Coolline

Model

CLS301/400/600

Instruction Manual

- Third Edition -

Thank you for purchasing "Coolline, CLS 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 Co. LTD.
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Cautions in Using with Safety

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.
## Cautions in Using with Safety

### Table of Illustrated Symbols

<table>
<thead>
<tr>
<th>Warning</th>
<th>Caution</th>
<th>Prohibit</th>
<th>Compulsion</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Warning Icon" /></td>
<td><img src="image2.png" alt="Caution Icon" /></td>
<td><img src="image3.png" alt="Prohibit Icon" /></td>
<td><img src="image4.png" alt="Compulsion Icon" /></td>
</tr>
<tr>
<td>Warning, generally</td>
<td>Caution, generally</td>
<td>Prohibit, generally</td>
<td>Compulsion, generally</td>
</tr>
<tr>
<td>Warning, high voltage</td>
<td>Caution, electrical shock</td>
<td>Prohibit, inflammable</td>
<td>Compulsion, connect to the grounding terminal</td>
</tr>
<tr>
<td>Warning, high temperature</td>
<td>Caution, scald</td>
<td>Prohibit, to disassemble</td>
<td>Compulsion, install on a flat surface</td>
</tr>
<tr>
<td>Warning, drive train</td>
<td>Caution, no road heating</td>
<td>Prohibit, to touch</td>
<td>Compulsion, disconnect the power plug</td>
</tr>
<tr>
<td>Warning, explosive</td>
<td>Caution, not to drench</td>
<td></td>
<td>Compulsion, periodical inspection</td>
</tr>
<tr>
<td>Caution, water only</td>
<td>Caution, deadly poison</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 page 50 "List of Dangerous Substances").

始终接地

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 circuit breaker right away, and then disconnect the power plug. 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. (Refer to page 50 "List of Dangerous Substances").

🚫 Do not disassemble or modify this unit

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

⚠️ Do not touch high-temperature parts

Some of the parts may become hot during and just after operation. It may cause burns.

⚠️ 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

1. Always ground this unit

- Be sure to connect the earth wire (the green cable of power cord) to the grounding conductor or ground terminal to prevent accidents caused by electric leakage.
- Do not connect the earth wire to gas or water pipes. If not, fire disaster may be caused.
- Do not connect the earth wire to the ground for telephone wire or lightning conductor. If not, fire disaster or electric shock may be caused.
- Do not use a branching receptacle, which may cause the heat generation.

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 above 30°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 page 50 “List of Dangerous Substances”.

Before Using This Unit

Requirements for Installation

4. Do not modify
   • Modification of this unit is strictly prohibited. This could cause a failure.

5. Installation on horizontal surface
   • Place this unit as flat a place as possible. If the rubber feet (model CLS301) or casters (models CLS400/600) are not in uniform contact with the floor surface, noise or vibration may result. Additionally, the unit may cause a problem or malfunction.

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:
     CLS301: 100V AC, 4A
     CLS400: 100V AC, 6A
     CLS600: 100V AC, 10A

     NOTE)
     There could be the case that the unit does not run even after turning ON the power. Inspect whether the voltage of the main power is lowered than the specified value, or whether other device(s) uses the same power line of this unit. If the phenomena might be found, change the power line of this unit to the other power line.

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.
**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. Use a proper circulating fluid in response to working conditions**

- Select a circulating fluid according to the working temperature.
  
  Set temperature + 10°C or over: Water  
  Set temperature + 10°C or below: Antifreezing fluid (Nybrine® - 60%, ethylene glycol - 50%)
  
  If water is used at the set temperature of + 10°C or below, the cooling coil may freeze to cause malfunction.

**10. When using a Nybrine aqueous solution instead of water**

- The freezing point of the antifreezing fluid depends on its concentration or type. Use an antifreezing fluid having a 10°C lower at least than the working temperature. Any antifreezing fluid, which freezes at a higher temperature than that, may freeze in the cooling unit and deteriorates heat exchanging efficiency.

**11. Do not use fluids other than water and antifreezing fluids (Nybrine®, ethylene glycol)**

- Pour distilled water or tap water into the water tank. Water of poor quality may cause fur or scale to accumulate on the heater pump, which may result in deteriorated performance or malfunction (e.g. well water, etc.).
- A circulating fluid with high specific gravity or highly viscosity places overburden on the circulating pump and damages the unit (e.g. Fluorinert, Galden, etc.).
- A corrosive fluid or a fluid that produces corrosive substances when heated may cause malfunction (e.g. Fluorinert).
- Do not use any fluid whose vapor is toxic or hazardous because it may result in an accident (methyl alcohol, etc.).
## Installation Procedure

1. Release the stopper lock of the casters.  
   (CLS400/600)  
   Push down the stopper button of the casters as shown in the right figure. It will be unlocked.  
   (Only the two casters on the front side of the unit are equipped with a caster.)  
   The model CLS301 is equipped with rubber feet.

2. Move the unit to the place of installation.  
   - If there is a bump on the floor, the casters may receive excessive load and get damaged. In this case, lift and move the unit.

3. After the unit is placed in the desired position, lock the stopper button of the casters.

4. Check the drain cock.  
   Confirm that the drain cock on the right side of the unit is in the "Close" position (perpendicular to the cock).

5. Connect the hoses.  
   - Securely connect the hoses to the ports of the unit and the external water tank of the external open system so that the fluid does not leak. See the figure shown below. The outside diameter of both discharge (OUT) and return (IN) ports is each 13 mm.  
     Note) Connect the priming pump port (IN) to the return (IN) port of the unit.  
   - Using a solenoid or throttle valve to shut off the circulating path may result in malfunction of the circulating pump or fluid leakage.  
   - Do not throttle the path excessively. Keep a flow rate of the circulating fluid at 1.5·/min or over.  
   - Slowly change the flow rate. A rapid change in the flow rate may reduce the service life of the circulating pump.
# Before Using This Unit

## Installation Procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
</table>
| 6    | **Connecting the power.**  
Confirm that the leakage breaker and the POWER switch are turned "OFF", and then plug into an outlet. |
| 7    | **Installing the external water tank (optional accessory)**  
Install the external water tank in a higher place than the unit. If it is installed in a lower place, the flow rate may drop or air bleeding may not be carried out smoothly when pouring the circulating fluid for the first time. |
| 8    | **Pour the circulating fluid into the water tank.**  
- Remove the lid from the external water tank, and pour the circulating fluid.  
  (Select a circulating fluid in response to the set temperature condition.)  
- Open the air release valve cock.  
- Push the priming pump more than ten times.  
  (Feed the fluid from the external water tank to the circulating pump inside the unit to let out air from the pump. The fluid circulates after air is let out.)  
- Turn on the leakage breaker and the POWER switch.  
  (The circulating fluid flows into the fluid tank of the unit.)  
- After the fluid tank is filled with the fluid, it is discharged into the external water tank.  
  (If the circulating fluid still does not circulate, immediately turn off the leakage breaker and the POWER switch. Check the unit according to the procedure described on page 43.)  
- Close the air release valve cock.  

