WATER BATH

BM410

First Edition

- Thank you for your Yamato Scientific BM series Water Bath purchase.
- For proper use of this unit, please read the instruction manual and warranty thoroughly before operation. Keep both for any future references.

Read and apprehend important warnings in this instruction manual prior to use.

Yamato Scientific

Contents

1. Specifications

Model		BM410
Temp. range during operation		Room temp. +5℃ ～ 95℃ *1
Temp. setting range		0℃～100℃
Accuracy of temp. adjustment *2		±1℃ at 60℃
Control system		PID Control by Micro Computer
Setting system		Digital Setting By △▽Key
Display system		Digital display shows the measured/set temp.
Resolution to display/set		1℃
Operation function		Operation at fixed point
Extra function		Temp. presetting function (preset/select one temp.)
Sensor		Pt100Ω
Heater	Material	SUS316 pipe heater
	Capacity	1kW
Power switch		Also functions as a circuit protector
Other components		Drain (with plug)
Safety device		1. Self-diagnostic Functions Automatic Overheat Prevention, Sensor Trouble, TRIAC short, Heater disconnection, Main relay trouble 2. Circuit protector 3. Tank protection cover 4. Temp. fuse
Tank	Capacity	7000ml
	Dimension	ϕ9.8×Depth 5.9 (inches) ϕ25×Depth 15 (cm)
External dimensions (W×D×H) *3		12.2×14.2×9.1 (inches) 31×36×23 (cm)
Weight		15.4 lb. (7kg)
Power source required		AC230V±10% 50Hz 4.5A
Liquid used		Water
Standard accessories		●Operation manual 1 ●Warranty 1

*1 In case of unloaded operation of bath only. The maximum temperature varies on circumstances and operational conditions.

*2 It shows the performance under rated power supply at the room temperature of 23℃±5℃ and with humidity of 65%±20%.

*3 It does not include projection parts.-.

2. Safety Information

Safety Symbols

Safety Information

This instruction manual and our products apply various indications for safety. Ignoring these indications can cause such situations as listed below. Read and understand the following warning and caution signs in this manual prior to use.

WARNING Indicates the possibility of serious or fatal injury (Note 1).

CAUTION Indicates the possibility of injury (Note 2) or damage (Note 3) to the equipment.

(Note 1) Serious injury : Bodily harm by electric shock, bone fracture or poisoning which may require hospitalization.

(Note 2) Injury : Bodily harm by electric shock, bone fracture or poisoning which may not require hospitalization.

(Note 3) Damage : Any damage on equipment, facility, structure, etc.

Meaning of Graphic Indications

	Shows warning or caution. Specific contents are described aside each sign.
	Shows users important information not to do. Specific contents are described aside each sign.
	Shows users important information sure to do. Specific contents are described aside each sign.

Safety Information

Safety Precautions


Do not use this unit for any purpose other than its intended use, described in this manual.

Do not use this unit in flammable or explosive gas environments.


This unit is not explosion proof. Never use this unit in flammable or explosive gas environments.

Never fail to ground the unit.


This unit uses a 3-conductor power cord (including ground wire). Be sure to ground the unit for safety.

Do not use this unit if a malfunction occurs.


If smoke or any strange odor should disburse from this unit, turn the power off immediately and pull out the main power cord. Then contact Yamato Scientific. Neglecting this procedure can result in fire or electric shock. Never try repairing the unit yourself.

Do not bundle the power cord.


Overheat or fire can occur if the power cord is bundled or if an object is on the cord.

Do not damage the power cord.


Forcible bending, pulling wrenching or extending the power cord can cause fire or electric shock.

Do not use any explosive or flammable heat medium.


Never use any explosive or flammable substances or such compounds as a heat medium which could cause an explosion or fire.

Avoid water contact.


To avoid electric leak or shock, avoid direct contact with water.

Do not heat with low water.


If you operate this unit with low water, fire can be caused by overheating.

Do not disassemble or remodel the unit


To avoid fire or electric shock, never try disassemble this unit.

If it begins to thunder…

In the event of electrical storm turn off main power. Neglecting this procedure can result in fire, electric shock or other troubles due to thunderbolts.

In case of power failure…

When the power is restored after a power failure, the unit resumes operation at the temperature previously set as if you turned off the unit.

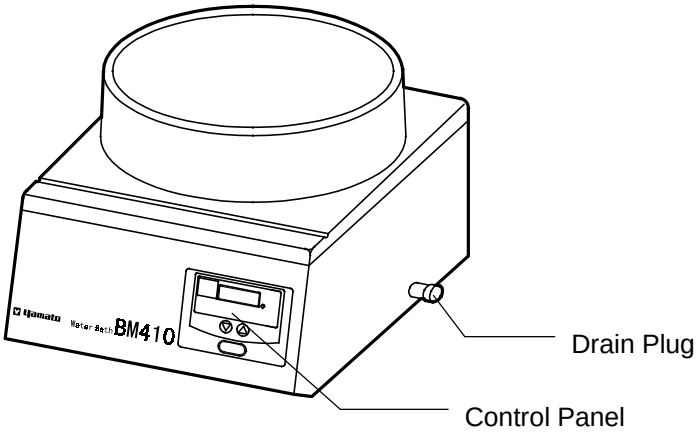
Indication of temperature and operational range.

