



Low temperature incubator

IJ102 / 102W / 202/302 type

Instruction manual

First Edition

Thank you for purchasing the Yamato Scientific Low Temperature Incubator IJ Series.

•For proper equipment operation, please read and become thoroughly familiar with this instruction manual before use. Always keep equipment documentation safe and close at hand for convenient future reference.



Warning: Read instruction manual warnings and cautions carefully and completely before proceeding.

YAMATO SCIENTIFIC RUSSIA, INC.

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1. SAFETY PRECAUTIONS

Explanation of Symbols

A Word Regarding Symbols

Various symbols are provided throughout this text and on equipment to ensure safe operation. Failure to comprehend the operational hazards and risks associated with these symbols may lead to adverse results as explained below. Become thoroughly familiar with all symbols and their meanings by carefully reading the following text regarding symbols before proceeding

 **Warning** Signifies a situation which may result in serious injury or death (Note 1.)

 **Caution** Signifies a situation which may result in minor injury (Note 2) and/or property damage (Note 3.)

(Note 1) Serious injury is defined as bodily wounds, electrocution, bone breaks/fractures or poisoning, which may cause debilitation requiring extended hospitalization and/or outpatient treatment.

(Note 2) Minor injury is defined as bodily wounds or electrocution, which will not require extended hospitalization or outpatient treatment.

(Note 3) Property damage is defined as damage to facilities, equipment, buildings or other property.

Symbol Meanings



Signifies warning or caution.
Specific explanation will follow symbol.



Signifies restriction.
Specific restrictions will follow symbol.



Signifies an action or actions which operator must undertake.
Specific instructions will follow symbol.

1. SAFETY PRECAUTIONS

Symbol Glossary

WARNING / CAUTION



General



Danger!: High Voltage



Danger!: High Temperature



Danger!: Moving Parts



Danger!: Blast Hazard



Caution: Water Only



Caution: Shock Hazard!



Caution: Burn Hazard!



Caution: Do Not Heat Without Water!



Caution: May Leak Water!



Caution: Toxic Chemicals

RESTRICTION



General Restriction



No Open Flame



Do Not Disassemble

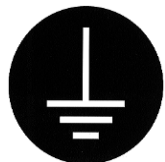


Do Not Touch

ACTION



General Action Required



Connect Ground Wire



Level Installation



Disconnect Power



Inspect Regularly

1. SAFETY PRECAUTIONS

WARNING / CAUTION



WARNING



Install in a location free of flammables and explosives.



Never install or operate unit in a flammable or explosive gas atmosphere. Unit is NOT fire or blast resistant. Simply switching earth leakage breaker (ELB) "ON" or "OFF" can produce a spark, which can then be relayed during operation, causing fire or explosion when near flammable or explosive fluids, chemicals or gases/fumes.

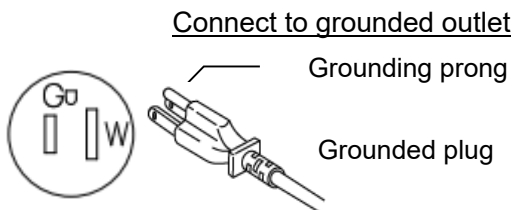
See "LIST OF HAZARDOUS SUBSTANCES" (P.60) for information on flammable and explosive gases.



Ground wire **MUST** be connected properly



- Connect power cable to a grounded outlet in order to avoid electric shock.
- Never connect ground wire to gas lines, water pipes, telephone grounding lines, or lightning conductor rods. Malfunction, electric shock, fire, or other accident may result.
- Never insert multiple plugs into a single outlet. Doing so may result in power cable overheating, fire or drop in voltage.



Grounded outlet

When no ground terminal is found

Contact original dealer of purchase for location-specific electrical requirements.



DO NOT disassemble or modify equipment

Never attempt to disassemble or modify unit. Doing so may cause malfunction, fire, electric shock, or personal injury. Note that any malfunction resulting from unauthorized modifications or customizations to unit will void the warranty.



Turn OFF (○) ELB immediately when an abnormality occurs.



If unit begins emitting smoke or abnormal odors for reasons unknown, turn OFF (○) ELB immediately, disconnect power cable from power supply, and contact original dealer of purchase for assistance. Continuing to operate without addressing abnormalities may cause fire or electric shock, resulting in serious injury or death.

Never attempt to disassemble or repair unit. Repairs should always be performed by a certified technician.

1. SAFETY PRECAUTIONS

WARNING / CAUTION



Handle power cable with care.



