Low temperature constant bath

BU 200
BU 300

Version 1.1

- Thank you very much for purchasing the product of Yamato Scientific Co., Ltd..
- Read this operating manual and the guarantee card thoroughly for the proper use of this product. Please keep both importantly after reading.

Warning: Before attempting to use the product, read the important warnings that appear in the text of this manual and get familiar with them.
Attention

Merit

BU200 and BU300 have following merits

Please observe the following rules

Installation

When using

Name of each part and function

Preparation and confirmation before using

Method of operation

Method of maintenance

After-sales service and guarantee

Specification table

Chart of connecting wires

Exchange part table
For the important warnings, the following symbols are used depending on the level and content of danger.

⚠️ **Warning** ----------------- For personal accident prevention

Failure to observe them may result in bodily harm and severe accidents according to circumstances.

⚠️ **Caution** ------------------ For damage prevention of product

Failure to observe them or to correct trouble may damage the product itself or samples. In addition, information on performance and mis-operation, which is useful for operation and maintenance.
1. **CFC-Free refrigeration system**
2. **Featuring earth leakage circuit-breaker**
3. **Building up optimized heating/cooling system by combining with appropriate immersion temperature control device.**
4. **This machine has the service outlet. It is possible to use this outlet as a power supply of Immersion temperature control device. (applicable to BU200 only)**
5. **By the optional putting stand, test tube racks can be used. (applicable to BU200 only)**
Warning

1. Please take the earth
   Please take the earth to avoid the electric shock hazard by the leak.
   - In case of outlet with ground at use
     Please insert the power supply plug in the ground outlet.
   - When you use the outlet of the dipoles type
     The optional earth adapter is inserted in the power supply plug. Please connect the power supply plug with the outlet after confirming the polarity on the outlet side.
   - In case of no earth terminal
     In this case, the special construction is needed. Please consult the dealer or our company sales office.

2. Please confirm the voltage and capacity of power supply.

   Electric capacity:
   - BU200  AC100V  4A (when the service outlet is used  15A)
   - BU300  AC100V  8A

Caution

1. Please note the installation place
   - Please do not set up especially in the following places.
     - Place where flammable gas and corroded gas are generated
     - Place where surrounding temperature becomes 35°C or more
     - Place where moisture exists
     - Place where direct sunshine strikes
     - Place where vibration is received
     - Place where ventilation is bad
       (Please set up with separating at least 10 cm or more from the wall)
   - Please set up in a strong and horizontal place. Otherwise, the refrigerator might break down. Please turn the caster stopper on after setting up. (applicable to BU300 only)
When using

⚠️ **Warning**

1. **Do not sprinkle water on the main body**
   - When water splashes to the electrical component, the leak and the electric shock are caused. Water must not splash to the operation panel and the power supply switch. Please turn off the power supply on the building side when water lies by any chance. And, please wipe water off. The danger of the leak and the electric shock grows when leaving as it is.

⚠️ **Caution**

1. **Do not operate without immersion temperature control device**
   - Sure to combine with a immersion temperature control device. The temperature of the liquid goes down and it is impossible to keep a constant temperature when using without immersion temperature control device.

2. **Turn the power of the refrigerator off**
   - Please turn the switch of the refrigerator off when a set point of immersion temperature control device exceeds room temperature +5°C.
3. About the liquid in the reservoir

Please use water or the ethyl alcohol solution.

(1) When using water
To use the ion exchange water or distilled water is recommendable. Because the adhesion of scale is few, maintenance becomes easy.

(2) When using alcohol
Be sure to use the ethyl alcohol solution. Please refer to the table to your right for the density of solution. Please never use neither antifreezing solution for the car nor the ethylene glycol solution. Immersion temperature control device might not operate normally.