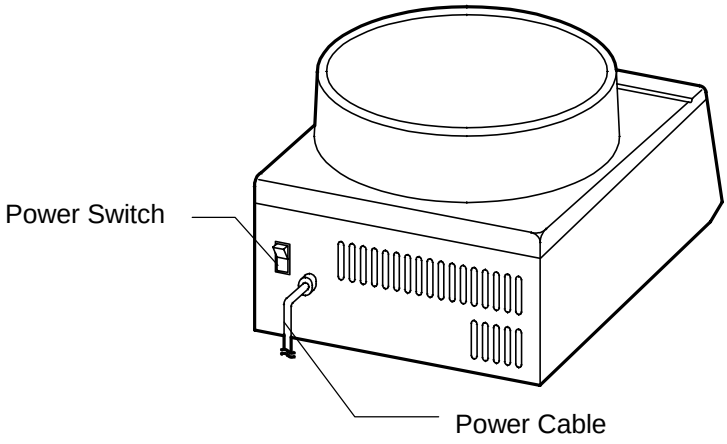
This unit is not equipped with a stirring function. Therefore, the maximum temperature varies according to the environments or operational conditions. This unit does not necessarily reach the maximum operational temperature under such environments as low room temperature.

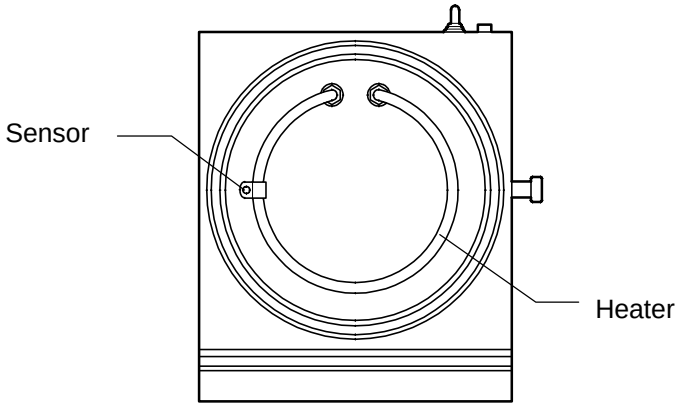
Hazardous materials are listed below. Never use these materials as samples or heat media.

Explosive	Explosive Substance	Nitroglycol, Nitroglycerin, Nitrocellulose, and other explosive nitric esters.
		Trinitrobenzene, Trinitrotoluene, Picric acid, and other explosive nitro compounds.
		Peracetic acid, Methyl ethyl ketone peroxide, Benzoyl peroxide, and other organic peroxides.
		Sodium azide, and other metallic azides
Flammable	Combustible Substance	Metallic lithium, Metallic potassium, Metallic sodium, Yellow phosphorus, Phosphorus sulfide, Red phosphorus, Celluloid, Calcium carbide, Lime phosphate, Magnesium powder, Aluminum powder, and other combustible metal powders and sodium dithionite (hydrosulfite).
	Oxidant	Potassium chlorate, Sodium chlorate, Ammonium chlorate, and other chlorates.
		Potassium perchlorate, Sodium perchlorate, Ammonia perchlorate, and other perchlorates.
		Potassium peroxide, Sodium peroxide, Barium peroxide, and other inorganic peroxides.
		Potassium nitrate, Sodium nitrate, Ammonia nitrate, and other nitrates.
		Sodium chlorite and other chlorites.
		Calcium hypochlorite and other hypochlorites.
	Ignitable Substance	Ethyl ether, Gasoline, Acetaldehyde, Propylene Oxide, Carbon disulfide, and other flammable substances with a flash point below minus 30ºC.
		Normal hexane, Ethylene oxide, Acetone, Benzene, Methyl ethyl ketone, and other flammable substances with a flash point between minus 30ºC and 0^{o}C.
		Methanol, Ethanol, Xylene, Pentyl acetate (amyl acetate), and other flammable substance with a flash point between 0ºC and 30ºC.
		Kerosene, Light oil, Turpentine oil, Isoamyl alcohol, Acetic acid, and other flammable substances with a flash point between 30ºC and 65ºC
	Combustible Gas	Hydrogen, Acetylene, Ethylene, Methane, Ethane, Propane, Butane and other flammable gas at 15℃ degree and under 1 atmosphere.

