

# Synthetic Reactor

Chemist Plaza **CP-1000**

## Operation Manual



Thank you for purchasing this product.

- This operation manual describes precautions that are important for preventing accidents as well as the procedures used to handle the product.
- To ensure safety, read this operation manual and the attached warranty thoroughly before use, and use the product correctly.
- After reading this operation manual and the warranty, keep them in a safe place where they can be referred to at any time.



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# 1 Safety Precautions

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The precautionary information that appears in this operation manual is for ensuring that the product is used safely and for preventing injury to you and other people and damage to equipment.

It is all important for ensuring safety and so be sure to read it thoroughly before using the product and observe it during use.

## ■ About the User (Important)

This product must be operated only by persons with adequate specialist skills, training, and experience to understand the potential dangers of operating the product.

Personnel who are untrained or still undergoing training may operate the product only under guidance from a trained person or a person with specialized experience.

This operation manual was written on the assumption that the product will be operated only by users who fully understand the potential dangers of operating the product.

## ■ Warning Labels

The degree of damage or injury that may occur if the product is used without consideration of the corresponding item of precautionary information is indicated by one of two labels: WARNING and CAUTION. These labels indicate precautionary information that is important for ensuring safety and so be sure to observe them.

Labels Indicating Degrees of Damage or Injury

|                                                                                                    |                                                                                                                                |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|  <b>WARNING</b> | Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or possibly death.           |
|  <b>CAUTION</b> | Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury or equipment damage. |

## **WARNING**

|                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p><b>Prohibited</b></p> <p>Do not install the product near objects that reach high temperatures or flammable objects.</p> <p>Doing so may result in fire or equipment damage.</p>                                                                       |  <p><b>Prohibited</b></p> <p>Do not install the product in locations that can be accessed by children.</p> <p>Doing so may result in injury, electric shock, or equipment damage.</p>            |
|  <p><b>Prohibited</b></p> <p>Do not damage, excessively bend, pull, twist, bundle, pinch, or modify the power cord. Do not place heavy objects on the cable or route it near hot areas.</p> <p>Doing so may result in fire or electric shock.</p>         |  <p><b>Prohibited</b></p> <p>Do not insert or remove the power plug or operate equipment when your hands are wet.</p> <p>Doing so may result in electric shock.</p>                              |
|  <p><b>Mandatory</b></p> <p>Use a power outlet that has a rated voltage.</p> <p>Not doing so may result in fire or equipment damage.</p>                                                                                                                |  <p><b>Connect To Ground</b></p> <p>Be sure to ground the product before use.</p> <p>Not doing so may result in electric shock, a short circuit, or equipment damage.</p>                      |
|  <p><b>Disconnect Power Plug</b></p> <p>If you notice smoke or an unusual smell, immediately turn OFF the power switch and remove the power plug from the power outlet.</p> <p>Not doing so may result in fire, a short circuit, or electric shock.</p> |  <p><b>Mandatory</b></p> <p>Be sure to hold the power plug itself when disconnecting it from the power outlet.</p> <p>Not doing so may result in fire, a short circuit, or electric shock.</p> |
|  <p><b>Disconnect Power Plug</b></p> <p>Remove the power plug from the power outlet when not using the product for long periods.</p> <p>Not doing so may result in fire.</p>                                                                            |  <p><b>Prohibited</b></p> <p>Do not attempt to disassemble, repair, or modify the product yourself.</p> <p>Doing so may result in fire, electric shock, or equipment damage.</p>               |

## **CAUTION**

|                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p><b>Prohibited</b></p> <p>Do not install the product on an inclined or unstable surface, or in locations that are subject to direct sunlight or that reach high temperatures.</p> <p>Doing so may result in equipment damage.</p> |  <p><b>Prohibited</b></p> <p>Do not install this product in locations that are subject to high humidity levels or large amounts of dust or in locations that are not well ventilated or under corrosive gas environment.</p> <p>Doing so may result in equipment damage.</p> |
|  <p><b>Prohibited</b></p> <p>Do not install the product in locations with an ambient temperature outside the range 5 °C to 35 °C.</p> <p>Doing so may result in equipment damage.</p>                                                |  <p><b>Disconnect Power Plug</b></p> <p>Remove the power plug from the power outlet before moving the product.</p> <p>Not doing so may result in equipment damage.</p>                                                                                                       |
|  <p><b>Disconnect Power Plug</b></p> <p>Remove the power plug from the power outlet before cleaning or inspection.</p> <p>Not doing so may result in equipment damage.</p>                                                         |  <p><b>Prohibited</b></p> <p>Do not insert your fingers or foreign objects inside the product.</p> <p>Doing so may result in injury or equipment damage.</p>                                                                                                               |
|  <p><b>Prohibited</b></p> <p>Do not subject the product to vibrations or shocks.</p> <p>Doing so may result in equipment damage.</p>                                                                                               |                                                                                                                                                                                                                                                                                                                                                               |

## 2 Before Use

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### WARNING

- This product does not have an explosive-proof structure. Do not use this product in hazardous location to prevent an explosion accident.
- Be sure to read this operation manual thoroughly before using the product, and be sure to use the product correctly.
- Keep this operation manual in a safe place where it can be referred to at any time.
- Be sure to familiarize yourself with, and observe, the safety precautions given in this operation manual.
- Observe usage procedures that are suitable for the product and that are specified in this operation manual.

Be sure to observe the above instructions.

Not following these instructions may result in an accident or injury.

### 2-1 About This Operation Manual

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- In the interests of product improvement, the contents of this operation manual may be changed without notice.
- Every effort has been made to ensure that the information contained in this operation manual is correct. If you discover any errors or omissions, however, please contact your Sibata representative.
- The copyright of this operation manual belongs to Sibata Scientific Technology Ltd. The reproduction of all or part of this operation manual without prior written permission from Sibata Scientific Technology Ltd. is prohibited.

## 2-2 Items in the Set

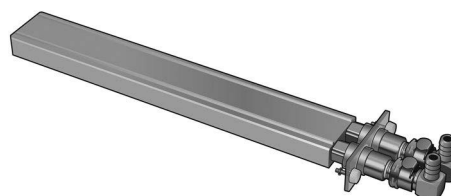
---

Verify that each product includes the items indicated below

### ■ CP-1000 Chemist Plaza Synthetic Reactor (054300-1000)



☐ CP-1000 main body



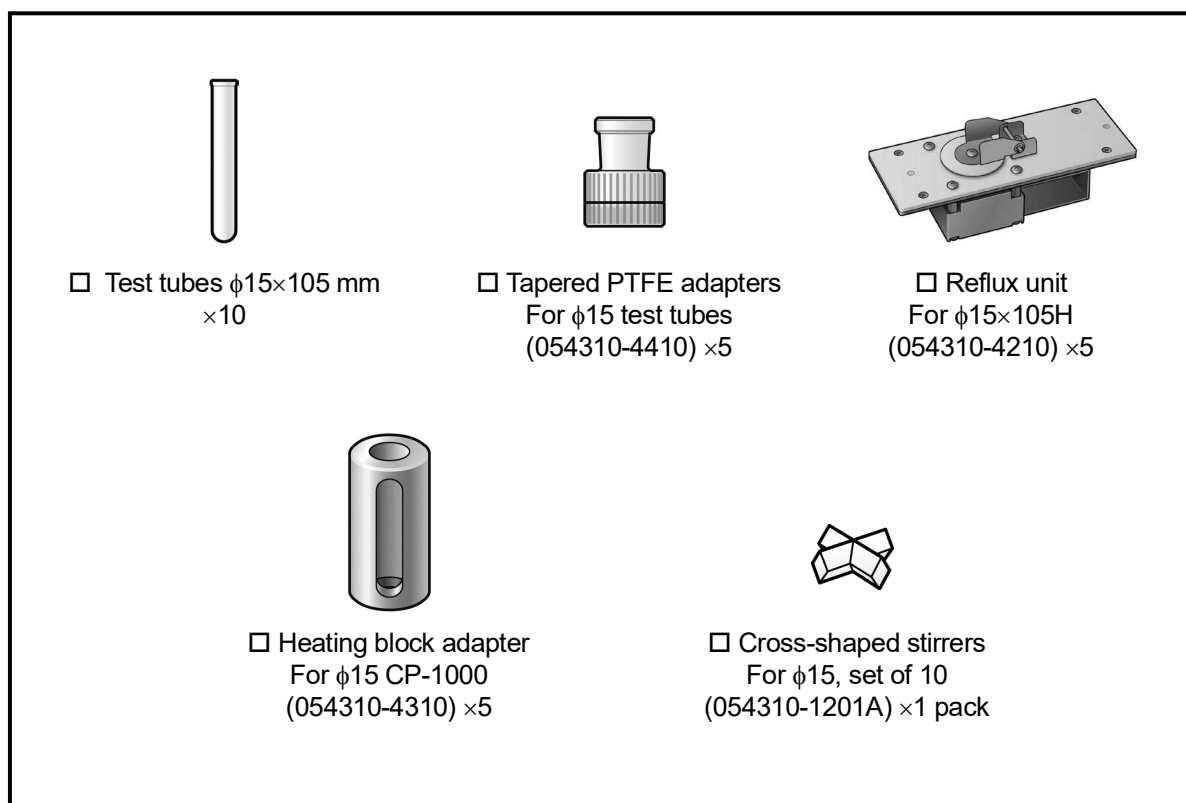
☐ Cooling cartridge  
For CP-1000  
(054310-4110)



