

WATER BATH BM400
OIL BATH BO600
(100V)

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.

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1. Specifications

Model		BM400	BO600
Temp. range during operation		Room temp. +5 ~ 95 *1	Room temp. +5 ~ 180
Temp. setting range		0 ~ 100	0 ~ 200
Accuracy of temp. adjustment *2		± 1 at 60	± 2 at 100
Control system		PID Control by Micro Computer	
Set-up 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		Pt100	
Heater	Material	SUS316 pipe heater	
	Capacity	1kW	
Power switch		Also functions as a circuit protector	
Others		Drain (with plug) , Service outlet for RE	
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. Thermofuse	
Tank	Capacity	7000ml	
	Dimension *3	250 x Depth 150 (mm)	
External dimensions (W x D x H) *3		310 x 360 x 230 (mm)	
Weight		7kg	8kg
Required power source		AC100V ± 10% 50/60Hz 10 A	
Liquid used		Water	Silicon oil
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

Graphic indications

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-core 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.

 Be sure to use water as a heat medium of BM400.
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.

Safety Information

Safety Precautions

If it begins to thunder...



If it begins to thunder, turn both the breaker and the main power off. Neglecting this procedure can result in fire, electric shock or other troubles due to thunderbolts.

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 such as low temperature, windy or highland areas.

Safety Information

Hazardous Materials

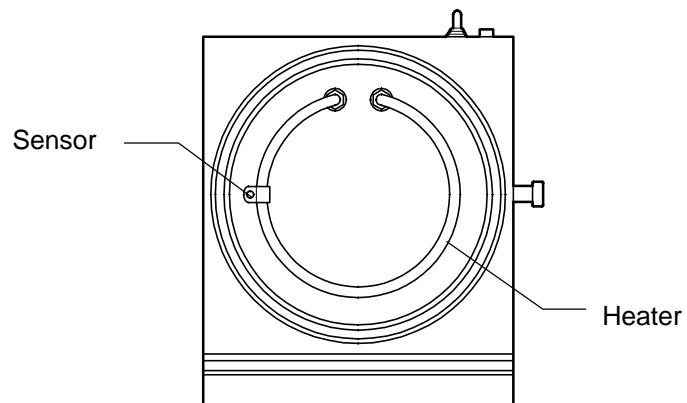
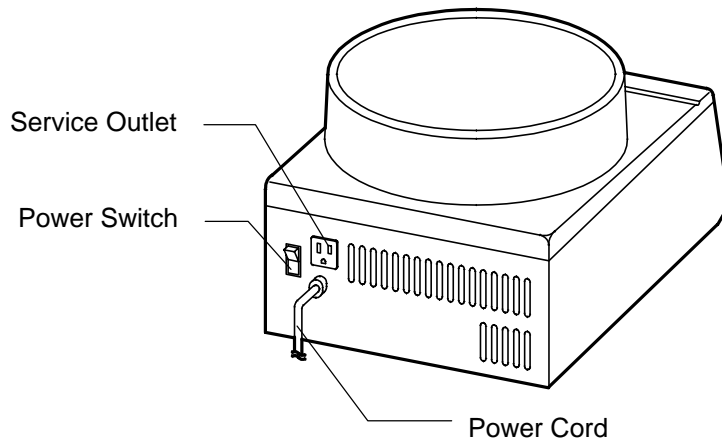
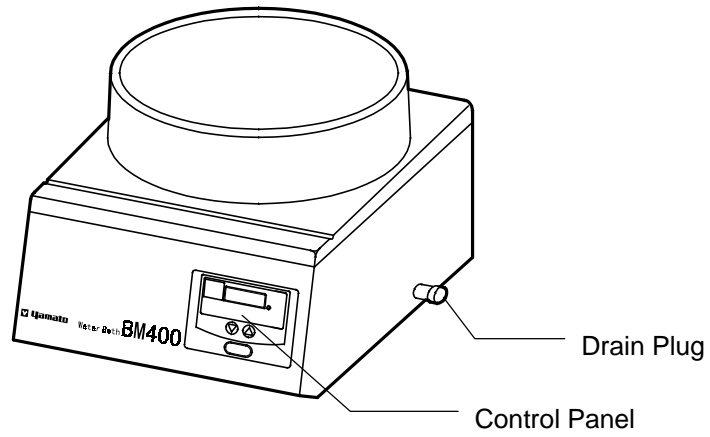
Hazardous materials are listed below. Never use these materials as samples or heat media.