BM410

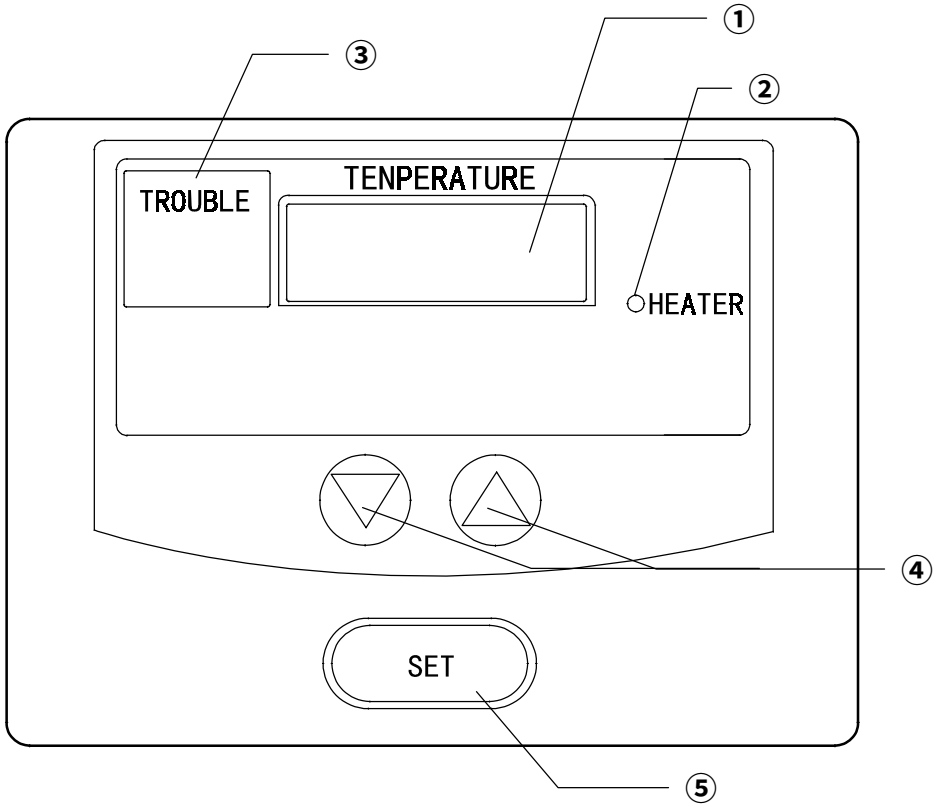

BM410
Drain Plug
Control Panel


Power Switch
Power Cable


Sensor
Heater

Identification of Parts

Control panel

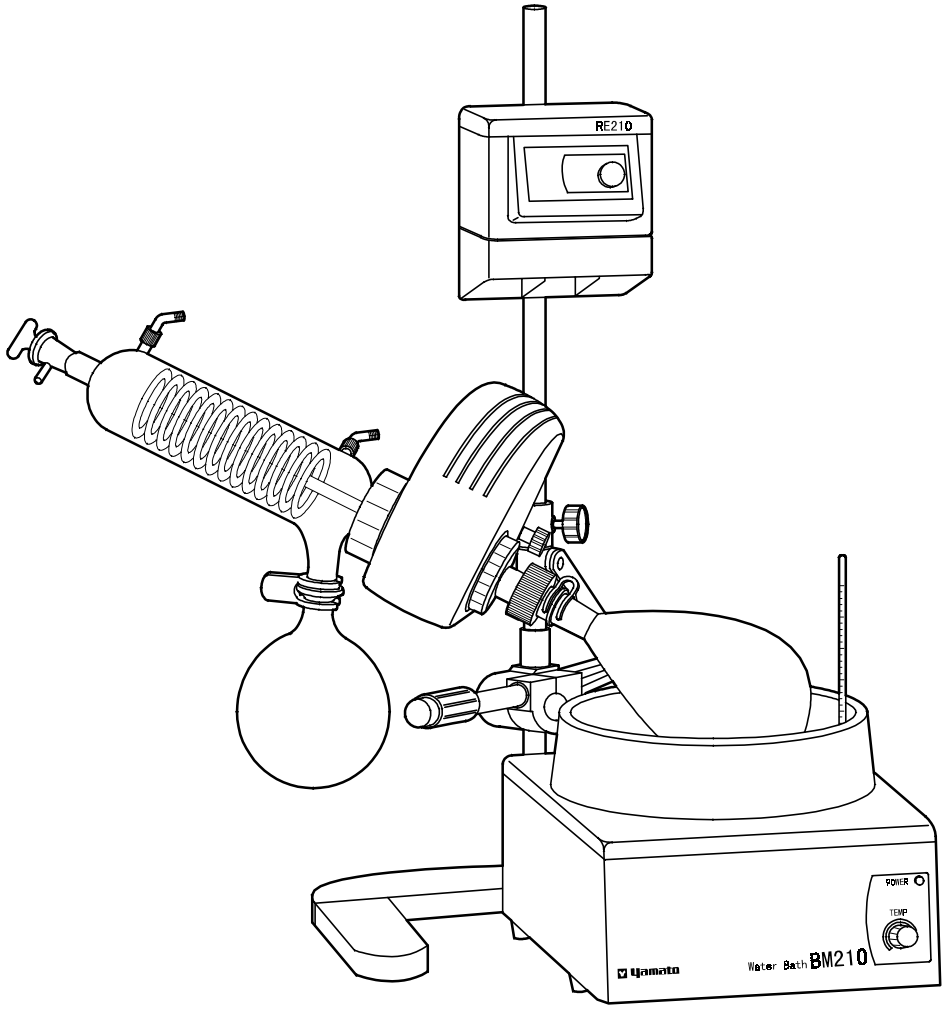


①	Display	Shows the set/measured temperature.
②	Heater Lamp	Lit when heater is on.
③	Blind Window	Indicates “TROUBLE” blinking when the unit is out of order.
④	Up-down Key	Set the point.
⑤	Set Key	Fixes the set point.