<table>
<thead>
<tr>
<th>Density of ethanol</th>
<th>Coagulation point (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt %</td>
<td>Vol %</td>
</tr>
<tr>
<td>4.8</td>
<td>6.0</td>
</tr>
<tr>
<td>11.3</td>
<td>14.0</td>
</tr>
<tr>
<td>13.8</td>
<td>17.0</td>
</tr>
<tr>
<td>16.4</td>
<td>20.2</td>
</tr>
<tr>
<td>17.5</td>
<td>21.5</td>
</tr>
<tr>
<td>18.8</td>
<td>23.1</td>
</tr>
<tr>
<td>20.3</td>
<td>24.8</td>
</tr>
<tr>
<td>22.1</td>
<td>27.0</td>
</tr>
<tr>
<td>24.2</td>
<td>29.5</td>
</tr>
<tr>
<td>26.7</td>
<td>32.4</td>
</tr>
<tr>
<td>29.9</td>
<td>36.1</td>
</tr>
<tr>
<td>33.8</td>
<td>40.5</td>
</tr>
<tr>
<td>39.0</td>
<td>46.3</td>
</tr>
<tr>
<td>46.3</td>
<td>53.8</td>
</tr>
</tbody>
</table>
Name of each part and function

BU200

Power supply switch
To turn the switch off makes power of the equipment off.
(page 9-1 / 4.)
When over-current or leakage of current occur, the power supply switch is turned off automatically.

Refrigerator switch
When the side of the switch marked ‘on’ is pushed, the refrigerator begins working. When the opposite side is pushed, the refrigerator stops working.
(page 9-3 / 4.)

Drain entrance
(page 11-2)

Service outlet
(page 8-2)

Power supply cable
(page 3-1 / 2)

Attached goods

auxiliary printed matters
• Instruction manual
• Guarantee book
Refrigerator switch
When the side of the switch marked ‘on’ is pushed, the refrigerator begins working. When the opposite side is pushed, the refrigerator stops working. (page10-3, 4)

Power supply switch
To turn the switch off makes power of the equipment off. (page10-1, 4)

When over-current or leakage of current occur, the power supply switch is turned off automatically.

Power supply cable
(page3-1, 2)

Drain entrance
(page11-2)

Attached goods
- Bath cover complete set for low temperature

auxiliary printed matters
- Instruction manual
- Guarantee book
1. Pour the liquid into the reservoir

The amount of the overflow liquid changes depending on the shape and the number of the container. Please pour appropriate amount of liquid into the reservoir. It is recommended to pour the liquid to the extent that the liquid just hides the cooling coil.

2. Attach immersion temperature control device

Please loosen the knob for fixation of the immersion temperature control device and set it up at the back of the main body. BU200 provides the immersion temperature control device with the power from its service outlet. Service outlet can be used as long as the power supply switch of main body is turned on. For more detailed information, please see the instruction manual for immersion temperature control device.
1. **Turn the power supply switch on**
   - The power supply turns on when the power supply switch is moved up.

2. **Set the setpoint (desired temperature) of immersion temperature control device**
   - Please set the setpoint of immersion temperature control device. The method of a detailed operation is described in the instruction manual for the immersion temperature control device. Please see the instruction manual for more detailed information.

3. **Push the "On" side of the refrigerator switch**
   - So long as the setpoint of immersion temperature control device is equal to or less than the room temperature +5°C, turn the power of the refrigerator on. Even if the temperature in the reservoir is high, the refrigerator can operate.

4. **When you stop the refrigerator**
   - Push the "OFF" side of the refrigerator switch. Then, the refrigerator stops. In this case, power of immersion temperature controller is still ON. Please turn off the immersion temperature controller if you do not use it any more.

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**Caution**

- Do not turn on and off the refrigerator in a short term (5 minutes or less). This causes the refrigerator to break down.
- When making the low temperature in the reservoir low in the high room temperature, the drop of water might adhere to this machine. Please wipe the drop of water off with a soft cloth in every case.
1. **Turn the power supply switch on**
   - The power supply turns on when the power supply switch is moved up.

2. **Set the setpoint (desired temperature) of immersion temperature control device**
   - Please set the setpoint of immersion temperature control device. The method of a detailed operation is described in the instruction manual. Please see the instruction manual for more detailed information.

3. **Push the "On " side of the refrigerator switch**
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---

**Caution**

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- When making the low temperature in the reservoir low in the high room temperature, the drop of water might adhere to this machine. Please wipe the drop of water off with a soft cloth in every case.
Caution

When maintaining, please pull out the power supply plug from the outlet for safety. Do not decompose the equipment.

