User manual

Heating Bath Circulators

Models : CW3-05, CW3-10, CW3-20, CW3-30

Manual No. :52303L002 Version: 3.0

JEIOtech

⚠WARNING

Before using this product, read this entire Operator's Manual carefully. Users should follow all of the Operational Guidelines contained in this Manual and take all necessary safety precautions while using this product. Failure to follow these guidelines could result in potentially irreparable bodily harm and/or property damage.

Thank you for purchasing Jeio Tech's products.

Jeio Tech Co., Ltd. is committed to customer service both during and after the sale. If you have questions concerning the operation of your product or the information in this manual, contact our Sales Department. If your product fails to operate properly, or if you have questions concerning spare parts or Service Contracts, contact our Service Department.

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1.0 Safety

1.1 How to use the manual

1.1.1 Introduction

This manual is intended for individuals requiring information about the use of equipment. Use this manual as a guide and reference for installing, operating, and maintaining your Jeio Tech equipment. The purpose is to assist you in applying efficient, proven techniques that enhance equipment productivity

This manual covers only light corrective maintenance. No installation, service procedure or other maintenance should be undertaken without first contacting a service technician, nor should be carried out by someone other than a service technician with specific experience with laboratory equipment and electricity

1.1.2 Chapter summary

The safety chapter guides users to use the equipment with the best caution to prevent any possible accident. Make sure to read the chapter before use.

The Functional Description chapter outlines models covered, standard features, and safety features.

The Installation chapter includes required data for receiving, unpacking, inspecting, and setup of the equipment.

The Operation chapter includes a description of controller features, key name, and equipment operation information.

The Maintenance chapter includes a description of the equipment cleaning, moving, storage.

The Troubleshooting chapter serves as a guide for identification of most common problems. Potential problems are listed, along with possible causes and related solutions.

The accessories chapter includes all the attachable accessories' information.

The software chapter provides information for installing monitoring program, communication protocol.

The Appendix contains technical specifications, warranty and Jeio Tech technical support contact information.

1.1.3 Model number nomenclature

This manual covers below models. The following describes the model number nomenclature used in throughout the manual.

	Heating bath Circulator Series			
Model	CW3-05	CW3-10	CW3-20	CW3-30

1.2 Responsibility

This equipment has been designed to ensure maximum safety of the user, when used under normal conditions and in compliance with instructions during operation.

All users are required to run the device according to this manual. The user of the device should be fully aware of the safety rules marked on the equipment and all the attention • Warning • Risk on the manual should be complied.

1.2.1 General liability

In any case, safety is the first priority. The owner of the equipment, user, and/or maintenance personnel must be fully aware of the safety which is the most important part of our everyday business.

If you are concern about the loss in efficiency, remember that accidental impact is always negative for the effectiveness of covering human resources and property.

Effective safety program is the most obvious way of increasing efficiency and productivity.

Ensuring and maintaining the safety of the equipment by checking it daily in addition to the regular maintenance of the equipment is a shortcut to improving the productivity.

The users must read this manual describing the functions and safety points of each part as a guided for safe operation.

1.2.2 Responsibility of the users

Users are most well- known for the equipment's performance and the limit because they are the ones running the equipment most of the time.
The safety of the user's maybe be easily be forgotten by the needs of efficiency or familiarity of using the device for a long time.

Precautions with regards to safety in the manual, or by other displayed safety information do not protect the users from injury while they are using the device.

Always read the safety instructions and run the equipment safely. In addition, the potential for dangerous situations always should be reported immediately to colleagues and superiors.

Things to read

- Do not touch any part of the body to the dangerous part of the device.
- Check the voltage, phase and capacity of the power supply and connect properly.
- Do not operate or service, adjust the device until you receive adequate training or are fully aware of the capabilities of the device.
- Remove unnecessary things, sample, or chemicals from this equipment.
- When the equipment does not operate normally or are neglected from use for a long time check all the settings before operating the equipment.
- Make sure that the equipment is operating normally when you move the equipment, or re-use after a long period.
- Stop operating immediately and report to the managers when you find the following states;
  - Unsafe operation and status
  - Shorts
  - Improper maintenance
- When you operating the equipment, do not wear loose clothing or jewelry, tie long hair or use hair cap.
- When not in use, turn off the power switch or cut off the power to the instrument by disconnecting the power plug.

1.2.3 Preventative maintenance

Proper maintenance is essential for safety. The maintenance personnel must be aware of the importance of safety in maintenance of the equipment for effectiveness of the equipment.

Before removing or adjusting parts of the device, shut off all the electrical supply, remove accessories. The equipment must display a warning that it is working.

Please ensure that the device is properly connected to a grounded outlet.
After repair and maintenance, check the work performed and clean tools.

Do not apply the power to the equipment until all workers clean the area. The device must be checked if there are no problems with the equipment before operating the equipment.

1.3 Symbols used in this manual

The following signal word panels, safety symbols and non-safety symbols are used to alert you to potential personal injury hazards or information of importance. Obey all safety messages that follow these symbols to avoid possible personal injury or death.

1.3.1 Signal word panels

Signal word panels are a method for calling attention to a safety messages or property damage messages and designate a degree or level of hazard seriousness. It consists of three elements: a safety alert symbol, a signal word and a contrasting rectangular background. The following signal word panels are in accordance with ANSI Z535.4-2007 and ISO 3864 standards.

Signal word panels	Uses
⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury
⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates a property damage message.

1.3.2 Safety symbols

Mandatory			
	Read manual		Wear gloves
	Wear a face mask		Wear goggles

Prohibition			
	No direct sunlight		No corrosive fluids or cleaners
	No high frequency noise		No water

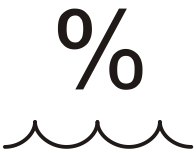
Warning			
	Safety alert symbol General caution		Hand crush or pinch
	Electrical shock		Foot crush
	Flammable or fire could be caused.		Lifting hazard
	Do not take the device apart deliberately.		

1.3.3 Non-safety symbols

The following graphic representations are intended to convey a message without words or to bring your attention to important information about the use of the equipment or a feature.

Permissible ambient temperature

Earth ground



Relative humidity

Altitude

1.4 Precautions for use

This equipment is designed to provide safe and reliable operation when installed and operated within design specifications. Make sure you read and understand all instructions and safety precautions listed in this manual before installing or operating your equipment. If you have any questions concerning the operation of your equipment or the information in this manual, contact our Sales Department.

To avoid possible personal injury or equipment damage when installing, operating, or maintaining this equipment, use good judgment and follow these safe practices.

1.4.1 Warning statements

⚠WARNING
Indicates a hazardous situation which, if not avoided, could result in death or serious injury

Observe all warning labels.

DO NOT remove warning labels.

DO NOT move the equipment during operation.

DO NOT use or keep flammable gases near the equipment.

DO NOT install the equipment near environments where flammable gas may leak.

DO NOT use the equipment near environments where explosion can occur due to organic evaporating gases.

DO NOT put explosive and flammable chemicals (Alcohol, Benzene, and etc) on the equipment.

Please install on the sturdy surface laboratory which is set safety facility and make sure horizontal align correctly.

Check the voltage, phase and capacity of the power supply and connect properly.

Make sure to use the grounded power cord.

Do not expose the Equipment to direct sunlight. (Ambient temperature range in 5°C ~ 40°C relative humidity lower than 80%)

DO NOT let moisture, organic solvents, dust, and corrosive gas enter the control panel.

DO NOT use Equipment in environments that contain industrial oil smoke and metallic dust.

DO NOT put explosive and flammable chemicals (Alcohol, Benzene, and etc) into the equipment.

Heating media should be 5℃ (Fp -5℃) lower than the flashing point.

DO NOT operate the Equipment when there is strange sound, smell and smoke coming from the equipment.

DO NOT disassemble, fix or change the Equipment other than for those items described in this operating manual.

In case of inner electronic components service, only the person who is qualified can handle the problem.

1.4.2 Caution statements

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

Wear safety gloves and be careful burn from the residual heat from the equipment.

After use, be sure to turn off the main power switch and unplug the power cord after.

Do not put heavy things on the power line. Do not put the equipment on the line.

Use grounded cord and consent.

Installation power outlet near instrument and may be convenient.

Do not touch it with wet hands and put the main plug correctly.

Do not inject any flammable objects, and conductive objects outside of equipment hole or vent.

Do not pour water directly on the outside of equipment.

Do not let the equipment take any strong shock or vibration.

Do not install the equipment near devices generating strong high-frequency Noise (high-frequency welders, high-frequency sewing equipment, large SCR control)

Do not clean equipment by solvent and harsh detergents, please use neutral detergent and smooth cloths.

Unplug the power cord when cleaning the equipment.

Since the equipment is heavy, use the proper tools and carry the equipment with two or more people together.

Safety symbols are graphic representations—of a hazard, a hazardous situation, a precaution to avoid a hazard, a result of not avoiding a hazard, or any combination of these messages—intended to convey a message without the use of words. The following safety symbols are used in this manual.

2.0 Functional description

2.1 Introduction

This Heating Bath Circulator is for multi-purpose use such as following applications essential for medicine, pharmacology, and bioengineering.
This bath controls not only liquid heating media temperature inside of bath through internal circulation but also heat exchange and bath temperature maintenance through connecting to external devices.

2.2 Features

2.2.1 Excellent performance

- PID feedback control
  PID Feedback control will be provided maximize the temperature stability and minimizes temperature variation

- Auto tuning
  Perform Auto Tuning in order to get precise and rapid temperature control. PID value saved automatically after Auto Tuning. [**Refer to 4.6 System Configuration**].

- Multi-point Temp. Calibration
  In case of the temperature recorder or validation temperature sensor is different with displayed temperature; you can correct the error temperature deviation in 3 different temperature points.[**Refer to 4.6 System Configuration**].

- Provide a dedicated S/W
  Provide a dedicated S/W to monitoring the equipment operation.

2.2.2 Improved safety

- We have firstly developed CLS (Custom Logical Safe)-Control system in this industry for convinces in use and safety to users.

- CLS-Control system[1] means "Control system which has logical safety device specialized for individual model". Laboratory must have Thermal safety secure because there are a lot of inflammable reagent. This system is highest safety secure control device (patent no. 0397583 and 0328729) and makes the equipment suitable for this kind of environment.