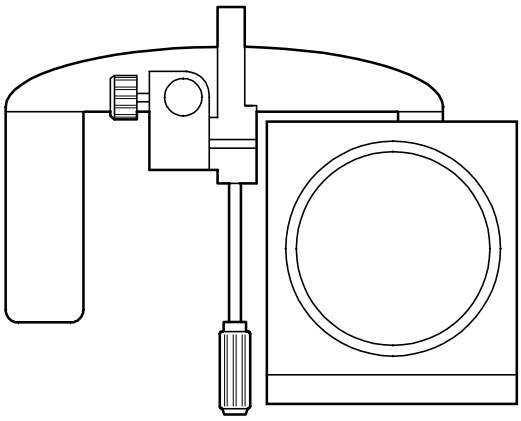
Identification of Parts

Sample : Combined with RE210

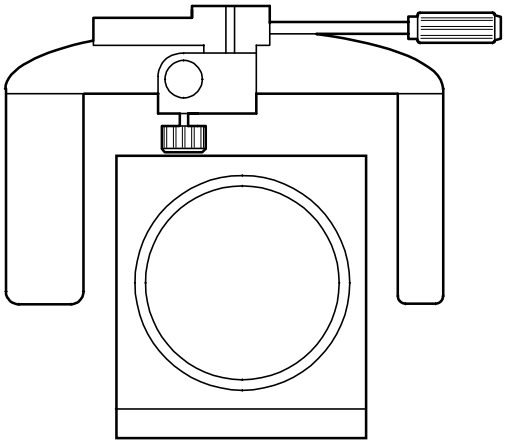
Combination with RE210



Drawing 1

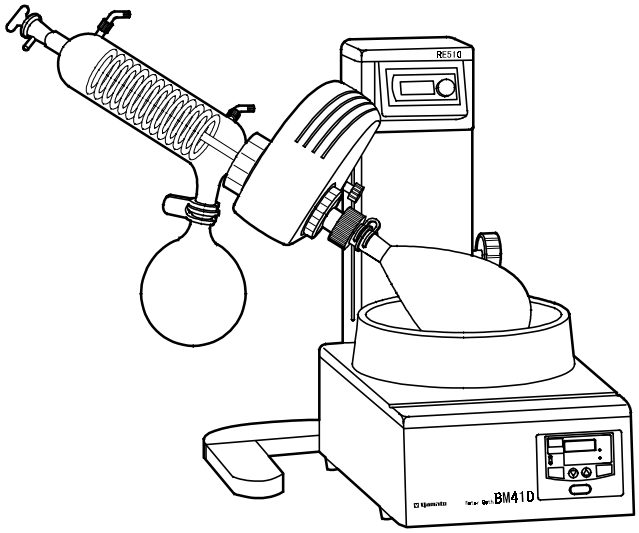


Drawing 2



According to the position or space to set the bath and the body, the arm jack can be in the front (drawing 1)or on the right side (drawing 2) as shown above.

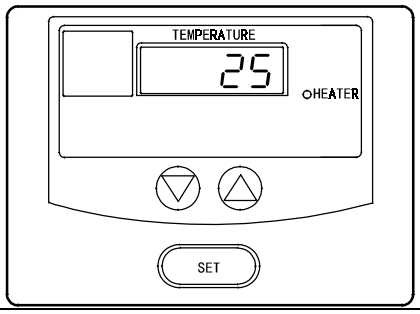
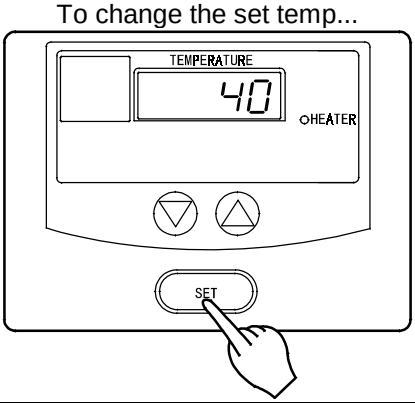
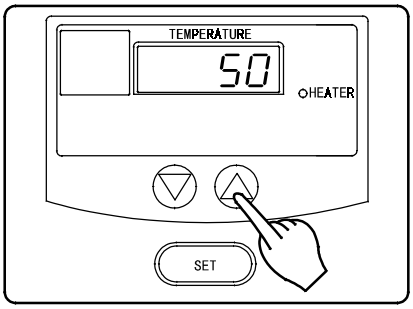
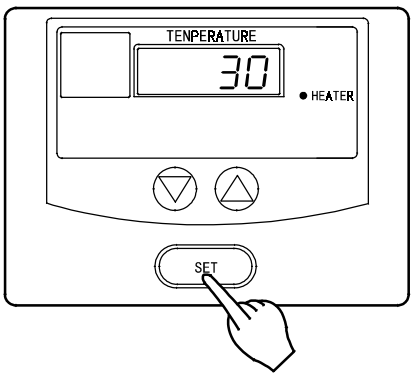
Combination with RE510



