

# **OPERATION MANUAL**

## **Shaking Water Bath**

**(Model : BS-06/11/21/31)**

**Manual No. : 00HAA0001152**



**Thank you for purchasing our products.**

**We always try to satisfy the customer.**

**We focus on the production and marketing of laboratory and scientific instruments, has produced these products with a state-of-the-art technology and new materials.**

---

**This operation manual describes the functions of the unit and key points that you have to keep in mind when you operate it.**

**Please be sure to read through this manual for an effective and utmost use of the unit before operating this instrument.**

## CONTENTS

1.	Application and Features	.....	4
2.	Installation precaution	.....	6
3.	Name of the parts and its operation	.....	8
4.	Operation	.....	12
5.	Maintenance	.....	16
6.	Causes of malfunction and its repairs	.....	17
7.	Warranty	.....	18
8.	Specification	.....	19
9.	Circuit Diagram	.....	20
10.	Exploded View / Parts List	.....	21

## **1. Application and Features**

**This multi-purpose Water Bath can be used at various fields such as pharmacy, medical science, chemistry, biology, etc. We have succeeded in realizing CLS (Custom Logical Safe)-Control System that is designed for the convenience and safety for user.**

### **Definition of CLS-Control System**

**The meaning is that adjustable device with logical safety mechanism just for specific equipment. The system is for safe operation of heating-type equipment under circumstance (for example, laboratories with flammable substances) that needs perfect thermal safety. The logic and construction of the safety device is the highest level and is designed by our accumulated technology. (Patent application)**

### **Functions of CLS – Control System**

**It consists of two parts that are Micro Processor (CPU) and Logic IC. Micro Processor (CPU) has PID control function; therefore CPU performs control of temperature and heating.**

**Logic IC is designed to operate ahead of CPU function. The IC controls all safety devices; therefore operating of safety devices perfectly works against any electrical and electronic shocks.**

**If once a safety device works, the power through parts of the unit shuts down immediately and the system lets the user recognize the defect components by alarming a certain sound or indicator.**

**Until user fixes (a) defect(s), the unit remains under a safe condition that is no power.**

**For additional convenience, there are two functions.**

**They are Wait Off Timer function and Wait On Timer function. The former stops unit's running automatically after the unit works for a setting time and the latter one restarts the unit after the unit is paused for a setting time.**

**The system has selective re-running function that you can choose.**

**One (AUTO RUN) is that you can let the unit re-work after power recovery or the other (MANUAL RUN) that you can prohibit the unit from re-work after power recovery.**

**Only 5V, 10mA passes between contact points of the safety device; therefore, the endurance lasts long because the contact points are merely damaged even though the unit continuously operates for a long period.**

**The sequence of the system is the following;**

**If once the safety device works, the system stops Thyristor that controls current flow of high-capacity heater. The next step is that separation of the contact points of Magnet Switch makes the power shut off, and therefore the mechanism prevents damage of contact points of the Magnetic Switch and creation of Noise.**

**When you start operating the unit, the system performs counter-sequence, and therefore damage of contact points of Magnet Switch and creation of Noise are prevented.**

## 2. Installation precaution

- 1) Please, find following items after opening the pack.

Main body, 1 Operation Manual, 2 Fuses

- 2) Be careful of carrying the unit because it is heavy.

You should use tools such as carrier, or two persons should carry it.

- 3) Caution



You should plug the power cord into a grounded socket during installation and operating of the unit.

- 4) The socket-outlet shall be installed near the equipment and shall be easily accessible.
- 5) You should check the electricity in accordance with the ID label. When you connect the plug to mains supply, please, check there is grounding. If it is impossible, please, find proper metal that is stuck on the building (except water pipe, gas pipe), and earth the unit on it by using over 2mm<sup>2</sup> thick wire.
- 6) Only those heat transfer liquids shall be considered suitable which are non-flammable or whose flash point is above 40°C and which can be pumped under 20°C. When user uses flammable heat transfer liquids whose flash points are higher than 40°C, the liquids must not be heated to more than 5°C below their flash points for safety.