[1] Control system which has logical safety device specialized for individual model

- If any error founds during operation, Error message is shown and warning alarm gets start.

- Overcurrent protection device
  -Two built-in fuse current can be automatically shuts off the current when overcurrent condition.

- Over temperature protection device
  Built-in over-temp. Protector will be cut off automatically the power when the heater is overheating.

- If temperature sensor is not working well during operation, equipment stops temperature control and shows warning alerts.

- When Bath heat transfer liquid is not enough during running the equipment, warning alert will be displayed.

2.2.3 User's convenience

- VFD and dial knob
  Bright VFD display with quick adjustable dial knob

- Temperature unit setting
  Temperature unit can be set between Celsius (Cels) or Fahrenheit (Fahr).

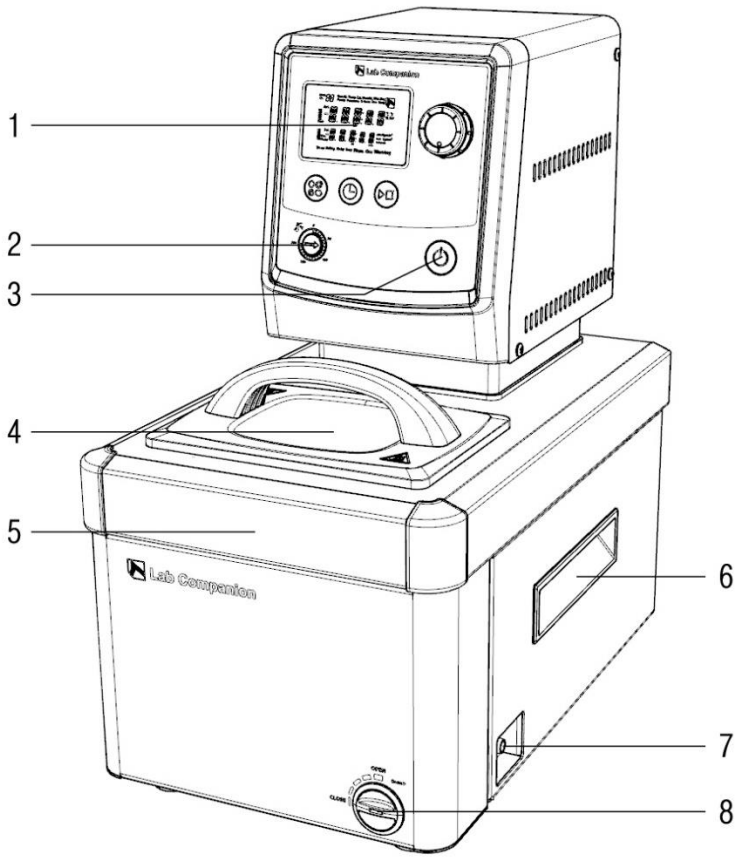
- Pump circulating capacity adjustment
  User can adjust pump circulating power from 0 to 5 steps

- Wait on timer, Wait off timer set
  - Wait ON starts immediately after the timer setting.
  - Wait OFF starts only after reaching the set temp

- Lock function
  When user press the menu button about 3 second, the timer and knob dial will be locked.
  If user want to cancel the lock function, press the menu button again.

- Auto-run function
  Auto-run function after power interruption: either Automatic Run or Manual Run.
  If the equipment was in run on basic mode before power interruption, the operation starts again with previous set temperature.

2.3 Structure



[CW3-05 Front]

(1) Control panel
Controller and other electronical parts are built in.

(2) Over temperature limiter
If the heater temperature rises higher than set temperature it cut the power of the temperature controller, makes the over temperature warning on the screen and alarming beep sounds. If you resume the operation, please set knob of it about 15% higher than set temperature and press Start/Stop switch one then check the running status is on display.

(3) Power button
Main power On/Off Switch.

(4) Bath cover / heating bath

Bath covers are made of polyphenylene Sulfide (PPS) resin to protect user from high-temperature burns. Pump, Heater, Temperature sensor, and Temperature regulator are installed inside the Bath.

(5) Main body

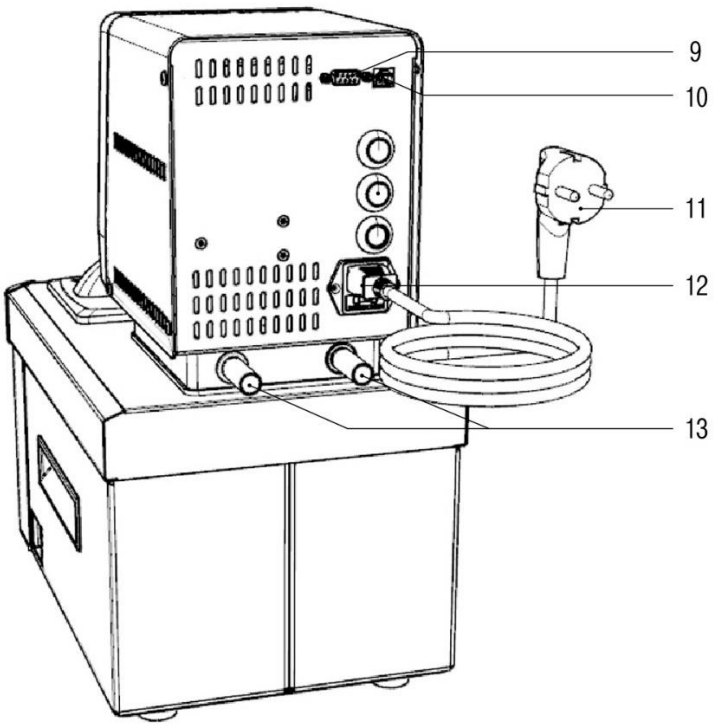
(6) Handle

(7) Drain

Bath fluid comes from this part. Turn (7) Drain Valve to open and close the drain hole. Caution that bath fluid may be hot.

(8) Drain valve

Turn the drain valve clockwise to drain out the bath fluid. User can easily turn the valve with hand or flat-head screwdriver. After high temperature test, user must wear protective gloves.



[CW3-05 Backside]

(9) Communication port (RS-232C)

User can monitor and control the equipment via RS-232C protocol interface to computer device. The control values can be stored and printed out.

(10) Communication port (USB-B)

User can monitor and control the equipment via USB-B port to computer device. The control values can be stored and printed out.

(11) Power cord

Power cord to supply power to the equipment.

(12) Main Fuse holder

Fuses protect the equipment from over-current. When replacing fuses, check the line voltage & Hertz [refer to 5.5 fuse replacement].

(13) Bath fluid In/Out line

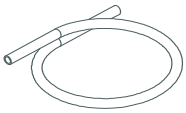
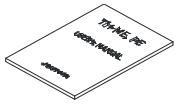
In case of using Bath for inner circulation purpose, connect silicone hose to bath fluid In/Out line, In case of using Bath for external circulation purpose, follow the instructions attached on the equipment.

3.0 Installation

3.1 Components

After unpacking, please check the contents to ensure you have received all of the following unit components. Also, check the identification plate on the side of the equipment to make sure you received the model number your ordered.

If you didn't receive one or more of the components or if the model is incorrect, contact your local Jeio Tech office, or the distributor from which the equipment was purchased. Refer to **9.3 Warranty** to see the contact information.

Item	Figure	Quantity	Description
Main body		1	-
Silicone hose		1	-
Operation manual		1	-

3.2 Preparing before installation

3.2.1 Environmental setting

The equipment can be operated properly under the following environmental conditions for a long time running without any problem.

No direct sunlight.

Please keep Ambient temperature 5℃~40℃

(The Optimum temperature is 25 ℃)

Relative humidity not to exceed 80%

Altitude not to exceed 2000m (6,562 feet)

3.2.2 Precaution for use

(1) Please install on the sturdy surface laboratory which is set safety facility and make sure horizontal align correctly.

(2) When you install it, minimum space (over than 30 Cm in usual) required from other objects.

(3) Do not install the Equipment near environments where flammable gas may leak.

(4) Do not install the Equipment near machinery generating high frequency noise.

(5) Do not install near other laboratory equipment, electric apparatus, and terminal electricity. Because, the vapor will be caused the damage.

(6) Do not use Equipment in environments that contain industrial oil smoke and metallic dust.

⚠WARNING

- Please install on the sturdy surface laboratory which is set safety facility and make sure horizontal align correctly. Avoid direct sunlight.

3.2.3 Bath heat transfer liquids supplement

(1) Check if drain valve is closed.

(2) Supply bath fluid up to the optimum level inside of the bath.

(3) Connect silicone hose to In/out line.

(4) Available heat transfer liquid and hoses

• For the best temperature stability, in case of the lowest temperature, if viscosity is 50 centistokes(cSt) and it is higher within 5℃ than ambient temperature, it is recommended not to exceed 10 centistokes(cSt).

• Heat transfer liquid should be non-flammable.
If heat transfer liquid is flammable, its flashing point should be over 40℃ and available to circulate in the pump. On this occasion, it must be used below at 5℃ which is lower than flashing point of the combustible fluid

• For use in the range of 10℃ to 90℃, distilled water is recommended. It is recommended to use mixed water with ethylene glycol and distilled water in the range of below 10℃. Please do not use deionized water. If it is used for a long time, it causes corrosion of the metal.

⚠WARNING

※ **WARNING : Please do not use the following liquids**

- Automobile antifreeze including additives
- Tap water
- Deionized water with a specific resistance >1 meg ohm
- Flammable liquid
- Corrosive material such as acid and alkaline material
- Solution with halogen: chlorides, fluorides, bromides, iodides or sulfur

- Sodium Hypochlorite
- Solution with chrome salt
- Glycerin
- 100% glycol
- **JeioTech is not responsible for equipment damage or accident that is caused by using improper heat transfer liquid.**

• **When silicone oil is used, please do not use silicone hoses**. It can be damaged. Please use hoses of other material (example: stainless steel, Teflon etc) and ask JeioTech or salesman if necessary.

• When heat transfer liquid is discharged, please cool the hot liquid on the room temperature.

• The following table is to show available hose types according to temperature range. Please refer and use them.