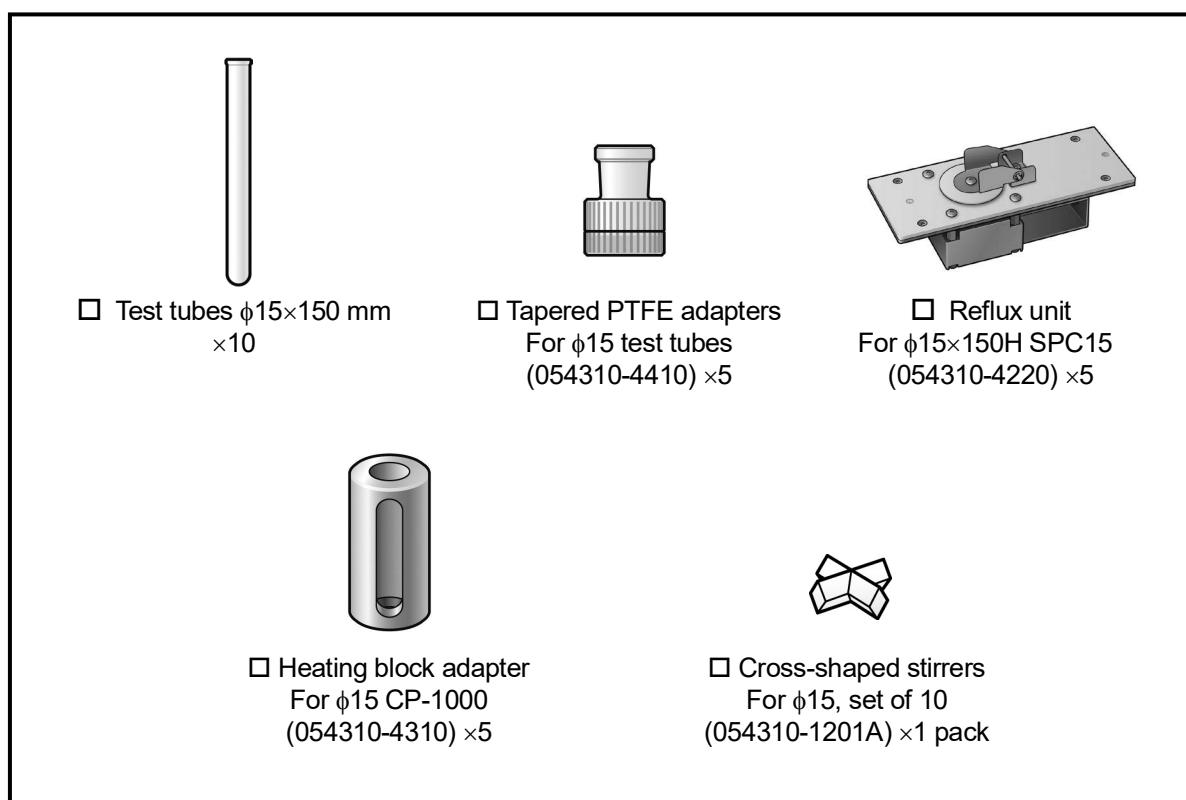
☐ Power cord, Outlet adapter

☐ Warranty..... 1

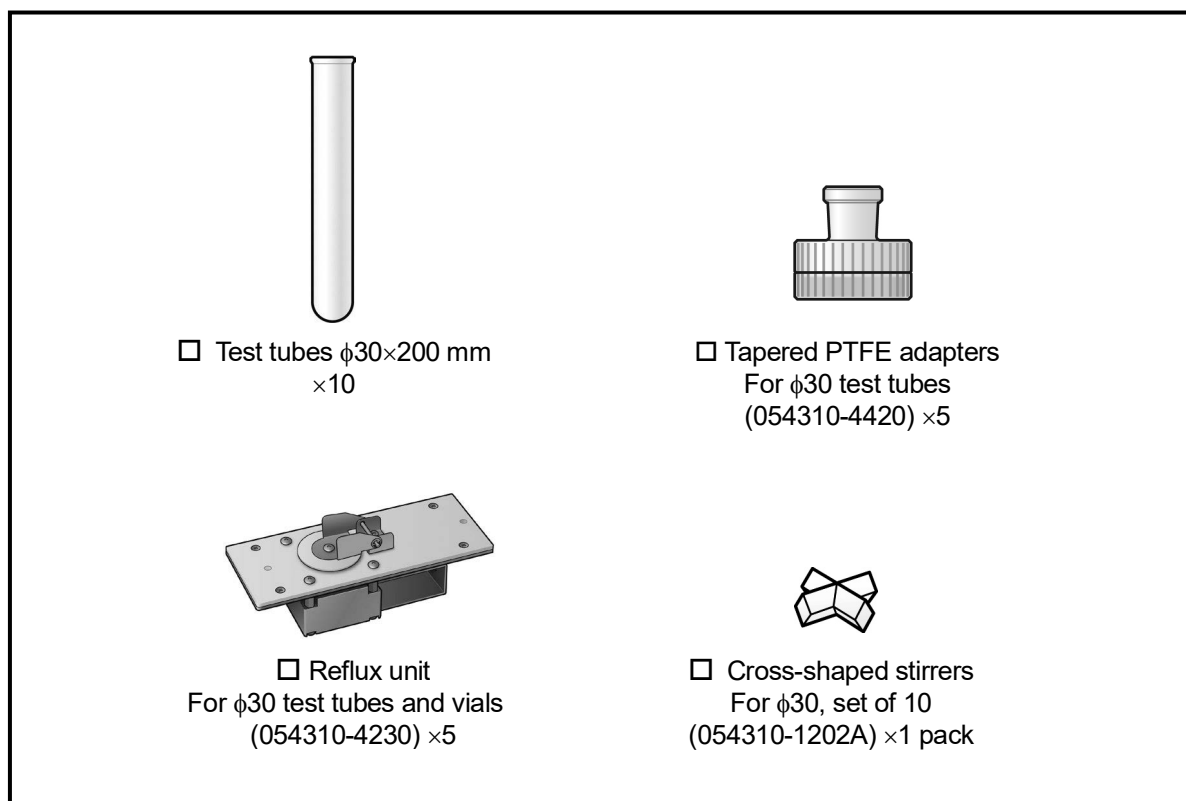
■ **φ15×105H Test Tube Set for CP-1000 (054300-1010)**



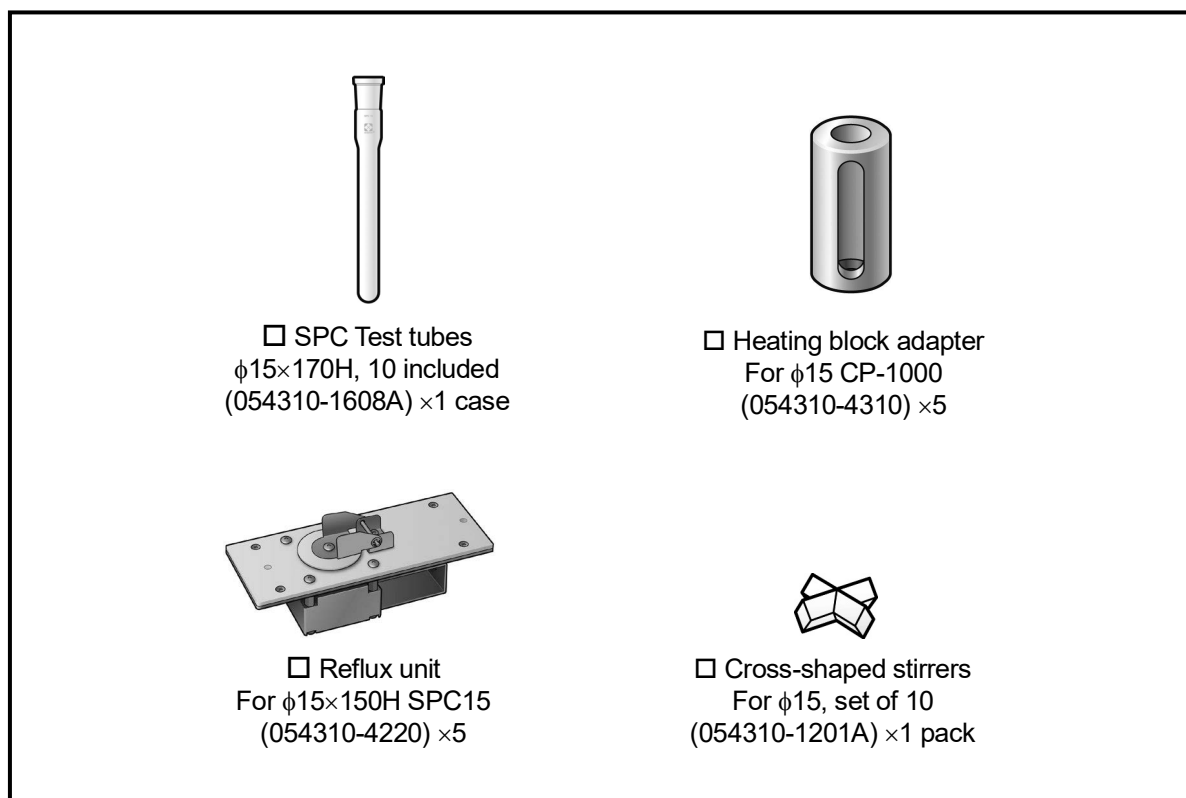
■ **φ15×150H Test Tube Set for CP-1000 (054300-1020)**



■  $\phi 30 \times 200\text{H}$  Test Tube Set for CP-1000 (054300-1030)



■ SPC15 Test Tube Set for CP-1000 (054300-1040)



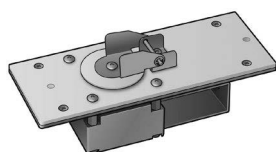
■ **SPC29 Test Tube Set for CP-1000 (054300-1050)**



□ SPC Test tubes  
 $\phi 30 \times 190H$ , 10 included  
 (054310-1609A)  $\times 1$  case



□ SPC reducing connector  
 15-29  
 (030300-1529)  $\times 5$



□ Reflux unit  
 For  $\phi 30$  test tubes and vials  
 (054310-4230)  $\times 5$



□ Cross-shaped stirrers  
 For  $\phi 30$ , set of 10  
 (054310-1202A)  $\times 1$  pack

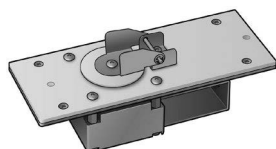
■ **28-mL Vial Set for CP-1000 (054300-1060)**



□ Vial, 28 mL  
 $\times 10$



□ Tapered PTFE adapters  
 For vials  
 (054310-4430)  $\times 5$



□ Reflux unit  
 For  $\phi 30$  test tubes and vials  
 (054310-4230)  $\times 5$



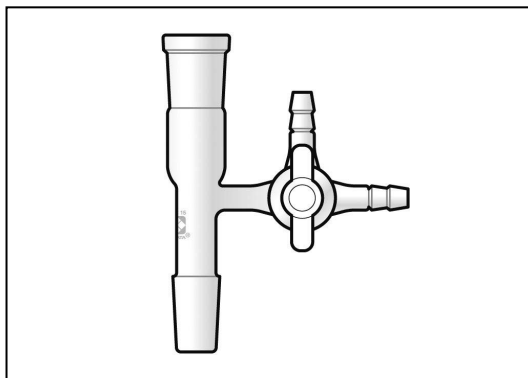
□ Triangular stirrer  
 For 28 mL, set of 10  
 (054310-1204A)  $\times 1$  pack

## 2-3 Options

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### ■ SPC Adapter with Three-Way Cock 15-15 (054310-4510)

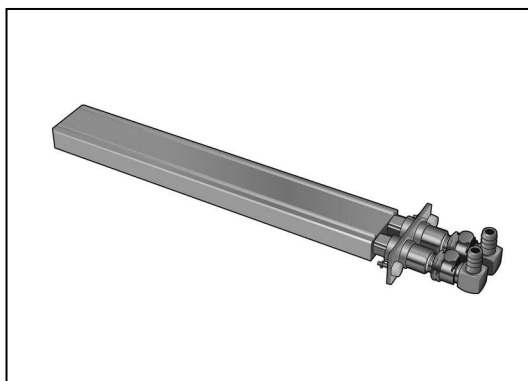
This SPC adapter with three-way cock is used for gas replacement by inert gas. The top part is SPC15, so you can add a reagent using a pipette or syringe, or connect it to a cooler.



### ■ Cooling Cartridge for CP-1000 (054310-4110)

This is the same as the one included with the CP-1000 Chemist Plaza Synthetic Reactor (054300-1000).

By using this in combination with the cooling unit provided, you can perform reflux and cooling simultaneously.



## 2-4 About This Product

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The CP-1000 Chemist Plaza Synthetic Reactor effectively produces a number of excellent substances from new reactions and catalysts. It is designed to improve on the functionality of the Chemist Plaza CP-100 without increasing the required footprint.

As with the CP-100, the temperature can be set independently for each channel. As a new function, the rotation speed can also be set independently. In addition, thanks to the newly installed color LCD, visibility is better than with conventional models.

Using this product will improve the techniques of synthetic chemistry via mobile phase in fields such as pharmacology, food science, agriculture, and industry.

### < Main Features >

#### **Independent Temperature Control**

The temperatures of the five heating blocks can be set independently in a range from -20 to 160 °C. Combined use with the cooling cartridge included with the product will enable experiments applying temperature differences.

#### **Individual Stirrings**

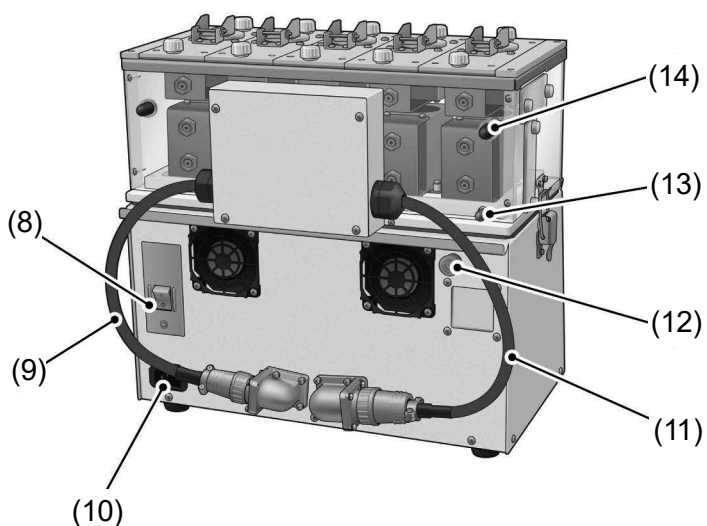
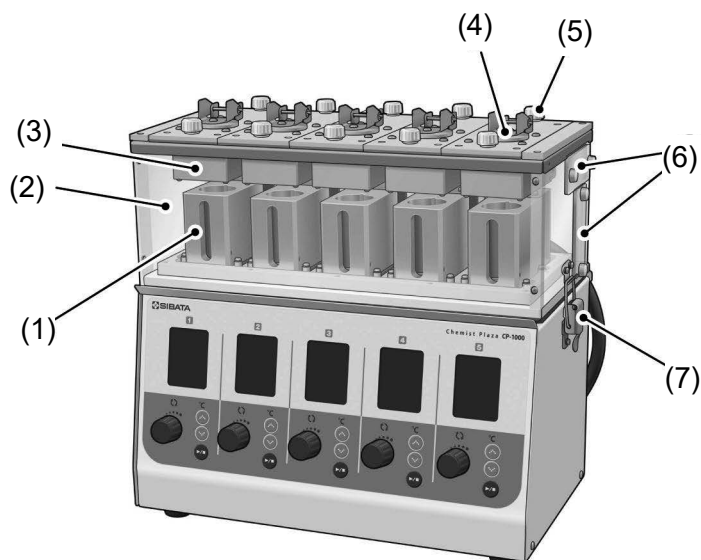
The unit is equipped with five motors, so the rotation speed can be set individually in a range from 100 rpm to 2,000 rpm.

