



Water Bath

Model

BS 200/400/600/660

Instruction Manual

- First Edition -

- Thank you for purchasing "Water Bath, BS Series" of Yamato Scientific Co., Ltd.
- To use this unit properly, read this "Instruction Manual" thoroughly before using this unit. Keep this instruction manual around this unit for referring at anytime.

⚠ WARNING!

Carefully read and thoroughly understand the important warning items described in this manual before using this unit.

**Yamato Scientific America Inc.
Santa Clara, CA**

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Explanation

MEANING OF ILLUSTRATED SYMBOLS

Illustrated Symbols

Various symbols are used in this safety manual in order to use the unit without danger of injury and damage of the unit. A list of problems caused by ignoring the warnings and improper handling is divided as shown below. Be sure that you understand the warnings and cautions in this manual before operating the unit.

 **WARNING!** If the warning is ignored, there is the danger of a problem that may cause a serious accident or even fatality.

 **CAUTION!** If the caution is ignored, there is the danger of a problem that may cause injury/damage to property or the unit itself.

Meaning of Symbols



This symbol indicates items that urge the warning (including the caution). A detailed warning message is shown adjacent to the symbol.



This symbol indicates items that are strictly prohibited. A detailed message is shown adjacent to the symbol with specific actions not to perform.



This symbol indicates items that should be always performed. A detailed message with instructions is shown adjacent to the symbol.

Table of Illustrated Symbols

Warning



Warning,
generally



Warning,
high voltage



Warning,
high temperature



Warning,
drive train



Warning,
explosive

Caution



Caution,
generally



Caution,
electrical shock



Caution,
scald



Caution,
no road heating



Caution,
not to drench



Caution,
water only



Caution,
deadly poison

Prohibit



Prohibit,
generally



Prohibit,
inflammable



Prohibit,
to disassemble



Prohibit,
to touch

Compulsion



Compulsion,
generally



Compulsion,
connect to the
grounding
terminal



Compulsion,
install on a flat
surface



Compulsion,
disconnect the
power plug



Compulsion,
periodical
inspection

Cautions in Using with Safety

Fundamental Matters of “WARNING!” and “CAUTION!”

WARNING!

Do not use this unit in an area where there is flammable or explosive gas

Never use this unit in an area where there is flammable or explosive gas. This unit is not explosion-proof. An arc may be generated when the power switch is turned on or off, and fire/explosion may result. (Refer to page20 “List of Dangerous Substances”.)

Always ground this unit

Always ground this unit on the power equipment side in order to avoid electrical shock due to a power surge.

If a problem occurs

If smoke or strange odor should come out of this unit for some reason, turn off the power key right away, and then turn off the circuit breaker and the main power. Immediately contact a service technician for inspection. If this procedure is not followed, fire or electrical shock may result. Never perform repair work yourself, since it is dangerous and not recommended.

Do not use the power cord if it is bundled or tangled

Do not use the power cord if it is bundled or tangled. If it is used in this manner, it can overheat and fire may be caused.

Do not process, bend, wring, or stretch the power cord forcibly

Do not process, bend, wring, or stretch the power cord forcibly. Fire or electrical shock may result.

Substances that can not be used

Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in this unit. Explosion or fire may occur.

Do not disassemble or modify this unit

Do not disassemble or modify this unit. Fire or electrical shock or failure may be caused.

CAUTION!

During a thunder storm

During a thunderstorm, turn off the power key immediately, then turn off the circuit breaker and the main power. If this procedure is not followed, fire or electrical shock may be caused.

Requirements for Installation

WARNING!

1. Always ground this unit



- Connect the power plug to a receptacle with grounding connectors.



- Do not forget to ground this unit, to protect you and the unit from electrical shock in case of power surge. Choose a receptacle with grounding connectors as often as possible.
- Do not connect the grounding wire to a gas pipe, or by means of a lightning rod or telephone line. A fire or electrical shock will occur.

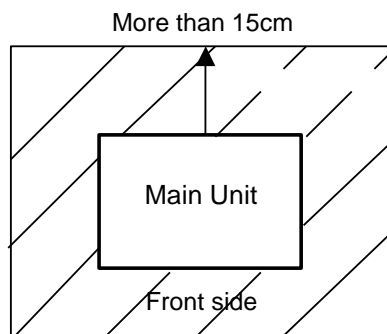
2. Choose a proper place for installation



- Do not install this unit in a place where:
 - ◆ Rough or dirty surface.
 - ◆ Flammable gas or corrosive gas is generated.
 - ◆ Ambient temperature exceeds 35°C.
 - ◆ Ambient temperature fluctuates violently.
 - ◆ There is direct sunlight.
 - ◆ There is excessive humidity and dust.
 - ◆ There is a constant vibration.



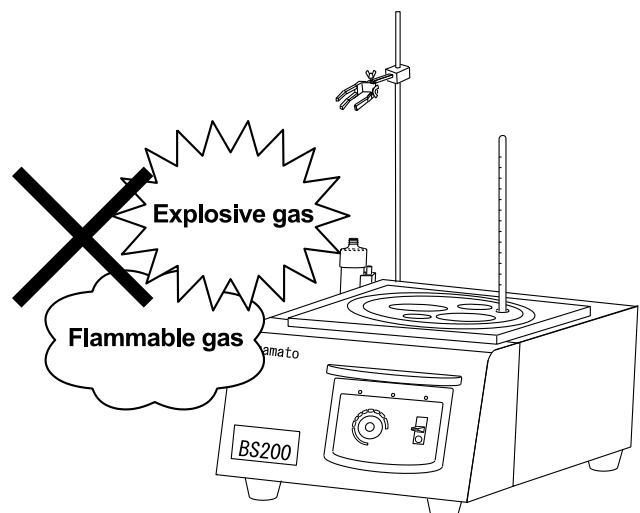
- Install this unit on a stable place with the space as shown below.