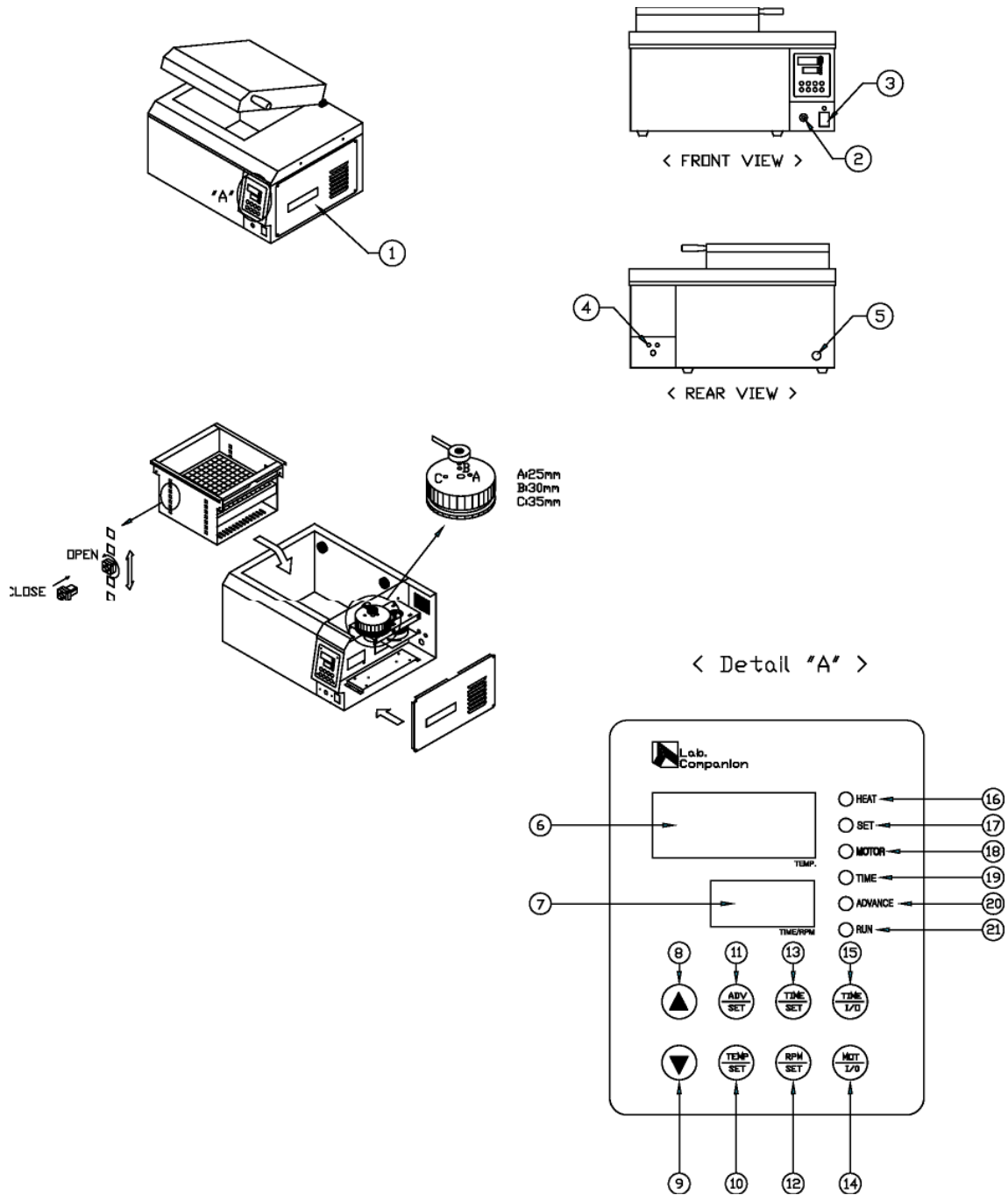
### **WARNING**

- Please, check rated electricity before operating the unit.
- Please, check the socket that has grounding or not.
- Heat transfer liquid must be used lower than flash point by 5°C at least.