4. Operational Procedure

How To Operate

Use the following procedure to operate water bath

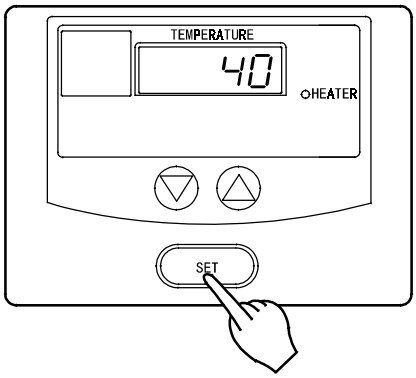
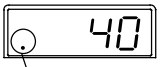
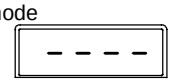
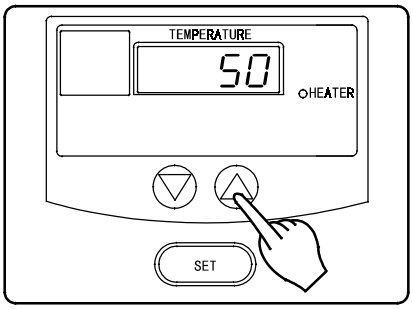
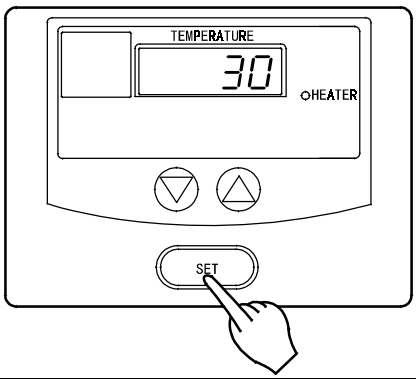
Display after operation procedure	Explanation
 Turn the power “ON”. ex. The measured temp. is 25℃.	After you turn the power on, the unit will start operation up to the temperature last set. →The display shows the current measured temperature.
To change the set temp...  Push “SET” key. ex. The last set temperature was 40℃.	Push “SET” key. →The display changes. The formerly set temperature will blink.
 Push either the ▽or △ key. ex. Change the set temp. from 40℃ to 50℃ during operation.	Push either the ▽or △key to change the blinking temp. to the degree you desired. ●▽key reduces the value, and the △key increases it.
 Push “SET” key.	After the temperature is set at desired degree, push the “SET” key. →The display changes from the set temp. blinking to the current measured temp., and the unit begins operation up to the set temp. ●If you set the temperature higher than the current measured temperature, the heater lamp will light up and the unit will begin to heat.

Operational Procedure

Pre-setting Temperature

How to preset the temperature.

You can preset the temperature at any time when the power is on expect if the unit malfunctions. Preset properly according to the following procedure. The unit continues to work even while you preset the temperature.

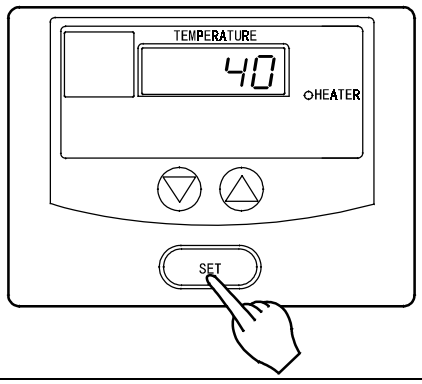
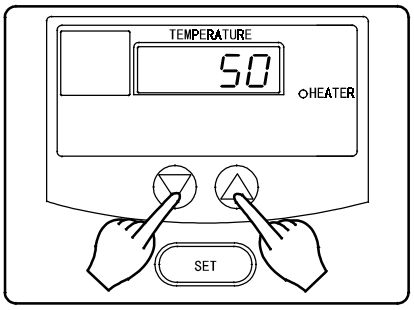
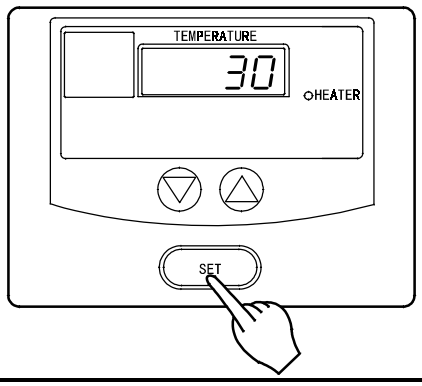
Display after operation procedure	Explanation
 Push “SET” key twice.	Push “SET” key twice. →The unit is changing into pre-setting mode. The display changes from current measured temp. to the preset one blinking. The dot on the left edge of display blinks to indicate presetting mode. ex.  Indicates that you are in the presetting mode The display blinks  if no temp. is preset.
ex. Preset at 50℃  Push either the▽or △ key.	Push either the▽or △key to set the temp. you desire.
 Push “SET” key. ex. The current measured temp. is 30℃.	After you set the desirable temp. push “SET” key. →The changed temp. is in memory and the last is deleted. →The display changes from the set temp. blinking to the current measured temperature.