3. Do not use this unit in an area where there is flammable or explosive gas



- Never use this unit in an area where there is flammable or explosive gas. This unit is not explosion-proof. An arc may be generated when the power switch is turned ON or OFF, and fire/explosion may result.
- To know about flammable or explosive gas refer to page20 "List of Dangerous Substances".

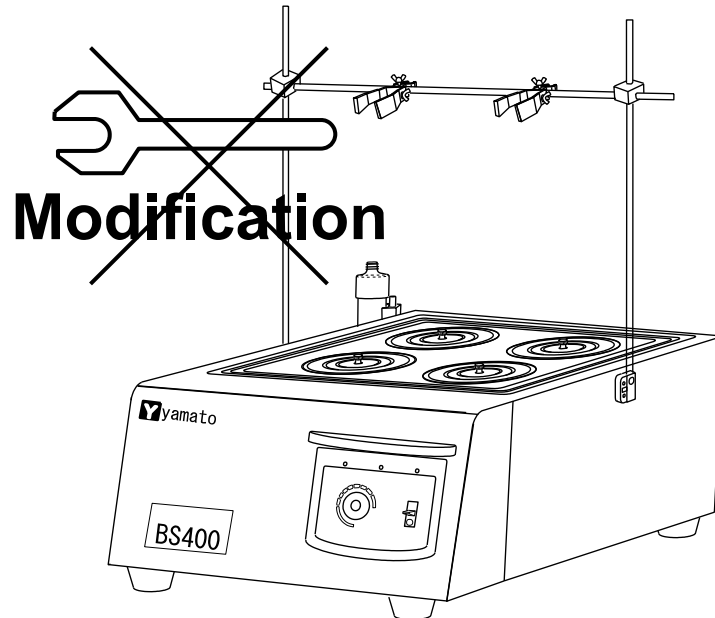


Requirements for Installation

4. Do not modify



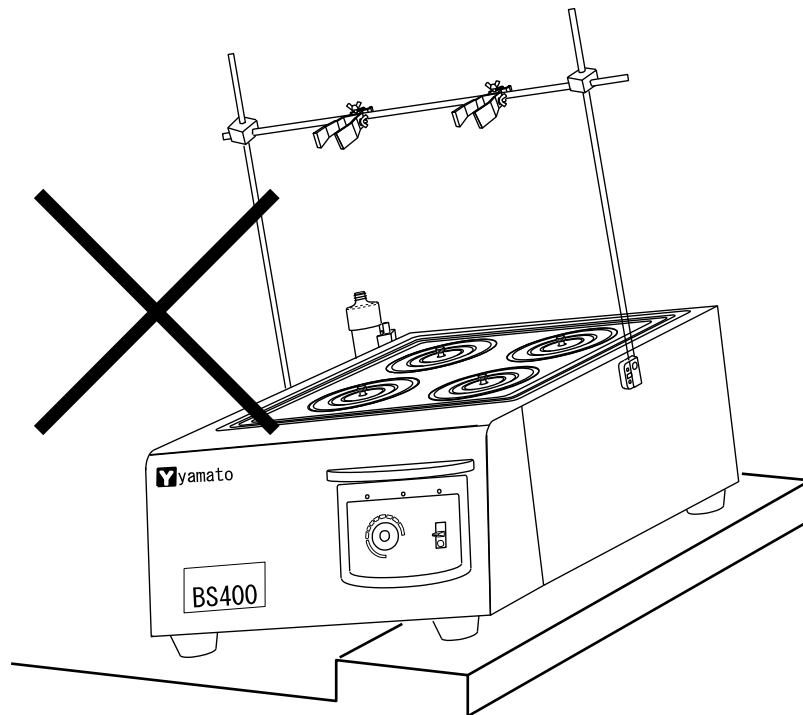
- Modification of this unit is strictly prohibited. This could cause a failure.



5. Installation on horizontal surface



- Set this unit to the flattest place. Not setting this unit with its 4 legs covered with rubber contacted to the setting place surface evenly could cause the unexpected trouble or malfunction.



Requirements for Installation

CAUTION!

6. Choose a correct power distribution board or receptacle



- Choose a correct power distribution board or receptacle that meets the unit's rated electric capacity.

Electric capacity:	BS200: 220V AC, 4.5A
	BS400: 220V AC, 6.5A
	BS600: 220V AC, 6.5A
	BS660: 220V AC, 6A

- ❖ If the power supply voltage is lower than the required voltage, the capacity of the heater may decrease, the temperature of the water may not rise with enough, or the temperature controller may cause to be malfunction. Check whether the power line shares with other device(s) or not. If does so, isolate the power line of this device from that (those) of other device(s).

7. Before/after installing



- It may cause injure to a person if this unit falls down or moves by the earthquake and the impact etc..To prevent, take measures that the unit cannot fall down, and not install to busy place.
- Touching the unit may cause a burn during and just after the operation. To prevent, take measures that putting up a notice of operating etc..

8. Handling of power code



- Do not entangle the power cord. This will cause overheating and possibly a fire.
- Do not bend or twist the power cord, or apply excessive tension to it. This may cause a fire and electrical shock.
- Do not lay the power cord under a desk or chair, and do not allow it to be pinched in order to prevent it from being damaged and to avoid a fire or electrical shock.
- Keep the power cord away from any heating equipment such as a room heater. The cord's insulation may melt and cause a fire or electrical shock.



- If the power cord becomes damaged (wiring exposed, breakage, etc.), immediately turn off the power at the rear of this unit and shut off the main supply power. Then contact your nearest dealer for replacement of the power cord. Leaving it may cause a fire or electrical shock.
- Connect the power plug to the receptacle which is supplied appropriate power and voltage.