Material	**Temperature Range**
Buna N tubing	-40℃ to 120℃
Viton® tubing	-32℃ to 200℃
Braided Teflon® tubing	-50℃ to 225℃
Silicone tubing (not to be used with silicone oil)	-30℃ to 220℃
Metal tubing	-50℃ to 200℃
Stainless steel fitting	-45℃ to 225℃
Nylon fittings	-40℃ to 90℃
Brass fittings	-40℃ to 80℃

⚠WARNING

- Please check connection of the hose always. Discharged liquid may get someone burned.
- Please check if a hose is damaged and replace it regularly.
- When using silicone oil, please use the hose made of other material differently from silicone hose. If silicone hose is used, it may be broken and you would be burned by the discharged liquid
- Please discharge after cooling Hot liquid on the room temperature. Please check the temperature of the liquids.

3.2.4 Power connection

Check to make sure that the line voltage & Hertz matches the supply voltage & Hertz specified on the identification plate before connecting to the main power.

⚠WARNING

Electrical Shock Hazard.

- Check to make sure that the correct line voltage, phase and capacity correspond to them specified on the identification plate.

- Do not use the branch socket or double-tap to prevent cable damage and fire caused by over current.

- Incorrect line voltages will cause the risk of fire, electric shock, and personal injury.

- Wear safety clothes, gloves, glasses.

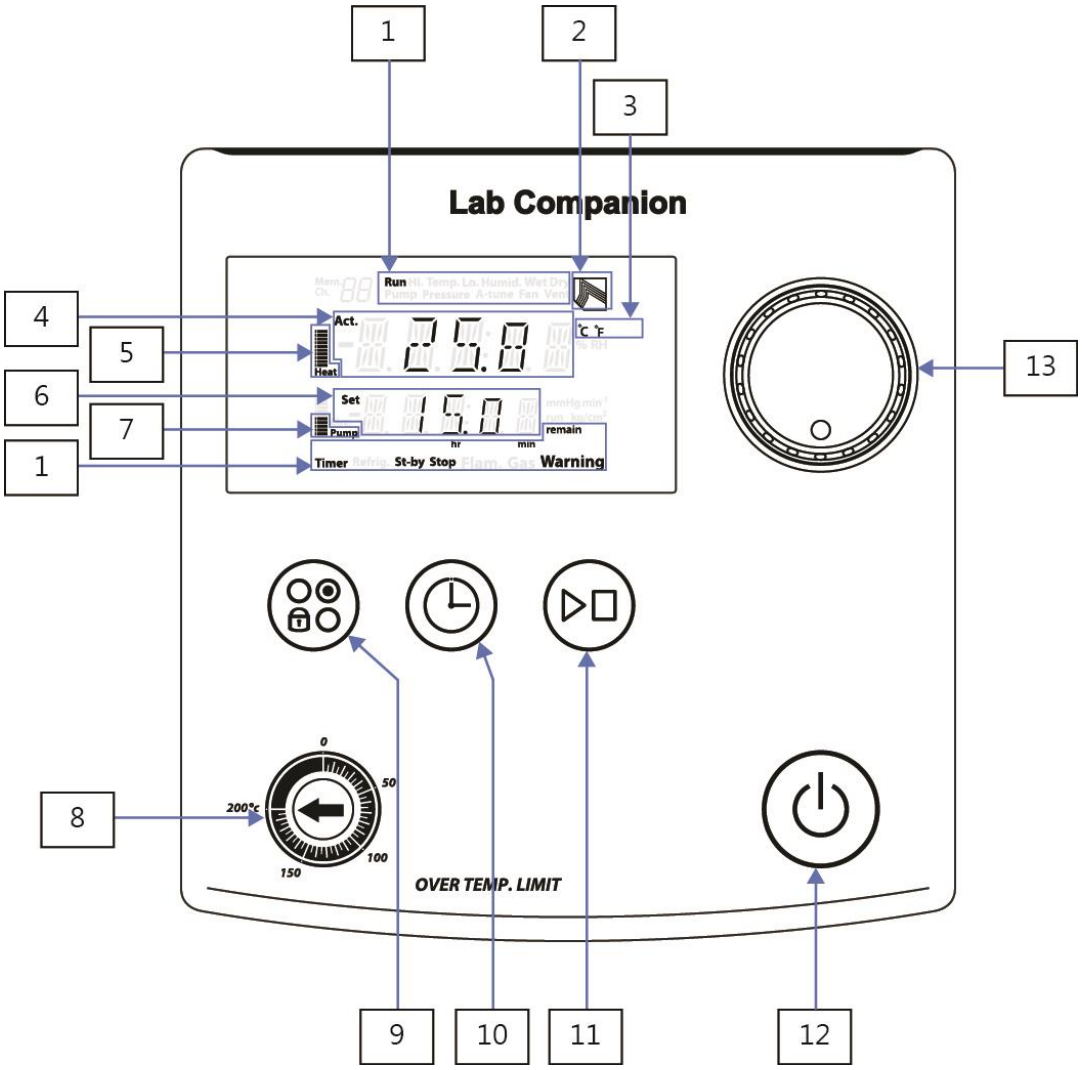
- Do not touch the equipment or plug with wet hands.

- Use grounded power cord and consent.

4.0 Operation

4.1 Control panel

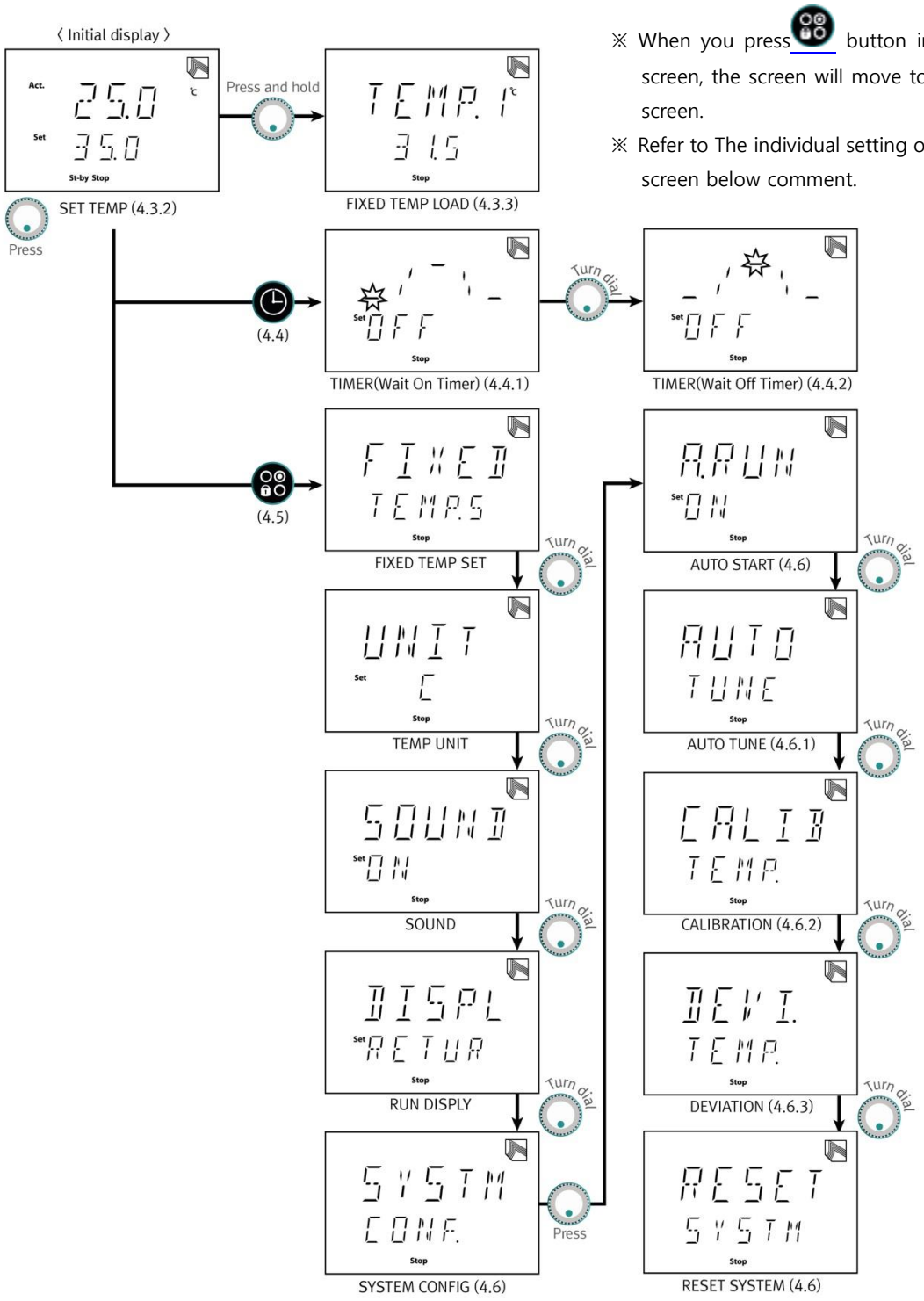
Bright VFD display with quick-adjustable dial knob and membrane buttons.



1	Status Display	Current status of the equipment is displayed. • Run: Running status • St-by: Stand-by status or indication during ON Timer • Stop: Stop status • Timer: Display timer state • Warning: Warning indication • hr/min: hour/minute indication • remain: remain time during timer ON

2	Logo(Lab Companion)	Brand logo. During computer interface communication, The logo flickers.
3	℃, ℉	Temperature units.
4	Actual Display	Present temperature. During setting menu, each menu is indicated instead of present temperature.
5	Heating Rate	Heating rate of the heater.
6	Set Display	Set temperature or menu setting value is indicated.
7	Pump Level	Pump level during operation.
8	Over temperature limiter	Extra over temperature limiter beside the temperature sensor which connected to the main controller. User can set the temperature limit.
9	Menu Button	* User can set the equipment's condition. * If you want to cancel any setting during temperature or menu setting, then press menu button. * If you push menu button for 3 seconds during operation, the controller can be locked or unlocked. (but, when controller locked status, stopping operation is possible.
10	Timer Button	Timer setting
11	Start/Stop Button	Start/stop operation.
12	Power Switch	Power ON/OFF
13	Dial Knob	* Turn Knob to increase or decrease value for setting. * User can turn knob during operation, to check the set value or remain time. * Turn Knob to search Menu. * Press knob and select menu. After changing the value, press knob to save it. * If you push knob long to load the saved temperature value.