⚠️ **The circulating pump may malfunction if the unit is operated with the circulating fluid uncirculated.**  

- After the circulation of the circulating fluid is stabilized, resupply the circulating fluid to 80% level of the external water tank.  
- After the resupply of the circulating fluid is completed, turn "off" the leakage breaker.  
- Replace the lid on the external water tank.  

⚠️ **Exercise care not to allow the circulating fluid to get on the unit. If it gets on any electric part, leakage or electric shock may result. If it splashes on the operation panel, wipe it out.** |
Description and Function of Each Part

Main Unit

**Front view**

- Control panel
- POWER switch
- Rating notice sticker
- Earth leakage breaker
- Caster (Two front casters have stopper)

**Rear view**

- Discharge port (OUT)
- Air release valve
- Return port (IN)
- Temperature output terminal
- Drain cock
- Power cord
Description and Function of Each Part

Control Panel

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>RUN/STOP Key</td>
<td>Used for operation Start/Stop.</td>
</tr>
<tr>
<td>②</td>
<td>▲▼ Key</td>
<td>Selects setting value.</td>
</tr>
<tr>
<td>③</td>
<td>TIMER Key (SUB MENU Key)</td>
<td>Selection key for timer operation. Selects Quick Auto Stop operation, Auto Stop operation, and Auto Start operation. Carries out the settings for Calibration Offset Temperature, Key rock function, and power failure compensation function.</td>
</tr>
<tr>
<td>④</td>
<td>FIXED TEMP Lamp</td>
<td>Lights during Fixed Temp. operation.</td>
</tr>
<tr>
<td>⑤</td>
<td>AUTO STOP Lamp</td>
<td>Lights during Quick Auto Stop timer operation and Auto Stop timer operation.</td>
</tr>
<tr>
<td>⑥</td>
<td>AUTO START Lamp</td>
<td>Lights during Auto Start timer operation.</td>
</tr>
<tr>
<td>⑦</td>
<td>ALARM Lamp</td>
<td>Lights when an error occurs.</td>
</tr>
<tr>
<td>⑧</td>
<td>Measurement Temperature Screen</td>
<td>Displays Inner bath measurement temperature, Setting character, and Alarm information.</td>
</tr>
<tr>
<td>⑨</td>
<td>Setting Temperature Screen</td>
<td>Displays Setting temperature, Timer setting value, and Remaining time. (Temperature can be set up to the 1st decimal place.)</td>
</tr>
<tr>
<td>⑩</td>
<td>Operation Monitor</td>
<td>Refer to page 11.</td>
</tr>
</tbody>
</table>
# Description and Function of Each Part

## Operation Monitor

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>REFRIGERATOR ERROR Lamp</td>
<td>Lights when the refrigerator is over-lorded.</td>
</tr>
<tr>
<td>②</td>
<td>ERROR Lamp</td>
<td>Lights when abnormality is found with the Temperature adjuster.</td>
</tr>
<tr>
<td>③</td>
<td>REFRIGERATOR Lamp</td>
<td>Lights when the refrigerator is running.</td>
</tr>
<tr>
<td>④</td>
<td>PUMP Lamp</td>
<td>Lights when the pump is running.</td>
</tr>
<tr>
<td>⑤</td>
<td>POWER Switch</td>
<td>Executes Power ON/OFF.</td>
</tr>
</tbody>
</table>
## Characters of the Controller

The characters controller shows are as follows:

<table>
<thead>
<tr>
<th>Character</th>
<th>Identifier</th>
<th>Name</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>AStP</td>
<td></td>
<td>Auto Stop Setting</td>
<td>Used for setting the auto stop operation.</td>
</tr>
<tr>
<td>AStr</td>
<td></td>
<td>Auto Start Setting</td>
<td>Used for setting the auto start operation.</td>
</tr>
<tr>
<td>End</td>
<td></td>
<td>Time-up</td>
<td>Displayed when timer operation is ended.</td>
</tr>
<tr>
<td>cAL</td>
<td></td>
<td>Calibration Offset</td>
<td>Used for inputting the calibration offset temperature. (Refer to Page 26 &quot;Calibration Offset Function&quot;.)</td>
</tr>
<tr>
<td>LocK</td>
<td></td>
<td>Key Lock</td>
<td>Locks the keys on control panel to protect from unnecessary operation. (Refer to Page 27 &quot;Lock Function&quot;.)</td>
</tr>
<tr>
<td>Pon</td>
<td></td>
<td>Power failure</td>
<td>Used for Power failure compensation setup. (Refer to Page 28 &quot;Power Failure Compensation Function&quot;.)</td>
</tr>
<tr>
<td>Accm</td>
<td></td>
<td>Addition time</td>
<td>Displays the time that electricity is turned on with the controller. (Refer to Page 29 &quot;Addition Time Function&quot;.)</td>
</tr>
</tbody>
</table>

* Refer to Page 15 "Operation Mode, Function Setting Key, and Characters" for operation mode and function character.
## Operation Mode and Function List

The operation modes of this unit are as follows:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Temperature Operation</td>
<td>Set the Temperature by ▼▲ key. Start/Stop operation by pressing RUN/STOP key.</td>
<td>16</td>
</tr>
<tr>
<td>Quick Auto Stop Operation</td>
<td>Used in case that the operation needs to be stopped a few hours after setting. The time to the operation stop can be set up by pressing TIMER key during the Fixed Temp. operation. The time can be set by ▼▲ key. Auto Start operation will start by pressing RUN/STOP key.</td>
<td>18</td>
</tr>
<tr>
<td>Auto Stop Operation</td>
<td>Used for Auto Stop operation setting at the time of Fixed Temp. operation setting. The temperature can be set by ▼▲ key. Display &quot;ASTP&quot; by pressing TIMER key. The time can be set by ▼▲ key. Auto Stop operation will start by pressing RUN/STOP key.</td>
<td>20</td>
</tr>
<tr>
<td>Auto Start Operation</td>
<td>Used for the operation that starts automatically a few hours after turning on the POWER key. The temperature can be set by ▼▲ key. Display &quot;ASTP&quot; by pressing TIMER key. The time can be set by ▼▲ key. Auto Start operation will start by pressing RUN/STOP key.</td>
<td>23</td>
</tr>
</tbody>
</table>