#### **Simultaneous Experiments Using Different Vessels**

The reflux unit is easy to replace, so experiments using different vessels can be performed simultaneously.

## 2-5 Names of Parts

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### (1) Heating Block

This block heats the reaction vessel. It incorporates a heater and temperature sensor.

### (2) Block Cover

This is a polycarbonate cover.

### (3) Reflux Block

This block is cooled during reflux operation. The cooling cartridge must be installed to perform reflux. (See page 22.)

**(4) Reflux Unit Lid**

This is opened to insert the reaction vessel. Closing the lids on unused channels will limit frost (condensation) inside.

**(5) Reflux Unit Fastening Screw**

This screw fastens the reflux unit to the block. It is included with the reflux unit.

**(6) Cooling Port Lid**

Remove these lids to use the cooling cartridge.

**(7) Block Cover Bracket**

Release the bracket lock to remove the block cover when cleaning the block.

**(8) Main Switch**

Turn ON this switch to display the current temperature, the set temperature, and the current rotation speed. A leak current breaker function is also available, so the circuit inside the main body is interrupted in the event of a current leak or over current.

**(9) Heater Cable**

This cable provides power to the heater built into the heating block.

**(10) Power Cord Connection Port**

This is for connecting the power cord. (The power cord provided is for 100 V AC.)

**(11) Sensor Cable**

This cable transmits the signal from the temperature sensor built into the heating block to the controller.

**(12) Option Connector**

This connector is used to connect optional parts.

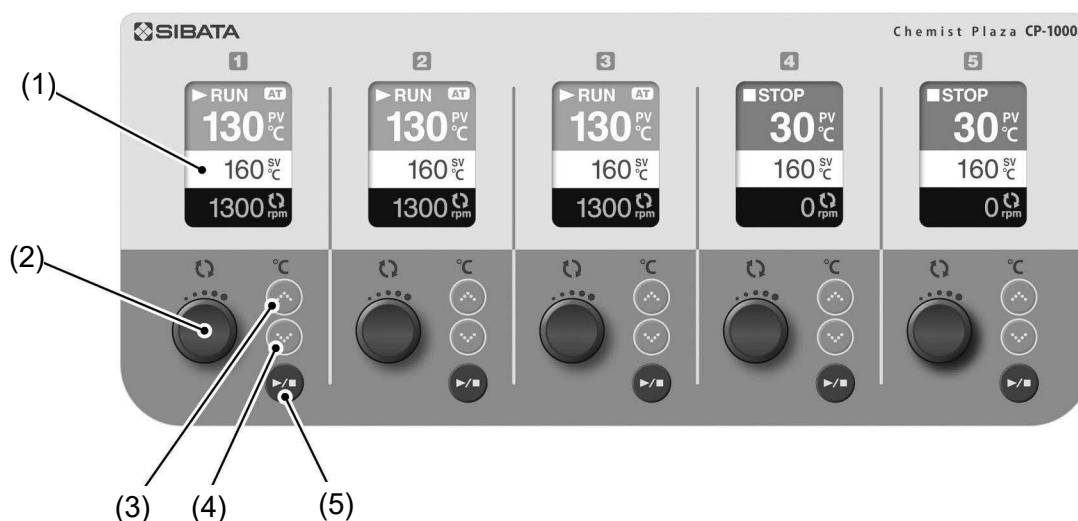
**(13) Drain Nozzle**

This nozzle is used to discharge water condensed by the block. The nozzle has an external diameter of  $\phi 5.5$  mm.

**(14) Gas Injection Nozzle**

This nozzle is used to inject inert gas and dry air into the block. The nozzle has an external diameter of  $\phi 7.5$  mm.

## ■ Control Panel



### (1) Display

This color LCD with backlight displays the operating status.

### (2) Rotation Speed Adjustment Knob

This knob adjusts the rotation speed. Turn it clockwise to increase the set rotation speed in 10 rpm increments.

### (3) UP Key

This is used when setting the temperature. Press and hold this key to increase the temperature in 10 °C increments.

Note: When shipped, the instrument is set so that the key beeps when operated.  
(To turn ON/OFF the beep setting, see page 37.)

### (4) DOWN Key

This is used when setting the temperature. Press and hold this key to decrease the temperature in 10 °C increments.

Note: When shipped, the instrument is set so that the key beeps when operated.  
(To turn ON/OFF the beep setting, see page 37.)

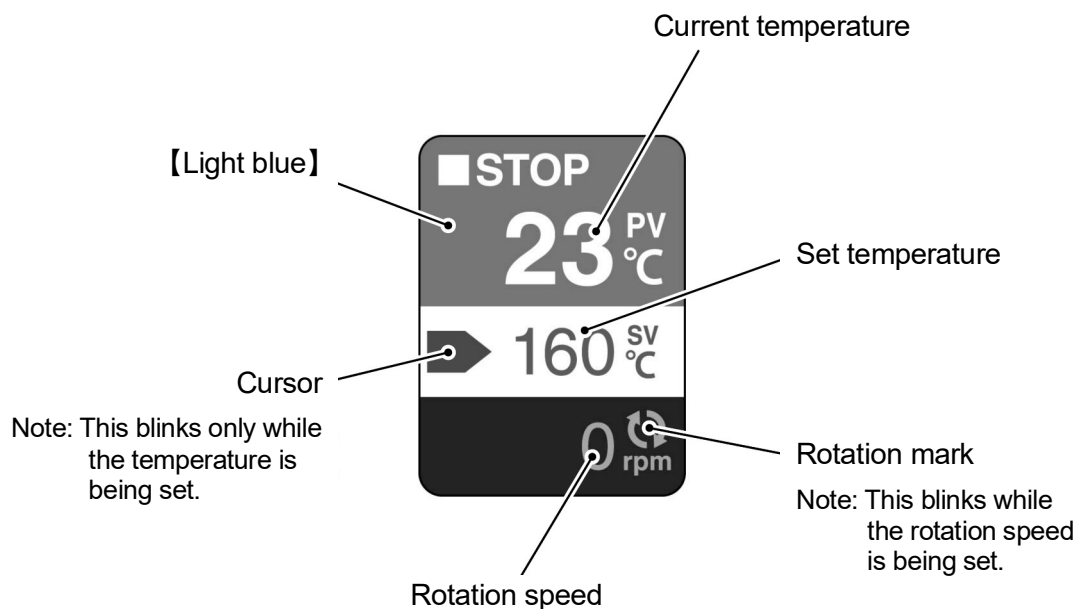
### (5) START/STOP Key

Press this once to start temperature control. Press it again to stop temperature control.

Note: When shipped, the instrument is set so that the key beeps when operated. The number of beeps differs with the situation. (To turn ON/OFF the beep setting, see page 37.)

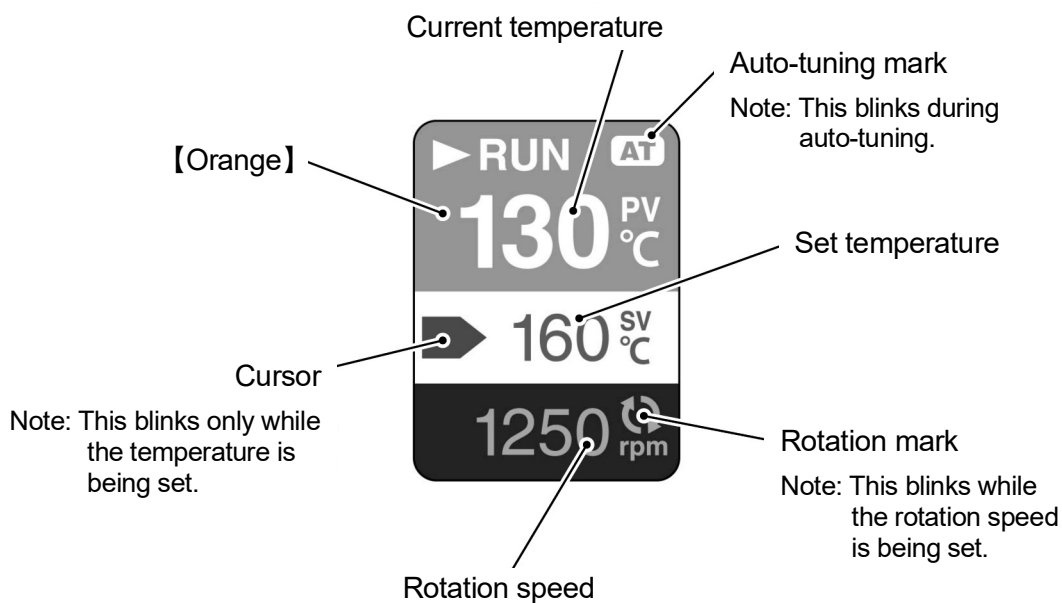
## ■ Display

### < Screen When Temperature Control is Stopped > ..... STOP Screen



Note: Stirring can be performed even while temperature control is stopped.

### < Temperature Control Operating Screen > ..... RUN Screen



## 3 Preparations



### CAUTION

**Do not connect the power cord to the main body until the preparations are complete.**

Equipment damage or personal injuries can occur if the instrument is operated unexpectedly.

### 3-1 Installing the Block



### CAUTION

**Do not place products made from iron, or equipment or magnetic cards affected by magnets above the main body.**

The instrument incorporates strong magnets, so such equipment could be damaged or magnetic cards could be rendered unusable.

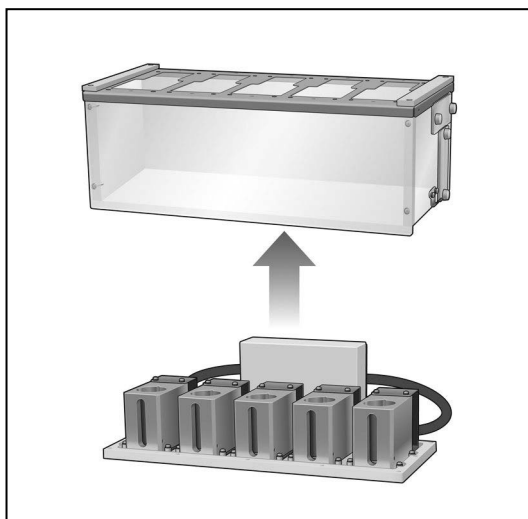
#### < Installation Procedure >

- (1) Position the main body at the installation site.

Note: The orange heat insulating material placed on the main body cannot be removed, so do not pull on it excessively.



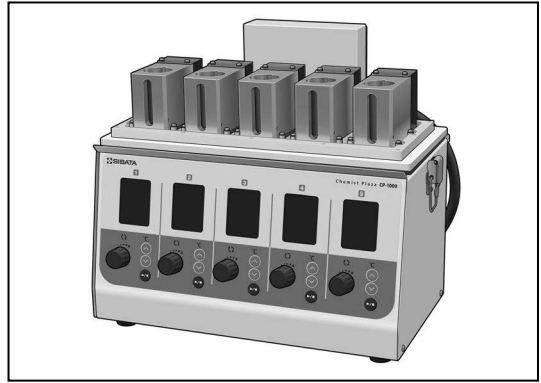
- (2) Remove the block cover.



- (3) Holding the heating block at both ends, place the block on the main body.

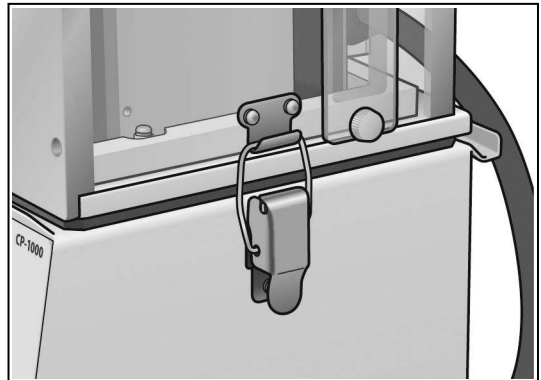
Note: Fit the protrusions on the bottom of the block into the holes in the heat insulating material.

Note: Be sure to hold both ends of the heating block while lifting it so that the block stays level.