4.2 Control structure



※ When you press button in each screen, the screen will move to initial screen.

※ Refer to The individual setting on each screen below comment.

4.3 Basic operation

4.3.1 Operation start

Turn on the green-color switch.

When the equipment is on, you can see the basic display for control the temperature.

4.3.2 Temperature control

(1) Start temperature control

STEP1. Press Start/Stop button when the equipment is stand-by.

STEP2. Start temperature control

(2) Stop temperature control

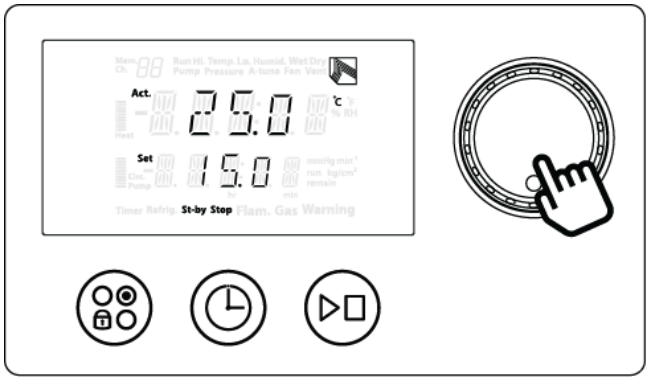
STEP1. Press Start/Stop when the equipment is running.

STEP2. Stop the equipment.

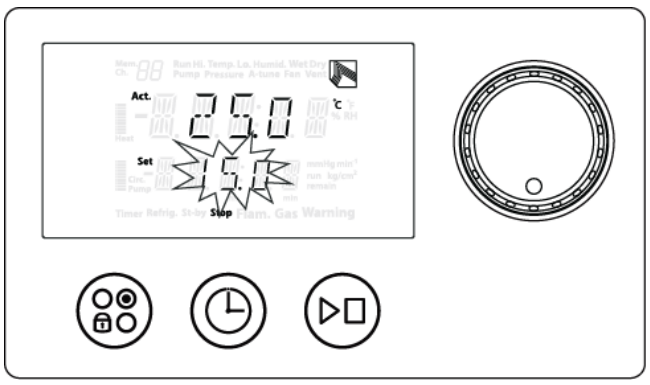
(3) Setting temperature

The method of setting temperature is as below.

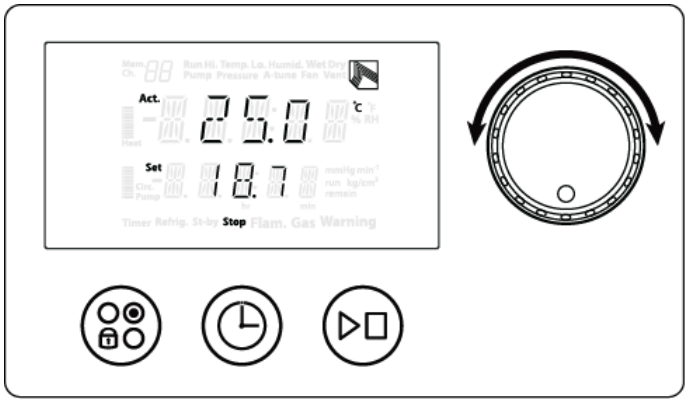
STEP1. Press the Dial Knob once.



The relevant value for setting blinks.



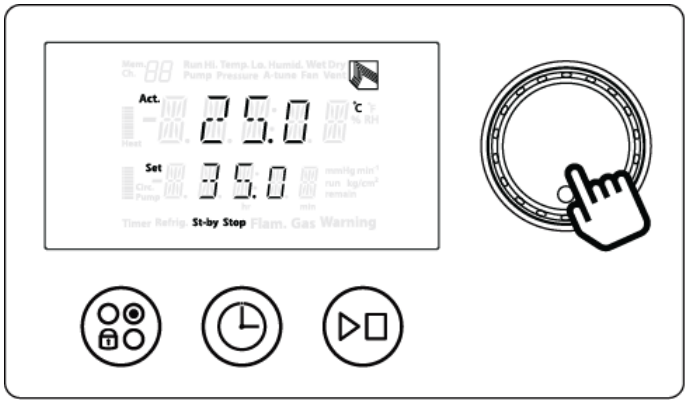
STEP2. Adjust the value with wheeling the Knob.



If there is no action of Knob for 3seconds, the value blinks again.

If there is no additional action of Knob for 20seconds, setting value will be canceled.

STEP3. Press the Knob. The equipment save the setting value.



NOTICE

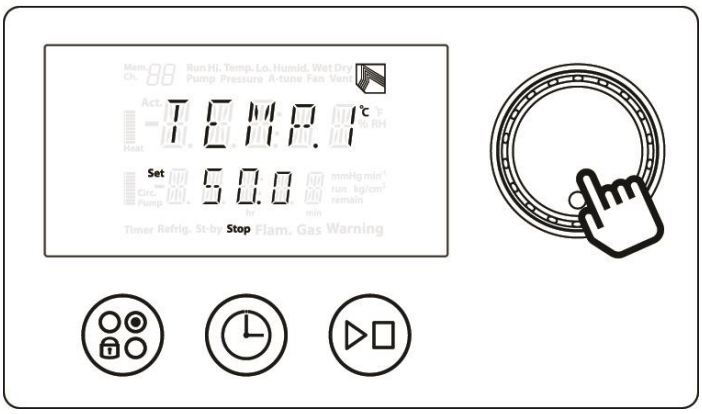
- If you want to cancel the setting during setting display, Press MENU to go back to previous stage.

4.3.3 SV storing function

The equipment has SV storing function up to 3 settings. Initial setup is 50, 80, 100℃.
To change the saved setting, go to 4.5 configuration of the equipment, Fixed temp. set menu.

(1) Press the knob for more than 3seconds.

(2) You can see 'TEMP1' on the display and saved temperature as below.



(3) Wheel the Knob toward right side, you can move on 'TEMP2', 'TEMP3', 'ESC' menu.

(4) Press the knob to select the saved setting. You can cancel the function choosing ESC.

(5) Press Start/Stop to run the equipment.

4.4 How to work a timer function

The equipment has 2 kinds of TIMER function which operates pressing TIMER button.

Wait On Timer : The equipment starts control the temperature after waiting for the set time.

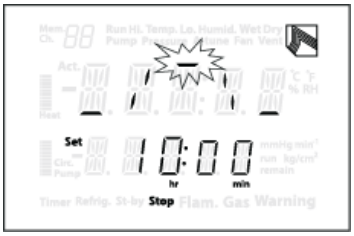
Wait Off Timer : The timer starts to run after the equipment reach the set temperature.
The equipment automatically stops after running for set time.

If the timer is set, you can see "timer" on your display.

4.4.1 Set-up the TIMER on

(1) Press Timer button once. You can see the timer value on the display.

(Wait On Timer)



(Wait Off Timer)

(2) Wheel the Knob to select the timer mode(Wait on, Wait off) and go to timer setting pressing the Knob.

(3) Choose "TIMER SET" to set the time..

(4) Press the knob after set the time.

(5) Change the minute value and press knob

(6) Go back to Stand-by display pressing TIMER button or wheel the knob to "ESC".

NOTICE

- If you change the timer setting, the equipment modify total running time after calculate pass-period. If you want to reset the timer, OFF the timer or stop the equipment at first.
- When the equipment is running, you can set Wait Off Timer only.

4.4.2 TIMER OFF

(1) Press TIMER once. You can see the timer set value on the display.

(2) Press Knob to modify timer set.

(3) Choose "TIMER OFF" and Press the Knob.

(4) Press TIMER or choose ESC to go back to Main display.

4.4.3 Timer end

(1) Alarm is on when Wait On timer ends.

(2) Alarm is on and you can see "TIMER END" on the display when 'Wait Off timer' ends. Press knob to check, and go to the main menu.

4.5 Configuration of the equipment

This function is for changing general configuration of the equipment.

Press MENU to set CONF. SET.

1	Pump Level	Adjust speed of pump
2	Fixed Temp Set	Set SV storing temperature.(maximum 3).
3	Temp Unit	Adjust mark of Celsius or Fahrenheit
4	Sound	Adjust mute in electronic sound of the equipment.
5	Run Display	Choosing status of display in wheeling the knob when the equipment is running. • **Return**: return to previous display after 3seconds. • **Fix:** fix the changed display • **Auto**: display in rotation for 3seconds each.
6	System Configuration	Adjust system configuration.

4.6 System configuration

The function adjust main setting which affects operation of the equipment. Be fully aware of this manual before adjust system configuration.

Pres MENU, choose CONF. SET and move to SYSTM CONF for setting.

1	Auto Start	Select availability of auto start function • when the power supply forcibly blocked and resolved, restore previous running status. (the equipment can't restore timer)
2	Auto Tune	Perform Auto Tuning in order to get precise and rapid temperature control. PID value is saved automatically after Auto Tuning.
3	Temp Calibration	Have calibration with the difference between user reference set value and performance value of sensor.
4	Temp Deviation	Adjust calibration tolerance and delay time between SV and PV. • Setting temperature: set Deviation Limit • Alarm Delay: when allowable tolerance exceed setting time, Deviation alarm is on.
5	Temp Limit	Lock the limit range of temperature which user uses frequently or range of temperature depending on solvent.
6	System Reset	Reset the parameters to beginning value.