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 30°C.
		Normal hexane, Ethylene oxide, Acetone, Benzene, Methyl ethyl ketone, and other flammable substances with a flash point between minus 30°C and 0°C.
		Methanol, Ethanol, Xylene, Pentyl acetate (amyl acetate), and other flammable substance with a flash point between 0°C and 30°C.
		Kerosene, Light oil, Turpentine oil, Isoamyl alcohol, Acetic acid, and other flammable substances with a flash point between 30°C and 65°C
	Combustible Gas	Hydrogen, Acetylene, Ethylene, Methane, Ethane, Propane, Butane and other flammable gas at 15 degree and under 1 atmosphere.

3. Identification of Parts

BM400

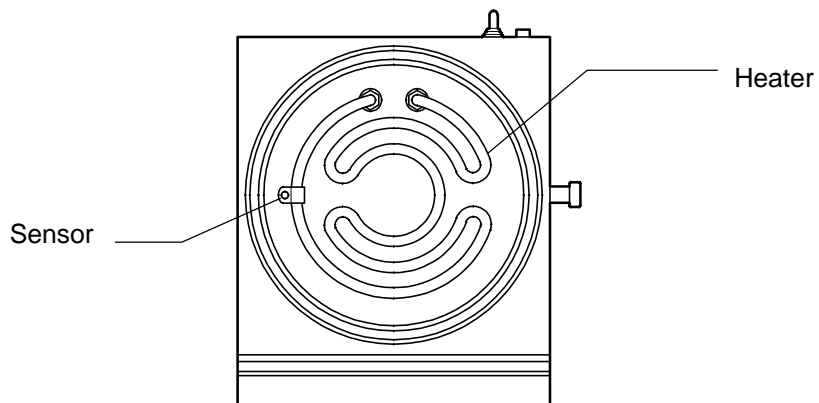
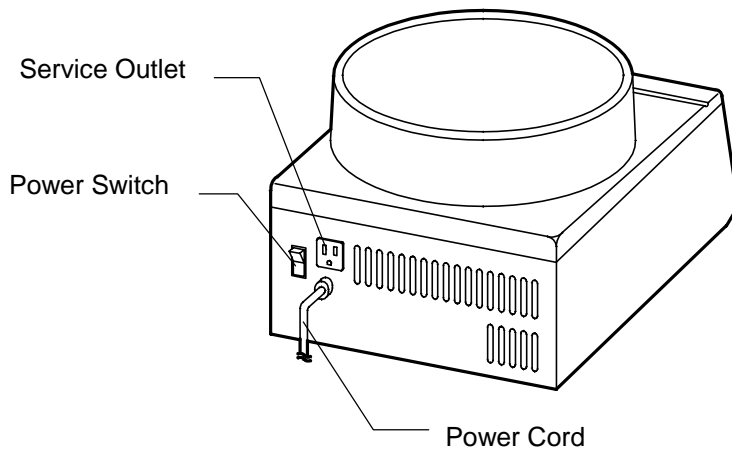
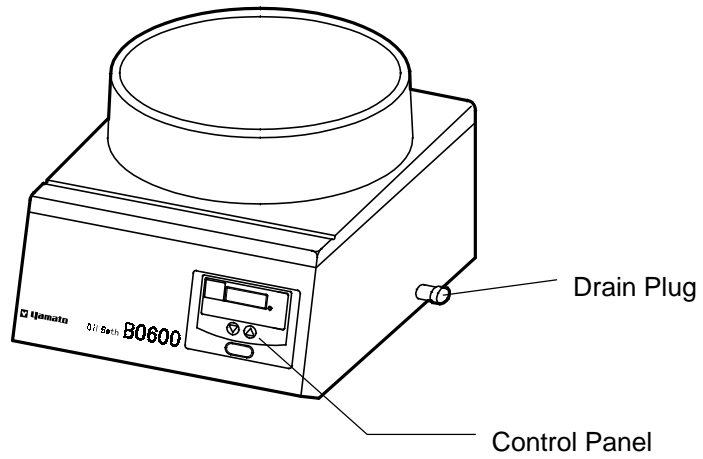
BM400