**NOTE** This unit is impossible to be changed the mode during the operation. If the mode requires to be changed, stop the operation.
The operation functions of this unit are as follows:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration offset function</td>
<td>This calibration offset function is for calibrating the difference occurred between the required in-bath temperature and control temperature (sensor temperature) of the controller. This unit can be calibrated toward either plus side or minus side of the whole temperature range.</td>
<td>26</td>
</tr>
<tr>
<td>Setting value locking</td>
<td>This function locks the established operation status. It can be set and cancelled with the SUB MENU key.</td>
<td>27</td>
</tr>
<tr>
<td>Power failure compensation function</td>
<td>In case of electric outage during operation, the operation will be started in the state just before the electric outage. It can be set or cancelled by SUB MENU key.</td>
<td>28</td>
</tr>
<tr>
<td>Addition time function</td>
<td>Time length while the Power supply is turned on is to be added by 1 hour cycle. It can be displayed by SUB MENU key.</td>
<td>29</td>
</tr>
<tr>
<td>Temperature Output Terminal</td>
<td>Transmits and outputs the measured temperature of the controller at 4 to 20 mA.</td>
<td>30</td>
</tr>
</tbody>
</table>
Operation Mode, Function Setting Key, and Characters

The operation mode setting and function setting use the key operation and characters shown in the following figure.
### Operation Method

#### Fixed Temperature Operation

In this mode, the unit starts to operate by pressing RUN/STOP key and continues operating at the set temperature until RUN/STOP key is re-pressed, as shown in the figure below.

![Graph showing Fixed Temperature Operation](image)

**SV: Set Temp.**

#### Fixed temperature operation procedure

1. **Turn on the earth leakage breaker/POWER switch**
   - When the earth leakage breaker and POWER switch are turned on, a starting screen will be displayed for about 4 seconds. PUMP lamp is to be lit, the pump starts operating, and the circulation starts. After starting operation, the initial setting screen will be displayed. Each screen shows the current inner bath temperature and setting temperature.

2. **Set the temperature**
   - Set the proper temperature by ▼▲ key. The setting value will be smaller by ▼ key, and larger by ▲ key.
   - Setting value will blink at the setting temperature screen.

**Measurement temperature screen:**
- Displays the current temperature in bath.

**Setting temperature screen:**
- Displays the setting temperature.
Fixed Temperature Operation

3. Start operation
- Press RUN/STOP key for a second.
- FIXED TEMP. lamp will be lit and operation will start.
- When the refrigerator starts operating, REFRIGERATOR lamp will be lit.

4. Stop operation
- Press RUN/STOP key for a second.
- FIXED TEMP. lamp will be put out and operation will stop.
- The screen will return to the initial setting screen.

To correct or check setting...
To change the setting value, press ▼▲ key. The blink will stop after 3 seconds, and the change will be confirmed.
Quick Auto Stop Operation

Quick auto stop operation procedure

This operation is used to specify the period up to automatic stop, i.e., sets the auto stop timer during operation.

1. Enter the quick auto stop mode during fixed temperature operation
   • Confirm that the FIXED TEMP. lamp is lit, and it is under operation.
   • Press TIMER key.
   • AUTO STOP lamp will blink.

2. Set the timer
   • Setting value will blink at setting temperature screen.
   • Set the proper time by ▼▲ key.
     The setting value will be smaller by ▼ key, and larger by ▲ key.

   Timer function:
   • The maximum setting time is "999 hours and 50 minutes".
   • The time can be set in increments of a minute under 99 hours and 59 minutes.
   • It can be set in increment of ten minutes over 100 hours.
   • The "▼▲" can change the setting time quickly when it is pressed continuously. Press them discontinuously when fine adjustment is needed.

3. Start timer operation
   • Press RUN/STOP key.
   • Start timer operation with the FIXED TEMP. lamp and AUTO STOP lamp on.
   • Timer operation starts when RUN/STOP key is pressed.
   • Remaining time is displayed at the setting temperature screen during the operation.
Quick Auto Stop Operation

4. Stop/terminate timer operation

- The operation will be stopped automatically at the setting time.
- The character “End” which tells that the operation is ended will blink at the setting temperature screen, while FIXED TEMP lamp and AUTO STOP lamp are on.
- End the timer operation mode by pressing RUN/STOP key for a second.
- The screen will return to initial setting screen.

5. To suspend quick auto stop operation

- End timer operation mode by pressing RUN/STOP key for a second.
- The screen will return to initial setting screen.

To change the setting time...

To change the setting time during the operation, press TIMER key and set the proper time by ▼▲ key. In this case, it is necessary to add the value of elapsed time to newly adding time. After a while, the blink at the setting temperature screen will stop, and the change will be confirmed.
Auto Stop Operation

In this mode, the unit automatically comes to a stop after the set period passes away from the start of fixed-value operation according to timer setting, as shown in the figure below.

**Auto stop operation procedure**

1. **Turn on the earth leakage breaker/POWER switch**
   - When the earth leakage breaker and POWER switch are turned on, a starting screen will be displayed for about 4 seconds. PUMP lamp is to be lit, the pump starts operating, and the circulation starts. After starting operation, the initial setting screen will be displayed. Each screen shows the current inner bath temperature and setting temperature.

2. **Set the temperature**
   - Set the proper temperature by ▼▲ key. The setting value will be smaller by ▼ key, and larger by ▲ key.
   - Setting value will blink at the setting temperature screen.
   - Before the timer starts, the setting temperature can be changed during the operation. Press ▼▲ key to change the setting value. After 3 seconds from changing, the blink stops and the change will be confirmed.
3. Select auto stop operation
   - Press TIMER key, and display the character "ASIP" which means auto stop operation.
   - Measured temperature screen: "ASIP" which means auto stop operation is displayed.
   - Setting temperature screen: The time which is set just before is displayed.

4. Set the timer
   - Setting value will blink at setting temperature screen.
   - Set the proper time by ▼▲ key.
     The setting value will be smaller by ▼ key, and larger by ▲ key.

   **Timer function:**
   - The maximum setting time is "999 hours and 50 minutes".
   - The time can be set in increments of a minute under 99 hours and 59 minutes.
   - It can be set in increment of ten minutes over 100 hours.
   - The "▼▲" can change the setting time quickly when it is pressed continuously. Press them discontinuously when fine adjustment is needed.

5. Start timer operation
   - Press RUN/STOP key for a second.
   - AUTO STOP lamp blinks and the operation will start.
   - Timer operation starts when the inner bath temperature at the measured temperature screen reaches the setting temperature.
   - During timer operation, the remaining time is displayed at the setting temperature screen.
Auto Stop Operation

6. Stop/terminate timer operation
   - The operation will be stopped automatically at the setting time.
   - The character "End" which tells that the operation is ended will blink at the setting temperature screen, while AUTO STOP lamp is on.
   - End the timer operation mode by pressing RUN/STOP key for a second.
   - The screen will return to initial setting screen.

7. To suspend auto stop operation
   - End timer operation mode by pressing RUN/STOP key for a second.
   - The screen will return to initial setting screen.