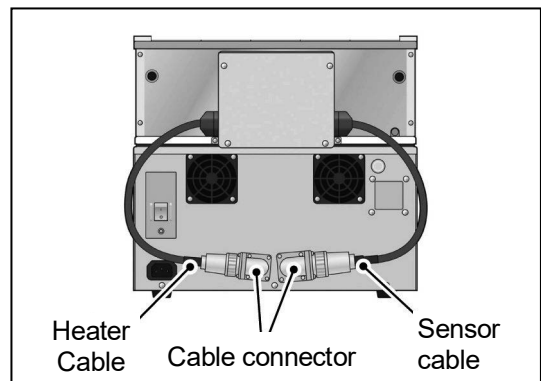
- (4) Attach the block cover, and lock the brackets at both sides.

Note: Be sure to lock the brackets during use. If they are not locked, there is a risk that significant vibrations or an impact could displace the block, dislodging it from the main body.



- (5) Connect the block heater cable and sensor cable into the respective connectors on the main body.

Note: After inserting the cables, turn the peripheral rings to fasten them.



### < Block Removal Procedure >

When removing the block from the main body for transport or storage, first check that the heating block temperature has dropped to near room temperature. Remove the power cord, and then reverse the installation procedures.

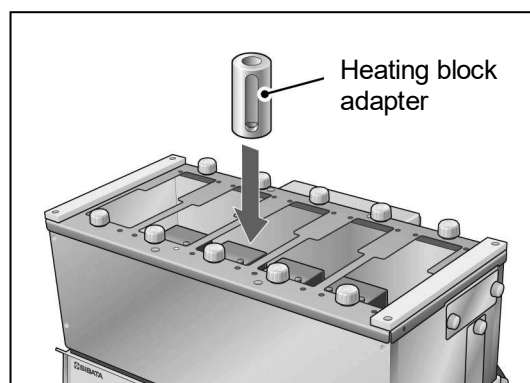
## 3-2 Attaching the Reflux Unit

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### < When Using $\phi 15$ -mm Test Tubes >

When using  $\phi 15$ -mm lipped test tubes and SPC15 test tubes, attach the heating block adapter to the heating block before attaching the reflux unit.

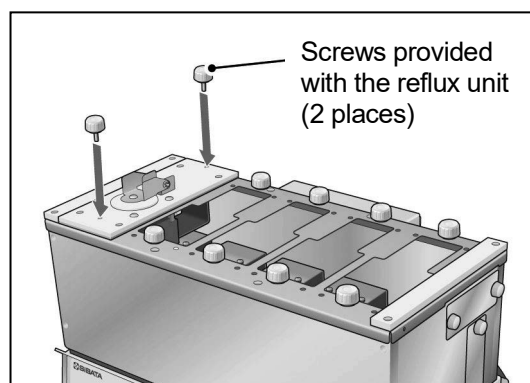
Note: Fit the protrusions on the heating block adapter into the grooves in the heating block.



### < Attaching the Reflux Unit >

Place the reflux unit in the block, and fasten it with the fastening screws provided.

Note: Fastening screw size: M4 $\times$ 10 mm



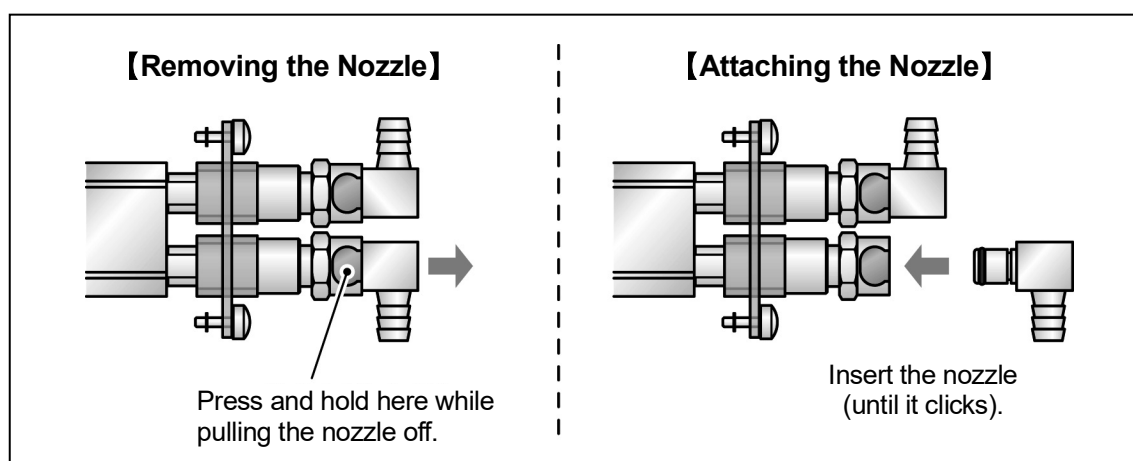
### 3-3 Attaching the Cooling Cartridge

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When performing reflux, or when operating the instrument at a set temperature near or below room temperature, you must attach the cooling unit and connect it to the low-temperature circulating water tank.

#### < Cooling Cartridge Nozzle >

The cooling cartridge nozzle can be removed. When re-attaching it after removal, pull on the nozzle to check that it does not come off.



Note: Be careful not to press the nozzle when attaching/removing the cooling cartridge.

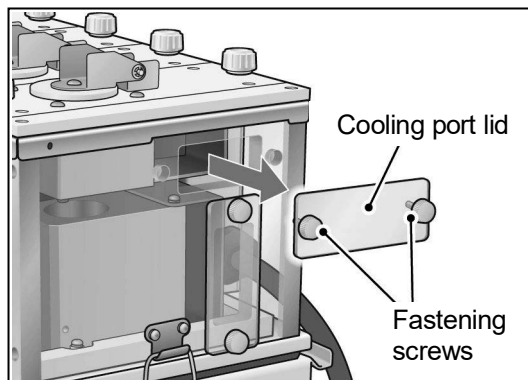
### 3-3-1 When Performing Reflux

When performing reflux, attach the cooling cartridge to the reflux unit (upper side).

#### < Installation Procedure >

- (1) Loosen the fastening screws in the upper cooling port lid on the side of the block cover, and remove the lid.

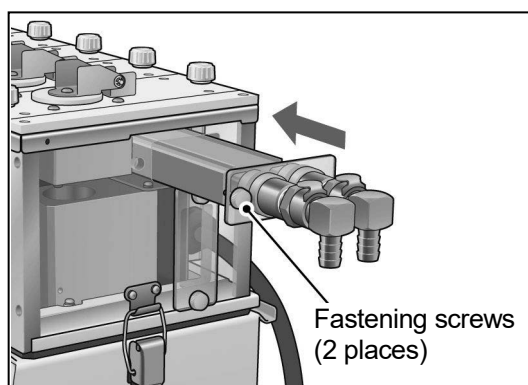
Note: In the figure, the cooling cartridge is inserted from the right. It can also be inserted from the left.



- (2) Insert the cooling cartridge, and tighten the fastening screws.

Note: Insert the cooling cartridge straight in, slowly. If it is tilted, it will not go in.

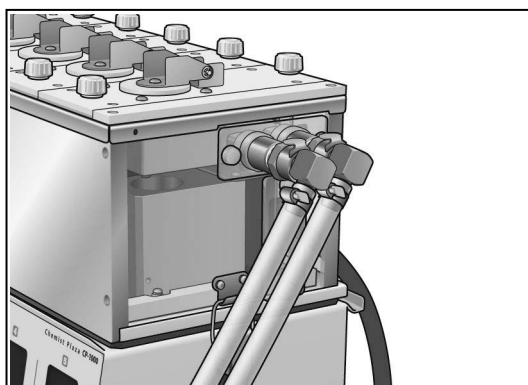
Note: There is no front/back to the cooling cartridge.



- (3) Connect it with the low temperature circulating water tank using the hose, and fasten the hose with the hose band. (The hose and hose band are included.)

Note: The nozzle has an external diameter of  $\phi 10.5$  mm.

Note: If necessary, wrap it in heat insulating material or rags to prevent condensation.



### 3-3-2 When Operating the Instrument at a Set Temperature Near or Below Room Temperature

Attach the cooling cartridge to the heating block (lower side) if you will be operating the instrument at a set temperature near or below room temperature.



#### CAUTION

**Do not circulate cooling water in the cooling cartridge when the power to the main body is OFF.**

Doing so may cause condensation inside the main body, resulting in equipment malfunctions.



#### CAUTION

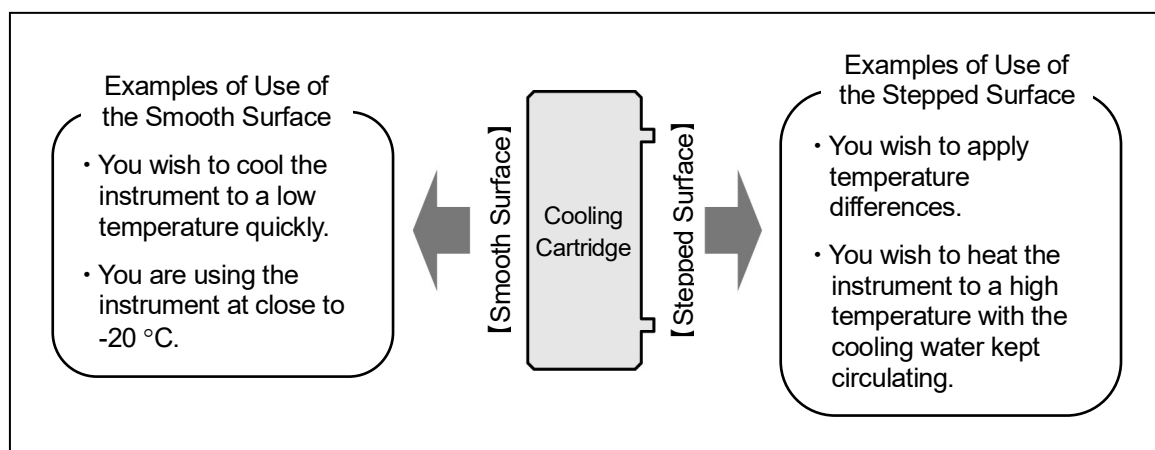
**Do not turn OFF the main body when cooling water is circulating in the cooling cartridge.**

Doing so disables heating to prevent condensation, and may cause condensation inside the main body, resulting in equipment malfunctions.

If you are turning OFF the power, remove the cooling water from inside the cooling cartridge. Alternatively, wait until the cooling water temperature has returned to room temperature before turning the power OFF.

#### < About the Cooling Cartridge Surfaces >

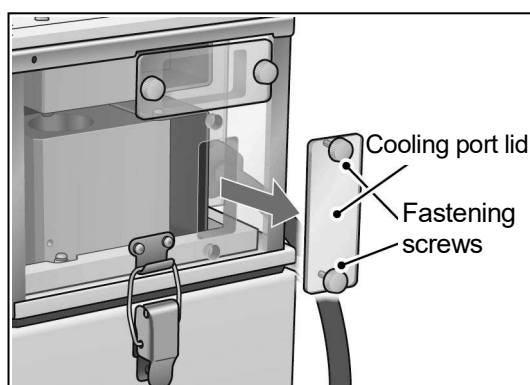
The cooling cartridge has a smooth surface and a stepped surface. By inserting it with the smooth surface against the heating block, the temperature can be lowered to a low value quickly. In contrast, by inserting it with the stepped surface against the heating block, the instrument can be heated to a high temperature while the cooling water is kept circulating. Decide which to use depending on the situation.



### < Installation Procedure >

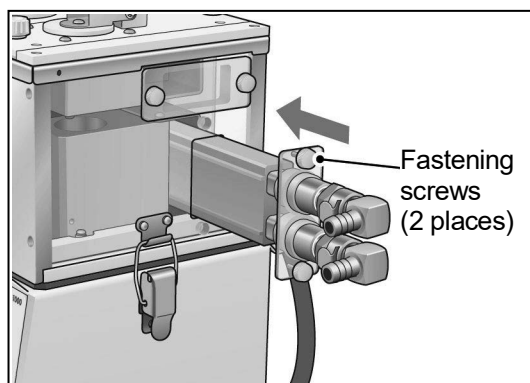
- (1) Loosen the fastening screws in the lower cooling port lid on the side of the block cover, and remove the lid.

Note: In the figure, the cooling cartridge is inserted from the right. It can also be inserted from the left.



- (2) Insert the cooling cartridge, and tighten the fastening screws.

Note: Insert the cooling cartridge straight in, slowly. If it is tilted, it will not go in.