9. Thermometer installation

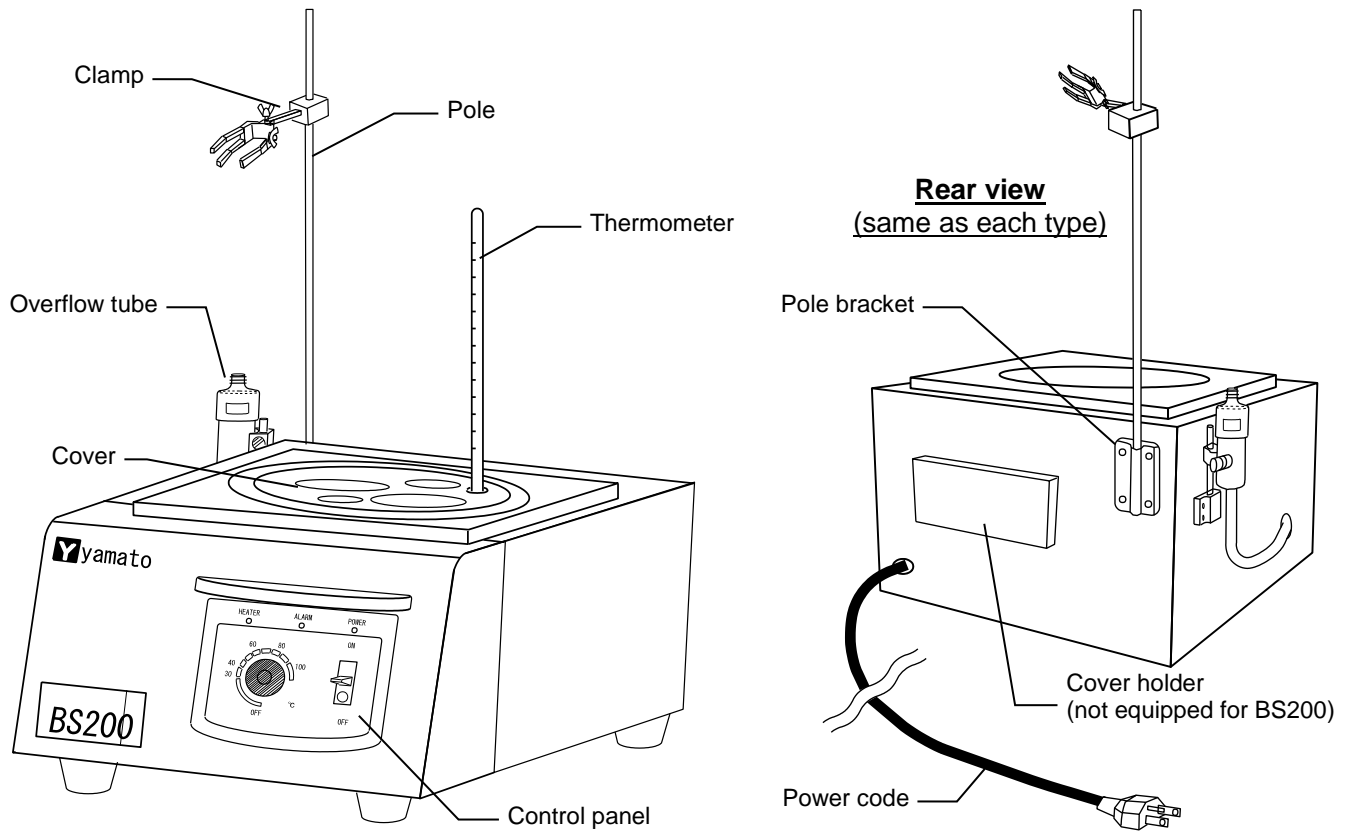


- Thermometer has line marking of im mersion level at around 76mm from iower end of Thermometer. Im merse thermometer under water up to the im mersion level to read Temperature properly.