Operational Procedure

Pre-setting Temperature

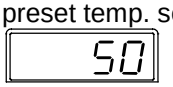
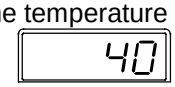
How to select the preset temperature.

You can select the preset temperature when setting your desirable temperature. Operate according to the following procedure. The unit continues to work when you select the preset temperature.

Display after operation procedure		Explanation
1 	Push “SET” key ex. The temp. last set time was 40℃.	Push “SET” key to select the temp. setting mode. →The display changes from the current measured temp. to the last set temp. blinking.
2 	Push both ▽and △key.	Push both ▽and △key simultaneously for more than 1 second. →The unit changes into the presetting mode, and the display blinks the preset temp. When no temp. is preset, the display blinks - - - -.
3 	Push “SET” key. ex. The current measured temp. is 30℃.	Push “SET” key after you select the presetting temp. →The unit begins operation up to the preset temp. →The display stops blinking the set temp. and shows the current measured temperature.

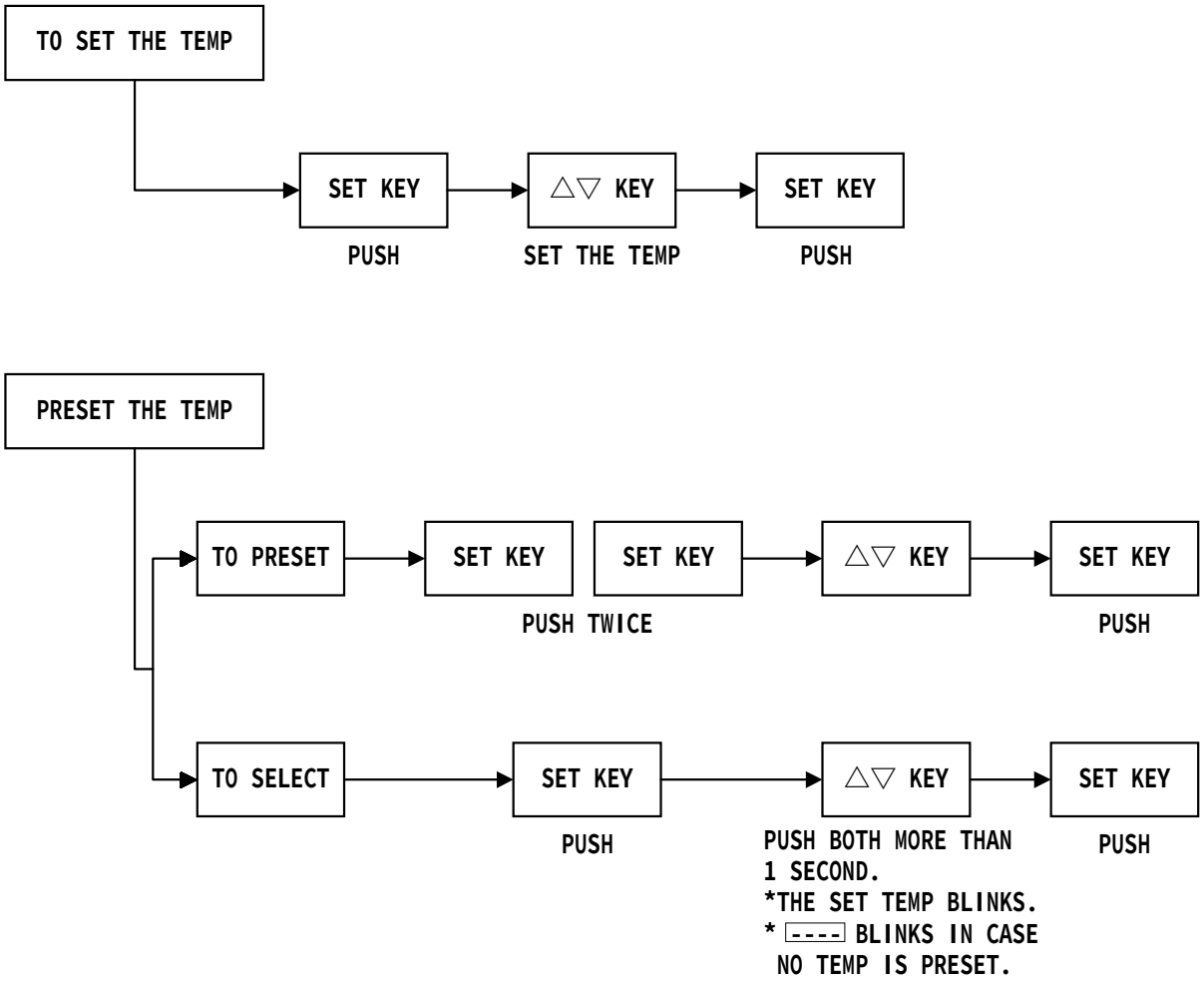
Canceling the preset temperature

You can easily cancel the preset temperature before you push the “SET” key in procedure 3. (See previous page) Please follow the following procedure. If you do not push the “SET” key for more than 1 minute, the display returns to the original mode.

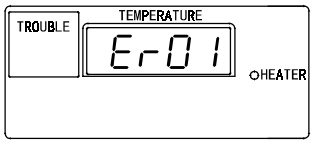
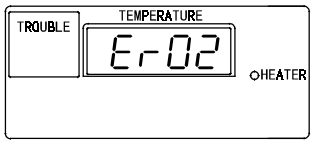
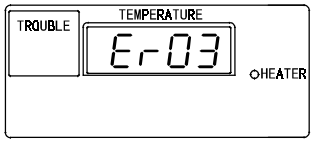
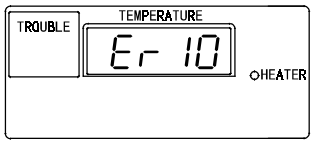
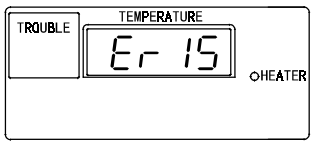
Display after operation/Operational procedure	Explanation
ex, The preset temp. selected  Example of display in case you select the preset temp. STOP → ex. The temperature last set  Example of display before you select the preset temp.	If you want to cancel the preset temp. just after you select, push both ▽and △key again for more than one second. The unit returns to the temp. setting mode.

Operational Procedure

Flowchart of operation procedure



This unit has a self-diagnostic function. If a malfunction is to occur, both the “TROUBLE” sign and the error code blinks on the operation panel, and the unit will alarm the user. If a malfunction should occur, check the error code and stop the operation immediately.

Error Code		Measure to take