To change the setting time...
To change setting time before the timer operation, press TIMER key. It will be in setting mode, and setting time can be changed. Input time length from the time that it reaches the setting time to the time that it stops the operation.

To change setting time before the timer operation, press TIMER key. In this case, it is necessary to add the value of elapsed time to newly adding time.

After that, press RUN/STOP key to confirm the change.
Auto Start Operation

In this mode, the unit automatically starts to operate after the set period passes away from the start of fixed temperature operation according to timer setting, as shown in the figure below. However, it does not automatically come to a stop and must be manually deactivated.

Auto start operation procedure

1. Turn on the earth leakage breaker/POWER switch
   - When the earth leakage breaker and POWER switch are turned on, a starting screen will be displayed for about 4 seconds. PUMP lamp is to be lit, the pump starts operating, and the circulation starts. After starting operation, the initial setting screen will be displayed. Each screen shows the current inner bath temperature and setting temperature.

2. Set the temperature
   - Set the proper temperature by ▼▲ key. The setting value will be smaller by ▼ key, and larger by ▲ key.
   - Setting value will blink at the setting temperature screen.
   - Temperature can be changed during operation.
Auto Start Operation

3. Select auto start operation
- Press TIMER key, and display the character "AStr" which means auto start operation.
- Measured temperature screen: "AStr" which means auto start operation is displayed.
- Setting temperature screen: The time which is set just before is displayed.

4. Set the timer
- Setting value will blink at setting temperature screen.
- Set the proper time by ▼▲ key.
  The setting value will be smaller by ▼ key, and larger by ▲ key.

Timer function:
- The maximum setting time is "999 hours and 50 minutes".
- The time can be set in increments of a minute under 99 hours and 59 minutes.
- It can be set in increment of ten minutes over 100 hours.
- The "▼▲" can change the setting time quickly when it is pressed continuously. Press them discontinuously when fine adjustment is needed.

5. Start timer operation
- Press RUN/STOP key for a second.
- AUTO START lamp blinks and the operation will start.
- During timer operation, the remaining time is displayed at the setting temperature screen.
Auto Start Operation

6. Stop/terminate timer operation
   • After timer operation, it will start operation at the setting time. At this time, AUTO START lamp is still on.
   • To stop/terminate timer operation, press RUN/STOP key for a second, then timer operation mode will end.
   • The screen will return to the initial screen.

7. To suspend auto start operation
   • End timer operation mode by pressing RUN/STOP key for a second.
   • The screen will return to initial setting screen.

To change the setting temperature / setting time...
To change setting temperature during operation, press ▼▲ key. The initial value blinks at setting temperature screen, and setting temperature can be changed by ▼▲ key.
To change setting time during operation, press TIMER key. The initial value blinks at setting temperature screen, and setting time can be changed by ▼▲ key.
After either change, the blink at setting temperature screen stops, and the setting is confirmed.
In this case, it is necessary to add the value of elapsed time to newly adding time.
Any setting changes after auto start time cannot be done. In this case, press RUN/STOP key to stop the operation once, then reset from the beginning.
Calibration Offset Function

Calibration offset is a function which corrects the difference between the temperature in bath and that of controller (sensor temperature) if arises. The function parallel corrects the difference either to the plus or minus side within the whole temperature range of unit. The function can be set or cancelled by the SUB MENU key. "0" is set at factory shipment.

1. Start operation with the target setting temperature. Check the temperature in bath with a thermograph after it is stabilized.
2. Check the difference between the setting temperature and that in bath.
3. Press SUB MENU key for 4 seconds. Press SUB MENU key again. Select "cAL" which means calibration offset, and press RUN/STOP key.
4. Input the difference between setting temperature and inner bath temperature by ▼▲ key, and press SUB MENU key for a few seconds to complete the setting.

- When the offset correction temperature is set to the minus side, the temperature on the measurement temperature display screen falls by the setting temperature, while the temperature on bath rises.
- When it is set to the minus side, the temperature on the measurement temperature display screen rises by the setting temperature, while the temperature on bath falls.
- The unit has two-point correction function, which performs offset between low-temperature zone and high-temperature zone.
- Please consult our local branch office when carrying out validation of temperature controller.
Lock Function

Lock function that makes operation setting unchangeable.

① Press SUB MENU key for 4 seconds. Then by pressing SUB MENU key, select the character "LocK" which means setting value lock, and press RUN/STOP key.

② The display "oFF" will light at the setting temperature screen. By changing the display to "on" with ▼▲ key, the setting value will be locked. Press SUB MENU key for a few seconds to complete the setting.

③ To cancel the lock function, press SUB MENU key for 4 seconds. Then by pressing SUB MENU key, select the character "LocK" which means setting value lock, and press RUN/STOP key.

④ Select "oFF" by ▼▲ key, and press RUN/STOP key to cancel the lock function.
   ❖ All keys other than the RUN/STOP and SUB MENU keys are lock when the lock function is on.
Power Failure Compensation Function

This is the setting that can start the operation with the former setting in case of electric outage.

1. Press SUB MENU key for 4 seconds. Then by pressing SUB MENU key, select the character "Pon" which means power failure compensation, and press RUN/STOP key.

2. The display "oFF" will light at the setting temperature screen. By changing the display to "on", power failure compensation operation is set. Press SUB MENU key for a few seconds to complete the setting.

3. To cancel power failure compensation, press SUB MENU key for 4 seconds. Then select the character "Pon" by pressing SUB MENU key, and press RUN/STOP key.

4. Select "oFF" by ▼▲ key, and press RUN/STOP key to cancel the lock function.
Addition Time Function

Displays the time length that the controller is plugged.

① Press SUB MENU key for 4 seconds. Then by pressing SUB MENU key, select the character "Accm" which means addition time, and press RUN/STOP key.

② The time length that the controller is plugged is displayed at the setting temperature screen. Press SUB MENU key for a few seconds. The screen will returns to the initial screen.
## Operation Method

### Temperature Output Terminal

#### Precautions

- Operate this product according to the procedure described in this instruction manual. Failure to follow the operation procedure described herein may result in a problem. The guarantee will not apply if you operate the product in the wrong manner.

### CAUTION!

- Turn off the breaker before connecting the cables.
- Connect a recorder or another appliance of 600 W or less in input impedance to the temperature output terminal.
- Securely fasten all connections with the screws attached to the terminal block.

#### Connection procedure

- Connect the cables to the appropriate terminals.
- When using temperature output, use a shielded wire for the cable to be connected to prevent noise.