- Do not operate unit with power cable bundled or tangled. Operating unit with the power cable bundled or otherwise tangled, may cause power cable to overheat and/or catch fire.
- Do not modify, bend, forcibly twist or pull on power cable. It may cause fire or electric shock.
- Do not risk damage to power cable by positioning it under desks or chairs, or by allowing it to be pinched in between objects. It may cause fire or electric shock.
- Do not place power cable near kerosene/electric heaters or other heat-generating devices. Doing so may cause power cable insulation to overheat, melt and/or catch fire, which may result in electric shock.
- Turn off earth leakage breaker immediately and disconnect from facility outlet, if power cable becomes partially severed or damaged in any way. Failure to do so may result in fire or electric shock.
- Always connect power cable to appropriate facility outlet or terminal.



DO NOT touch hot surfaces

Do not touch the surface of the device such as the door or in the chamber during operation or for a while after the operation. At high temperatures, it may cause burns.



DO NOT climb or place any objects on top of equipment.

Personal injury or equipment malfunction may result.
Do not place any products other than those specified as options on top of unit.
Personal injury or equipment malfunction may result.



CAUTION



DO NOT operate equipment during thunderstorms

In the event of a thunderstorm, turn OFF (○) ELB and disconnect power cable immediately. A direct lightning strike may cause equipment damage, fire or electric shock, resulting in serious injury or death.



Turn OFF (○) ELB in case of power failure.

Operation stops when power failures occur. For added safety however, turn OFF (○) ELB in the event of a power failure.

1. SAFETY PRECAUTIONS

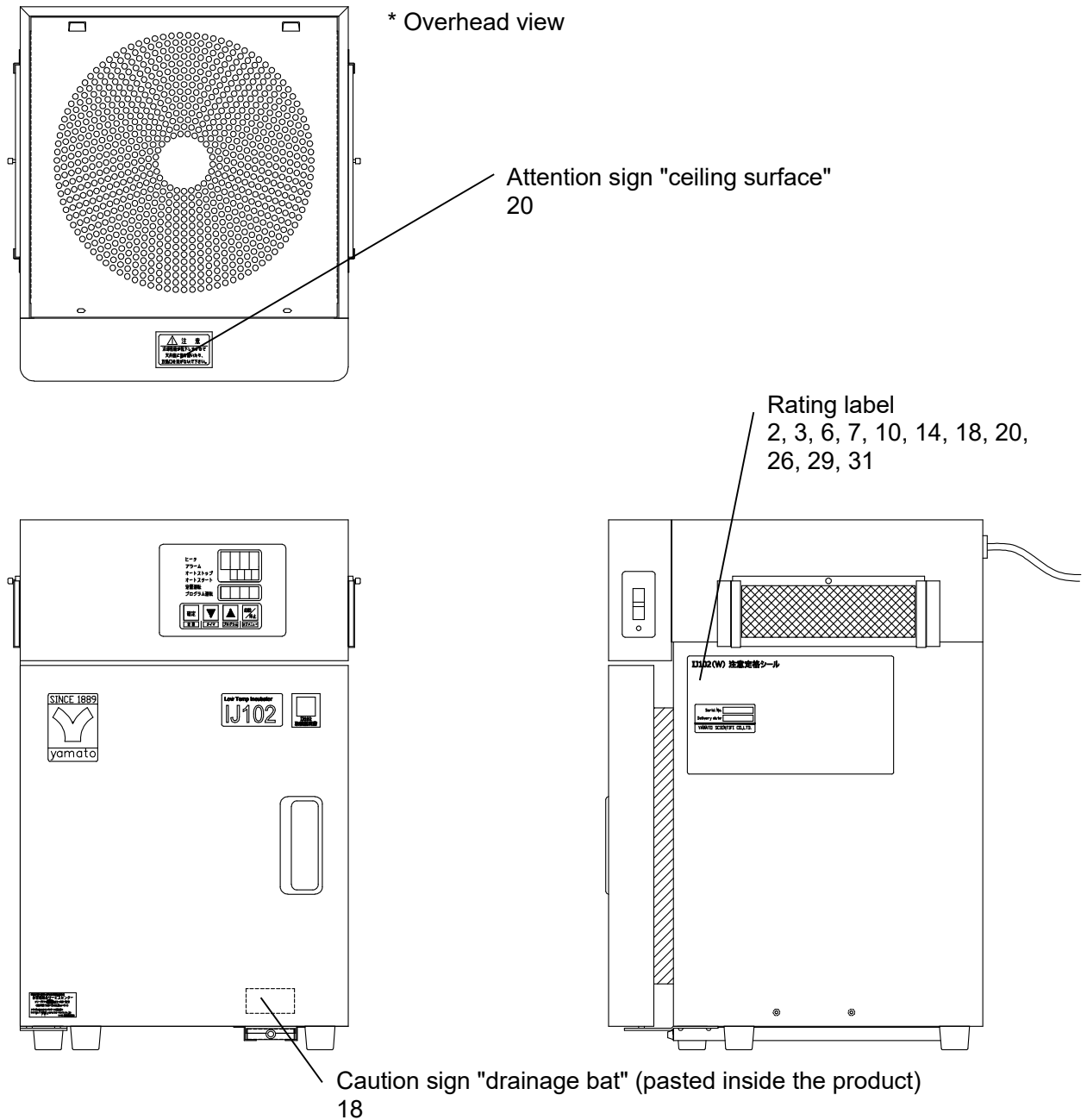
Residual Risk Map

These figures indicate positions of caution labels.