- 7) Do not expose the unit to a direct ray, and keep the unit away from high heating sources like a heater or a stove. Keep the unit under ambient temperature 5°C~ 40°C and below 80% RH condition.
- 8) Do not install the unit where flammable gas, organic solvents, or explosive risks are. Keep the unit away from flammable substances.
- 9) Do not put the unit around equipment that generates strong high-frequency noise.
- 10) Put the unit on the flat and rigid place that has no risks of vibration or crash. If the unit must be placed on rough surface, please, regulate the foot.
- 11) Protect the control box from inflow of moisture, organic solvents, dust, or corrosives.
- 12) Do not touch or change the sample in the bath while the unit is being operated. User's finger or cloth may be put in between Shaking Rack and Bath.

☞NOTE : If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

### 3. Name of the parts and its operation



#### 1) Control Box

Consisted of micro controller, heater, temperature sensor and motor for accurate temperature controlling and shaking.



## 2) Over-temp. Protector

This is a safety device that is consisted of an independent circuit. When the heater is overheated abnormally over the set temperature, this safety device will cut off the power supply automatically with buzzer ringing and display of “oVEr” (over) on Display.

## 3) START / STOP Switch

It is to operate the unit.

- ① One must press once this switch after setting Temperature and Time completely.
- ② One must press once this switch to operate the unit again in case the unit has stopped cause of certain faulty factor.

## 4) Fuse

Protect the machine from over-current. Connected to L and also N, so it ensures the safety of the machine.

## 5) Drain Valve

Specially designed this valve is used for draining the liquid away in the bath. Rotate this valve counter-clockwise 2 - 3 times, then you can drain the contents in the bath away.



Rotating this valve more than 5 times may cause falling off the valve from the body possibly. After doing high temperature experiment, please, wear gloves for safe draining.

## 6) Temperature Display

It displays setup temperature and actual temperature.

## 7) TIME / RPM Display

It displays remaining time, or motor RPM when the timer is on.

## 8) ▲ Key

This key is to increase the set value (temperature, hour, RPM).

**9) ▼ Key**

**This key is to decrease the set value (temperature, hour, RPM).**

**10) TEMP. / SET Key**

**This key is to change the setup temperature.**

**11) ADV (advance) / SET Key**

**This Key is to choose stop shaking, or keep running motion of the unit, to protect sample, in consideration of Timer function over. Before operate Timer function, user should select a proper motion.**

**12) RPM / SET Key**

**This key is to set, or change RPM.**

**13) TIME / SET Key**

**This key is to set, or change time.**

**14) MOTOR / I.O Key**

**This key is to select motor start or stop after setting RPM.**

**15) TIME / I.O Key**

**This key is to select setup time start or stop.**

**16) HEAT LED**

**LED on reveals that the heater is running on.**

**17) SET LED**

**LED will blink when user sets temperature, RPM, and time.**

**18) MOTOR LED**

**LED on reveals that the motor is running on.**

**19) TIMER LED**

**This LED is to notice that the time is already set up. When this LED is on lit, most of input functions are going to be out of order, but can check only setting state.**

**20) ADV (advance) LED**

**This LED is to notice that the unit is going to work continuously or not, after timer function stop.**

**21) RUN LED**

**This LED is to notice that the unit has working normally, or stopped.**



LED on : Reveals unit works normally.

LED blink : Reveals unit stopped. In this case, please, push  
START / STOP Key once, to operate the unit again,  
after removing faulty factors.