#### Connection terminal

<table>
<thead>
<tr>
<th>ANALOG</th>
<th>+</th>
<th>-</th>
</tr>
</thead>
</table>

![Connection terminal diagram]
**Operation Method**

**Temperature Output Terminal**

**Specification**

- The voltage (DC) corresponding to the measured temperature is output.
- Output temperature range: CLS301 -15 to 35°C, CLS400/600 -20 to 35°C
- Output voltage: 4 to 20mA DC
- Load: 600Ω or below
- Resolution: ±1°C
- Connection: M4 screw terminal block

---

**CLS301**

**Temperature Output**

![Graph for CLS301](image)

**CLS400/600**

**Temperature Output**

![Graph for CLS400/600](image)
The graphs show the cooling and cooling capacity curves of each model below. Use the values just for reference because they depend on the sample volume, the ambient temperature, etc.
Operation Method

Cooling curve, cooling capacity curve (reference data)

CLS400 cooling curve at a room temperature of 20°C

Temperature (°C)

Elapsed time (minutes)

Fluid quantity in external water tank: 5 liters of ethylene glycol 50%

Fluid quantity in external water tank: 10 liters of ethylene glycol 50%

Fluid quantity in external water tank: 20 liters of ethylene glycol 50%

CLS400/CLH400 Flow rate and head

Head (m)

Flow rate (L/min)

60Hz

50Hz
Operation Method

Cooling curve, cooling capacity curve (reference data)

CLS600 heating and cooling curves at a room temperature of 20°C

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Elapsed time (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20.0</td>
<td>0</td>
</tr>
<tr>
<td>-10.0</td>
<td>30</td>
</tr>
<tr>
<td>0.0</td>
<td>60</td>
</tr>
<tr>
<td>10.0</td>
<td>90</td>
</tr>
<tr>
<td>20.0</td>
<td>120</td>
</tr>
</tbody>
</table>

Fluid quantity in external water tank:
- 10 litters of ethylene glycol 50%
- 20 litters of ethylene glycol 50%
- 30 litters of ethylene glycol 50%

CLS600/CLH600 Flow rate and head

<table>
<thead>
<tr>
<th>Flow rate (L/min)</th>
<th>Head (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>0.5</td>
<td>9</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>1.5</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2.5</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>3.5</td>
<td>0</td>
</tr>
</tbody>
</table>

50Hz

60Hz
**Operation Method**

Cooling curve, cooling capacity curve (reference data)

**CLS cooling capacity curves**

- **Room temperature:** 20°C
- **Used circulating fluid:** Ethylene glycol 50%
- **External water tank:** CTB-12A (12L)
- **Power supply:** 100V AC 50Hz

The graph shows the cooling capacity curves for CLS600, CLS400, and CLS301, with temperature ranging from -40°C to 60°C and cooling capacity ranging from 0 to 1000 W.
Nybrine freezing temperature and viscosity (reference data)

**Freezing temperatures of Nybrine Z1, Z1-K, and Nybrine NFP**

**Viscosity of Nybrine Z1, Z1-K, and RH aqueous solution**

- Kinetic viscosity = Viscosity/Specific gravity
- 1 cSt = 1 mPa·sec

Temperature (°C) vs Nybrine concentration (wt%)

Viscosity (mPa·sec) vs Temperature (°C)
**WARNING!**

If a problem occurs

- If smoke or strange odor should come out of this unit for some reason, turn off the POWER switch 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.

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 page 50 "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 switch immediately, then turn off the circuit breaker and the main power. If this procedure is not followed, fire or electrical shock may be caused.

Thoroughly wash the unit.

- The unit was washed already. However, when you first use it or operate it after a long period of deactivation, thoroughly wash it.

Circulating fluid to be used in the external water tank

- For the circulating fluid to be used in the external water tank, use an aqueous solution of ethylene glycol 50% (Vol %) or Nybrine® 40% (Vol %).

Resupply of ethylene glycol and Nybrine®

- Ethylene glycol or Nybrine® gradually varies in density when used. If the solution is used with its concentration lower than the appropriate level, it may freeze or its viscosity may increase, which may result in pump malfunction. Additionally, if ethylene glycol or Nybrine® gets on the control panel, wipe it out. Electric leakage or electric shock may result.

The circulating pump protection

- Do not let the circulating pump run at idle. This may result in the circulating pump malfunction.
- Entering foreign materials into the cooler may result in damage of the circulating pump.
- When installing a solenoid valve or a throttle valve in the circulating route, do not close or extremely squeeze it for protection of the circulating pump.
- Secure the flow amount of 1.5L/min or more for the circulating fluid.
Handling Precautions

Countermeasure for stop operation during night or long-term stop

⚠️ In case of stopping operation during night or long-term, toggle the breaker and POWER switch to "OFF".

Recovery from a power failure

⚠️ If the unit was deactivated in the middle of operation due to a power failure and is re-energized, the unit automatically returns to the state just before the power failure and resumes operation. If the resumption of operation by automatic recovery is inconvenient, turn off the leakage breaker.

Abnormal refrigerator pressure

⚠️ If the refrigerator operates in a high-temperature range, the refrigerator overload relay protecting circuit may work to illuminate REFRIGERATOR ERROR lamp deactivate the refrigerator. In this case, reduce thermal load by changing the fluid, or taking other appropriate measures.
**Daily Inspection and Maintenance**

For the safety use of this unit, please perform the daily inspection and maintenance without fail. Using the city water to this unit might attach dirt. Do inspect and maintain this point while performing daily inspection and maintenance.

![WARNING!](image)

- 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!](image)

- 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.

**Maintaining the external water tank**

- Remove foreign substances inside the external water tank as frequently as possible. They may result in circulating pump malfunction if they are left there.

**Replacing the hoses**

- Replace the hoses at regular intervals, ideally every two years, to use the product in good condition. Ask Yamato Scientific Co., Ltd. for replacement.
Cleaning the filter

The mesh plate is fixed with a magnet. Pull it toward you.

The bottom of the mesh plate is slipped over pins. Lift it up and remove it.

The filter cover is fixed with a magnet. Remove it, and clean the filter or remove dust with a vacuum cleaner. Deep inside the filter is a condenser fin. Do not touch it with bare hands because you may get injured. After cleaning, reversely follow the procedure to replace the filter cover.

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

#### When not using this unit for long term / When disposing

**CAUTION!**

When not using this unit for long term...

- Turn off the breaker and disconnect the power cord.

**WARNING!**

When disposing...

- Keep out of reach of children.
- The unit uses a CFCs substitute. Ask a qualified disposal service company for the disposal of it.