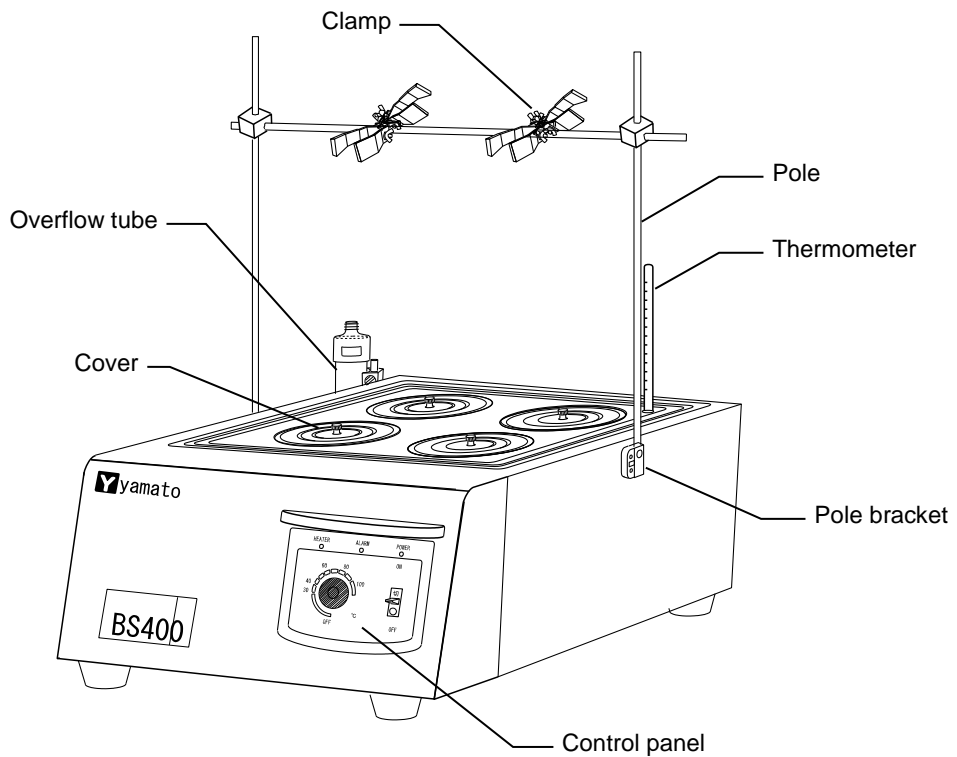
Description and Function of Each Part

Main Unit

BS200



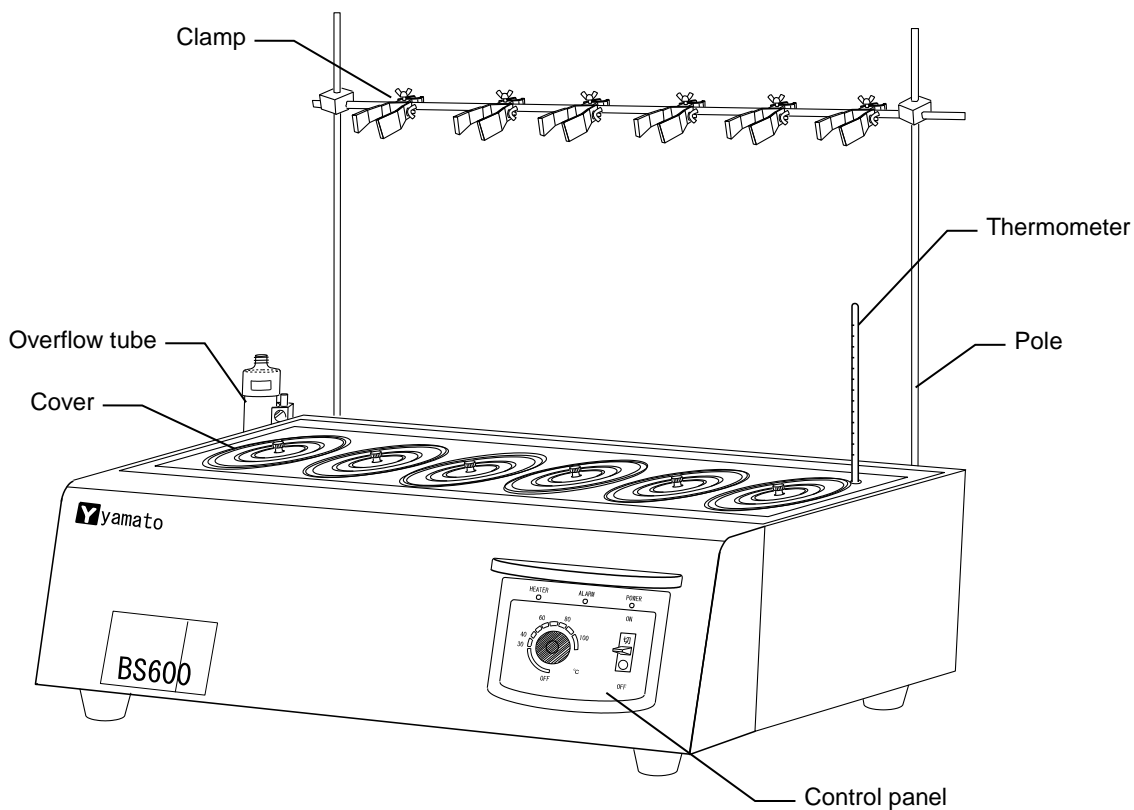
BS400



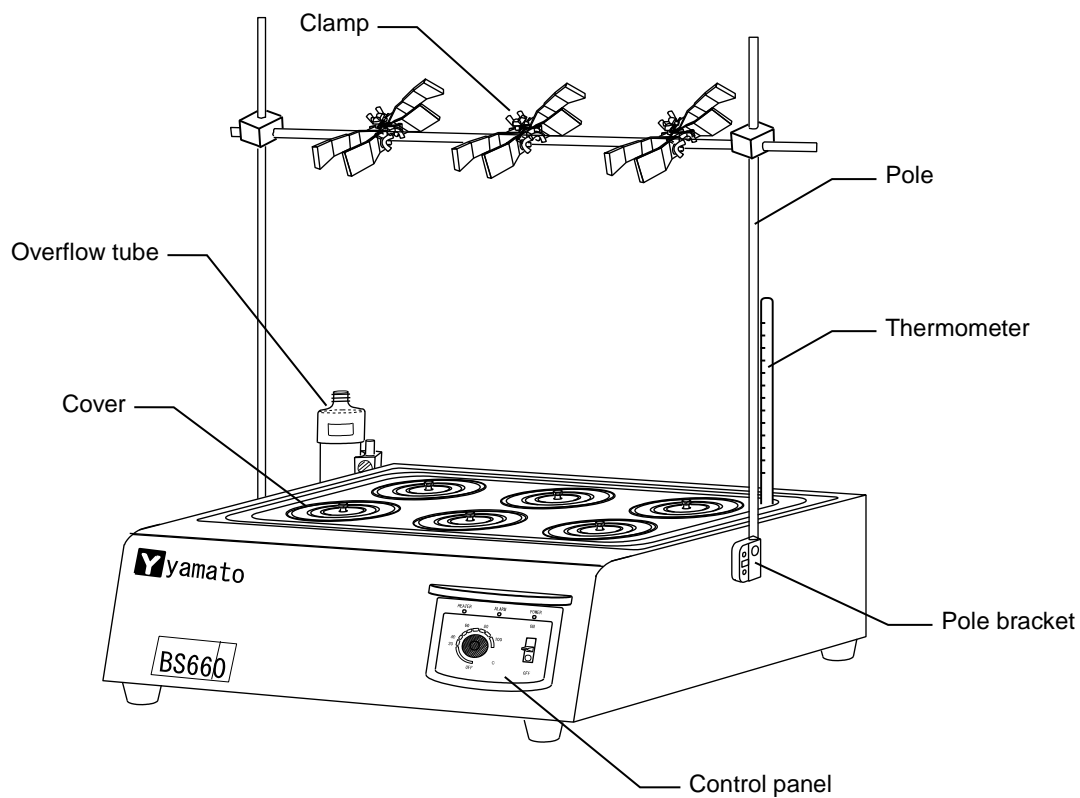
Description and Function of Each Part

Main Unit

BS600

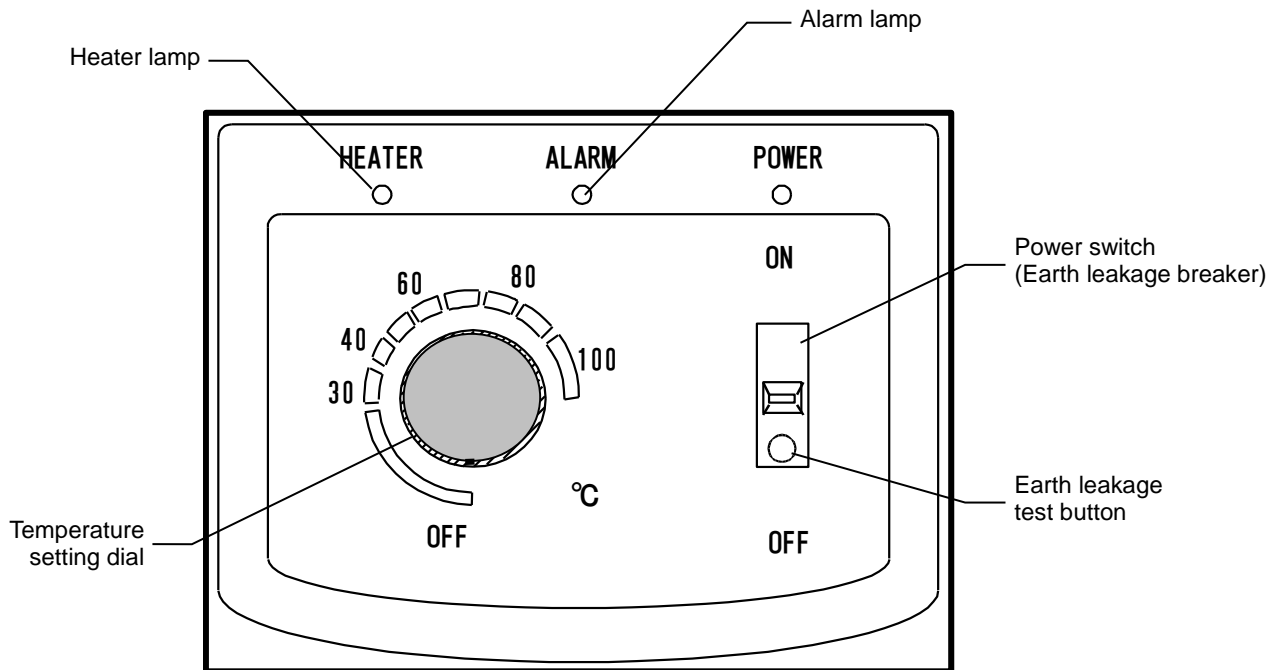


BS660



Description and Function of Each Part

Control Panel



Name	Function
Power switch (Earth leakage breaker)	Turns ON/OFF the power.
Earth leakage test button	Uses for testing the earth leakage breaker function. (Refer to the Page 13 "Maintenance Method".)
Power lamp	Lights on by turning on the power switch, lights off by turning off the power switch.
Temperature setting dial	Uses for setting the operation temperature.
Heater lamp	Lights on while the heater is active.
Alarm lamp	Lights on when the overheating prevention device is activated.

Procedure

1. Prepare the water bath.

Pour appropriate amount of the water for each water bath as follows, and then set the options to this unit;

BS200: around 4.7 liters, BS400: around 9 liters,

BS600: around 11 liters, BS660: around 14 liters

2. Turn on the power.

Connect this unit to the 100VAC±10% power source securely, toggle the power switch to "ON" after connecting the ground wire without fail. (The power lamp is lit.)