## **4. Operation**

### **(1) Basic Process**

- 1) Adjust height of Spring Wire Rack in consideration of the height of sample.**
- 2) Fill up the proper heat transfer liquid (distilled water, oil, etc.) in the bath, before put plug in.**
- 3) Adjust Over Temp. Protector Knob to have value of 110% in comparison with the set value.**
- 4) Put plug in the socket, and turn on Main Power Switch. And input set value.**
- 5) Choose AUTO, or MANUAL Function after pushing ▲ Key for 5 seconds (MANUAL Function has fixed as Factory Default).**
- 6) Operate the unit with pushing START / STOP Key (If user choose AUTO, the unit will start automatically).**

### **(2) Temperature Setting**

- 1) Push TEMP. / SET Key (#10). Then, user will see**
  - SET LED on (#17)
  - tEmP display on lower Display
  - Set Temperature blinking on upper Display
- 2) Set up set temperature with operating ▲, ▼ Key, and push TEMP. / SET Key to finish set up.**
- 3) It is impossible to change temperature value when the timer is on. User only can see setup temperature by pushing TEMP. / SET Key (#10).**

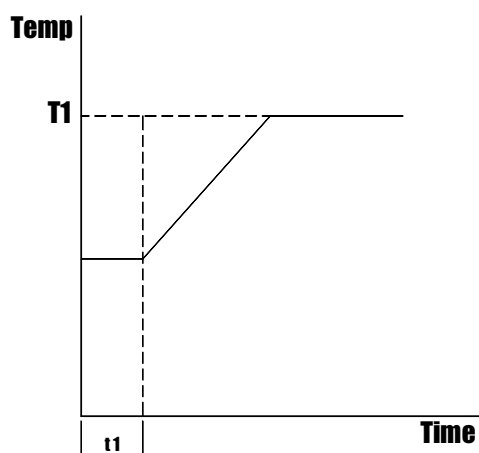
### **(3) Time Setting**

- 1) Push TIME / SET Key (#13). Then, user will see**
  - SET LED on (#17)
  - Won (Wait on) display on lower Display
  - 00 (hour).00 (minute) display on upper Display
  - Hour blinking

- 2) Set up hour with operating ▲, ▼ Key, and push TIME / SET Key to go to minute set up. When user sees minute blinking, set up minute with operating ▲, ▼ Key (Wait on time).
- 3) Push TIME / SET Key (#13) again. Then, user will see
  - SET LED on (#17)
  - Woff (Wait off) display on lower Display
  - 00 (hour).00 (minute) display on upper Display
  - Hour blinking
- 4) Set up hour with operating ▲, ▼ Key, and push TIME / SET Key to go to minute set up. When user sees minute blinking, set up minute with operating ▲, ▼ Key, and push TIME / SET Key (#13) – SET LED off - to finish set up (Wait off time).
- 5) If all process has finished, turn TIME / I.O Key (#15) on to operate the unit. At this time, user can not change the set value, but can see set value.
- 6) Time can be set to 99 hours and 59 minutes.
- 7) If there were power failure after setting Timer, and restored, Timer would memorize the value before power failure, and restart.

★ WAIT ON time

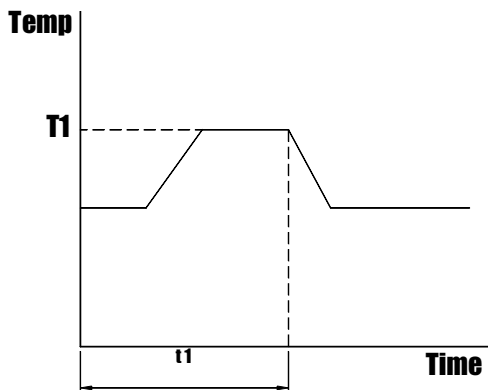
It shows system becomes “ON” in set time. LED keeps on blinking during Timer operation period. After set time, Buzzer rings for 10 seconds to notice user that Wait on time function has finished.



Heating and shaking start after  $t_1$  period.  
 $T_1$  = Set temperature  
 (Wait on time)

★ WAIT OFF time

It shows system becomes “OFF” in set time. LED keeps on during Timer operation period. After set time, Buzzer rings continuously to notice user that Wait off time function has finished.