	The error code indicates low water heating or any sensor trouble. Both “TROUBLE” and Er01 blink on and off.	● If you come across any of these error codes, turn the power, located on the back of the unit, off immediately. ● If you are experiencing difficulties with error codes, please call Yamato Scientific immediately at (800) 292-6286 at ext. 235.
	The error code indicates trouble of triac circuit. Both “TROUBLE” and Er02 blink on and off.	
	The error code indicates disconnection of heater. Both “TROUBLE” and Er03 blink on and off.	
	The error code indicates trouble of main-relay. Both “TROUBLE” and Er 10 blink on and off.	
	The error code indicates trouble of electric circuit. Both “TROUBLE” and Er 15 blink on and off.	

Operation after restoration from power failure.

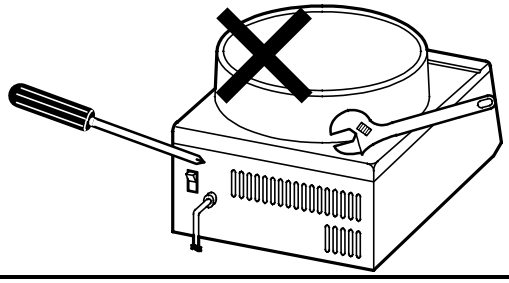
After restoring from power failure, the unit will re-start operation up to the temperature last set.

5. Maintenance

Daily maintenance/Weekly maintenance

Do not disjoint the unit

Never modify the unit. There are some high-voltage areas inside the unit, which could cause electric shock. Request Yamato Scientific for internal check, adjustment or repair.



Maintenance

Daily Maintenance:

Turn power switch off and disconnect main power cord before attempting any maintenance.

Once the water bath has cooled to room temperature you may empty the water.

Wipe off any excess dirt on the interior and exterior with a damp cloth. Do not use benzene, thinner or cleanser.

Weekly Maintenance:

The pipe heater should be cleaned at least twice a month. Accumulation of scale build up results in poor heat transfer and high sheath temperatures.

When the unit is not in use for a long period of time.

Be sure to disconnect main power and drain the water tank if the unit will not be used for a long time.

Troubleshooting Guide

Situation	Make Sure
The display on the operation panel is not lit even when the power switch is on.	●Check main power cord is connected firmly. ●Check main input voltage. ＊When you repeatedly switch on and off, the display does not light up sometimes. Wait for a few seconds, and switch on again.

If you have any questions, contact Yamato Scientific.

6. After Sale Service and Warranty

Request for Repair

When you request repair

If any troubles should occur, stop the operation immediately, turn the power off, pull the power cord out and contact Yamato Sciectific's Technical Service Department.