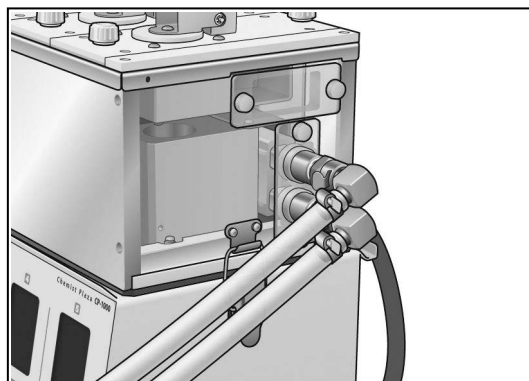


- (3) Connect it with the low-temperature circulating water tank using the hose, and fasten the hose with the hose band. (The hose and hose band are not included.)

Note: The nozzle has an external diameter of  $\phi 10.5$  mm.

Note: If necessary, wrap it in heat insulating material or rags to prevent condensation.

Note: If heating the instrument while the cooling water is circulating, use a hose made of a heat-resistant material.



### < Cautions When Using the Cooling Cartridge >

- Use of the stepped surface makes the instrument slower to cool than use of the smooth surface.
- The speed of the temperature drop varies with the block.
- Depending on the temperature and humidity conditions, condensed water on the surface of the block cover may pool on the surface where the main body is installed. If necessary, prepare rags to clean up such water.
- When attaching/removing the cooling cartridge, stop the circulation of cooling water.
- Immediately after the cooling cartridge is used, there may be frost on the surface of the cartridge, which can make it difficult to remove from the reflux or heating block. If you forcibly remove the cartridge despite the frost, the equipment may be damaged. Accordingly, wait for it to return to room temperature before removing it.

## 3-4 Attaching the PTFE Adapter



### CAUTION

**Before use, check the glass part for scratches and cracks. Handle the glass part with care.**

If you use it when it is scratched or cracked, the glass may break, resulting in injuries or accidents.

### 3-4-1 Adapters for $\phi 15$ -mm Test Tubes and $\phi 30$ -mm Test Tubes

Note: The figures show that the adapter for the  $\phi 15$ -mm test tube is used, but the situation is the same for the  $\phi 30$ -mm test tube.

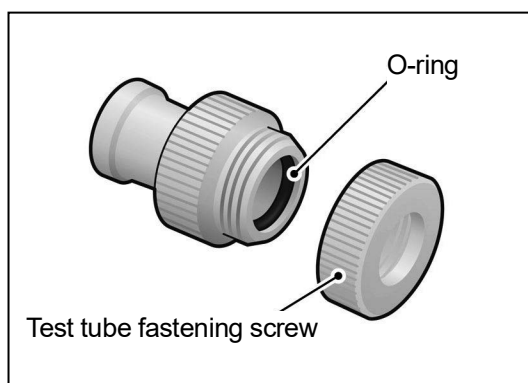
- (1) Remove the test tube fastening screw.

Note: Check that there is an O-ring inside.

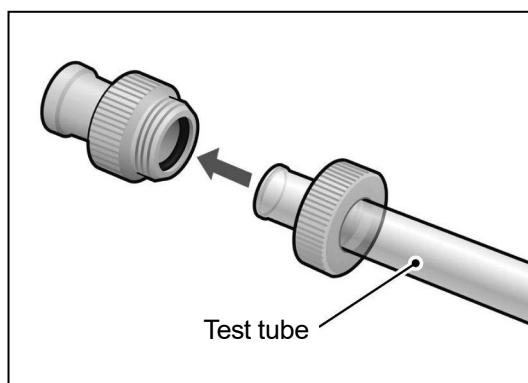
Note: O-Ring Sizes (material)

For  $\phi 15$ -mm test tubes: P14 (perfluoroelastomer)

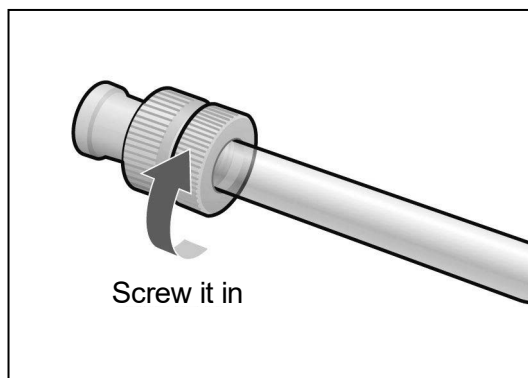
For  $\phi 30$ -mm test tubes: P28 (perfluoroelastomer)



- (2) Pass the test tube through the test tube fastening screw, and place the rim of the test tube against the O-ring.



- (3) Screw in the test tube fastening screw, fastening the test tube.

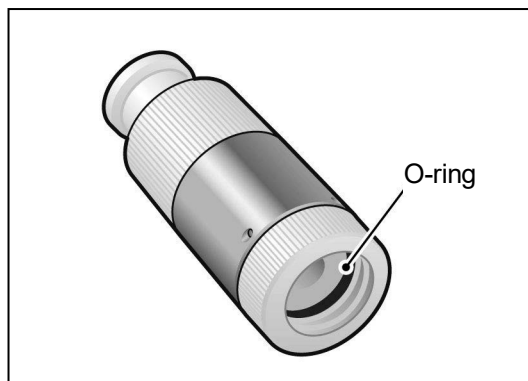


### 3-4-2 Adapters for $\phi 28$ -mL Vials

- (1) Check that there is an O-ring in the bottom of the adapter.

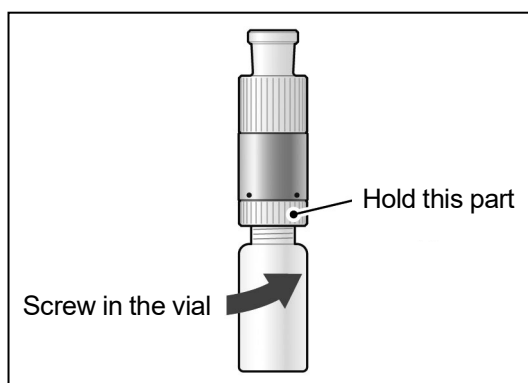
Note: O-Ring Size (material)

For  $\phi 28$ -mL vials: P18 (perfluoroelastomer)



- (2) Holding the part shown in the figure, screw the vial into the PTFE adapter.

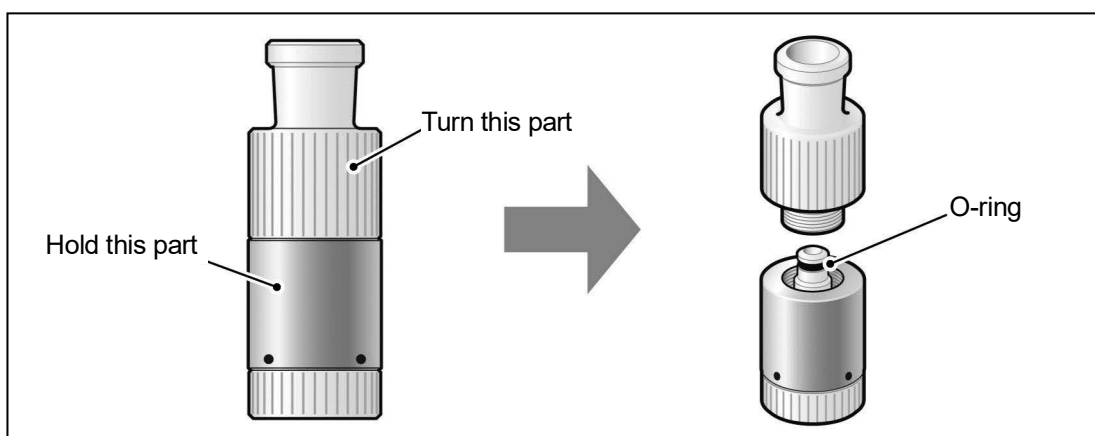
Note: The vial cannot be fastened if you hold the aluminum part.



#### < Cleaning the Adapter >

As shown in the figure, hold the aluminum part and turn the upper PTFE part to disassemble the adapter. There is an O-ring inside. If necessary, remove the O-ring for cleaning.

Note: O-Ring Size (material): S7 (perfluoroelastomer)



## 3-5 Additional Preparations

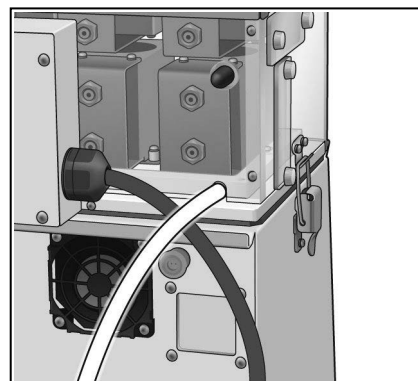
---

### 3-5-1 Connecting the Drain Hose

If you are using the instrument at low temperatures, frost may form on the block and cooling cartridge depending on the usage conditions. When the instrument returns to room temperature, this frost will melt, causing water to pool around the heating block. Connect a hose to the drain nozzle if necessary to drain the water.

Note: The nozzle has an external diameter of  $\phi 5.5$  mm.

Note: A cap is affixed at time of shipment.

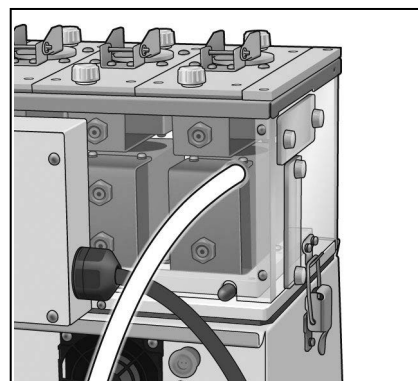


### 3-5-2 Injecting Dry Air

There is a dry air injection nozzle on the back of the block cover. If frost or condensation forms on the block inside the cover under high humidity conditions, connect a hose to the nozzle and inject dry air or an inert gas, as shown in the figure, to suppress the frost and condensation.

Note: The nozzle has an external diameter of  $\phi 7.5$  mm.

Note: A cap is affixed at time of shipment.

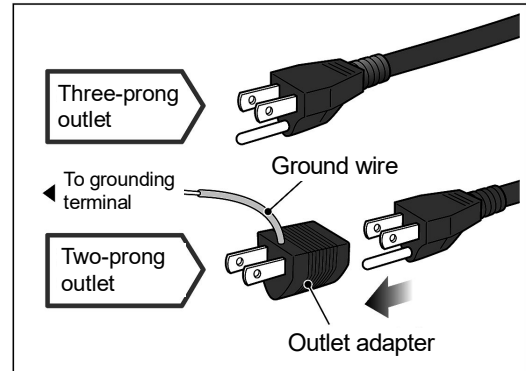


## 4 Operation Procedures

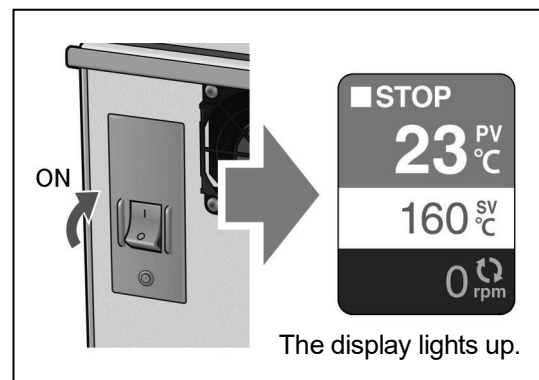
### 4-1 Turning ON the Power

- (1) After all the preparations are complete, plug the power cord into the outlet.

Note: If a grounded 100 VAC three-prong outlet is not available, use the outlet adapter provided to connect the cord to a two-prong outlet. In this case, be sure to connect the ground wire to the grounding terminal.



- (2) Turn ON the main switch on the back.  
->The display will light up and show the current temperature and other information.

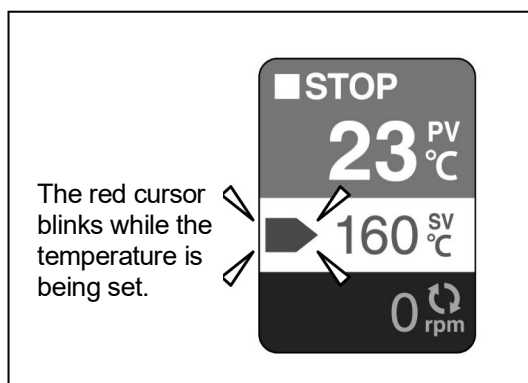


## 4-2 Setting the Temperature

- (1) Press the UP key and DOWN key to set the intended temperature.