Identification of Parts

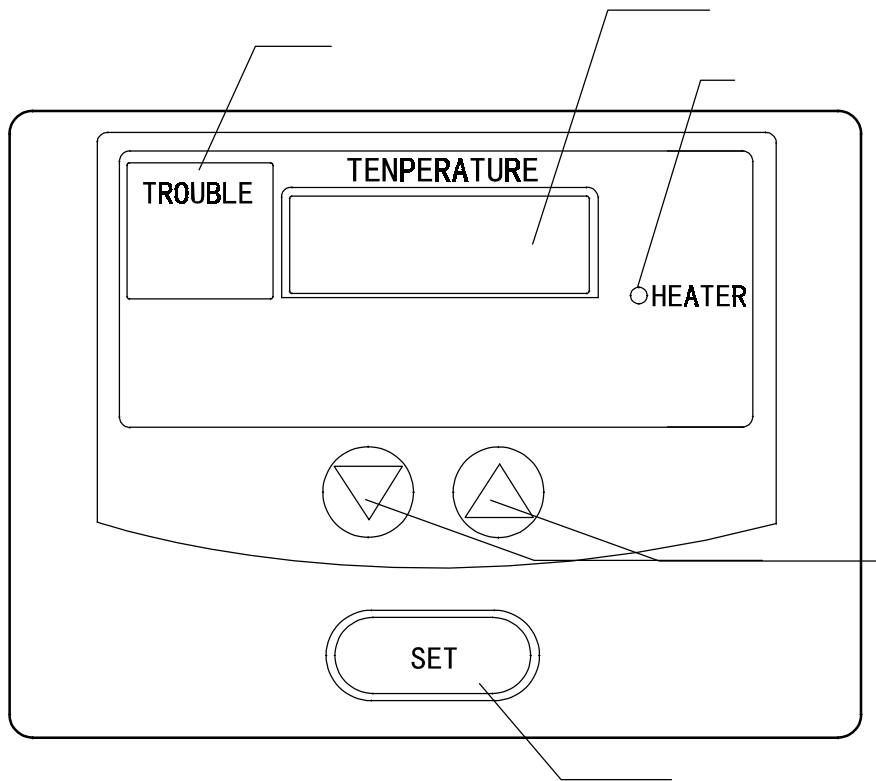
BO600

BO600



Identification of Parts

Control panel

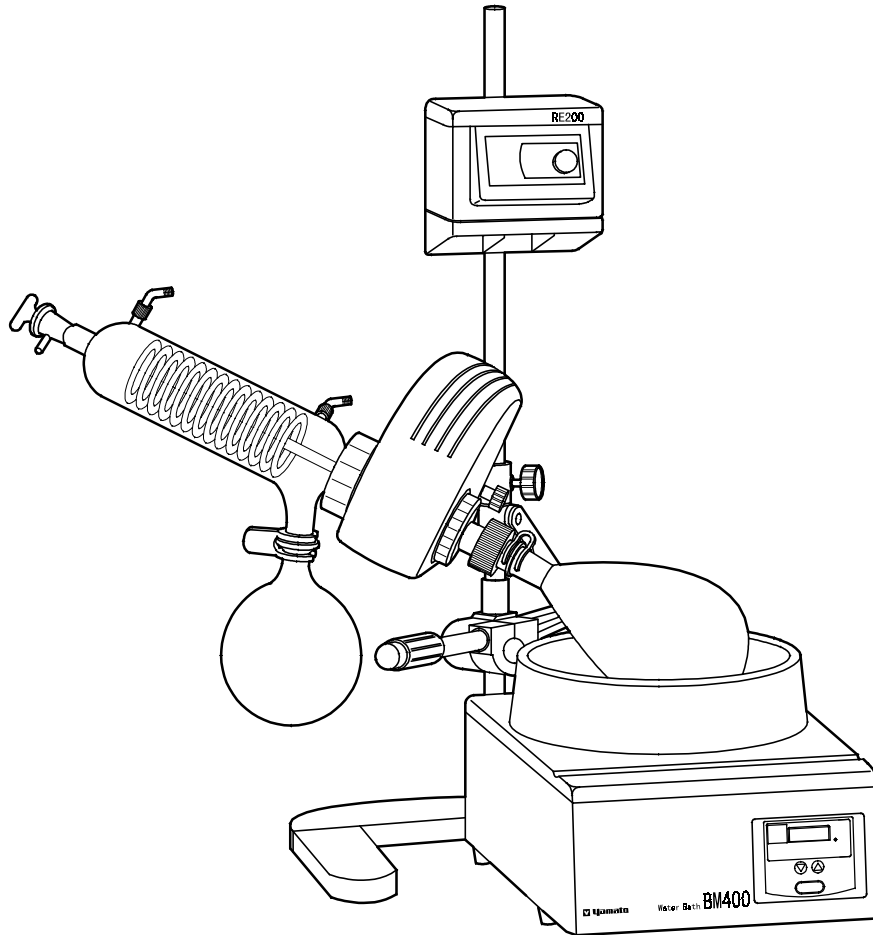


	Display	Shows the set/measured temperature.
	Heater Lamp	Lit when heater is on.
	Blind Window	Indicates "TROUBLE" blinking when the unit is out of order.
	Up-down Key	Set the point.
	Set Key	Fixes the set point.