3. Set the temperature.

Adjust the setting mark of the temperature setting dial to the required temperature. (The heater lamp is lit.)

The temperature scale is prepared just as a guideline (not the precise temperature scale). When the temperature rises around the required one, set the temperature reading the scale of the thermometer prepared separately. After the in-bath temperature stays stable, use this unit.

NOTE)

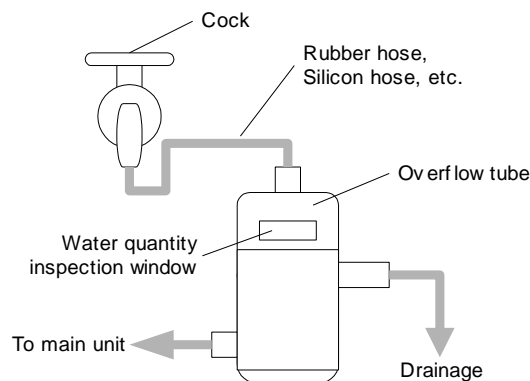
The temperature varies slightly depending on the operating condition. Check whether the temperature is matched to the required temperature during the operation sometimes.

4. Put the sample into the unit.

Put the sample into the open cover opening. When using the large sample container, remove the whole cover with the opening.

5. Constant Water Supply Operation Method

When this unit operates under the constant water supply mode, use this unit injecting the water to the overflow tube constantly. Note that never operate this unit under the unattached mode for preventing from any accident.



NOTE)

There is the case that the temperature does not reach to the maximum specified temperature depending on the water supply amount or water supply temperature when operating this unit under the constant water supply mode.