### 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.

<table>
<thead>
<tr>
<th>Component Name</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exterior Parts</strong></td>
<td></td>
</tr>
<tr>
<td>Outer covering</td>
<td>Iron steel plate</td>
</tr>
<tr>
<td>Inner bath</td>
<td>Stainless steel SUS304</td>
</tr>
<tr>
<td>Plates</td>
<td>PET resin film</td>
</tr>
<tr>
<td>Brace</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Rubber vibration insulator</td>
<td>Chloroprene rubber</td>
</tr>
<tr>
<td><strong>Electrical Parts</strong></td>
<td></td>
</tr>
<tr>
<td>Switches, Relays</td>
<td>Composite of resin, copper and other</td>
</tr>
<tr>
<td>Circuit boards</td>
<td>Composite of glass fiber and other</td>
</tr>
<tr>
<td>Power cord</td>
<td>Composite of synthetic rubber, copper and nickel</td>
</tr>
<tr>
<td><strong>Piping Parts</strong></td>
<td></td>
</tr>
<tr>
<td>Hoses</td>
<td>Silicon rubber, EPDM</td>
</tr>
<tr>
<td>Joints</td>
<td>Brass, Stainless steel</td>
</tr>
<tr>
<td>Hose clamp</td>
<td>66 nylon</td>
</tr>
<tr>
<td>Hose nipple</td>
<td>Brass</td>
</tr>
</tbody>
</table>
In the Event of Failure…

Safety Device and Error Code

This unit has an automatic diagnosis function built in the controller and safety devices independent of the controller. The table below shows the cause and the solution method when the safety device operates.

**Error Code:**
When an abnormal condition occurs, an error code appears and the ALARM lamp lights in the controller, the buzzer sounds simultaneously. Record the error code and turn off the power of device immediately.

<table>
<thead>
<tr>
<th>Safety Device</th>
<th>Notify</th>
<th>Cause/Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature input error</td>
<td>“ALARM” lamp lights on, “Er.01” appears</td>
<td>• Failure in temperature input circuit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Temperature sensor is broken or disconnected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Measured temperature is out of display range.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>❖ Make a call for service.</td>
</tr>
<tr>
<td>Memory error</td>
<td>“ALARM” lamp lights on, “Er.15” appears</td>
<td>• Failure in internal memory.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>❖ Make a call for service.</td>
</tr>
<tr>
<td>Flow rate error</td>
<td>“ALARM” lamp lights on, “Er.20” appears</td>
<td>• The circulating fluid does not properly circulate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Air remains in the circulating path.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>❖ Make a call for service.</td>
</tr>
<tr>
<td>Measurement temperature</td>
<td>“ALARM” lamp lights on, “-----” appears</td>
<td>• Upper limit alarm of the temperature alarm function is activated.</td>
</tr>
<tr>
<td>error</td>
<td></td>
<td>❖ Make a call for service.</td>
</tr>
<tr>
<td>Refrigerator pressure error</td>
<td>“REFRIGERATO ERROR” lamp lights on</td>
<td>• The condenser filter is dirty.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The room temperature is high.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>❖ Make a call for service.</td>
</tr>
</tbody>
</table>
## Trouble Shooting

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Check point</th>
</tr>
</thead>
<tbody>
<tr>
<td>The unit does not start to operate although the earth leakage breaker and</td>
<td>• Check if the power cable is securely connected to the power supply.</td>
</tr>
<tr>
<td>POWER switch are turned on.</td>
<td>• Check if the power fails.</td>
</tr>
<tr>
<td>The ALARM lamp lights on.</td>
<td>• Check if the external water tank is filled with a circulating fluid.</td>
</tr>
<tr>
<td>The temperature does not drop.</td>
<td>• Check if the set temperature is higher than the inside temperature of the bath.</td>
</tr>
<tr>
<td></td>
<td>• Check if the condenser filter is contaminated.</td>
</tr>
<tr>
<td>The circulating pump produces unusual noise.</td>
<td>• Check if air remains in the circulating pump.</td>
</tr>
<tr>
<td></td>
<td>✓ Turn off the power, and open the air release valve in the back of the system to let out air.</td>
</tr>
<tr>
<td>The circulating fluid does not circulate.</td>
<td>• Check if the insulation hose with a priming pump is properly connected. (Refer to page 7.)</td>
</tr>
<tr>
<td></td>
<td>• Check if the quantity of fluid inside the external water tank is sufficient.</td>
</tr>
<tr>
<td></td>
<td>• Operate the priming pump more frequently and retry.</td>
</tr>
<tr>
<td>&quot;REFRIGERATO ERROR&quot; lamp lights on.</td>
<td>• Check if the condenser filter is dirty.</td>
</tr>
<tr>
<td></td>
<td>• Check if the room temperature is high.</td>
</tr>
<tr>
<td>The displayed temperature does not match the measured temperature.</td>
<td>• Check if the set value of calibration offset is other than &quot;0&quot;. Set it at &quot;0&quot;. (Refer to page 26.)</td>
</tr>
</tbody>
</table>

### When a power failure occur

If the unit was deactivated in the middle of operation due to a power failure and is re-energized, the unit automatically returns to the state just before the power failure and resumes operation. (To know the setting method of this function, refer to page 28 "Power Failure Compensation Function").

If the resumption of operation by automatic recovery is inconvenient, turn off the leakage breaker.