4.6.1 Auto tune

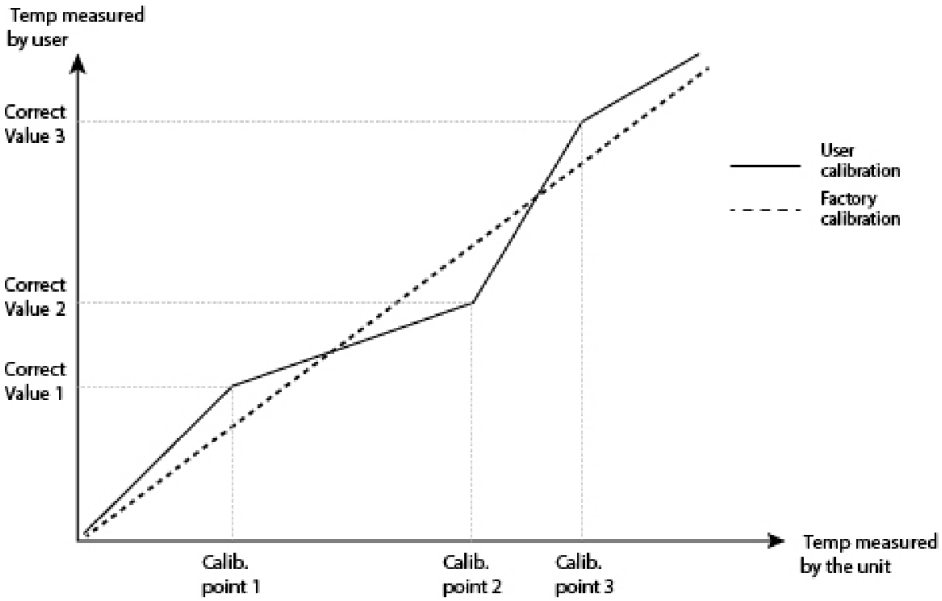
Updating parameters of temperature PID control will be activated. You can auto-tune the optimal temperature control at the main operating temperature. Every equipment is factory set to allow temperature control in the range of temperature control. If the equipment can't perform the proper temperature control, try Auto-tuning for better temperature control.

Referring the below process, you can proceed the optimization of PID control following temperature or using environment. Especially, following using environment(kinds of liquid type used inside of bath etc.), auto tuning value can be remembered, AT-1 ~ AT-3 each. Also they can be set as different temperature each. If you set any data on it, it operates with initial value.

Enter the Setting menu, and input your primarily using temperature.
Press the "Knob" to start the parameter tuning by input temperature value.
During the tuning, you can stop the tuning by pressing "Knob" or "Stop" button.
After tuning is complete, you can see "completion message" and save it by press the "Knob"

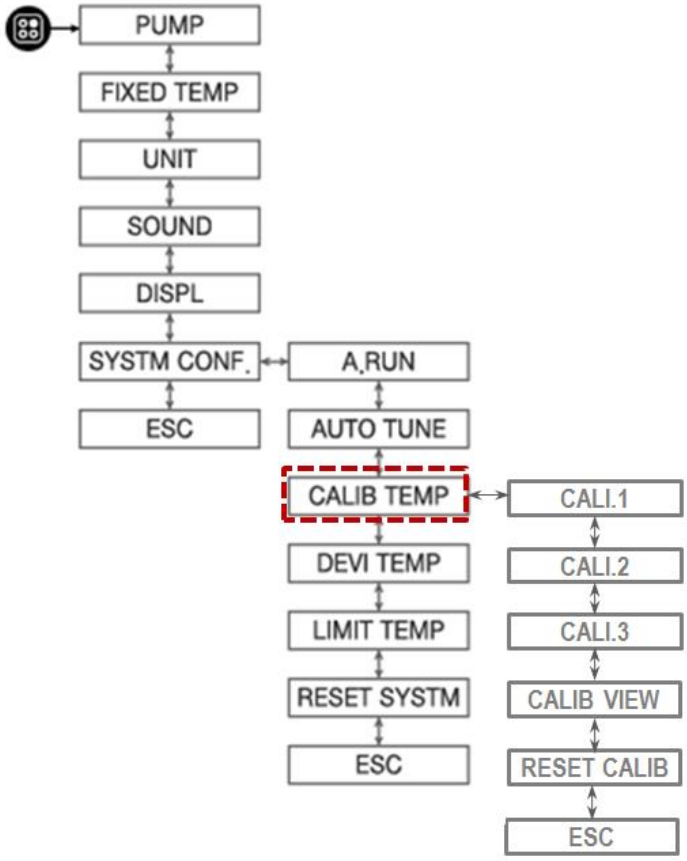
4.6.2 Temp calibration

You can calibrate the temperature sensor using this function. The equipment can tune the temperature with 3 measure point and user reference measurement.
You can check the value of temperature at this function. Choose the temperature point among the 3 points. Locate the user reference thermostat sensor.
Choose the calibration temperature the user wants and press Knob to run the equipment. Wait until Actual Temperature catch up with setting temperature. After that, press Knob to input the value of reference thermostat sensor. Press Knob to save and the equipment will follow the temperature of the reference sensor.

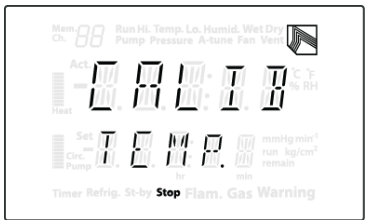


Go to the temperature calibration menu by following process;

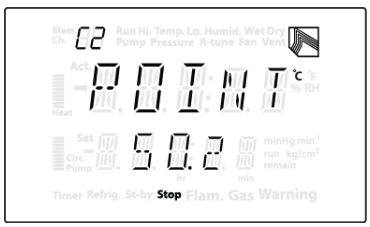
Use can calibrate he temperature deviation in 3 different points (CALI1, CALI2, CALI3)



(1) Enter the calibration menu by following process; Menu button> SYSTEM CONFI > CALIB TEMP

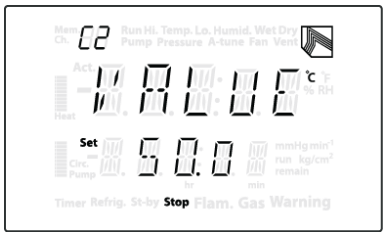


(2) To select between CALI 1 to 3 and calibrate the temperature deviation value by using control knob



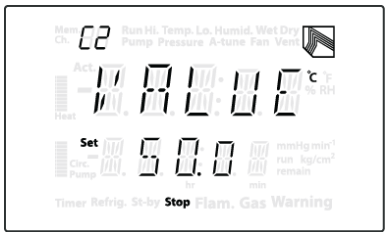
[In case of calibrate the CALI 2 point with adjust to the temperature 50.2℃]

(3) After the actual temperature is approached to set temperature, to put the value a calibrated temperature. (as shown below).



[In case of calibrate is 50℃]

(4) User can check the calibrated value by following process; Menu button >SYSTEM CONFI > CALIB TEMP > CALIB VIEW



[In CALI 2, Calibrated 50.0℃ the calibrated value 50.2℃]

(5) User can change to initial value by following process; Menu button > SYSTEM CONFI > CALIB TEMP > RESET CALIB.

(6) When you return to main screen;1) selected the ESC by turning the control knob. 2) Stay 20 sec. without any touch.

NOTICE

- If the error occurs such as exceed the range of over temperature during temperature control, the control stops.
- As the equipment calibrate the temperature in many points, if you input wrong adjustment, the equipment can't proceed the calibration.
- You can see the result of the calibration any time in CALIB VIEW. It displays C1, C2, C3for checking measure points. POINT represents measure points, VALUE represents the setting value of calibration.
- RESET CALIB can reset each Calibration.

4.6.3 Temp deviation

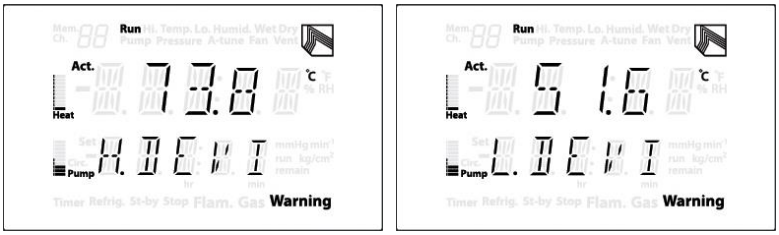
The equipment alarms for Deviation warning when the difference between SV and PV value is over allowable range. After the alarm, although the temperature restored to be normal, it takes time for end of Deviation alarm.

4.7 Warning and fault messages

The equipment has several functions that making the user to acknowledge the error on the equipment. This equipment can call attention by visual – audible alarm. This functions are divided into Warning and Fault based on seriousness of problem

4.7.1 Warning

In case of Warning, visual and audible alarm operated but the equipment keeps operating. If user presses Knob, alarm sound is stopped but the visual alarm is remained until problem is solved.

1	Temp Deviation	* This message is displayed if the difference between set-up temperature and actual temperature is over than a allowance error which is beyond alarm delay. * Warning is stopped if the actual temperature reaches the set-up temperature after sometime to approach a permissible range. 

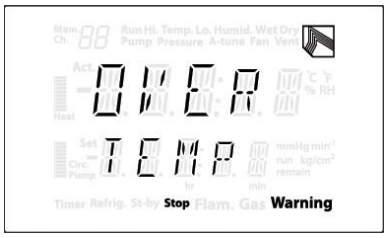
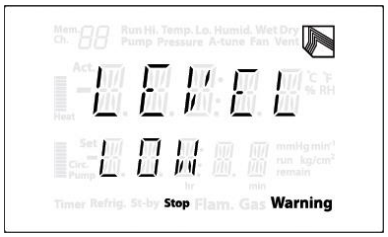
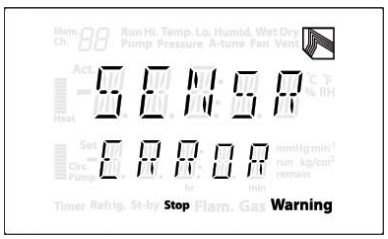
NOTICE

- In case of sound OFF in Configuration part, the sound alarm about WARNING is not operated.

4.7.2 Fault

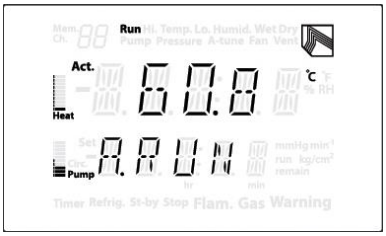
Fault is the very serious problem level to stop the equipment forcibly.

If user presses Knob, audible alarm is canceled but visual alarm is not canceled until the problem is solved. If the problem is not fixed after some time, the audible alarm is operated again and the shaking operation is stopped to protect shaking system.

1	Over temperature	This message is displayed when the over temperature sensor is on. The actual temperature is out of range of setting value of over temperature sensor. The equipment stops to protect the equipment and solvents. Check the setting value of over temperature sensor. 
2	Low Level	The water-lever sensor is operated when the water level is low. The equipment stops running and alarm is on. You can re-activate the equipment pressing Start/Stop button after refill the solution. 
3	Sensor Fault	The temperature sensor has error. The equipment stops and the user should check the sensor. 