Heating and shaking stop after t1 period.

T1 = Set temperature  
(Wait off time)

At this time, if ADV Function is “ON”, Buzzer rings and the unit will be operated normally, but if not, Buzzer rings and the unit will be stopped.

(4) Motor RPM Setting

1) Push RPM / SET Key (#12). Then, user will see

- SET LED on (#17)
- rPm display on lower Display
- Set RPM blinking on upper Display

2) Set up RPM with operating ▲, ▼ Key, and push RPM / SET Key (#12) to finish set up.

3) It is impossible to change RPM value when the timer is on. User only can see set RPM by pushing RPM / SET Key (#12).

#### **(5) AUTO RUN / MANUAL RUN Function Setting**

- 1) Push **▲** Key for over 5 seconds. Then, user will see
  - AUTO (Auto Run), or MANU (Manual Run) display on upper Display
  - Set RPM display on lower Display
- 2) At this time, push TEMP. / SET Key (#10) to choose the function, and choose a function with **▲**, **▼** Key. Push TEMP. / SET Key again to finish set up.
- 3) This function is to choose Auto Run, or Manual Run after restoring from power failure during doing experiment. If user chooses Auto Run, Controller will work again automatically after restoring, but if user chooses Manual Run, Controller will not work automatically without operation of user. To operate the unit after restoring, push START / STOP Switch once.

#### **(6) Temperature Calibration Function**

- 1) Push **▼** Key for over 5 seconds. Then, user will see
  - In-b (In Band) display on lower Display
  - Temperature display on lower Display
- 2) At this time, push TEMP. / SET Key (#10) to calibrate the value, and calibrate it with **▲**, **▼** Key. Push TEMP. / SET Key again to finish set up.
- 3) Calibration range is  $\pm 5^{\circ}\text{C}$ .
- 4) This function is to fit inner chamber temperature to real temperature.

#### **(7) Auto return to initial mode**

If there are no keypad operations for 10 seconds in each mode by user, mode will return to initial mode automatically.

## **5. Maintenance**

- 1) Turn Main Power Switch off, and pull plug out from consent.**
- 2) Remove solvent from the bath.**
- 3) Wipe solvent off in the bath with soft plain cloth that is soaked in neutral detergent.**
- 4) Clean the bath with soft plain cloth that is soaked in distilled water.**
- 5) Dry the bath with dry cloth.**
- 6) Do not use organic solvents to clean the bath.**
- 7) Before using any cleaning or decontamination method except those recommended by the manufacturer, users should check with the manufacturer that the proposed method would not damage the equipment.**
- 8) If poisonous chemical substances that could damage the human's skin or substances that could emit toxic gases overflow in the equipment, user must wear safety gloves against poisonous chemical substances and mask against toxic gases, and then user completely clean them in the equipment with dry clothes.**



## 6. Causes of malfunction and its repairs

### (1) In case that the equipment is not working

1) Please, check rated electricity.

2) Please, check fuse.

#### ★ Fuse Information ★

① MODEL BS-06 : 250V, 5A/ 120V, 8A, Time Delay Type

② MODEL BS-11 : 250V, 5A/ 120V, 10A, Time Delay Type

③ MODEL BS-21 : 250V, 12A, Time Delay Type

④ MODEL BS-31 : 250V, 12A, Time Delay Type

3) Please, check that RUN LED on Display is blinking or not. If it blinks, push START / STOP Switch to operate the unit.

### (2) In case that there is ERROR message

1) When the message “SnSr” blinks and buzzer keeps ringing, please, check input sensor disconnection.

2) When the message “oVer” blinks and buzzer keeps ringing, please, check overheating in the bath. After settling down the problem, push START / STOP Key to operate the unit.

3) If the problem is concerned with temperature controlling, please, apply for service.

4) If there were power failure after setting Timer, and restored, Timer would memorize the value before power failure, and restart.