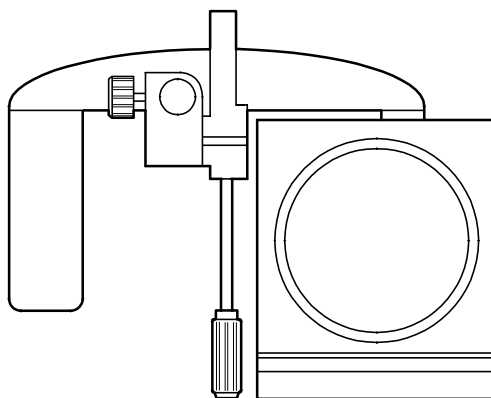
Identification of Parts

Sample : Combined with RE200

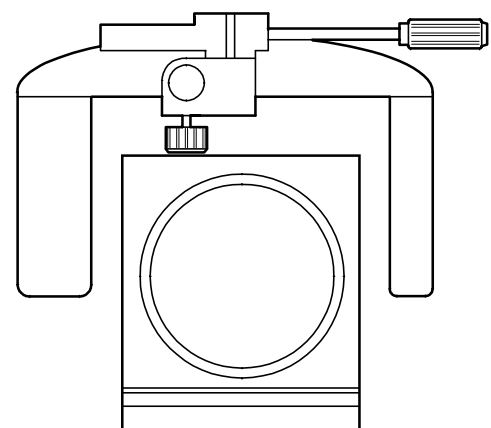
Combination with RE200



Drawing 1



Drawing 2

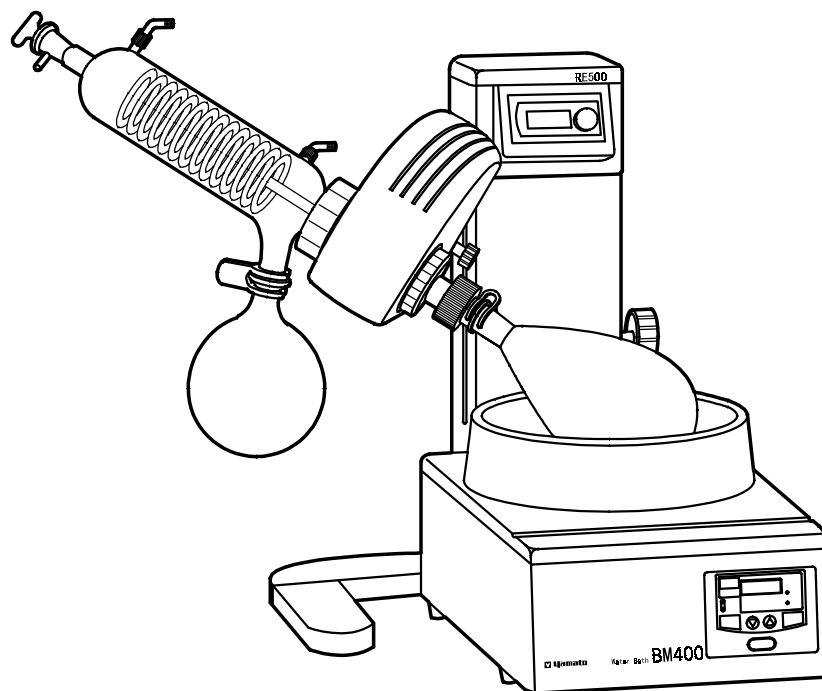


According to the position or space to set the bath and the body, the arm jack can be in the front (drawing 1) or on the right side (drawing 2) as shown above.