4.7.3 Other messages

When the user press the Knob, the equipment recognizes the user checked the status. The visual alarm is turned off and move to main display.

1	Auto Start	During operation, Forced power OFF or ON In configuration, if A.RUN Set-up value is ON "A.RUN" displayed. If OFF, "PWR.F"displayed  

5.0 Maintenance

5.1 Maintenance period

Classification	Period	
	Daily	Weekly
Connection between equipment and power	●	
Exterior cleanliness	●	
Damage and cleanness of inside of the bath		●
Cleanness of surface of the equipment and accessories.		●
Check defects of Start/Stop button and Dial knob		●
Check Over Temperature limiter	●	
Check Low fluid level alarm		●
Connection between the equipment and accessories.		●

5.2 Cleanness

The equipment maintains the best condition and operates with full efficiency and extend the life expectancy, only satisfied with periodical cleaning. We suggest that checking cleanliness every day, cleaning the chamber once a week, cleaning the surface of the equipment once a month. And immediate cleaning is required when the equipment is contaminated.

5.2.1 Cleaning the equipment

Unplug the power cord and discharge the thermal liquid clean it with soft and dry towel. Rub the unremoved part, using alcohol solvent (methanol, ethanol) with towel.

⚠ CAUTION

- Do not pour the water on the outside of the equipment (especially Control Panel),
  The water could cause short-circuit problem and etc.

- Be caution on the damage of parts inside of chamber and system.

- Do not use acid liquid, benzene, sharp stuff, soap water, cleaner, and hot water. It causes color change or damage on the equipment surface. Rubber and plastics parts could be changed in color, shape, and feature. Especially do not use the volatile materials. Use the neutral detergent only with towel. And dry it completely.

- Clean up the inside of chamber with dry towel and wear toxic free glove and mask, when the toxic chemical material or gas generated in inside of chamber.

- In the case of clean up the equipment using the method that different form manual,
  contact to the manufacturer and confirm whether the method damage the equipment or not.

5.2.2 Accessories

(1) Check the foreign substance and put the accessories in the neutral detergent.

(2) Clean it with distilled water.

(3) Store it after dry the equipment completely.

5.3 Moving the placement of the equipment

(1) Unplug the power cord.

(2) Discharge all the thermal fluid in the bath.

(3) Pack the equipment and accessories as initial packing. Or pack it to prevent damage during the move.

⚠ CAUTION

- Do not move the equipment in plugged.
- Do not make mechanical shock or vibration on the equipment.
- It could cause problem on the later use because of the inner damage

5.4 Storage

In the case of no long time use

(1) Unplug the power cord.

(2) Clean up the equipment with dry towel.

(3) Pack it and place it in the dry area.

5.5 Replacement of fuse

The fuse be shorten and the equipment turned off when the overcurrent occur on the equipment.

Then replace the fuse refer to below procedure. (Two fuse is included in the manual pocket.).

⚠ WARNING

Must turn off the power and check the power connection before replacing the fuse. In the case of the power is on, there could be severe injury and lead death.

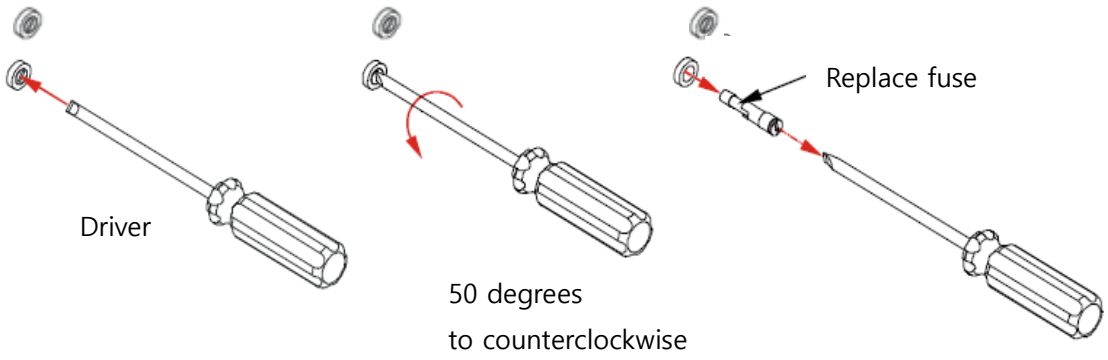
5.5.1 Main fuse

(1) Turn off the power pushing the power switch.

(2) Insert "-" driver into the fuse holder. The fuse holder is separated when the driver move the holder 50 degrees to counterclockwise. [Refer to 2.3 (13) Fuse Holder]

(3) Replace the shorted fuse into spare fuse.

(4) Implement step (2) reversely and complete the replacement



5.5.2 Controller fuse

(1) Turn off the power pushing the power switch.

(2) Insert "-" driver into the fuse holder. The fuse holder is separated when the driver move the holder 50 degrees to counterclockwise. [Refer to 2.3 (13) Fuse Holder]

(3) Replace the shorted fuse into spare fuse.

(4) Implement step (2) reversely and complete the replacement

6.0 Trouble shooting

6.1 Instruction on problem

Check the below statement and take action according to the instruction.

If the unindicated problems arise or you cannot solve the problem with the instruction, Contact to Jeio Tech Service part and solve the problem.

In the case of no operation of the equipment.

(1) Check the power.

(2) Check the Fuse.

(3) Check if the Lock button is on

(4) Check the black out

6.2 Power

Problem	Cause	Instruction
No power on	• Power supplied with wrong voltage and hertz	• Check the voltage, phase and hertz.
	• Circuit breaker going down and black out	• Find the leakage
	• The power cord inserted not perfectly	• Insert the cord perfectly
	• Damage on consent, plug, cable	• Replace the damaged consent, plug and cable.
	• Fuse short circuit	• Replace the fuse
	• Inner circuit damage	• Ask service
Circuit breaker is shorten constantely	• Too many cord plugged	• Remove all the plugs inserted and use the consent in the allowed current volume.
	• Inner circuit damage	• Ask service
Power on but, no operation	• Over heating causes protection system and cut off the power.	• Once over heating generated on the inner circuit, the equipment off the heater power and make alarm noise. • Unpug the cord and cool it down, restart the equipment.
	• Inner circuit damage	• Ask service

6.3 Problem generating during the operation

Problem	Cause	Instruction
Alarming continuosely	• Shortage of thermal liquid • Problem on the setting temp of Over temp. Limiter	• Check the Door sign on the screen and make sure the door close. • Set the Over temp. Limiter to the value of 15% increasing
No temp increasing	• No operation	• Touch Start to operate the equipment
No temp control	• Check the existence of equipment that generating high frequency noise near the equipment. • No operation of Auto tuning • Malfuction of temp. sensor • Inflow of the foreign substance or oil	• Remove the equipment that generating high frequency noise near the equipment. • Operate Auto tuning • Ask service
No thermal liquid circulation in the bath	• Set the pump circulation amount as '0' • Pump problem	• Check the pump circulation amount and put 1~5 • Ask Service
Problem of dial nob	• Nob problem	• Pull out the nob and put it again. • Check the Lock funtion • Ask service

※ Use the original parts for the replacement.

※ Technical maintenance cannot be implemented on the problem of the out of technical limits.

7.0 Accessories

7.1 Accessories

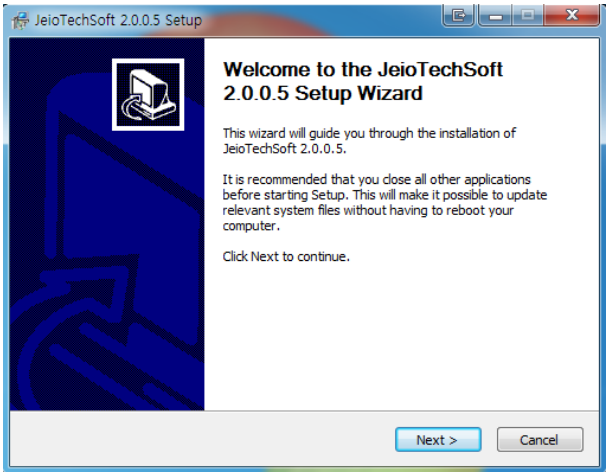
Designation	Cat. No.	Description
Spring wire rack	AAA51522	CW3-20 (185(W) x 159(D) x 170(H), mm)
	AAA51523	CW3-30 (249(W) x 219(D) x 198(H), mm)
Test tube rack	AAA44581	CW3-20, CW3-30 (for 86 test tubes, 8mm dia., 2ea)
	AAA44582	CW3-20, CW3-30 (for 86 test tubes, 10mm dia., 2ea)
	AAA44583	CW3-20, CW3-30 (for 58 test tubes, 12mm dia., 2ea)
	AAA44585	CW3-20, CW3-30 (for 32 test tubes, 16mm dia., 2ea)
	AAA44586	CW3-20, CW3-30 (for 19 test tubes, 25mm dia., 2ea)
	AAA41531	CW3-10 (for 50 test tubes, 8mm dia., 1ea)
	AAA41532	CW3-10 (for 50 test tubes, 10mm dia., 1ea)
	AAA41533	CW3-10 (for 33 test tubes, 12mm dia., 1ea)
	AAA41535	CW3-10 (for 16 test tubes, 16mm dia., 1ea)
	AAA41539	CW3-10 (for 10 test tubes, 25mm dia., 1ea)
Stainless steel cover	AAA51531	CW3-05
	AAA51532	CW3-10
	AAA51533	CW3-20
	AAA51534	CW3-30

※ Regarding changing the accessories, please visit our webpage (http://www.labcompanion.com), or contact to JeioTech sales department or the dealer.