## **WARNING**

- Please, turn the main power switch off, if the equipment does not work properly.
- When user needs A/S, please, contact us or nearest service center. The user should not disassembly the equipment by him/herself for the purpose of unit repairing.

☞ If you can't solve the troubles, please apply for service.

☞ If you want to repair the unit, please call qualified electric engineers.

☞ When you need some part change, please use pure licensed parts.

☞ We will not cover damages caused by natural disasters.

## **7. Warranty**

### **(1) Warranty Period**

**Each Product purchased by customer will be free from defects in material and workmanship for 2 year limited warranty. We will replace faulty parts for a fee based on then current component acquisition costs after warranty period.**

**We will, at our option, repair at no charge, replace or refund the purchase price of a defective product purchased through our authorized sales outlet and at the applicable price during warranty period. We will pay all costs for product repaired or replaced in-warranty in case of exported items.**

### **(2) Limitation**

**This warranty does not cover fuses, disposable batteries and damage from accident, neglect, contamination, misuse or abnormal conditions of operation or handling, including over-voltage failures caused by use outside the Products' specified rating, or normal wear and tear of mechanical components. This warranty covers the original purchaser only and is not transferable.**

### **(3) General**

**Send defective product with a description of the problem to the nearest service Center, postage and insurance prepaid. We will pay return transportation for product repaired or replaced in-warranty. Before making any non-warranty repair, we will estimate cost and obtain authorization, then invoice you for repair and return transportation.**

**This warranty is your only remedy. No other warranties, such as fitness for a particular purpose, are expressed or implied. We are not liable for any special, indirect, incidental or consequential damages or loses, including loss of data, arising from any cause or theory. Authorized resellers are not authorized to extend any different warranty on our behalf.**

**Since some countries do not allow the exclusion or limitation of an implied warranty or of incidental or consequential damages, this limitation of liability may not apply to you.**