---

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.
<table>
<thead>
<tr>
<th>Specification</th>
<th>Coolline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Name</strong></td>
<td>Coolline</td>
</tr>
<tr>
<td><strong>Model</strong></td>
<td>CLS301</td>
</tr>
<tr>
<td><strong>Circulation unit</strong></td>
<td>Circulation in the external open system</td>
</tr>
<tr>
<td><strong>Usable ambient temp.</strong></td>
<td>5 to 30°C</td>
</tr>
<tr>
<td><strong>Temperature control range</strong></td>
<td>-10°C to Room temperature</td>
</tr>
<tr>
<td><strong>Temperature setting range</strong></td>
<td>-15 to 35°C</td>
</tr>
<tr>
<td><strong>Temperature adjustment accuracy</strong></td>
<td>±1.5 to 2.0°C</td>
</tr>
<tr>
<td><strong>Refrigerator</strong></td>
<td>Approx.450W at 15°C</td>
</tr>
<tr>
<td><strong>Maximum flow rate of pump (50/60 Hz)</strong></td>
<td>10/11 L/min</td>
</tr>
<tr>
<td><strong>Maximum head of pump (50/60 Hz)</strong></td>
<td>4.9/6.9m</td>
</tr>
<tr>
<td><strong>Bath</strong></td>
<td>SUS304</td>
</tr>
<tr>
<td><strong>Temperature control method</strong></td>
<td>Refrigerator ON-OFF control</td>
</tr>
<tr>
<td><strong>Sensor</strong></td>
<td>T-thermocouple</td>
</tr>
<tr>
<td><strong>Temperature setting method</strong></td>
<td>Digital setting by up/down keys</td>
</tr>
<tr>
<td><strong>Display method</strong></td>
<td>Digital display</td>
</tr>
<tr>
<td><strong>Refrigerator</strong></td>
<td>Air-cooled rotary</td>
</tr>
<tr>
<td><strong>Cooling medium</strong></td>
<td>HFC R404A 270g</td>
</tr>
<tr>
<td><strong>Cooling coil</strong></td>
<td>Copper</td>
</tr>
<tr>
<td><strong>Outside diameter of external circulating nozzle</strong></td>
<td>Both discharge and return ports: φ13 hose nipple</td>
</tr>
<tr>
<td><strong>Circulation pump</strong></td>
<td>Magnet pump 20W</td>
</tr>
<tr>
<td><strong>Safety devices</strong></td>
<td>Over current earth leakage breaker, Refrigerator overload relay protecting circuit, Pump thermal protector (Pump built-in), Refrigerator pressure detection, Delay timer for refrigerator protection, Bypass for circulating pump protection, Dustproof filter for condenser, Key lock Function</td>
</tr>
<tr>
<td><strong>Other functions</strong></td>
<td>Operation monitor, Drain cock, Temperature output terminal</td>
</tr>
<tr>
<td><strong>Standard</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Bath dimensions (Inner dia. × height)</strong></td>
<td>φ 120 × 200 mm</td>
</tr>
<tr>
<td><strong>External dimensions (W × D × H)</strong></td>
<td>380 × 460 × 500 mm</td>
</tr>
<tr>
<td><strong>Bath capacity</strong></td>
<td>1.5L</td>
</tr>
<tr>
<td><strong>Power supply (50/60Hz)</strong></td>
<td>100V AC, 4A</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Approx. 40kg</td>
</tr>
<tr>
<td><strong>Optional accessories</strong></td>
<td>1-meter-long insulation hose: 1, 1-meter-long insulation hose with a priming pump: 1, Drain hose 0.5m: 1, Wire clamp: 4, Instruction manual</td>
</tr>
</tbody>
</table>
Symbol | Part name | Symbol | Part name
--- | --- | --- | ---
ELB | Earth leakage breaker | C2 | Start condenser
T1 | Terminal block | X5 | Start relay
T2 | Terminal block | WIB | Operation display board
T3 | Terminal block | PSW | Power switch
PLB | PLANAR board | P | Magnet pump
PIO | Display board | X1 | Relay (refrigerator)
TH | Temperature sensor (T) | X2 | Relay (error)
FM | Fan motor | X3 | Relay (pressure)
RF | Compressor | X4 | Relay (flow)
OVR | Overload relay | PS | Pressure switch
C1 | Operation condenser | FS | Flow sensor
Wiring Diagram

CLS400

Symbol | Part name                  | Symbol | Part name                  |
-------|---------------------------|--------|---------------------------|
ELB    | Earth leakage breaker     | C2     | Start condenser           |
T1     | Terminal block            | X5     | Start relay               |
T2     | Terminal block            | WIB    | Operation display board   |
T3     | Terminal block            | PSW    | Power switch              |
PLB    | PLANAR board              | P      | Magnet pump               |
PIO    | Display board             | X1     | Relay (refrigerator)      |
TH     | Temperature sensor (T)    | X2     | Relay (error)             |
FM     | Fan motor                 | X3     | Relay (pressure)          |
RF     | Compressor                | X4     | Relay (flow)              |
OVR    | Overload relay            | PS     | Pressure switch           |
C1     | Operation condenser       | FS     | Flow sensor               |

AC100V

PV transmission output
Symbol | Part name                        | Symbol | Part name                        
--- | ---                            | --- | ---                            
ELB  | Earth leakage breaker          | C2   | Start condenser                 
T1   | Terminal block                 | X5   | Start relay                     
T2   | Terminal block                 | WIB  | Operation display board         
T3   | Terminal block                 | PSW  | Power switch                    
PLB  | PLANAR board                   | P    | Magnet pump                     
PIO  | Display board                  | X1   | Electromagnetic Contact(reefrigerator) 
TH   | Temperature sensor (T)         | X2   | Relay (error)                   
FM   | Fan motor                      | X3   | Relay (pressure)                
RF   | Compressor                     | X4   | Relay (flow)                    
OVR  | Overload relay                 | PS   | Pressure switch                 
C1   | Operation condenser            | FS   | Flow sensor                     

PV transmission output
## Common Parts

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Part Name</th>
<th>Code No.</th>
<th>Specification</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIB</td>
<td>Operation display board</td>
<td>LT00006042</td>
<td></td>
<td>Toho Denshi</td>
</tr>
<tr>
<td>PLB, PIO</td>
<td>Temperature controller</td>
<td>LT00005449</td>
<td>TTM-00B-YC (with tough card)</td>
<td>Toho Denshi</td>
</tr>
<tr>
<td>FS</td>
<td>Float switch</td>
<td>LT00006043</td>
<td>NK-1RAN 1.2 /min</td>
<td>Nicom</td>
</tr>
<tr>
<td>TH</td>
<td>Temperature sensor</td>
<td>LT00005488</td>
<td>T-thermocouple L-50mm</td>
<td>Yamato Scientific</td>
</tr>
<tr>
<td></td>
<td>Flow rate adjusting valve</td>
<td>LT00006065</td>
<td>6542-10 G3/8</td>
<td>Tasco</td>
</tr>
<tr>
<td></td>
<td>Air release valve</td>
<td>LT00006067</td>
<td>TA295BH-29</td>
<td>Tasco</td>
</tr>
<tr>
<td>PSW</td>
<td>Power switch</td>
<td>2-01-001-0011</td>
<td>DS-850S-F2-10</td>
<td>Miyama</td>
</tr>
<tr>
<td>X2,3,4</td>
<td>Relay</td>
<td>2-05-000-0055</td>
<td>AP3524K</td>
<td>Matsushita</td>
</tr>
<tr>
<td>T1</td>
<td>Terminal block</td>
<td>LT00031663</td>
<td>TFD250ABC-6P</td>
<td>Terminal</td>
</tr>
<tr>
<td>T2</td>
<td>Terminal block</td>
<td>LT00031661</td>
<td>TFD250ABC-4P</td>
<td>Terminal</td>
</tr>
<tr>
<td>T3</td>
<td>Terminal block</td>
<td>LT00032123</td>
<td>W101A-2P</td>
<td>World</td>
</tr>
<tr>
<td>ELB</td>
<td>Earth leakage breaker</td>
<td>LT00029774</td>
<td>NV-L22GR 15A</td>
<td>Mitsubishi</td>
</tr>
<tr>
<td></td>
<td>Power cord</td>
<td>2-13-001-0005</td>
<td>T2-3b</td>
<td>Yamato Scientific</td>
</tr>
</tbody>
</table>

### CLS301

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Part Name</th>
<th>Code No.</th>
<th>Specification</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Magnet pump</td>
<td>LT00005462</td>
<td>MD20RZ-N</td>
<td>Iwaki</td>
</tr>
<tr>
<td>RF</td>
<td>Compressor</td>
<td>LT00005487</td>
<td>C-2SN200LOT</td>
<td>Sanyo</td>
</tr>
<tr>
<td>FM</td>
<td>Fan motor</td>
<td>3-01-006-006</td>
<td>SE4-CO41NP</td>
<td>Sanyo</td>
</tr>
<tr>
<td>X1</td>
<td>Relay</td>
<td>LT00012708</td>
<td>G4B-112T1</td>
<td>OMRON</td>
</tr>
</tbody>
</table>