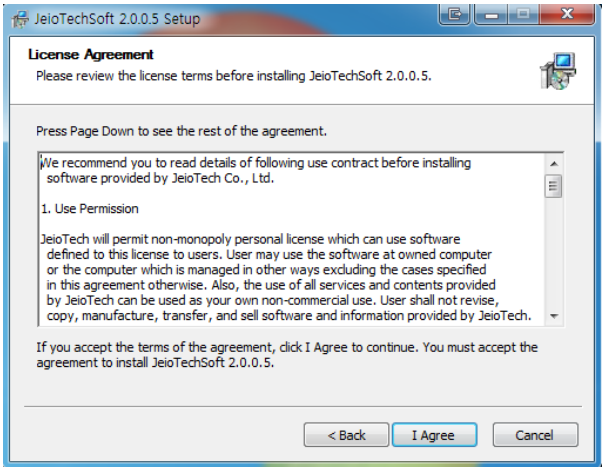
8.0 Dedicated S/W

8.1 Monitoring program installation

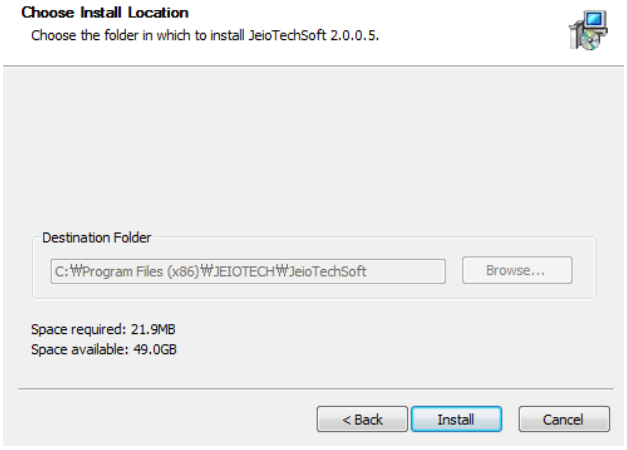
(1) The software is automatically installed. When user put the "Next" button, the screen showed "License Agreement" page.



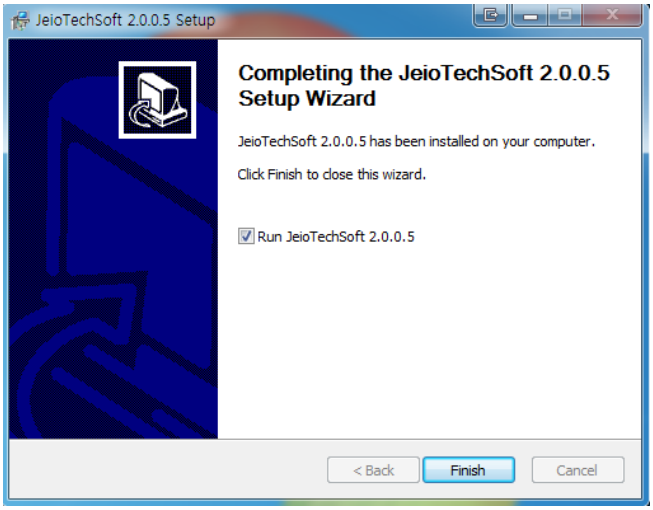
(2) Please consider and carefully read "License" contents before install the JeioTechSoft.



(3) Set the software install location. And press the "Install" button.



(4) After install the software, you can see the "JeioTechSoft" icon on computer main screen.



NOTICE

- In case of JeioTechSoft program operating by connecting of RS-232 port, user can set the temperature, timer, and Pump circulation level by keyboard number keypad or arrow key ↑ ↓. Also in case of enter the "." place, you can use arrow key ← or → to move.
- In case of press the keyboard Delete key, the enter value will input "0".
- In case of user enter value greater than possible input value, the value will be entered maximum possible input value.

8.2 Communication protocol

It is possible to communication from this equipment to external device by RS-232C port. Providing JeioTech software can be supported the both way communication, check the operating status, data recording, and data saving.
In addition, if you want to modify the software, please refer below communication protocol and communication reference.

Communication Reference :
http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf

8.2.1 Physical layer

- Communication port : RS-232C

8.2.2 System number for each model

Item	System number	System	Model name
CW3	2111H	Circulator	CW3-05
	2112H	Circulator	CW3-10
	2113H	Circulator	CW3-20
	2114H	Circulator	CW3-30

8.2.3 Modbus protocol address definition

Modbus function code	Address	Command	Data	Description	Data length	
					word	byte
W/S	1	Beep	0x0001	BEEP_SYS_BOOT (for communication test)	1	2
			0x0002	BEEP_KEY(for communication test)	1	2
R/I	2	MOD_SYS_NAME	X	Equipment name	1	2
R/I	3	MOD_SYS_VER	x	Firmware Version	1	2
W/S, R/I	5	MOD_AUTO_RUN	0/1	auto run	1	2
R/I, W/M	981	MOD_MAN_SV_SET	low temp lmt /high temp lmt	manual mode set value read/set	4	8
R/I, W/M	985	MOD_MAN_ON_TIME	60L ~ 3599940L	manual mode wait on time read/set	2	4
R/I, W/M	987	MOD_MAN_OFF_TIME	60L ~ 3599940L	manual mode wait off time read/set	2	4
W/S	989	MOD_MAN_ONT_O	1/0	manual mode wait on	1	2

		NOFF		time on/off		
W/S	990	MOD_MAN_OFFT_ONOFF	1/0	manual mode wait off time on/off	1	2
W/S	993	MOD_SYS_RUN_STOP	1/0	system operation start/stop	1	2
R/I	994	MOD_REPORT	X	system report	25	50
R/I	1031	MOD_SYS_TEMP_LMT	X	system temp limit	8	16
R/I, W/M	1040	MOD_DEVI_TEMP_SET	low temp lmt /high temp lmt	system deviation temperatrue range	4	8
R/I, W/M	1044	MOD_DEVI_TIME_SET	0 ~ 3599L	system deviation time set	2	4

8.2.4 Modbus Protocol description

Command	Description		
Beep	Buzzer sounds	Modbus function code	0
		W.S	Data

Write data	1	System boot beep
	2	System key beep

MOD_SYS_NAME	Returns the equipment name. Refer, System number	Modbus function code	0
		R.I	address

Return data	0	
	Upper	Lower
	Model num	

MOD_SYS_VER	Returns the firmware version.	Modbus function code	0
		R.I	address

Return data	0	
	Upper	Lower
	version	

MOD_FAN_SPEED	Fan speed setting	Modbus function code	0
		R.I	address
		Modbus function code	0
		W.S	data

Return data	0	
	upper	Lower
	Fan speed	
R/W data	0~5	
	0 : stop 5 : Max	

MOD_AUTO_RUN	Auto run setting during power outage	Modbus function code	0
		R.I	address
		Modbus function code	0
		W.S	data

Return data	0	
	upper	Lower
	Auto run flag	
R/W data	0	Auto run off
	1	Auto run on

MOD_OFFSET_VALUE	System offset point/value	Modbus function code	0	Return data	0~3	4~7	8~11
		R.I	Address		Offset P1	Offset v1	Offset P2
					12~15	16~19	20~23
					Offset v2	Offset p3	Offsest v3

Modbus function code	4	4	4	4	4	4
W.M	Offset p1	Offset v1	Offset p2	Offset v2	Offset p3	Offset v3

MOD_OFFSET_P1	Offset1 point value (double)	Modbus function code	4	W data	The value which is between the upper and lower limit value of equipment
		W.M	data		
MOD_OFFSET_P2	Offset2 point value (double)	Modbus function code	4	W data	The value which is between the upper and lower limit value of equipment
		W.M	data		
MOD_OFFSET_P3	Offset3 point value (double)	Modbus function code	4	W data	The value which is between the upper and lower limit value of equipment
		W.M	data		
MOD_OFFSET_V1	Offset1 user set value (double)	Modbus function code	4	W data	The value which is between the upper and lower limit value of equipment
		W.M	data		
MOD_OFFSET_V2	Offset2 user set value (double)	Modbus function code	4	W data	The value which is between the upper and lower limit value of equipment
		W.M	data		
MOD_OFFSET_V3	Offset3 user set value (double)	Modbus function code	4	W data	The value which is between the upper and lower limit value of equipment
		W.M	data		

MOD_DIO_DO1	DO1 data	Modbus function code	0	Return data	0	1~4	5~8	9	10~13
		R.I	address		type	X1	X2	Delay time	Dead zone
		Modbus function	0	1~4	5~8	9	10~13		

		code					
		W.M	type	X1	X2	Delay time	Dead zone

MOD_DIO_DO2	DO2 data	Modbus function code	0		Return data	0	1~4	5~8	9	10~13
		R.I	address			type	X1	X2	Delay time	Dead zone

		Modbus function code	0	1~4	5~8	9	10~13
		W.M	type	X1	X2	Delay time	Dead zone

MOD_DIO_DO3	DO3 data	Modbus function code	0		Return data	0	1~4	5~8	9	10~13
		R.I	address			type	X1	X2	Delay time	Dead zone

		Modbus function code	0	1~4	5~8	9	10~13
		W.M	type	X1	X2	Delay time	Dead zone

MOD_DIO_DI1	DI1 data	Modbus function code	0		Return data	0	1
		R.I	address			type	Delay time

		Modbus function code	0	1
		W.M	type	Delay time

MOD_DIO_DI2	DI2 data	Modbus function code	0		Return data	0	1
		R.I	address			type	Delay time

		Modbus function code	0	1
		W.M	type	Delay time

Type		0~10
X1, X2	Type 0~5	The upper and lower limit value of equipment
	Type 6	1~4
	Type 7	1~2
Delay time		0~59:59(mm:ss)
Dead zone		The upper and lower limit value of equipment

Type	0~2
Delay time	0~59:59(mm:ss)

MOD_PROG_PTN 1~10	Pattern data 1~10	Modbus function code		0					
		R.I		address					
		Return data	0	1	2	3~6	7~10	11~12	13
			Ptn link	Ptn start seg	Ptn end seg	SSP	Wait zone	Wait time	Rpt cycle
			14	15	16~19	20~21	22	23~26	27~28
			Rpt start seg	Rpt end seg	Seg1 temp	Seg1 time	Seg1 tevent	Seg2 temp	Seg2 time
			29	30~33	34~35	36	37~40	41~42	43
			Seg2 tevent	Seg3 temp	Seg3 time	Seg3 tevent	Seg4 temp	Seg4 time	Seg4 tevent
			44~47	48~49	50	51~54	55~56	57	58~61
			Seg5 temp	Seg5 time	Seg5 tevent	Seg6 temp	Seg6 time	Seg6 tevent	Seg7 temp
			62~63	64	65~68	69~70	71	72~75	76~77
			Seg7 time	Seg7 tevent	Seg8 temp	Seg8 time	Seg8 tevent	Seg9 temp	Seg9 time
			78	79~82	83~84	85			
			Seg9 tevent	Seg10 temp	Seg10 time	Seg10 tevent			
		Modbus function code	0	1	2	3~6	7~10	11~12	13
			Ptn link	Ptn start	Ptn end seg	SSP	Wait zone	Wait time	Rpt cycle
			14	15	16~19	20~21	22	23~26	27~28
			Rpt start seg	Rpt end seg	Seg1 temp	Seg1 time	Seg1 tevent	Seg2 temp	Seg2 time
			29	30~33	34~35	36	37~40	41~42	43
			Seg2 tevent	Seg3 temp	Seg3 time	Seg3 tevent	Seg4 temp	Seg4 time	Seg4 tevent
			44~47	48~49	50	51~41	55~56	57	58~61