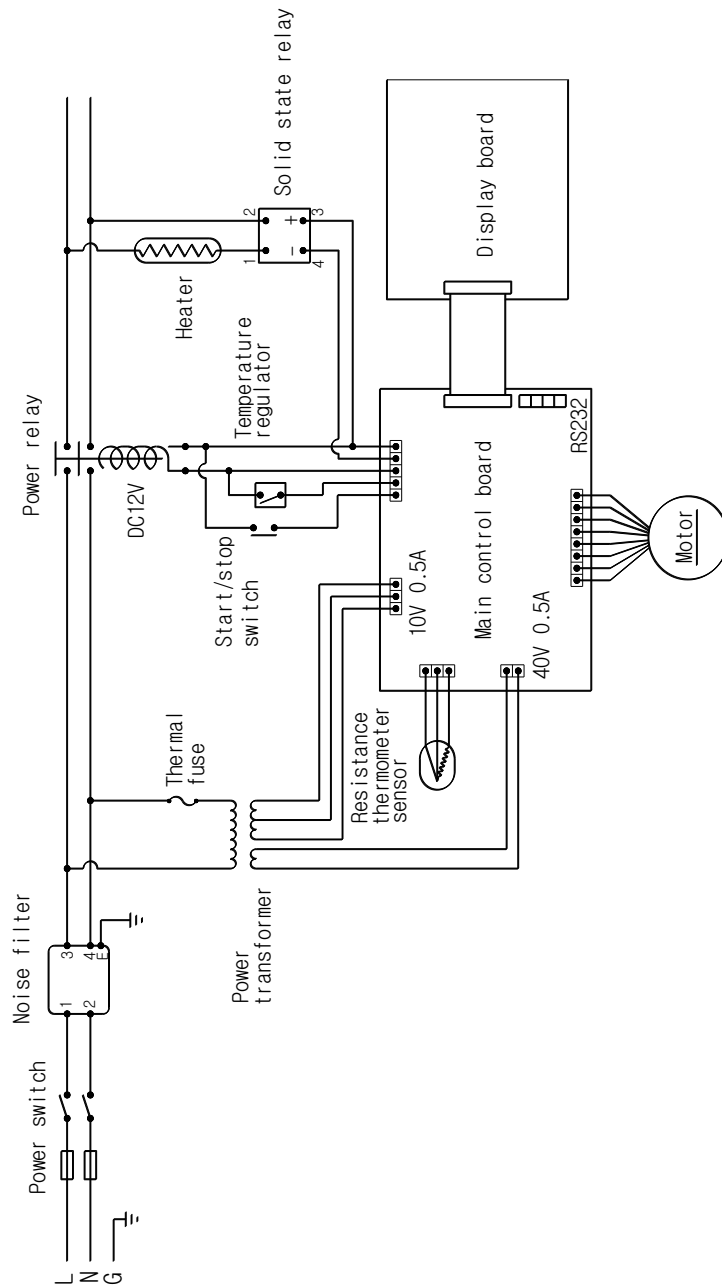
## 8. Specification

Model		BS-06	BS-11	BS-21	BS-31
Spec.					
Volume Capacity		17L	25L	37L	55L
Temp.	Range	Amb. +5℃ ~ 100℃			
	Stability <sup>1)</sup>	± 0.2℃			
	Controller	PID Controlled microprocessor touch pad, Digital Display			
Permissible environment condition		Temperature : 5℃ to 40℃ Relative humidity : 50% ~ 80% Altitude : Up to 2,000m Indoor use pollution : Degree 2 Installation category (Over voltage category) : II			
Material	Internal	Stainless steel, 1.0t, Cubic Type			
	External	Steel, 1.2t, Double painted and baked			
	Heater	Incoloy Sheath 800W	Incoloy Sheath 1000W	Incoloy Sheath 2000W	Incoloy Sheath 2000W
	Insulation	Glass Wool			
	Sensor	Pt 100			
Size (mm/inch)	Bath opening (WXL)	199x300 / 7.8x11.8	319x300 / 12.6 x11.8	479x300 / 18.9x11.8	629x350 / 24.8x13.8
	Depth(mm/inch)	235/ 9.3	235/ 9.3	235/ 9.3	235/ 9.3
	Overall (WXLXH)	430x440x355 16.9x17.3x14.0	550x440x355 21.7x17.3x14.0	710x440x355 28.0x17.3x14.0	860x490x355 33.9x19.3x14.0
Shaking System	Motion	Reciprocating			
	Frequency	20 to 180 RPM			
	Recip stroke length(mm/inch)	25mm, 30mm(Standard), 35mm/1.0, 1.2(Standard), 1.4			
Safety Device		CLS (Custom Logical Safe) - Control System			
Electric Requirements		230VAC 50/60Hz, 3.7A	230VAC 50/60Hz, 4.6A	230VAC 50/60Hz, 8.9A	230VAC 50/60Hz, 8.9A
		120VAC 60Hz, 7.1A	120VAC 60Hz, 8.8A		
Net weight		26kg	30kg	35kg	42kg