### CLS400

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Part Name</th>
<th>Code No.</th>
<th>Specification</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Magnet pump</td>
<td>LT00005462</td>
<td>MD20RZ-N</td>
<td>Iwaki</td>
</tr>
<tr>
<td>RF</td>
<td>Compressor</td>
<td>3-01-006-0005</td>
<td>C-2SN350LOR</td>
<td>Sanyo</td>
</tr>
<tr>
<td>FM</td>
<td>Fan motor</td>
<td>3-01-006-006</td>
<td>SE4-CO41NP</td>
<td>Sanyo</td>
</tr>
<tr>
<td>X1</td>
<td>Relay</td>
<td>LT00012708</td>
<td>G4B-112T1</td>
<td>OMRON</td>
</tr>
</tbody>
</table>

### CLS600

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Part Name</th>
<th>Code No.</th>
<th>Specification</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Magnet pump</td>
<td>2-15-008-0013</td>
<td>MD30RZ-N</td>
<td>Iwaki</td>
</tr>
<tr>
<td>RF</td>
<td>Compressor</td>
<td>3-01-006-0012</td>
<td>C-RHN60LOA</td>
<td>Sanyo</td>
</tr>
<tr>
<td>FM</td>
<td>Fan motor</td>
<td>3-01-006-0014</td>
<td>SE4-D11LP</td>
<td>Sanyo</td>
</tr>
<tr>
<td>X1</td>
<td>Electromagnetic Contact</td>
<td>LT00032906</td>
<td>FC-0ST 1a 100V</td>
<td>Fuji</td>
</tr>
</tbody>
</table>
Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in this unit.

### EXPLOSIVE

<table>
<thead>
<tr>
<th><strong>EXPLOSIVE:</strong></th>
<th>Ethylene glycol dinitrate (nitro glycol), Glycerin trinitrate (nitroglycerine), Cellulose nitrate (nitrocellulose), and other explosive nitrate esters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trinitrobenzene, Trinitrotoluene, Trinitrophenol (picric acid), and other explosive nitro compounds</td>
</tr>
<tr>
<td></td>
<td>Acetyl hydroperoxide (peracetic acid), Methyl ethyl ketone peroxide, Benzyl peroxide, and other organic peroxides</td>
</tr>
</tbody>
</table>

### FLAMMABLE

#### IGNITING:

| **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 hydrosulfit |

#### OXIDIZING:

<table>
<thead>
<tr>
<th><strong>OXIDIZING:</strong></th>
<th>Potassium chlorate, Sodium chlorate, Ammonium chlorate, and other chlorate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Potassium perchlorate, Sodium perchlorate, Ammonium perchlorate, and other perchlorate</td>
</tr>
<tr>
<td></td>
<td>Potassium peroxide, Sodium peroxide, Barium peroxide, and other inorganic peroxide</td>
</tr>
<tr>
<td></td>
<td>Potassium nitrate, Sodium nitrate, Ammonium nitrate, and other nitrate</td>
</tr>
<tr>
<td></td>
<td>Sodium chlorite and other chlorites</td>
</tr>
<tr>
<td></td>
<td>Calcium hypochlorite and other hypochlorites</td>
</tr>
</tbody>
</table>

#### INFLAMMABLE LIQUID:

<table>
<thead>
<tr>
<th><strong>INFLAMMABLE LIQUID:</strong></th>
<th>Ethyl ether, Gasoline, Acetaldehyde, Propylene chloride, Carbon disulfide, and other flammable substances having a flash point of lower than -30°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>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</td>
</tr>
</tbody>
</table>

#### FLAMMABLE GAS:

| **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)
Install the unit according to the procedure described below (check options and special specifications separately).

<table>
<thead>
<tr>
<th>Model</th>
<th>Serial number</th>
<th>Date</th>
<th>Person in charge of installation (company name)</th>
<th>Person in charge of installation</th>
<th>Judgment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>№</th>
<th>Item</th>
<th>Method</th>
<th>Reference operation manual</th>
<th>Judgment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Accessories</td>
<td>Check the quantities of accessories with the quantities shown in the Accessory column.</td>
<td>Specification</td>
<td>P.45</td>
</tr>
<tr>
<td>2</td>
<td>Installation</td>
<td>Visually check the surrounding area.</td>
<td>Before Using This Unit</td>
<td>P.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Caution: Pay attention to the ambient environment.</td>
<td>&quot;2. Choose a proper place for installation&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Keep space.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pour water into the water bath.</td>
<td>Before Using This Unit</td>
<td>P.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Caution: Air release.</td>
<td>&quot;Installation Procedure&quot;</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Power voltage</td>
<td>Using a tester, measure the voltage of the voltage used by the customer (distribution board, outlet, etc.).</td>
<td>Before Using This Unit</td>
<td>P.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measure the voltage during operation (the voltage must be within the standard).</td>
<td>&quot;1. Always ground this unit&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Caution: When a unit is to be connected to the plug or breaker, use one that conforms to the standard.</td>
<td>Specification</td>
<td>P.45</td>
</tr>
<tr>
<td>2</td>
<td>Start of operation</td>
<td>Start operation.</td>
<td>Before Using This Unit</td>
<td>P.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The circulating water must circulate.</td>
<td>&quot;Installation Procedure&quot;</td>
<td>P.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Set the temperature at 20°C to confirm the state.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check: Water leakage is not permissible.</td>
<td>Operation Method</td>
<td>P.13</td>
</tr>
</tbody>
</table>

Description

<table>
<thead>
<tr>
<th>№</th>
<th>Item</th>
<th>Method</th>
<th>Reference operation manual</th>
<th>Judgment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Description of operation</td>
<td>Explain the operation of each unit to the customer according to this Operation Manual.</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Error code</td>
<td>Explain error codes and the procedure for resetting them to the customer according to this Operation Manual.</td>
<td>In the Event of Failure…</td>
<td>P.42</td>
</tr>
<tr>
<td>3</td>
<td>Maintenance inspection</td>
<td>Explain the operation of each unit to the customer according to this Operation Manual.</td>
<td>Maintenance Method</td>
<td>P.39</td>
</tr>
<tr>
<td>4</td>
<td>Completion of installation Information to be entered</td>
<td>Enter the date of installation and the name of the person in charge of installation on the face plate on the unit.</td>
<td>After Service and Warranty</td>
<td>P.44</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enter necessary information on the guarantee, and pass it to the customer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Explain the after-sale service route to the customer.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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.