6. Stop operation.


Turn the temperature setting dial back to "OFF", and turn OFF the power. If this unit is not used for a long time, unplug the appliance from the receptacle.

7. Drain water from the water bath.


When draining the water from the bath, remove the water supply/drain hose of the overflow tube, and drain the water. Change the water of the bath frequently, and be sure to clean the water bath each time.

WARNING!

If a problem occurs


-  If smoke or strange odor should come out of this unit for some reason, turn off the power key right away, and then turn off the breaker and the main power. Immediately contact a service technician for inspection. If this procedure is not followed, fire or electrical shock may result. Never perform repair work yourself, since it is dangerous and not recommended.

Substances that cannot be used


-  Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in this unit. Explosion or fire may occur. (Refer to page20 "List of Dangerous Substances".)

CAUTION!


Do not step on this unit

-  Do not step on this unit. It will cause injury if this unit fall down or break.


Do not put anything on this unit

-  Do not put anything on this unit. It will cause injury if fall.


During a thunder storm

-  During a thunderstorm, turn off the power key immediately, then turn off the circuit breaker and the main power. If this procedure is not followed, fire or electrical shock may be caused.


Heating medium

-  This unit is acceptable only the "Water" medium. Never use the heating medium such as oil for this unit. Failure to do so could cause the fire or water leakage. Use either pure water (distilled water, ion exchange water) or tap water without fail. Using well water or bad-quality water could cause the damage or malfunction. Be sure to change the water in the water bath frequently.



Water supply

-  When supplying water, pay attention not to spill water from the water bath or spread over the water bath. Should be spread a water over the control panel, wipe it off completely. Failure to do so could cause the electric leakage or electric shock.

Do not invert this unit

-  Do not invert this unit. This could cause a malfunction.

Pay attention not to heat empty bath. (Operation of overheating prevention device)

-  Do not operate this unit with empty water bath or with its heater spilled the water from. The heater might be red hot, the heater life descends seriously. What is worse, it could cause a fire. Be sure to check the water amount of the water bath before the operation, and supply water as required. (Refer to the Page 10.)
-  This unit has the overheating prevention device in itself, and goes off the electricity at 130°C in case of occurring the heating of empty bath. Please contact to Yamato Scientific Service Office if the heating of empty bath is occurred.

CAUTION!

Temperature distribution, operating temperature range



This unit does not have the stirring function. Since the water flows with natural convection, the in-bath water temperature differs. Besides, the operating temperature range differs depending on the operating environment or operating condition. If the ambient temperature is low, or if the unit is used in the place with strong wind or in the high altitude, the operating temperature might not reach to the maximum temperature described in the performance table.

Boiling Temperature



The maximum temperature of this unit differs depending on the operating environment and operating condition. There might be the case that the water does not boil depending on the ambient temperature and operating condition.

The reason for not boiling might be raised as follows;

- Outside air temperature is low.
- Affected by the endothermic quantity of the sample.
- Lowered the power voltage.

Return after power failure



When power is supplied after a power failure, the device automatically starts operation again with the same state as just before the power failure. It is danger that the device starts unattached operation after a power failure. We recommend for you to turn off the switch of this unit if a power failure occurs during operation.

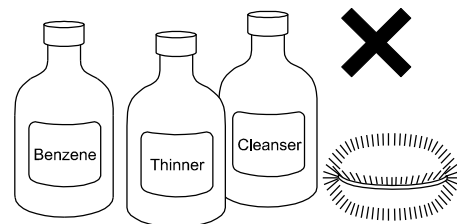
Daily Inspection and Maintenance

WARNING!

- Disconnect the power cable from the power source when doing an inspection or maintenance unless needed.
- Perform the daily inspection and maintenance after returning the temperature of this unit to the normal one.
- Do not disassemble this unit.

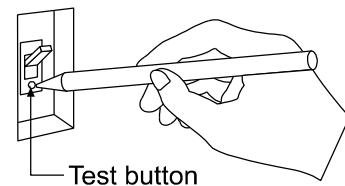
CAUTION!

- Use a well-drained soft cloth to wipe dirt on this unit. Do not use benzene, thinner or cleanser for wiping. Do not scrub this unit. Deformation, deterioration or color change may result in.



Monthly maintenance

- Check the earth leakage breaker function.
 1. Connect the power cord.
 2. Turn the breaker on.
 3. Push the red test switch by a ballpoint pen etc.
 4. If there is no problem, the earth leakage breaker will be turned off.



For any questions, contact the dealer who you purchased this unit from, or the nearest sales division in our company.

When not using this unit for long term / When disposing

CAUTION!

When not using this unit for long term...

- Turn off the power and disconnect the power cord.

WARNING!

When disposing...

- Keep out of reach of children.
- Treat as large trash.

Environmental protection should be considered

We request you to disassemble this unit as possible and recycle the reusable parts considering to the environmental protection. The feature components of this unit and materials used are listed below.

Component Name	Material
Exterior Parts	
Exterior	Iron steel plate
Interior	Stainless steel SUS304
Shelf	Stainless steel SUS304
Cover	Stainless steel SUS304
Pole	Stainless steel
Clamp	Aluminum and resin
Electrical Parts	
Power cord	Composites with synthetic rubber, Copper, Nickel
Temperature controller	Resin, Oil, Copper
Board	PC board, Condenser, Resistor, Relay

Trouble Shooting

Condition	Possible Causes
The device does not start when turning on the power switch.	<ul style="list-style-type: none">• Power plug is not connected to the receptacle correctly.• Power failure.
The temperature does not rise.	<ul style="list-style-type: none">• The temperature adjusting knob is loosen.• The power voltage is too low.
The water does not come to boil.	<ul style="list-style-type: none">• Outside air temperature is low.• The device is affected by the endothermic quantity of the sample.• The power voltage is too low.

In the case if the error other than listed above occurred, turn off the power switch and primary power source immediately. Contact the shop of your purchase or nearest Yamato Scientific Service Office.