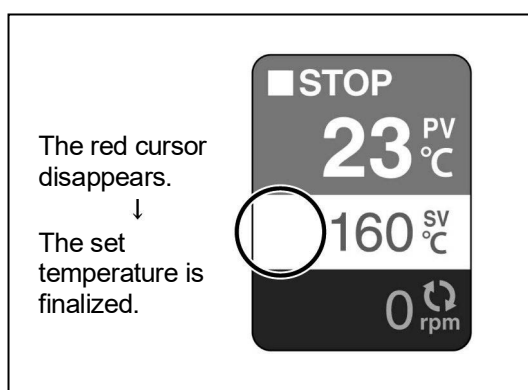
Note: While the temperature is being set, the red cursor on the left side of the set temperature display will blink.

Note: Press and hold the keys to change the value in 10 °C increments.



- (2) After setting the intended temperature, wait two seconds. The red cursor will disappear, the instrument will beep three times, and the set temperature will be finalized.

Note: You can also press the START/STOP key while the red cursor is blinking to finalize the setting.



### < Supplementary Information on the Temperature Settings >

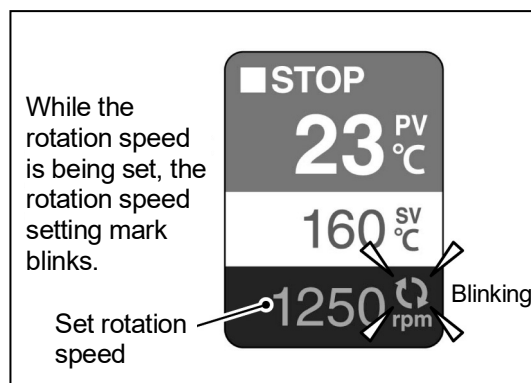
- The figures above show the case when temperature control is stopped (STOP screen), but the temperature can be set in the same way when temperature control is operating (RUN window).
- The temperature settings are retained even if the power is turned OFF.

## 4-3 Setting the Rotation Speed

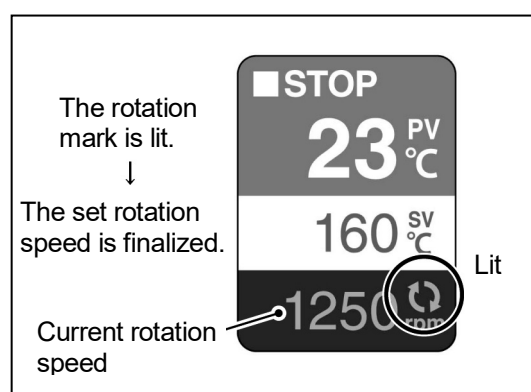
- (1) Turn the rotation speed adjustment knob to the intended rotation speed.

Note: While the rotation speed is being set, the rotation speed setting mark blinks, and the set speed is displayed.

Note: The rotation speed can be set in 10 rpm increments.



- (2) After setting the knob to the intended rotation speed, wait two seconds. The rotation mark will change from blinking to lit, the set rotation speed will be finalized, and the display will return to the current rotation speed.



### < Supplementary Information on the Rotation >

- The rotation speed settings are not stored. It is reset to 0 rpm whenever the power is turned ON.
- After the display returns to the current rotation speed, it may take some time for the rotation speed to increase to the set rotation speed. This is normal, and prevents problems with the stirrers caused by a sudden increase in the rotation speed.
- The rotation speed is displayed in 10 rpm increments.
- At high rotation speeds, the motor may be noisy.
- When a neighboring block is rotating, a stirrer may move slightly even though it is set to 0 rpm.
- At low speeds, the rotation speed displayed may fluctuate within a  $\pm 20$  rpm range.

### < Cautions when Setting the Rotation Speed >

- A stirrer may not rotate at the highest speeds due to the temperature and viscosity of the liquid being stirred, and the characteristics of the magnet in the stirrer. In this case, adjust the rotation speed within the range possible for the stirrer.
- The stirrer can jump out if the rotation speed is raised or lowered suddenly. Adjust the rotation speed gradually.

## 4-4 Starting and Stopping Temperature Control

### Cautions Regarding the High-Temperature Parts

When the set temperature is high, the metal part of the block, the block cover (transparent part), and the upper part of the block (white part) will become hot. To prevent burns, when removing the vessel when the temperature is high, wear protective gloves to avoid touching it with your bare hands.



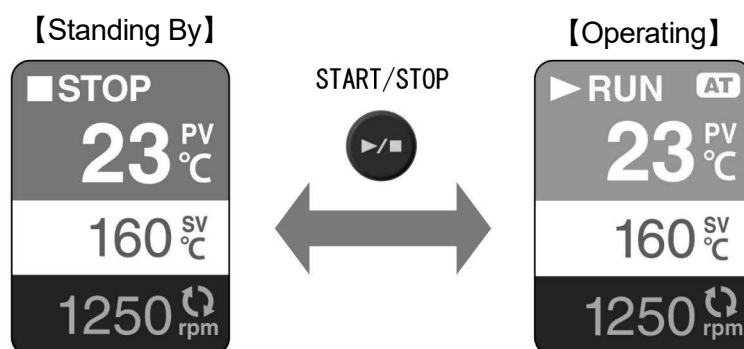
### WARNING

If you are heating the instrument with the cooling cartridge attached, be sure to circulate the cooling water. Alternatively, remove the brine from inside the cartridge beforehand.

Depending on the type of the brine inside the cooling unit, it may be volatile and catch fire if its temperature rises. The cooling unit may also malfunction.

### <Starting and Stopping Temperature Control >

To start temperature control, press the START/STOP key. To stop temperature control, press the START/STOP key again.



Note: When you press the START/STOP key, the instrument will beep twice.

### < Supplementary Information on Temperature Control >

- Rotation can be performed even while temperature control is stopped (STOP screen).
- Rotation does not stop even if temperature control is stopped. To stop the rotation, set the rotation speed to 0 rpm.

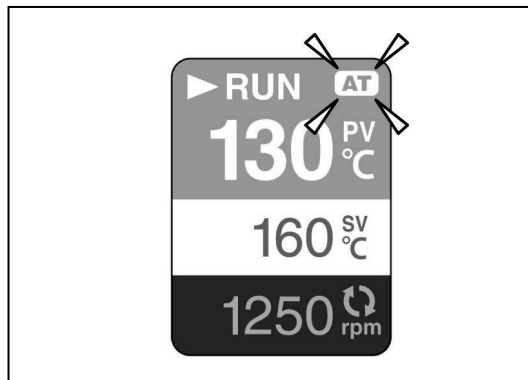
## 5 Other Functions and Parameters

### 5-1 The Auto-Tuning Function

This instrument is provided with an auto-tuning function, so highly accurate temperature control can be performed in response to the ambient temperature and other conditions.

During auto-tuning, the [AT] mark blinks as shown in the figure.

There are two auto-tuning modes.



#### < Auto-Tuning Modes >

##### (1) Automatic Mode (factory default setting)

In this mode, the instrument determines when auto-tuning is necessary, and implements auto-tuning based on the determination.

Normally, the automatic mode provides ample temperature control.

##### (2) Manual Mode

In this mode, auto-tuning is implemented manually. If auto-tuning is not necessarily required whenever the set temperature is changed, select this manual mode.

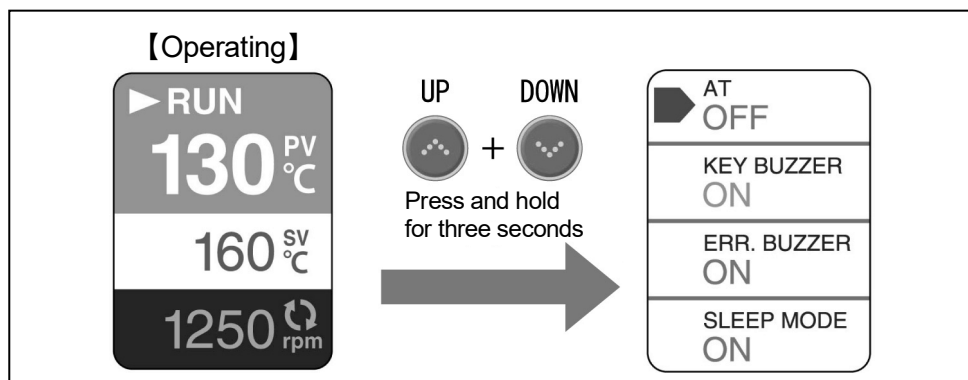
Note: See page 37 "ATA: Auto-Tuning Mode" regarding the procedure for toggling between auto-tuning modes.

#### < Auto-Tuning Procedure >

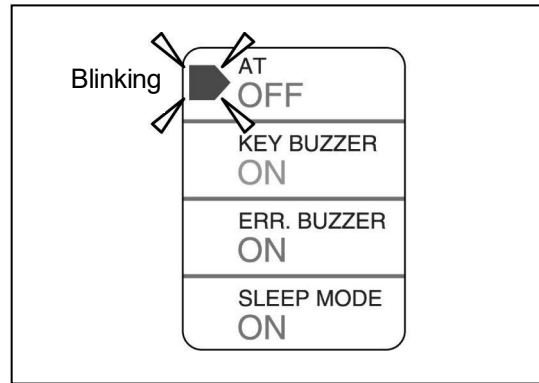
Auto-tuning can be implemented while temperature control is operating (RUN screen).

##### (1) Press and hold the UP key and DOWN key simultaneously for three seconds.

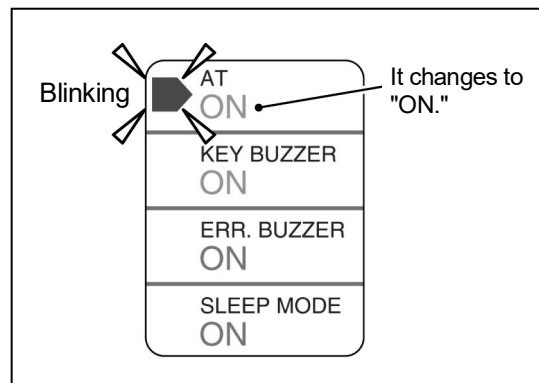
-> The instrument will beep twice, and the parameter settings screen will be displayed.



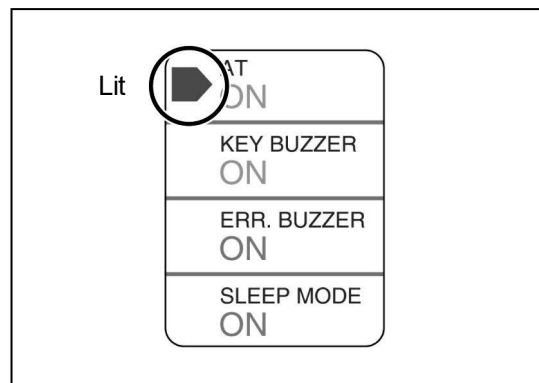
- (2) Check that the red cursor has moved to the [AT] position, and then press the START/STOP key.  
 -> The red cursor blinks.



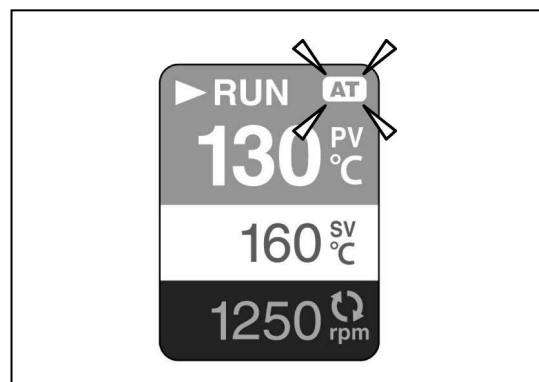
- (3) Press the DOWN key.  
 -> "OFF" will change to "ON."



- (4) Press the START/STOP key.  
 -> The instrument will beep three times, and then the red cursor will change from blinking to lit.



- (5) Press and hold the START/STOP key for three seconds.  
 -> The instrument will beep twice. The original screen will be displayed, and the [AT] mark will blink.



### **< Cancelling Auto-Tuning >**

To cancel auto-tuning, press the UP key or DOWN key during auto-tuning. (The [AT] mark will disappear.)