1. Main body
   - Please wipe the dirt of the surface off with a soft cloth which squeezes and removed moisture. There is danger of the electric shock. Please do not wipe the equipment with benzine, thinner or kurenzah etc. Please do not rub with the scouter. The painting of the equipment is hurt and rust is caused.

2. Reservoir
   - When the reservoir becomes dirty with the scales and the floatage, please remove the cap of the drain and pull out the liquid in the reservoir. After that, please wash the reservoir with the neutral detergent. Afterwards, please rinse the detergent by water. Please do not use an alkaline detergent.
   - If reservoir is not used for a long term, empties the reservoir and keep it dry.
3. Refrigerator

Please detach the cover of the front of this machine regularly and remove the garbage which adheres to the condenser fin with a cleaner. Please pay attention so as not to crush the fin when cleaning.
1. When you request the repair
   ■ Please record the error code, turn off the power supply switch, and pull out the power supply plug if abnormality occurs by any chance. Please report to the dealer or our company office.
   ■ Contents to report
     • Model of product
     • Product number
     • Date of purchase (Please look at the guarantee book or the rating plate pasted to the main body)
     • Symptom of breakdown (as detailed as possible)
   ■ Please present the guarantee book when the person in charge of service visits.

2. Guarantee book
   ■ The guarantee book is passed from the dealer or our company office. Please keep it importantly after confirming the filling in matter such as the shop name and the purchase days and often reading.
   ■ The guaranteed term is for one year from purchase day. When the breakdown occurs within the guaranteed term, our company repairs free of charge according to the condition described to the guarantee book.
   ■ Please consult the dealer from which you purchase the equipment or our company about the repair after the guaranteed term expires. When the function can recover by repair, we repair the equipment upon your request. In this case the repair is charged.

3. The minimum possession periods of parts for repair
   ■ After discontinuance of manufacturing, the minimum possession periods of parts for repair of this machine are seven years. Parts for the repair mean the parts necessary to maintain the performance of the product.

4. When thinking the equipment breaks down

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Checkpoint before requesting repair</th>
</tr>
</thead>
</table>
| The equipment does not work even if the refrigerator switch is turned on | • Check whether the power supply switch will be turned off.  
• Check whether the plug and the outlet come in contact neatly. |
| If the temperature in the reservoir does not go down or is slow to go down even if the refrigerator switch is turned on | • Check whether there will be a lot of samples.  
• Check whether the cooling coil freezes.  
• Check whether a lot of garbage adhere to the condenser fin. |
<table>
<thead>
<tr>
<th><strong>Model</strong></th>
<th>BU200</th>
<th>BU300</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance ↓</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature Range (°C)</td>
<td>−10 to 80</td>
<td>−20 to 80</td>
</tr>
<tr>
<td>Cooling Capacity (J/s)</td>
<td>350 (300 kcal/h)(^1) at 20 °C</td>
<td>465 (400 kcal/h)(^3) at 20 °C</td>
</tr>
<tr>
<td></td>
<td>290 (250 kcal/h)(^2) at 10 °C</td>
<td>400 (350 kcal/h)(^4) at 0 °C</td>
</tr>
<tr>
<td>Time to reach the lowest temperature (minute)</td>
<td>approximate 90(^5) (20 to −10 °C)</td>
<td>approximate 120(^6) (20 to −20 °C)</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>Air cooling sealing type 150 W</td>
<td>Air cooling sealing type 400 W</td>
</tr>
<tr>
<td>Compressor machine output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refrigerant</td>
<td></td>
<td>R22</td>
</tr>
<tr>
<td><strong>Dimensions ↓</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity of Reservoir (litter)</td>
<td>13</td>
<td>30</td>
</tr>
<tr>
<td>Reservoir (W × D × H mm)</td>
<td>220 × 160 × 150</td>
<td>360 × 240 × 200</td>
</tr>
<tr>
<td>Overall (W × D × H mm)</td>
<td>650 × 480 × 315</td>
<td>385 × 575 × 830</td>
</tr>
<tr>
<td><strong>Power Requirement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(with BF200 or BF400 or BF500 working)</td>
<td>AC100V, 15A</td>
<td>AC100V, 8A(^7)</td>
</tr>
<tr>
<td><strong>Standard auxilary goods</strong></td>
<td>None</td>
<td>Bath cover for low temperature</td>
</tr>
<tr>
<td><strong>Options</strong></td>
<td>Bath cover for low temperature, Putting stand with height adjustment mechanism</td>
<td>None</td>
</tr>
</tbody>
</table>