In Case of Request for Repair

If the failure occurs, stop the operation, turn OFF the power switch, and unplug the power plug. Please contact the sales agency that this unit was purchased, or the Yamato Scientific's sales office.

< Check following items before contact >

- ◆ Model Name of Product
 - ◆ Production Number
 - ◆ Purchase Date
 - ◆ About Trouble (in detail as possible)
- } See the production plate attached to this unit.

Minimum Retention Period of Performance Parts for Repair

The minimum retention period of performance parts for repair of this unit is 7 years after discontinuance of this unit.

The "performance part for repair" is the part that is required to maintain this unit.

Specification

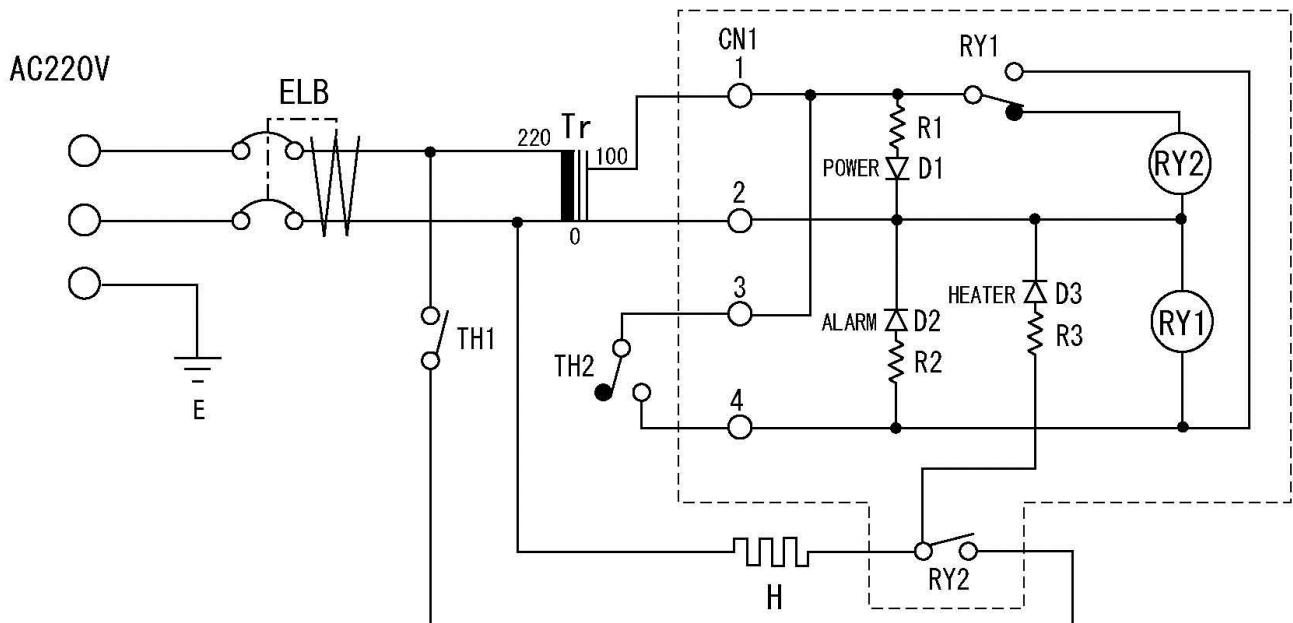
Model	BS200	BS400	BS600	BS660
<i>Performance</i>				
Operating temperature range (*1)	Room temp.+5°C to boiling temp. (water)			
Temperature adjustment accuracy (*2)	±3°C (at70°C)			
Temperature distribution accuracy (*2)	±5°C (at70°C)			
Time required to reach highest temperature	Approx. 35min.		Approx. 60min.	Approx. 50min.
<i>Configuration</i>				
In-bath material	Stainless steel			
Temperature controller	ON/OFF control (Indication of heater lamp blinking)			
Sensor	Liquid expansion method			
Heater	Copper pipe heater (Nickel plated)			
	0.9KW	1.4KW		1.3KW
Safety device	Overheating (empty bath heating) prevention device (liquid expansion method, self holding relay, alarm lamp lighting), Earth leakage breaker with OC (the lamp lights when the power is ON)			
<i>Standard</i>				
Internal dimensions (mm)	φ 200 × Depth149	Wid328 × Dim302 × Depth99	Wid790 × Dim150 × Depth102	Wid502 × Dim302 × Depth99
Valid internal dimensions (mm)	φ 186 × Depth115	Wid298 × Dim260 × Depth64	Wid776 × Dim140 × Depth73	Wid468 × Dim260 × Depth66
External dimensions (*3) (W × D × H mm)	300 × 364 × 216	390 × 438 × 214	864 × 288 × 215	565 × 437 × 214
In-bath capacity	Approx. 4.7L	Approx. 9L	Approx. 11L	Approx. 14L
Power supply	220V AC, 4.5A	220V AC, 6.5A		220V AC, 6A
Diameter/Number of the opening	4pcs (*4)	φ 115/4pcs	φ 115/6pcs	
Weight	Approx. 5Kg	Approx. 9.5Kg	Approx. 16Kg	Approx. 12Kg
<i>Optional Accessories</i>				
Ring	None	φ 57.5mm, 83mm 4pcs for each	φ 57.5mm, 83mm 6pcs for each	
Cover	4pcs (φ 96,72,56,40 mm)	4pcs (φ 56 mm)	6pcs (φ 56 mm)	
Container mounting clamp	1pc	Two mount × 2pcs	6pcs	Two mount × 3pcs
Pole	Large and small 1pc for each		2pcs	
Horizontal rod for the clamp	None		1pc	
Connector (for the pole)	1pc		2pcs	
Thermometer	1pc (-10 to 110°C) line marking of im mersion level alcohol method			
Shelf	1pc	1pc(275 × 270 mm)	1pc(790 × 145 mm)	1pc(440 × 265 mm)
Basket (diameter × depth mm)	96 × 50, 96 × 50 56 × 40, 40 × 30 1pc for each	None		
Instruction manual	1 copy			

*1: This result is output with the bath itself in no load operation. Note that the maximum temperature differs depending on the operating environment and operating condition.