### **< Cautions Regarding Auto-Tuning >**

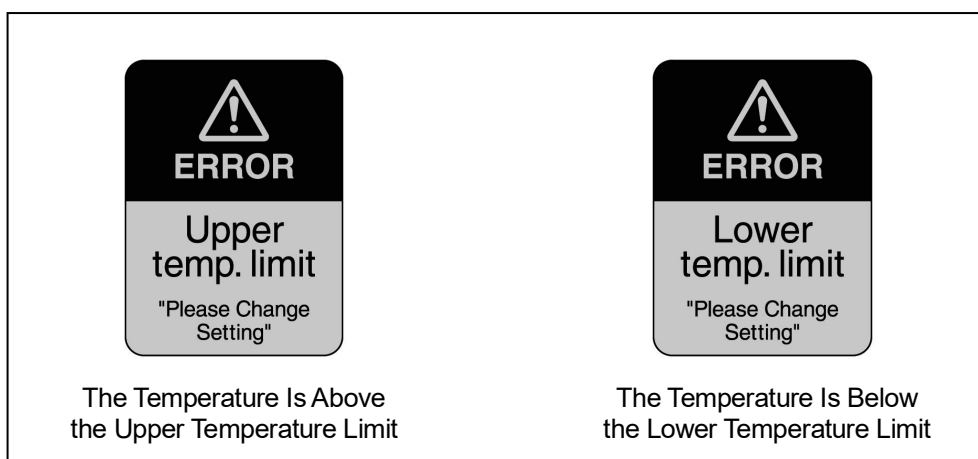
- During auto-tuning, the temperature of the heating block may rise or fall relative to the set temperature. This is due to the auto-tuning procedure and is not a problem.
- If you are using a sample that is sensitive to temperature changes, confirm that auto-tuning is finished before positioning the vessel.

## 5-2 Upper/Lower Temperature Limit Alarm Function

This instrument is equipped with a function that issues an alarm if the temperature of the heating block rises above or falls below set temperature thresholds.

When an alarm is issued, a buzzer will sound. At the same time, a screen as shown in the figure will alternate with the STOP screen, and the power to the heater will be interrupted.

At time of shipment, the upper temperature limit (ALARM HIGH) is set at 180 °C, and the lower temperature limit (ALARM LOW) is set at -30 °C. The values for the upper/lower temperature limit can be changed by the user.



### < Cancelling the Alarm >

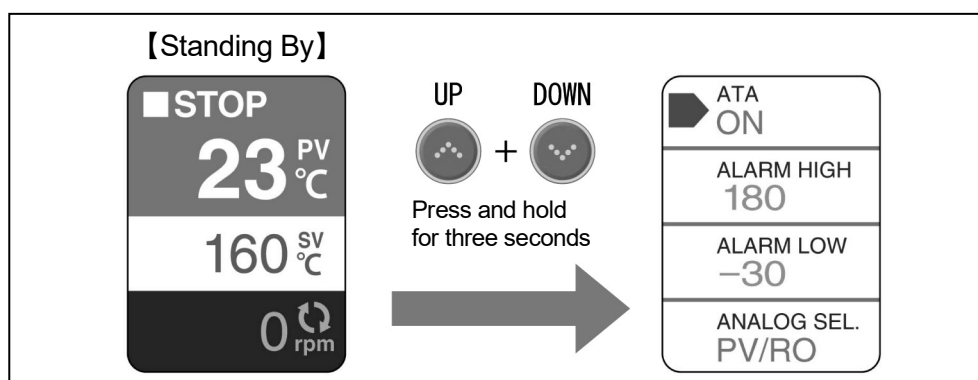
If the buzzer sounds, press any key to stop the buzzer. Press the key again to display the STOP screen.

### < Changing the Upper/Lower Temperature Limit >

In this example, the upper temperature limit (ALARM HIGH) is changed to 150 °C.

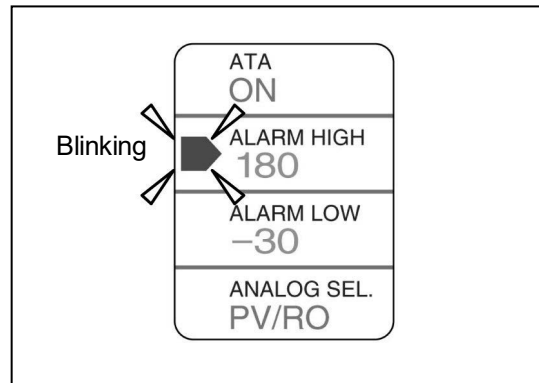
(1) While temperature control is stopped (STOP screen), press and hold the UP key and DOWN key simultaneously for three seconds.

-> The instrument will beep twice, and the parameter settings screen will be displayed.



- (2) Press the DOWN key, move the red cursor to the "ALARM HIGH" position, and then press the START/STOP key.

->The red cursor blinks.

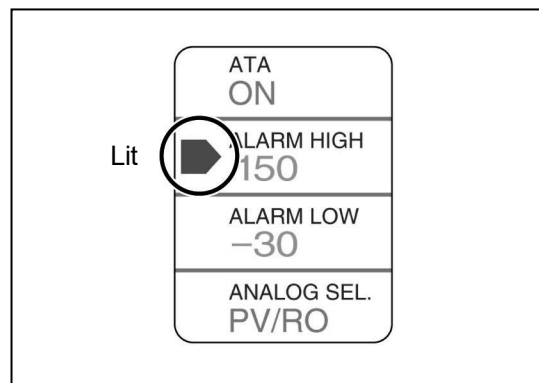


- (3) Press the UP key or DOWN key to set the temperature to "150". Then press the START/STOP key.

-> The instrument will beep three times, the settings value will be finalized, and the red cursor will change from blinking to lit.

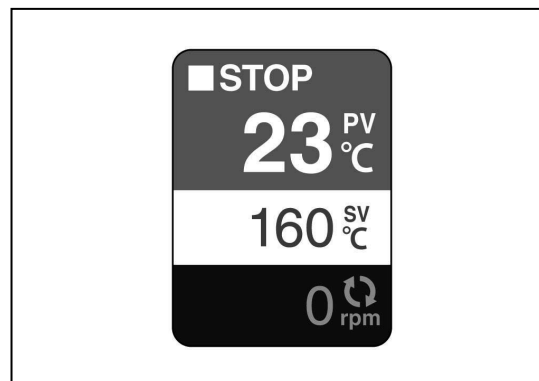
Note: If the default value is changed, the settings value will be displayed in orange.

Note: If you press nothing for 30 seconds, the system will return to the original screen.



- (4) Press and hold the START/STOP key for three seconds.

-> The instrument will beep twice, the settings will be finalized, and the system will return to the original screen.



### < Cautions Regarding the Upper/Lower Temperature Limit Alarm >

- If the temperature rises above the upper temperature limit, the power to the heater will be interrupted. However, there is no function to stop the cooling unit if the temperature falls below the lower temperature limit.
- During auto-tuning, the temperature may rise or fall several °C with respect to the set temperature. As a result, an alarm may be issued depending on the settings for the upper/lower limit temperature alarm. In this case, change the settings for the upper/lower limit temperature alarm.

## 5-3 Setting and Changing the Parameters

With this instrument, the operation of the above mentioned auto-tuning function and the upper/lower temperature limit alarm can be set or changed by changing the parameters.

### Parameters That Can Be Changed Only While Temperature Control Is Stopped (STOP screen)

| Display     | Name                    | Details                                                                                                                                                 | Factory Default |
|-------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| ATA         | Auto-tuning mode        | This sets the auto-tuning mode.<br>ON: Automatic mode / OFF: Manual mode                                                                                | ON              |
| ALARM HIGH  | Upper temperature limit | This is the upper temperature limit for issuing the upper/lower temperature limit alarm. See page 35 regarding the upper/lower temperature limit alarm. | 180             |
| ALARM LOW   | Lower temperature limit | This is the lower temperature limit for issuing the upper/lower temperature limit alarm. See page 35 regarding the upper/lower temperature limit alarm. | -30             |
| ANALOG SEL. | Analog output item      | Note: This parameter is not used.                                                                                                                       | PV/RO           |
| RESET       | Settings reset          | This returns the settings to the factory defaults.<br>OFF / ACTION: Implement the reset                                                                 | OFF             |

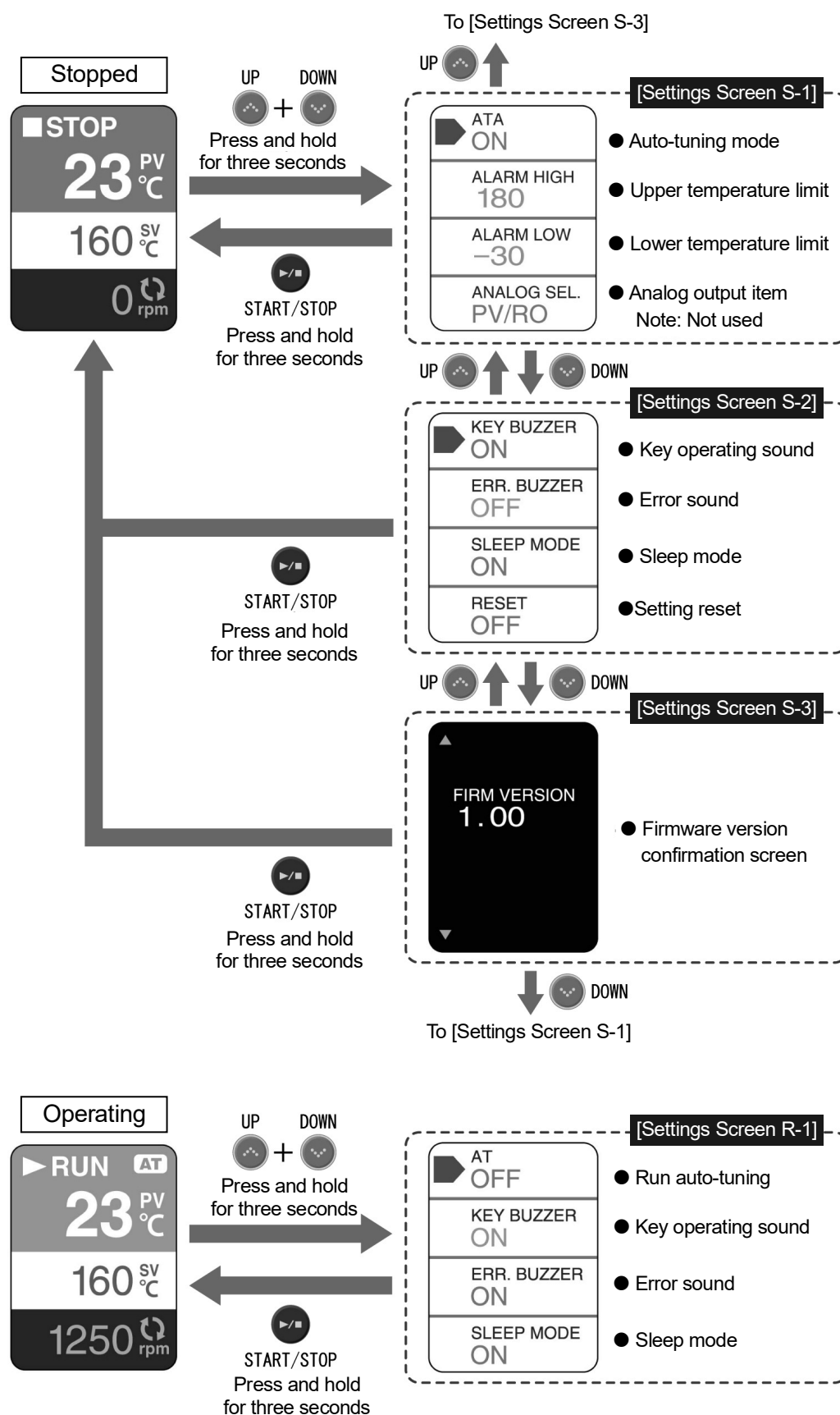
### Parameters That Can Only Be Changed While Temperature Control is Operating (RUN screen)

| Display | Name            | Details                                                               | Factory Default |
|---------|-----------------|-----------------------------------------------------------------------|-----------------|
| AT      | Run auto-tuning | Set this to turn auto-tuning ON manually.<br>OFF/ ON: Run auto-tuning | OFF             |

### Parameters That Can Always Be Changed

| Display     | Name                | Details                                                                                                                                                                                                                                    | Factory Default |
|-------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| KEY BUZZER  | Key operating sound | This sets the key operating sound.<br>ON: Sound / OFF: No sound                                                                                                                                                                            | ON              |
| ERR. BUZZER | Error sound         | This sets the issuance of the error sound.<br>ON: Sound / OFF: No sound                                                                                                                                                                    | ON              |
| SLEEP MODE  | Sleep mode          | This sets the time after which the display backlight goes out if no key is pressed in the STOP screen.<br>ON: Remains lit / 1: After one minute / 2: After two minutes / 5: After five minutes / 10: After ten minutes / OFF: Always unlit | ON              |

## < Parameter Settings Sequence >



Note: In the settings screen, if no key is pressed for 30 seconds, the system returns automatically to the original screen. In this case, the items being set are not finalized.