	Seg5 temp	Seg5 time	Seg5 tevent	Seg6 temp	Seg6 time	Seg6 tevent	Seg7 temp
	62~63	64	65~68	69~70	71	72~75	76~77
	Seg7 time	Seg7 tevent	Seg8 temp	Seg8 time	Seg8 tevent	Seg9 temp	Seg9 time
	78	79~82	83~84	85	86		
	Seg9 tevent	Seg10 temp	Seg10 time	Seg10 tevent	Pump		

Link	0 : stop	Rpt cycle	100: Infinite loop
	11 : continue		1~99:Repeat settings (0:No repeat)
	1~10 : link number	Rpt start seg	1 ~ end seg
End seg	1~10	Rpt end seg	Rpt start seg ~ end seg
End seg	1~10	Seg temp	The upper and lower limit value
SSP	The value setting during input the upper and lower limit value	Seg time	0~359940L(Unit/ 1 min.)
	Current value setting beyond the upper and lower limit value range.	Seg tevent	1~4
Wait zone	The upper and lower limit value		
Wait time	0~359940L(Unit/ 1 min.)		

MOD_TIME_ EVENT1~4	Time event data 1~4	Modbus function code	0	Return data	0	1~2	3~4
		R.I	Address		Sequence	On time	Off time

Modbus function code	0	1~2	3~4
W.M	Sequence	On time	Off time

Sequence	0	on→off
	1	off→on
On time	0~359940L (Unit/ 1 min.)	
Off time	1~3.59940L (Unit/ 1 min.)	

MOD_SET_PTN	Program pattern set	Modbus function code	0	Ptn num	0~10
		W.S	Ptn num		

MOD_MAN_SV_SET	SV value set	Modbus function code	0	Return data	4
		R.I	address		SV
		Modbus function code	4	Value	The equipment upper and lower limit value
		W.M	value		

MOD_MAN_ON_TIME	Wait on timer set	Modbus function code	0	Return data	2
		R.I	address		On timer
		Modbus function code	2	Value	0~359940L(Unit/ 1 min.)
		W.M	value		

MOD_MAN_OFF_TIME	Wait off timer set	Modbus function code	0	Return data	2
		R.I	address		Off timer
		Modbus function code	2	Value	0~359940L(Unit/ 1 min.)
		W.M	value		

MOD_MAN_ONT_ONOFF	Wait on timer on/off set	Modbus function code	0	Data	0 : wait on timer off
		W.S	data		1 : wait on timer on

MOD_MAN_OFFT_ONOFF	Wait off timer on/off set	Modbus function code	0	Data	0 : wait off timer off
		W.S	data		1 : wait off timer on

MOD_MAN_ATUNE	Auto tune on/off set	Modbus function code	0	Data	0 : auto tune off
		W.S	data		1 : auto tune on

MOD/SCR/CHANGE	Screen change	Modbus function code	0	Data	0 : scr home
		W.S	data		1 : scr program
					2 : scr manual

MOD_SYS_RUN_STOP	System operation set	Modbus function code	0	Data	0 : system stop
		W.S	data		1 : system start

MOD_MAN_MODE_REPORT	Manual mode report	Modbus function code	0
		R.I	Address

		Return data	0~3	4~7	8	9		10~11
			SV	PV	Heat ratio	Act timer		Set time
			12~13	14	15	16	17	18~24
			Remain time	Dio status	System indicate	T_progress	Pump	dummy
	Dio status	1 byte	MSB					
			Dummy	Dummy	Di2	Di1		Dummy
					LSB			
			Do3	Do2	Do1			
	System indicate	2byte	MSB					
			System mode		Hold	Otp_warn	Door	Operation
			Prog	Man	Step hold	Over temp warning	Door warning	System operation
			Wait time	Time event	Otp	level	Door	Refrig
			Prog time wait	Time event set	Otp		Door open	
						LSB		
			Woff	Won	Atune	Key_lock		
			Wait off set	Wait on set	Atune set	Key lock set		
			Temp progress	None	0			
				Up	1			
				Down	2			
				Keep	3			

MOD_PROG_MODE_REPORT	Program mode report	Modbus function code		0				
		R.I		Address				
	Return data	0	1	2	3	4~7	8~11	12~15
		Ptn num	Ptn cycle	Act cycle	Act set	SV	Ramp value	PV
		16	17~18	19~20	21	22	23	24

		Heat ratio	Act time	Elapsed time	Dio status	System indicate	T_progress	Pump

Dio status	1byte	MSB					
		Dummy	Dummy	Di2	Di1	Dummy	Do3
			LSB				
		Do2	Do1				

Temp progress	None	0
	Up	1
	Down	2
	Keep	3

System indicate	2byte	MSB						
		Mode	Sensor err	Hold	Otp_warn	Door/warn	Operation	
		Prog	Sensor	Step hold	Over temp warning	Door warning	System operation	
		Wait_ time	Time event	Otp	level	Door	refrig	Woff	Won
		Prog time wait	Time event set	otp		Door open		Wait off set	Wait on set
			LSB					
		Atune	Key_lock					
		Atune set	Key lock set					

MOD_PROG_TIME_INFO	Program time information	Mod function code		0			
		R.I		address			
		Return data	0~1	2~3	4~5	6~7	8~9
			Remain time	Elapsed time	Total time	Delay time	Skip time

MOD_SYS_TEMP_LMT	System temp limit	Mod function code	0	
		R.I	address	
		Return data	0~3	4~7
			High temp limit	Low temp limit

8.2.5 Decimal point setting and read

Decimal point read	Decimal point write

typedef union DOUBLE_2_INT_8_BYTE
{
double dData;
unsigned char cData[8];
}D2I_DOUBLETYPE_PACKET;
 	
D2I_DOUBLETYPE_PACKET d2i_packet;
 	
memcpy(d2i_packet.cData, sData, 8); // sData(read buffer)
double dSV = d2i_packet.dData;
	D2I_DOUBLETYPE_PACKET d2i_packet;
	d2i_packet.dData = dValue;
	
	for(int i = 0; i < 8; i++)
	{
	packetBuffer[i] = d2i_packet.cData[i];
	// packetBuffer (send buffer)
	}

※ Caution : During the input register address, transfer adding -1 from specified address.
EX.) During the RUB/STOP Addr Address (5504) setting and reading, transfer and include 5503.

Serial communication setting
BaudRate : 9600bsp
ByteSize : 8
Parity : No parity
Stop Bits : 1

9.0 Appendix

9.1 Technical specification

Item / Model		CW3-05	CW3-10	CW3-20	CW3-30
Bath volume (L/cu ft)		5.0/0.2	10.0/0.4	20.0/0.7	30.0/1.1
Temp.	Range (℃/℉)	Amb.+5~ 150/ Amb.+9~ 302			
	Accuracy (0℃, at 50℃/℉)	0.05/0.09			0.08/0.14
	Uniformity (℃, at 50℃/℉)	±0.1			
	Heat up time to 70℃ (min)	24	31	43	55
	Controller	Microprocessor PID			
	Sensor	PT 100Ω			
Controller functions		Auto tuning, 3-point temp. calibration, Wait on / off timer (99hr 59min), Auto-run, Pump speed,			
Safety		CLS(Custom Logical Safe) – control system, IEC protection Class Ⅱ, Over temp. limit, Low fluid level alarm			
Control panel		VFD, 3buttons, 1dial knob			
Interface		RS-232C, USB			
Material	Internal	Stainless steel, 1.0t, Cubic type			
	External	Steel, 1.2t, double painted and baked			
Dimension	Bath (W x L x D, mm/inch)	150 x 99, 160/ 5.9 x 3.9, 6.3	211 x 154, 180/8.3 x 6.1, 7.1	290 x 214, 200/11.4 x 8.4, 7.9	300 x 264, 230/11.8x 10.4, 9
	Overall (W x D x H, mm/inch)	228 x 395 x 424 /9.0 x 15.6, 16.7	289 x 450 x 444 /11.4 x 17.7, 17.5	368 x 510 x 464 /14.5 x 20.1, 18.3	378 x 560 x 494 /14.9 x 22,19.4
	Weight (kg/lbs)	12.5/27.6	15/33.1	17.5/38.6	19.5/43
Pump	Step	1	2	3	4	5
	Flow rate (l/min)	5.6	8	12.8	18.8	28
	Height (m)	0.35	0.75	1.7	3.5	4.2
	Material	Stainless steel mold pump				
	In / out (mm)	12.7				
Electric requirements (230V,50/60Hz)		8.5A	8.5A	8.5A	8.5A	
Electric requirements (120V,60Hz)		8.6 A	8.6A	8.6 A	8.6A	

※ the standard value is recorded by 25℃, 60%R.H. conditions, If the data did not mention specifically checking condition.

※ Above spec. could be changed without prior notice.

9.2 Product Disposal

Before disposing of the incubated shaker or any of its components:

1. The product should be cleaned and decontaminated to protect workers servicing the product, the environment or the public purchasing surplus public purchasing surplus equipment because the product can because the product can potentially be contaminated with biological material, chemicals or radioisotopes. Check with your institution or laboratory for individual policies and procedures for disposal of laboratory Equipment.

2. Please contact your local governing body for regulations regarding disposal of electrical, electronic, metal (brass, aluminum, steel and stainless steel), refrigeration and rubber components. Jeio Tech recommends the user find a local scavenger or laboratory equipment recycler to properly dispose of the product and its components.

9.3 Warranty

9.3.1 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.

- Date of purchase:
- Customer name / address / phone number / E-mail:
- Fault status
- Model
- Serial number

9.3.2 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

9.3.3 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.

- 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.