*2: This performance is output with the room temperature 23°C±5°C, humidity 65%±20%, and rated power.

*3: No protrusion is included.

*4: With basket



Symbol	Part name	Specification
P	Power cord w/plug	T2-3C
ELB	Earth leakage breaker	Mitsubishi NV-L20GR
H	Pipe heater	G2R-2 AC100V
PCB	Board	BS
TH2	Overheating prevention device	Matsushita TO-101C
TH1	Temperature controller	EGO 55.13022.040
Tr	Transformer	UD11-050A

Replacement Parts Table

Part Name	Code No.	Apply	Specification	Manufacturer
Temperature controller	1030020006	Common	EGO 55.13022.040	EGO
Thermometer	5020016016	Common	-10to110°C scaled alcohol-in-glass-thermometer	Yamato Scientific
Heater	2220170150	BS200	AC100V 900W	Yamato Scientific
	2220180150	BS400	AC100V 1400W	
	2220190150	BS600	AC100V 1400W	
	2220200150	BS660	AC100V 1300W	
Overheating prevention device	1270010009	Common	EGO 55.13242.060	EGO
Earth leakage breaker	DN104	Common	BJS1532N 15A	Panasonic
Earth leakage breaker	2060050002	Common	BJS2032N 20A (BS400/600/660)	Panasonic
Board	1240000105	Common		Yamato Scientific
Knob	7140000031	Common	ELMA 021-5415	ELMA
Knob cap	7140000032	Common	ELMA 040-5015	ELMA
Power cord	DN004	BS200	T2-3B 1.25Sq	Yamato Scientific
	DN003	BS400/600/660	T2-3C 2.0Sq	
Drain hose	3040010004	BS200	Silicon hose ϕ 10 × L360	Yamato Scientific
		BS400/660	Silicon hose ϕ 10 × L540	
		BS600	Silicon hose ϕ 10 × L450	
Rod bracket (A)	2211080125	BS400/600/660		Yamato Scientific
Rod bracket (B)	2211080126	Common		Yamato Scientific
Flask clip	R0350012	BS200		Yamato Scientific
Clamp holder	2211080327	Common		Yamato Scientific
Clamp 400	2220200139	BS400/660		Yamato Scientific
Clamp 600	2220180139	BS600		Yamato Scientific
Top cover knob (small)	F0030070	Common		Yamato Scientific
Top cover knob (large)	F0030071	BS200		Yamato Scientific
Overflow tube	2220110133	Common		Yamato Scientific
Overflow main unit	2220110132	Common		Yamato Scientific
Transformer		Common	UD21-050A	Toyozumi

List of Dangerous Substances



Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in this unit.

EXPLOSIVE

EXPLOSIVE:	Ethylene glycol dinitrate (nitro glycol), Glycerin trinitrate (nitroglycerine), Cellulose nitrate (nitrocellulose), and other explosive nitrate esters
	Trinitrobenzene, Trinitrotoluene, Trinitrophenol (picric acid), and other explosive nitro compounds
	Acetyl hidroperoxide (peracetic acid), Methyl ethyl ketone peroxide, Benzyl peroxide, and other organic peroxides

FLAMMABLE

IGNITING:	Lithium (metal), Potassium (metal), Sodium (metal), Yellow phosphorus, Phosphorus sulfide, Red phosphorus, Celluloid compounds, Calcium carbide, Lime phosphate, Magnesium (powder), Aluminum (powder), Powder of metals other than magnesium and aluminum, Sodium hydrosulfite
OXIDIZING:	Potassium chlorate, Sodium chlorate, Ammonium chlorate, and other chlorate
	Potassium perchlorate, Sodium perchlorate, Ammonium perchlorate, and other perchlorate
	Potassium peroxide, Sodium peroxide, Barium peroxide, and other inorganic peroxide
	Potassium nitrate, Sodium nitrate, Ammonium nitrate, and other nitrate
	Sodium chlorite and other chlorites
	Calcium hypochlorite and other hypochlorites
INFLAMMABLE LIQUID:	Ethyl ether, Gasoline, Acetaldehyde, Propylene chloride, Carbon disulfide, and other flammable substances having a flash point of lower than -30°C
	Normal hexane, ethylene oxide, acetone, benzene, methyl ethyl ketone, and other flammable substances having a flash point of -30°C or higher but lower than 0°C
	Methanol, Ethanol, Xylene, Pentyl acetate (amyl acetate), and other flammable substances having a flash point of 0°C or higher but lower than 30°C
	Kerosene, Light oil (gas oil), Oil of turpentine, Isopentyl alcohol (isoamyl alcohol), Acetic acid, and other flammable substances having a flash point of 30°C or higher but lower than 65°C
FLAMMABLE GAS:	Hydrogen, Acetylene, Ethylene, Methane, Propane, Butane, and other flammable substances which assume a gaseous state at 15°C and 1 atm

(Source: Appendix Table 1 of Article 6 of the Industrial Safety and Health Order in Japan)

Responsibility

Please follow the instructions in this document when using this unit. Yamato Scientific has no responsibility for the accidents or breakdown of device if it is used with a failure to comply. Never conduct what this document forbids. Unexpected accidents or breakdown may result in.

Note

- ◆ The contents of this document may be changed in future without notice.
- ◆ Any books with missing pages or disorderly binding may be replaced.

Instruction Manual for

Water Bath

Model BS 200/400/600/660

First Edition February 13, 2017

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