Identification of Parts

Sample: Combined with RE500

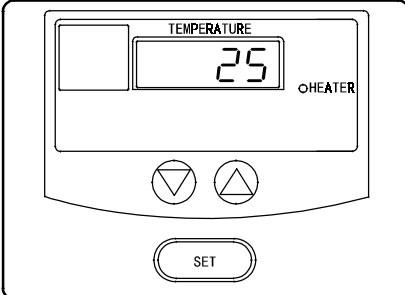
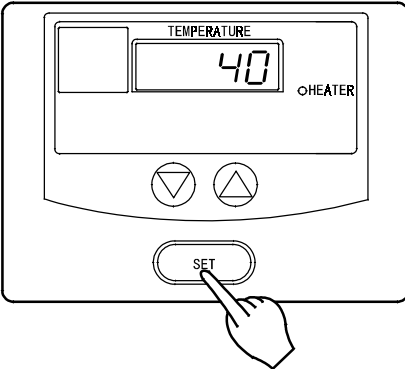
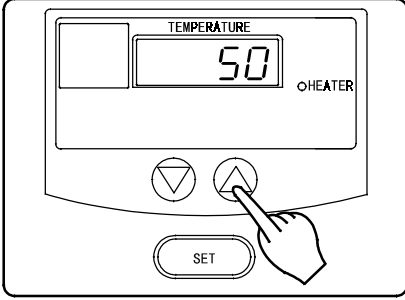
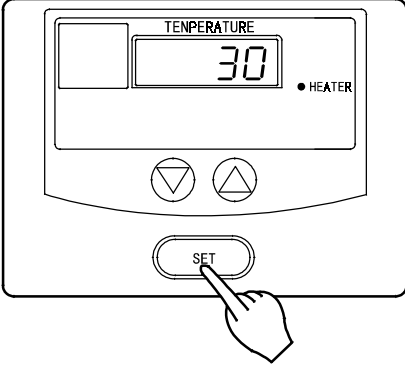
Combination with RE500



4. Operational Procedure

How To Operate

Use the following procedure to operate water bath

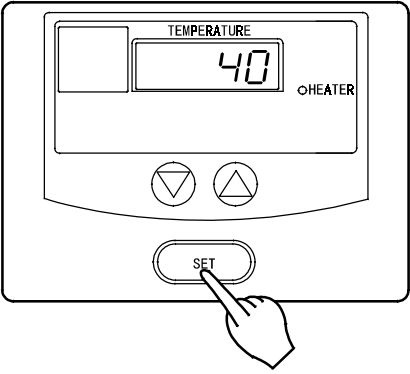

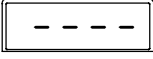
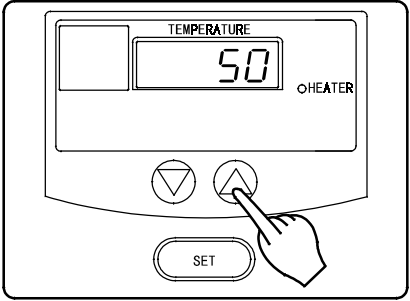




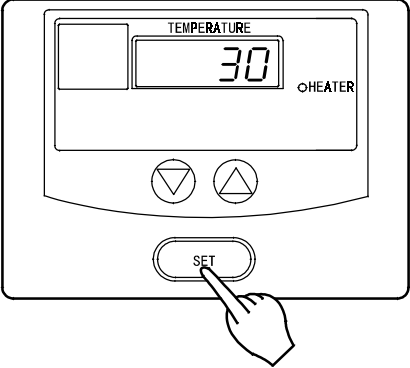
Display after operation procedure	Explanation	
	<p>Turn the power "ON".</p> <p>ex. The measured temp. is 25 .</p>	<p>After you turn the power on, the unit will start operation up to the temperature last set.</p> <p>The display shows the current measured temperature.</p>
<p>To change the set temp...</p>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

Operational Procedure

Pre-setting Temperature

How to preset the temperature.

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

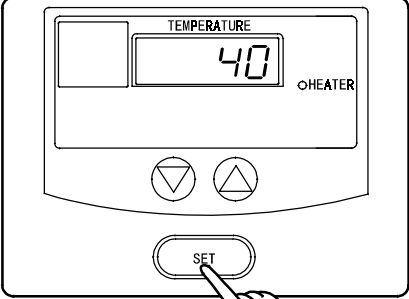
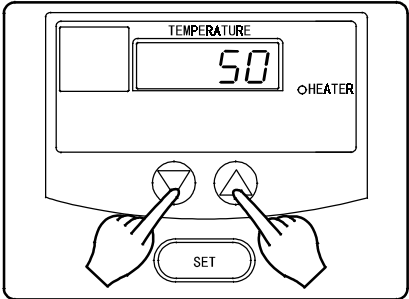
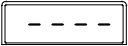
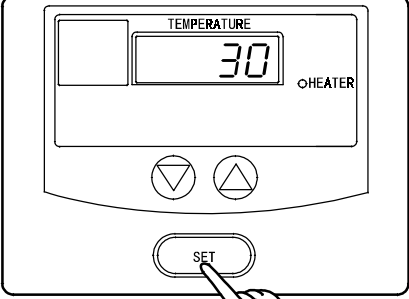
Display after operation procedure	Explanation
<p data-bbox="673 546 938 577">Push "SET" key twice.</p> 	<p data-bbox="1011 546 1276 577">Push "SET" key twice.</p> <p data-bbox="1011 591 1430 770">The unit is changing into pre-setting mode. The display changes from current measured temp. to the preset one blinking.</p> <p data-bbox="1011 784 1430 864">The dot on the left edge of display blinks to indicate presetting mode.</p> <p data-bbox="1011 864 1378 976">ex.  Indicates that you are in the presetting mode</p> <p data-bbox="1011 976 1394 1081">The display blinks  if no temp. is preset.</p>
<p data-bbox="328 1104 520 1135">ex. Preset at 50</p> 	<p data-bbox="673 1104 906 1184">Push either the  or  key.</p> <p data-bbox="1011 1104 1445 1184">Push either the  or  key to set the temp. you desire.</p>
<p data-bbox="673 1507 871 1538">Push "SET" key.</p> <p data-bbox="673 1606 938 1727">ex. The current measured temp. is 30 .</p> 	<p data-bbox="1011 1507 1398 1588">After you set the desirable temp. push "SET" key.</p> <p data-bbox="1011 1601 1430 1682">The changed temp. is in memory and the last is deleted.</p> <p data-bbox="1011 1695 1445 1825">The display changes from the set temp. blinking to the current measured temperature.</p>