## 6 Troubleshooting

If a problem occurs during use, promptly stop using the product. If the problem has been caused by a product failure, please request repair.

In some cases, problems may be caused by something other than a malfunction. Before requesting repair, check the following.

### 6-1 No Malfunction

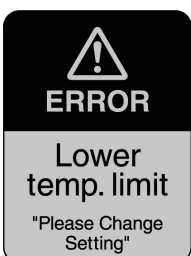
| Problem                                                                                                    | Cause                                                                 | Remedy                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nothing is displayed even though the main switch is turned ON.                                             | The power cord is not connected to the main body.                     | Connect the power cord to the main body.                                                                                                              |
| The LCD goes dark suddenly and nothing is displayed anymore.                                               | The system has entered sleep mode.                                    | If necessary, cancel sleep mode. (For information on sleep mode, see "Sleep Mode" on page 37.)                                                        |
| The stirrers are not operating.                                                                            | The rotation speed is 0 rpm.                                          | Set the rotation speed.                                                                                                                               |
|                                                                                                            | No stirrer has been added, or an inappropriate stirrer is being used. | Add an appropriate stirrer.                                                                                                                           |
|                                                                                                            | The reagent is too viscous.                                           | The stirrer may not operate if the viscosity is too high. Lower the viscosity.                                                                        |
| The rotation speed displayed is unstable.                                                                  | The set rotation speed is low.                                        | At low speeds, the rotation speed displayed may fluctuate within a $\pm 10$ rpm to 20 rpm range.                                                      |
| The temperature does not rise to the set temperature. Alternatively, the temperature does not rise at all. | The heater cable is not connected.                                    | Connect the heater cable.                                                                                                                             |
|                                                                                                            | You did not press the START/STOP key.                                 | Press the START/STOP key to start temperature control.                                                                                                |
|                                                                                                            | The cooling water temperature is too low.                             | Adjust the temperature of the cooling water.                                                                                                          |
| The temperature fluctuates near the set temperature.                                                       | The auto-tuning function is operating.                                | This is not a problem, as auto-tuning is in progress. In a short time, it will stabilize at the set temperature. (See page 32 regarding auto-tuning.) |

| Problem                                                                                                    | Cause                                                            | Remedy                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| The temperature does not drop to the set temperature. Alternatively, the temperature does not drop at all. | The cooling water is not circulating.                            | Use the cooling cartridge, and circulate the cooling water.                                                                                |
|                                                                                                            | The cooling water temperature is too high.                       | Lower the temperature of the cooling water.                                                                                                |
|                                                                                                            | You are using the stepped surface side of the cooling cartridge. | If the stepped surface is used, cooling can take longer. In this case, use the smooth side. (See page 21 regarding the cooling cartridge.) |

For any problems not mentioned above, request repairs.

## 6-2 Errors Displayed

If a part of this instrument malfunctions or breaks down, an alarm will sound. At the same time, the power to the heater will be interrupted, and you will be notified by an error message on the LCD.

| Display                                                                             | Details                                        | Remedy                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | Sensor problem                                 | <p>Check if the sensor cable is connected.</p> <p>If an error is displayed even though the cable is connected, then request repairs.</p>                                                                                                                                                                                     |
|   | Motor problem                                  | Request repairs.                                                                                                                                                                                                                                                                                                             |
|  | Upper temperature limit alarm<br>(See page 35) | <p>If the value configured for the upper temperature limit (ALARM HIGH) is lower than the set temperature, then revise the value for the upper temperature limit.</p> <p>If an error occurs even though the value for the upper temperature limit (ALARM HIGH) is higher than the set temperature, then request repairs.</p> |
|  | Lower temperature limit alarm<br>(See page 35) | <p>If the value configured for the lower temperature limit (ALARM LOW) is higher than the set temperature, then revise the value for the lower temperature limit.</p> <p>If an error occurs even though the value for the lower temperature limit (ALARM LOW) is lower than the set temperature, then request repairs.</p>   |

## 7 Main Specifications

### 7-1 Reaction Vessel Set

| Product Code        | 054300-1010            | 054300-1020            | 054300-1030            | 054300-1040         | 054300-1050         | 054300-1060    |
|---------------------|------------------------|------------------------|------------------------|---------------------|---------------------|----------------|
| Name of set         | φ15×105H Test Tube Set | φ15×150H Test Tube Set | φ30×200H Test Tube Set | SPC15 Test Tube Set | SPC29 Test Tube Set | 28-mL Vial Set |
| Model               | Lipped test tubes      |                        |                        | SPC Test tubes      |                     | Vial           |
| Size of vessel (mm) | φ15×105H               | φ15×150H               | φ30×200H               | φ15×170H            | φ30×190H            | φ30×65H        |
| Volume*1            | 7mL                    | 7mL                    | 30mL                   | 7mL                 | 30mL                | 28mL           |

\*1 This is the quantity when the vessels are placed in the block and filled with water up to the height of the heating block.

### 7-2 Main Body

|                                   |                     |                                                                                                   |
|-----------------------------------|---------------------|---------------------------------------------------------------------------------------------------|
| Product Code                      |                     | 054300-1000                                                                                       |
| Model                             |                     | CP-1000                                                                                           |
| Number of vessels                 |                     | 1 to 5 vessels                                                                                    |
| Temperature                       | Settings range      | -20 to 160 °C*1                                                                                   |
|                                   | Setting and display | Sheet key entry, and color LCD with backlight*2                                                   |
| Rotation                          | Settings range      | 100 rpm to 2,000 rpm*3                                                                            |
|                                   | Setting and display | Rotating knob entry, and color LCD with backlight*2                                               |
|                                   | Stirring method     | Individual stirrings using strongly magnetic stirrers                                             |
| Reflux                            |                     | Reflux by a cooling plate (Cooling plate can be attached/detached from both left and right sides) |
| Reagent addition method           |                     | Can be added under inert conditions using either a pipette, syringe, or dropping funnel           |
| Reaction observation              |                     | Through an observation window                                                                     |
| Safety measures                   |                     | Polycarbonate cover, upper/lower temperature limit alarm, condensation water drain                |
| Materials in contact with liquids |                     | Glass, PTFE, and perfluoroelastomer                                                               |
| Cooling water connection port     |                     | External diameter φ10.5 mm                                                                        |
| Operating ambient temperature     |                     | 5 to 35 °C                                                                                        |
| External size (W×D×H mm)          |                     | 330×222×315 (Excluding protrusions)                                                               |
| Weight                            |                     | Approx. 15 kg                                                                                     |
| Power supply                      |                     | 100 V AC, 50/60 Hz, 7A                                                                            |

\*1 If the set temperature is near or below room temperature, you must connect it with a separate low temperature circulating water tank.

\*2 The LCD brightness and contrast cannot be adjusted. The brightness and color density of the display may differ for the five screens.

\*3 The actual stirring rotation speed will change with the temperature and viscosity of the sample, and the characteristics of the magnet in the stirrer.

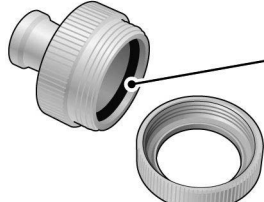
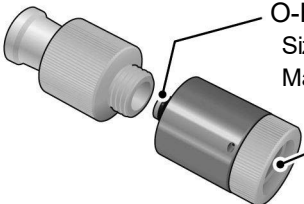
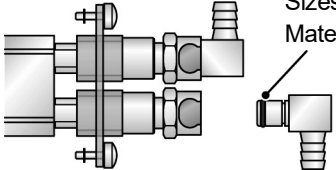
## 8 Parts and Consumables

### 8-1 Parts List

|    | Type            | Product Code | Product Name                                         |
|----|-----------------|--------------|------------------------------------------------------|
| 1  | Reaction vessel | 054310-1601A | Test tubes $\phi 15 \times 105$ mm, 100 included     |
| 2  |                 | 054310-1602A | Test tubes $\phi 15 \times 150$ mm, 50 included      |
| 3  |                 | 054310-1603A | Test tubes $\phi 30 \times 200$ mm, 25 included      |
| 4  |                 | 054310-1606A | Vial, 28 mL, 50 included                             |
| 5  |                 | 054310-1608A | SPC Test tubes $\phi 15 \times 170$ H, 10 included   |
| 6  |                 | 054310-1609A | SPC Test tubes $\phi 30 \times 190$ H, 10 included   |
| 7  | PTFE adapter    | 054310-4410  | Tapered PTFE adapters for $\phi 15$ test tubes       |
| 8  |                 | 054310-4420  | Tapered PTFE adapters for $\phi 30$ test tubes       |
| 9  |                 | 054310-4430  | Tapered PTFE adapters for vials                      |
| 10 | Stirrer         | 054310-1201A | Cross-shaped stirrers for $\phi 15$ , set of 10      |
| 11 |                 | 054310-1202A | Cross-shaped stirrers for $\phi 30$ , set of 10      |
| 12 |                 | 054310-1204A | Triangular stirrer for 28 mL, set of 10              |
| 13 |                 | 054310-1207A | Cross-shaped stirrers for $\phi 30$ , L25, set of 10 |
| 14 | Reflux unit     | 054310-4210  | Reflux unit for $\phi 15 \times 105$ H               |
| 15 |                 | 054310-4220  | Reflux unit for $\phi 15 \times 150$ H SPC15         |
| 16 |                 | 054310-4230  | Reflux unit for $\phi 30$ test tubes and vials       |
| 17 | Other           | 054310-4310  | Heating block adapter for $\phi 15$ CP-1000          |
| 18 |                 | 054310-4110  | Cooling Cartridge for CP-1000                        |
| 19 |                 | 030300-1529  | SPC reducing connector 15-29                         |
| 20 |                 | 054310-4510  | SPC Adapter with Three-Way Cock 15-15                |

## 8-2 Consumables

Following parts are consumables. Replace as necessary. Please contact delivery agent or our distributor to purchase.

| Product Code | Product Name                                   | Consumable parts                                                                                                                                                                                                |
|--------------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 054310-4410  | Tapered PTFE adapters for $\phi 15$ test tubes |  <p>O-Ring<br/>Sizes: P14<br/>Material: Perfluoroelastomer</p>                                                                |
| 054310-4420  | Tapered PTFE adapters for $\phi 30$ test tubes |  <p>O-Ring<br/>Sizes: P28<br/>Material: Perfluoroelastomer</p>                                                                |
| 054310-4430  | Tapered PTFE adapters for vials                |  <p>O-Ring<br/>Sizes: S7<br/>Material: Perfluoroelastomer</p> <p>O-Ring<br/>Sizes: P18<br/>Material: Perfluoroelastomer</p> |
| 054310-4110  | Cooling Cartridge for CP-1000                  |  <p>O-Ring<br/>Sizes: AS568-011<br/>Material: Type 4C</p>                                                                   |

## 9 Warranty and Repairs

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### 9-1 Warranty

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A warranty is provided with this product. At the time of purchase, check the terms of the warranty, and fill in the required items. The warranty period is one year from the time of purchase. The warranty cannot be reissued and so keep it in a safe place.

### 9-2 Repairs Occurring Within the Warranty Period

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During the warranty period, repairs are performed in accordance with the terms of the warranty. For details, check the terms of the warranty, and contact your Sibata representative. When requesting repairs, be sure to provide the warranty together with the product. If there is no warranty, a charge is applied for repairs, even if they are covered by the warranty. The warranty excludes consumable parts included with the product, products without the purchase date or distributor information recorded, and products for which warranty information was revised.

Regardless of the existence of a warranty, the following are not covered:

- Faults or damage resulting from incorrect use
- Faults or damage resulting from repairs or modifications implemented by parties other than Sibata
- Faults caused by abuse or inadequate maintenance
- Faults or damage resulting from fires or natural disasters, such as earthquakes
- Faults or damage occurring after purchase due to relocation, movement, falling, or vibration
- Faults or damage resulting from the use of consumable items not specified by Sibata

### 9-3 Repairs After Expiry of the Warranty

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If repairs are required after the warranty has expired, contact your Sibata representative. If functionality can be maintained by repair, and repair parts are available, we shall perform the requested repair for a fee.

## 10 Inquiries

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If you have any questions about this product, or if there is any other way in which we can be of assistance, contact your Sibata representative.



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