Necessary information

- Model Number
- Serial Number
- Date of Purchase
- Distributor Name
- Information on difficulties

Warranty

- Keep your warranty card for future references. Check the name of the distributor, date of purchase and any other contents of warranty.

- The terms of warranty is two years limited commencing the date of purchase. Repair is made without charge according to the contents of warranty.

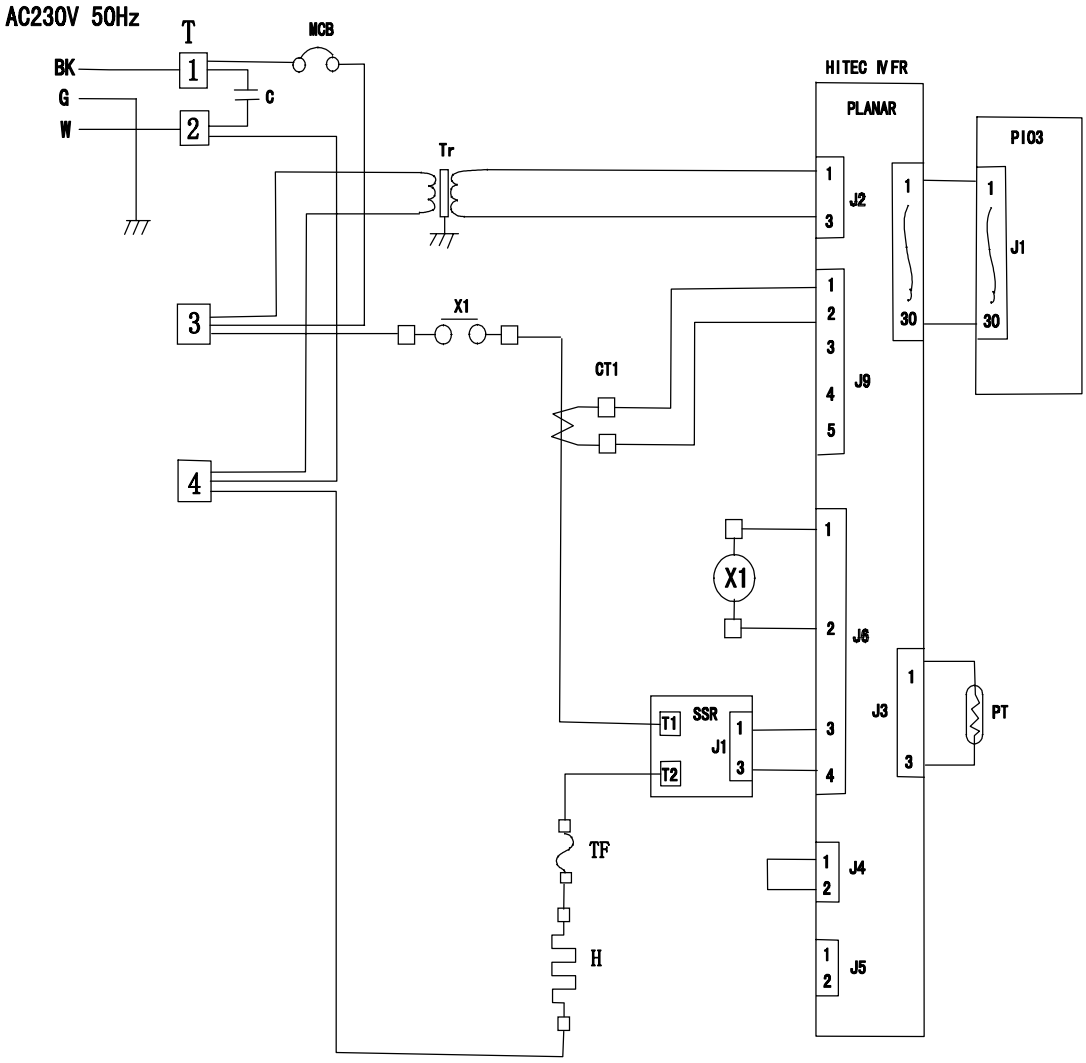
- Decontamination Statement:
  We can not accept any product or parts returned to us for repair or credit that is contaminated with or has been exposed to potentially infectious agents or radioactive materials.

7. Replacement Parts

Name of Parts	Parts Number	Specification
Drain Plug	7-32-001-6005	
O-Ring	4-21-002-6020	BAITON P12.5
Thermal Fuse	2-10-003-0010	
Heater Element	BM410-30070	
Sensor	BM400-40070	
Planar Board	1-24-000-0035	
Display Board	1-24-000-0030	

8. Wiring Diagram

BM410



Symbol	Name	Symbol	Name
C	Condenser	S	Service Outlet
CT1	CT Sensor	SSR	Solid State Relay
H	Heater	T	Terminal
PIO3	Display Board	Tr	Transformer
PLANAR	Planar Board	X1	Relay
PT	Sensor	MCB	Circuit Breaker (Power Switch)
TF	Thermal Fuse		