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
<p>1</p>  <p>Push "SET" key</p> <p>ex. The temp. last set time was 40 .</p>	<p>Push "SET" key to select the temp. setting mode.</p> <p>The display changes from the current measured temp. to the last set temp. blinking.</p>
<p>2</p>  <p>Push both and key.</p>	<p>Push both and key simultaneously for more than 1 second.</p> <p>The unit changes into the presetting mode, and the display blinks the preset temp.</p> <p>When no temp. is preset, the display blinks .</p>
<p>3</p>  <p>Push "SET" key.</p> <p>ex. The current measured temp. is 30 .</p>	<p>Push "SET" key after you select the presetting temp.</p> <p>The unit begins operation up to the preset temp.</p> <p>The display stops blinking the set temp. and shows the current measured temperature.</p>

Operational Procedure

Pre-setting Temperature

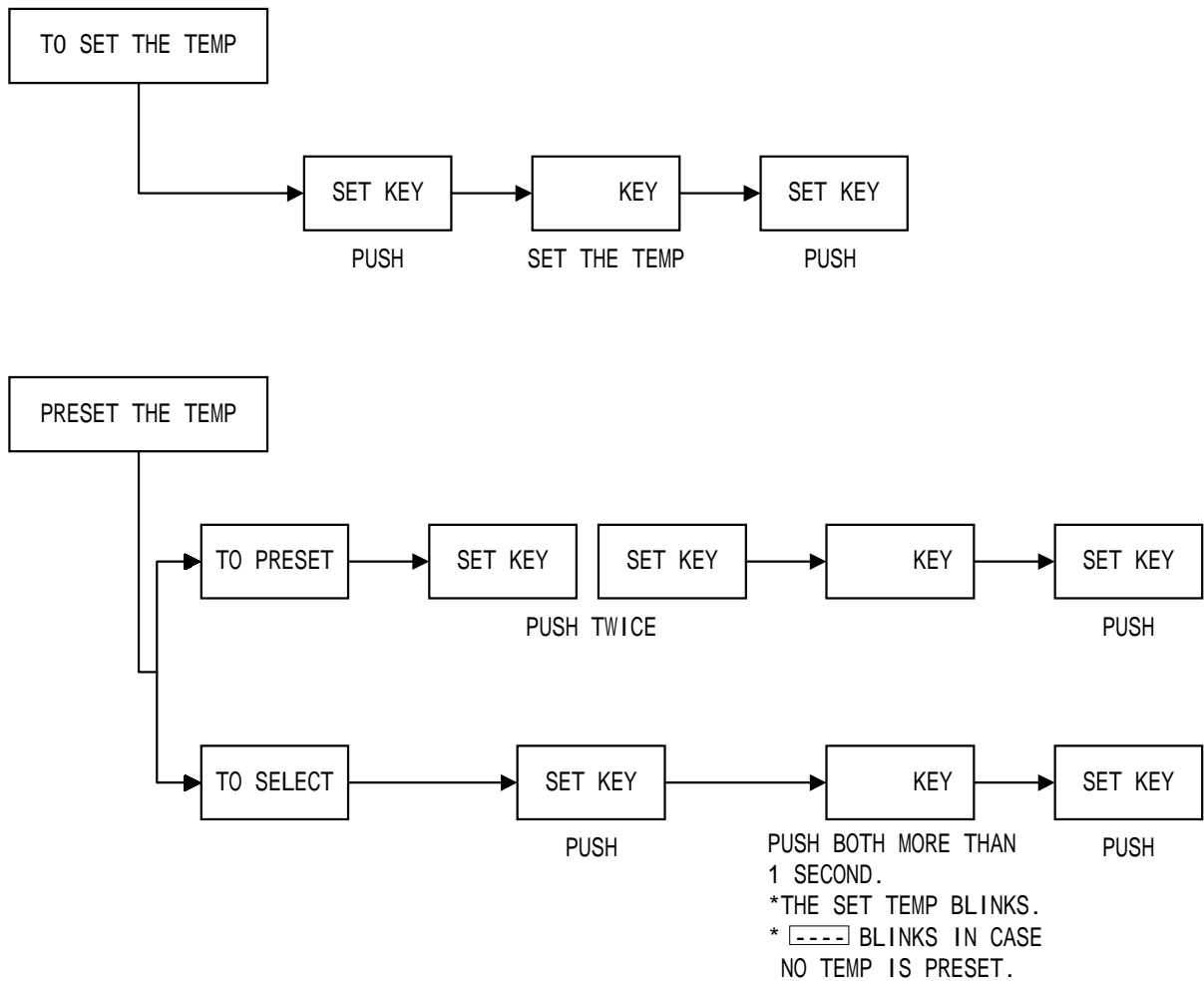
Canceling the preset temperature

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 <div style="text-align: center; border: 1px solid black; padding: 2px; width: 40px; margin: 5px auto;">50</div> Example of display in case you select the preset temp.	STOP ex. The temperature last set <div style="text-align: center; border: 1px solid black; padding: 2px; width: 40px; margin: 5px auto;">40</div> 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

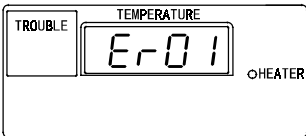
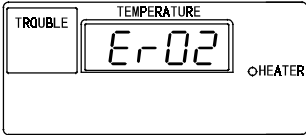
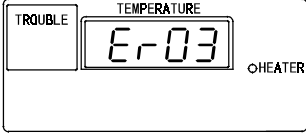
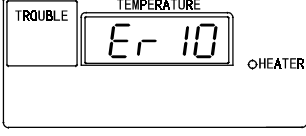
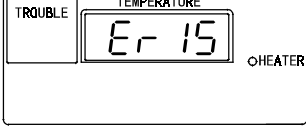
Flowchart of operation procedure



Operation Procedure

Error Codes