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\(^1\) Standard rating  
\(^2\) Standard rating  
\(^3\) Standard rating  
\(^4\) Standard rating  
\(^5\) Heating medium is 100% ethanol.  
\(^6\) Heating medium is 100% ethanol.  
\(^7\) It is a voltage source capacity of the main body. Using together with immersion temperature control device, the power supply for the immersion temperature control device is required.
BU200

BU300

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>FG</td>
<td>Frame ground</td>
</tr>
<tr>
<td>ELB</td>
<td>Earth leakage circuit-breaker</td>
</tr>
<tr>
<td>P</td>
<td>Power supply plug</td>
</tr>
<tr>
<td>RF</td>
<td>Refrigerator</td>
</tr>
<tr>
<td>S</td>
<td>Service outlet</td>
</tr>
<tr>
<td>SW</td>
<td>Switch</td>
</tr>
<tr>
<td>T1, T2</td>
<td>Terminal Block</td>
</tr>
<tr>
<td>X</td>
<td>Relay</td>
</tr>
</tbody>
</table>

^ Applicable to BU 200 only
## Exchange part table

### BU200

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Part name</th>
<th>Code number</th>
<th>Specification</th>
<th>Maker</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELB</td>
<td>Earth leakage circuit-breaker</td>
<td>2-06-005-0019</td>
<td>AC100V 15A BJ S1531</td>
<td>Matsushita Elec.</td>
</tr>
<tr>
<td>T1, T2</td>
<td>Terminal block</td>
<td>2-07-000-0004</td>
<td>F1112-250-6-4P</td>
<td>Fujicon</td>
</tr>
<tr>
<td>S</td>
<td>Service outlet</td>
<td>7-08-002-0008</td>
<td>S-150</td>
<td>Satohparts</td>
</tr>
<tr>
<td>SW</td>
<td>Switch</td>
<td>2-01-011-0008</td>
<td>C1353AT-BGS</td>
<td>Izumi</td>
</tr>
<tr>
<td>RF</td>
<td>Refrigerator</td>
<td>3-01-002-0006</td>
<td>UF-S210ML</td>
<td>Sanyo</td>
</tr>
<tr>
<td>X</td>
<td>Relay</td>
<td>2-05-012-0003</td>
<td>15A 250VAC AR6524</td>
<td>Matsushita Elec.</td>
</tr>
<tr>
<td></td>
<td>Bath</td>
<td>BU200-30190</td>
<td>SH-1706</td>
<td>Yamato Scientific</td>
</tr>
</tbody>
</table>

### BU300

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Part name</th>
<th>Code number</th>
<th>Specification</th>
<th>Maker</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELB</td>
<td>Earth leakage circuit-breaker</td>
<td>2-06-005-0019</td>
<td>AC100V 15A BJ S1531</td>
<td>Matsushita Elec.</td>
</tr>
<tr>
<td>T1, T2</td>
<td>Terminal block</td>
<td>2-07-000-0004</td>
<td>F1112-250-6-4P</td>
<td>Fujicon</td>
</tr>
<tr>
<td>SW</td>
<td>Switch</td>
<td>2-01-011-0008</td>
<td>C1353AT-BGS</td>
<td>Izumi</td>
</tr>
<tr>
<td>RF</td>
<td>Refrigerator</td>
<td>3-01-002-0005</td>
<td>NU-401-ALE</td>
<td>Matsushita Elec.</td>
</tr>
<tr>
<td>X</td>
<td>Relay</td>
<td>2-05-012-0003</td>
<td>15A 250VAC AR6524</td>
<td>Matsushita Elec.</td>
</tr>
<tr>
<td></td>
<td>Bath</td>
<td>BU300-30310</td>
<td>SH-1908</td>
<td>Yamato Scientific</td>
</tr>
</tbody>
</table>