C	0.1°C	0.1°C
	Uniformity at 50°C with 30rpm (bath fluid : water)	0.1°C	0.1°C	0.1°C	0.1°C
Heat up time to 70°C (bath fluid : water)		100 Min.	100 Min.	100 Min.	120 Min.
Material	Heater 230V/110V	Sheath 800W/800W	Sheath 1,000W/1,000W	Sheath 2,000W/-	Sheath 2,000W/-
	Insulation	EPDM(15T)			
	Sensor	PT100			
Dimensions	Spring Wire Rack (WXDXH)	269X143X192	269X263X192	269X415X192	319X565X192
	Bath Opening (WXL), Depth (mm)	300X250, 235	300X370, 235	300X520, 235	350X670, 235
	Exterior (WXDXH)	474X417X426	594X417X426	746X417X426	882X467X426
Shaking system	Motion	Reciprocating			
	Frequency	30 to 200 rpm			
	Stroke length	25mm(Standard), 30mm, 35mm		25mm, 30mm(Standard), 35mm	
	Motor (Capacity)	BLDC(60W)			
Electric requirement	120V	60Hz, 7.1A	60Hz, 8.8A	No support	
	230V	50/60Hz, 3.7A	50/60Hz, 4.6A	50/60Hz, 8.9A	50/60Hz, 8.9A
Net weight		23kg	27kg	31kg	38kg

* The maximum liquid level inside the tank should be maintained at approximately 70% of the bath volume for optimal operation of the product.

※ Bath fluid water / Technical data according to DIN12876 & DIN12880

8.2 Disposing the Device

Observe the following before disposing of the device or its components.



(1) Since this device has a high risk of exposing biological, chemical or radioactive materials, the person who disposes of the device and takes over the waste must clean the device for the protection of the environment.

(2) Ask the person in charge of the disposal department of the device to check the electrical, electronic and material disposal standards. If you require external assistance, we recommend that you contact our company's branch office or distributor or an experiment equipment company that can properly dispose of the such devices and components.

8.3 Warranty

8.3.1 Warranty period

- (1) If the product fails during normal and proper use, the warranty period for manufacturing liability shall be two years from the date of delivery.
- (2) If you request a repair, please check the items below and let us know so that you can get a quicker and more accurate repair.

- | |
|---|
| <ul style="list-style-type: none">• Date of purchase:• Customer name / address / phone number / E-mail:• Fault status• Model• Serial number |
|---|

8.3.2 Technical Service Contact Points

- Technical Services
- Address: 153 (Youngsan-dong), Techno 2-ro Yuseong-gu, Daejeon-city, 34025, Republic of Korea
- Tel: +82 (0)2 -2627-3824
- Website: <https://www.JeioTech.com/eng/>
- E-mail: overseas@JeioTech.com

8.3.3 Certificate of Product Warranty

This is a guide to the product quality warranty and service terms provided by JEIOTECH Co., Ltd

All products are guaranteed to operate normally when installed under proper conditions, as specified in the user manual for each product, and used according to the intended purposes and permissible operating conditions.

The warranty period for product quality starts from the delivery date and is indicated in the catalog provided for each product or in the purchase order agreed upon with the customer. If a product malfunctions within the warranty period, JEIOTECH Co., Ltd. provides free repair services. However, among the transportation costs incurred during the repair process, any special costs resulting from the customer's site conditions (e.g., door or wall modifications, use of special handling equipment) are not covered under the warranty. Furthermore, JEIOTECH's liability under this warranty is limited to replacing the product or refunding the original purchase price at JEIOTECH's sole discretion if reasonable attempts to repair or replace the product fail.

Parts replaced during free repairs within the warranty period become the property of JEIOTECH Co., Ltd. Additionally, the warranty period is not extended due to free repairs. JEIOTECH is not responsible for any losses incurred by the customer due to delays in repairs caused by issues such as part shortages or shipping delays.

The following cases will be handled as paid repairs, even within the warranty period:

1. Non-defective cases

- * Requests to resolve issues arising from improper operating environments or abnormal installations.
- * Reinstallation requests or connections with external equipment other than the initial installation.
- * Requests for usage instructions or simple adjustments that do not require disassembly.
- * Inspections of non-defective products.
- * Cleaning or debris removal service requests.

2. Failures caused by user errors:

- * Malfunctions due to usage not in accordance with the user manual.
- * Issues resulting from improper operating environments or abnormal installations.
- * Malfunctions caused by incompatible chemical usage.
- * Malfunctions caused by irregular or improper electrical or utility supplies.
- * Damage due to product movement, storage, external impact, or dropping by the customer.
- * Malfunctions resulting from unauthorized modifications or repairs without prior written approval from JEIOTECH Co., Ltd.
- * Malfunctions caused by using consumables or optional components not specified by JEIOTECH Co., Ltd.
- * Repairs performed by personnel other than JEIOTECH or its authorized service agents.

3. Other cases

- * When the product model or serial number has been damaged, removed, manipulated, or altered.
 - * Malfunctions caused by fire, flooding, or other natural disasters.
 - * Failure due to consumable parts reaching the end of their lifespan (e.g., lamps, filters, fuses, gaskets, packings, hoses, heat transfer fluids).
 - * Natural wear and tear (e.g., discoloration, screen printing degradation).
 - * Damage or malfunction of product accessories (e.g., power cables, data cables, glass components) or options.
 - * Malfunctions caused by errors in computers, computer components, or connected network systems.
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- Before JEIOTECH performs free or paid repairs or accepts the return of a product, the customer must ensure the product has been decontaminated of chemical and biological hazards.
 - Replacement parts used during repairs may differ from the original but will function correctly and be equivalent in performance.
 - JEIOTECH does not bear any responsibility for damage to stored samples, data loss, or any other direct or indirect damages caused by product malfunctions, regardless of the warranty period.
 - JEIOTECH does not guarantee issues related to computers, computer components, or network systems connected to the product, regardless of the warranty period.
 - This warranty is the sole and exclusive warranty provided. Any implied warranties imposed by applicable laws are limited to the warranty period stated herein. This warranty cannot be modified by any verbal advice, statements, or documents on behalf of JEIOTECH unless explicitly labeled as a "Warranty Amendment" and signed by an authorized representative of JEIOTECH.
 - This warranty applies only to products purchased for direct use by the customer. It does not cover products purchased for resale purposes without prior written approval from JEIOTECH.
 - This warranty does not apply to consumables and is non-transferable.

- The contents of this manual can be changed without prior notice to improve product performance and deliver accurate information.
- The copyright of this manual belongs to JEIOTECH.