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
 <p>The error code indicates low water heating or any sensor trouble.</p> <p>Both "TROUBLE" and <i>Er 01</i> blink on and off.</p>	<p>If you come across any of these error codes, turn the power off, located on the back of the unit, off immediately.</p> <p>If you are experiencing difficulties with error codes, please call Yamato Scientific immediately.</p>
 <p>The error code indicates trouble of triac circuit.</p> <p>Both "TROUBLE" and <i>Er 02</i> blink on and off.</p>	
 <p>The error code indicates disconnection of heater.</p> <p>Both "TROUBLE" and <i>Er 03</i> blink on and off.</p>	
 <p>The error code indicates trouble of main-relay.</p> <p>Both "TROUBLE" and <i>Er 10</i> blink on and off.</p>	
 <p>The error code indicates trouble of electric circuit.</p> <p>Both "TROUBLE" and <i>Er 15</i> blink on and off.</p>	

Operation after restoration from power failure.

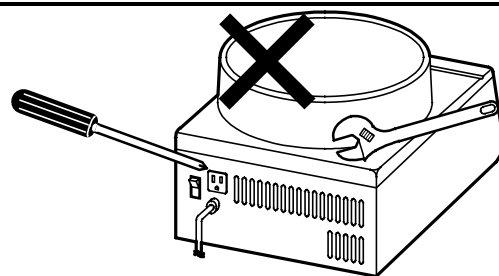
After restoring from power failure, the unit will re-start operation up to the temperature last set.

5. Maintenance

Daily maintenance

Do not disjoint the unit

- ⊘ Never remodel 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.



For maintenance

- ! For your safety, be sure to turn the power switch off (on the back side) and pull the power cord out for maintenance. You must wait until the inside temperature of the unit goes down to normal. Wipe off any or excess dirt on the packing and the operation panel with a soft dry cloth. Do not use benzine, thinner or cleanser to wipe or scrub with a brush. This could cause change in shape, quality or color.