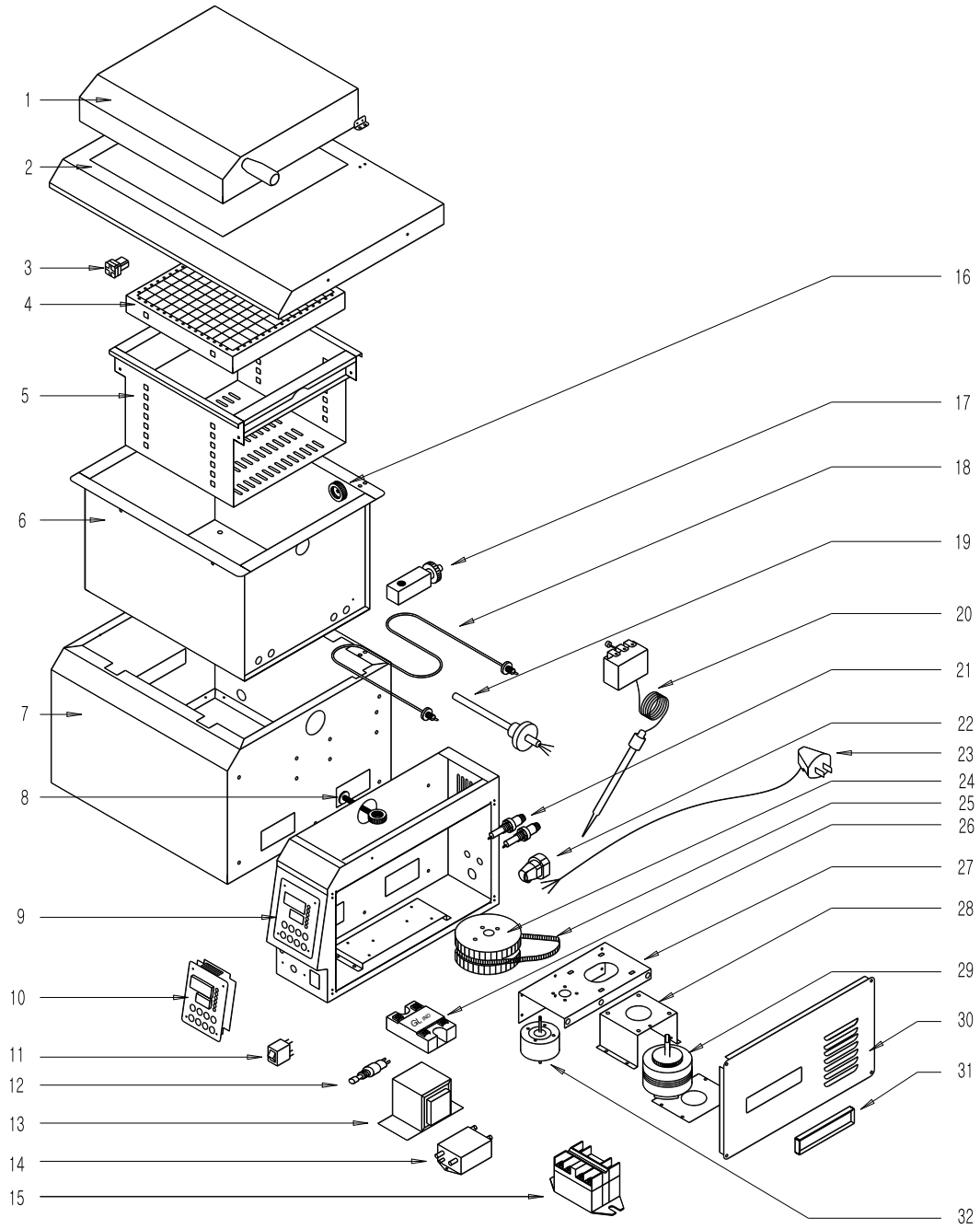
※ BS-21,31 are provided ONLY for 230 voltage

※ 1) Technical data (according to DIN 12880)

# 9. Circuit Diagram



# 10. Exploded view / Parts list



- 1) Cover
- 2) Housing cover
- 3) Arrow
- 4) Spring wire rack
- 5) Shuttle carriage
- 6) Bath vessel
- 7) Housing
- 8) Connecting rod
- 9) Control box
- 10) Display board & Main control board
- 11) Power switch
- 12) Start/Stop switch
- 13) Power transformer
- 14) Noise filter
- 15) Power relay
- 16) Roller
- 17) Drain valve
- 18) Heater
- 19) Resistance thermometer sensor
- 20) Temperature regulator
- 21) Fuse holder
- 22) Insulating bushing
- 23) Power cord
- 24) Driving wheel
- 25) Belt
- 26) Solid state relay
- 27) Driver support
- 28) Motor bracket
- 29) Motor
- 30) Side cover
- 31) Handle
- 32) Shaft housing