When you do not use the unit for a long period of time, or dispose of it

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

- ! Turn the power switch off and pull the power cord out for safety. When the unit is not use for a long period of time. Be sure to drain the tank.

When you dispose of the unit

- ⊘ Do not dispose of and leave the unit in child playground etc.,

When you suspect “trouble”?

Situation	Make Sure
The display on the operation panel is not lit even when the power switch is on.	If the power cord is connected firmly to an outlet If there is no power failure * 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 question, 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 Scientific's Technical Service Department.

Necessary information

Model Number

Serial Number

Date of Purchase

Distributor Name

Information on difficulties

Be sure to show the warranty when the service man visits you.

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 the warranty is one year limited commencing the date of purchase. Repair is made without charge according to the contents of warranty.

As for repair after expiration of the warranty period, consult the seller or our service office. As long as the function of the unit is maintained by repair, upon your request, we will repair it with charge.

Minimum period to keep repair parts in stock

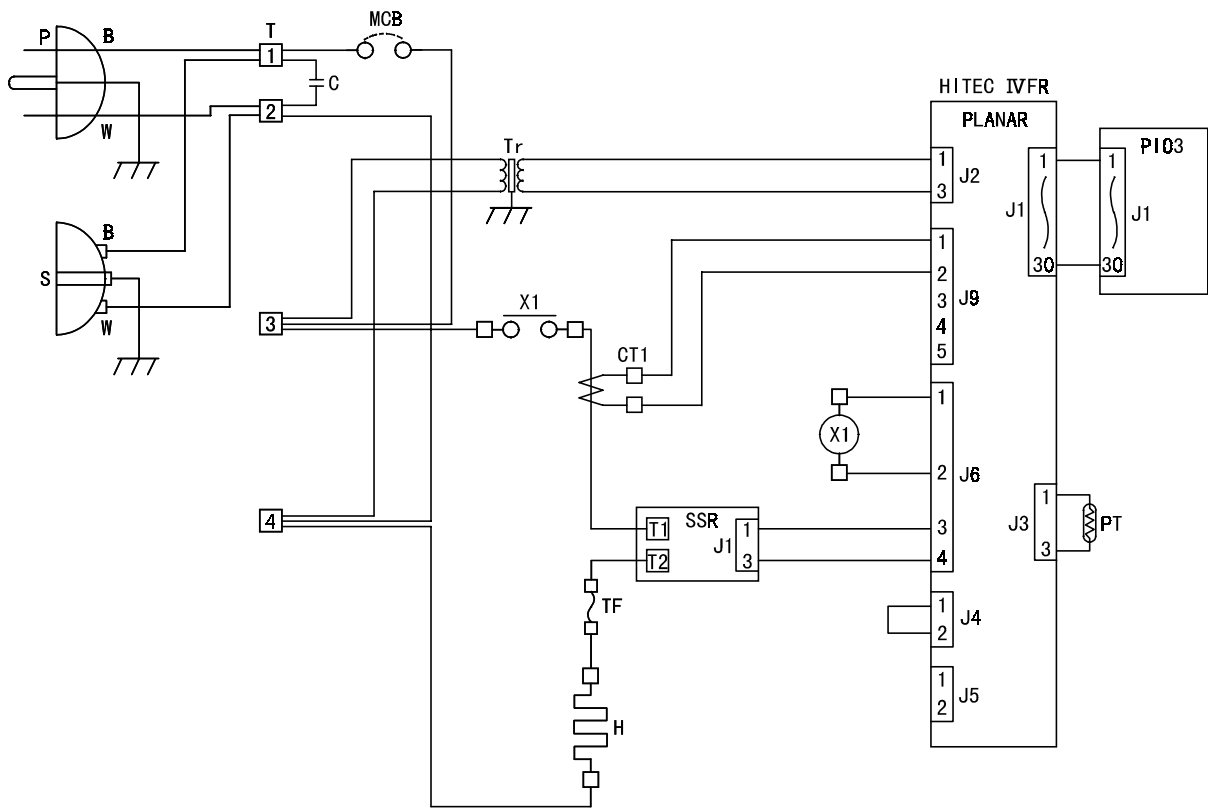
Minimum period to keep repair-parts in stock is 7 years after the production stop. The repair parts means any necessary parts to maintain the performance of the unit.

7. List of Exchange Parts

Name of Parts	Parts Number	Application	Specification
Drain Plug (BM400)	7320016005	BM400	
Drain Plug (BO600)	BH500-40010	BO600	PTFE
O-Ring	4210026020	BM400/BO600	BAITON P12.5

8. Wiring Diagram

BM400/BO600



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