The numbers shown in the figure indicate the numbers listed in the "List of Residual Risks" in this manual.

For details of individual residual risks, see the List of Residual Risks.

【IJ102】



***Contact original dealer of purchase if the nameplates and caution labels have come off, or become illegible. New nameplates are available at cost.**

1. SAFETY PRECAUTIONS

List of Residual Risks

List of residual risks (instructions for risk avoidance)

This list summarizes residual risks to avoid personal injuries or damages to properties during or related to the use of equipment.

Be sure to fully understand or receive instructions on how to use, maintain and inspect equipment before starting operation.

| Loading/Installation | | | | |
|----------------------|-----------------|---------------------|---|---------------|
| No. | Degree of risks | Risk description | Protective measures taken by the user | Relevant page |
| 1 | CAUTION | Injury | Always use cargo-handling equipment to move or install unit. Transport unit with sufficient number of people and an appropriate work method when carrying out manually. | P.13 |
| 2 | WARNING | Fire/Electric shock | Choose an appropriate installation site. | P.12 |
| 3 | CAUTION | Injury | Install unit on a level surface. | P.13 |
| 4 | CAUTION | Injury | Take appropriate safety measures when installing. | P.13 |
| 5 | WARNING | Fire | Install equipment in a well-ventilated place | P.13 |
| 6 | WARNING | Fire/Electric shock | Install in a dry location. | P.14 |
| 7 | WARNING | Explosion/fire | Install in a location free of flammables and explosives. | P.3 |
| 8 | WARNING | Fire/Electric shock | Always connect power cable to appropriate facility outlet or terminal. | P.13 |
| 9 | WARNING | Fire/Electric shock | Handle power cable with care. | P.4 |
| 10 | WARNING | Fire/Electric shock | Ground wire MUST be connected properly | P.3 |
| 11 | WARNING | Fire/Electric shock | DO NOT disassemble or modify equipment. | P.3 |
| 12 | WARNING | Injury | Never place unit directly on top of another. Use a stacking rack or stacking bracket exclusively for 2-tier stacking. | P.14 |
| 13 | CAUTION | Fire | Place samples only on dedicated shelf boards. Use caution not to exceed maximum load rating and space test samples appropriately. | P.20 |

1. SAFETY PRECAUTIONS

List of Residual Risks

| Use | | | | |
|-----|-----------------|-----------------------------|---|---------------|
| No. | Degree of risks | Risk description | Protective measures taken by the user | Relevant page |
| 14 | WARNING | Explosion/fire | DO NOT process explosive or flammable substances | P.45 |
| 15 | WARNING | Fire/Electric shock | Turn OFF (○) ELB immediately when an abnormality occurs. | P.3 |
| 16 | WARNING | Fire/Electric shock Burn | Take care not to drop test samples or objects into the inside unit. | P.45 |
| 17 | CAUTION | Fire | In the event of a power failure with Auto-resume mode "ON", unit automatically reverts to status just before power loss and begin operation once again from that point. Be sure to confirm the state of unit when the power is supplied again. | P.46 |
| 18 | CAUTION | Injury | Condensed water is drained from the drain on the underside of the back of the main unit, so be sure to set the attached drain tray. | P.14 |
| 19 | WARNING | Fire | Place samples only on dedicated shelf boards. | P.20 |
| 20 | WARNING | Injury | DO NOT climb or place any objects on top of equipment. | P.4 |
| 21 | WARNING | Fire | DO NOT operate equipment during thunderstorms | P.4 |
| 22 | CAUTION | Burn Injury | ALWAYS run equipment within specified temperature range. | P.46 |
| 23 | WARNING | Fire/Electric shock | Carefully handle test samples. | P.45 |
| 24 | WARNING | Fire/Electric shock | When processing wet samples, remove as much of the moisture as possible beforehand. | P.46 |
| 25 | WARNING | Burn Injury, fire | Do not place a sample weighing more than 5 kg or 10 kg. Space test samples appropriately and leave more than 30% of space on shelf board. | P.20 |
| 26 | WARNING | Fire | Set the overheat prevention activation temperature. | P.45 |

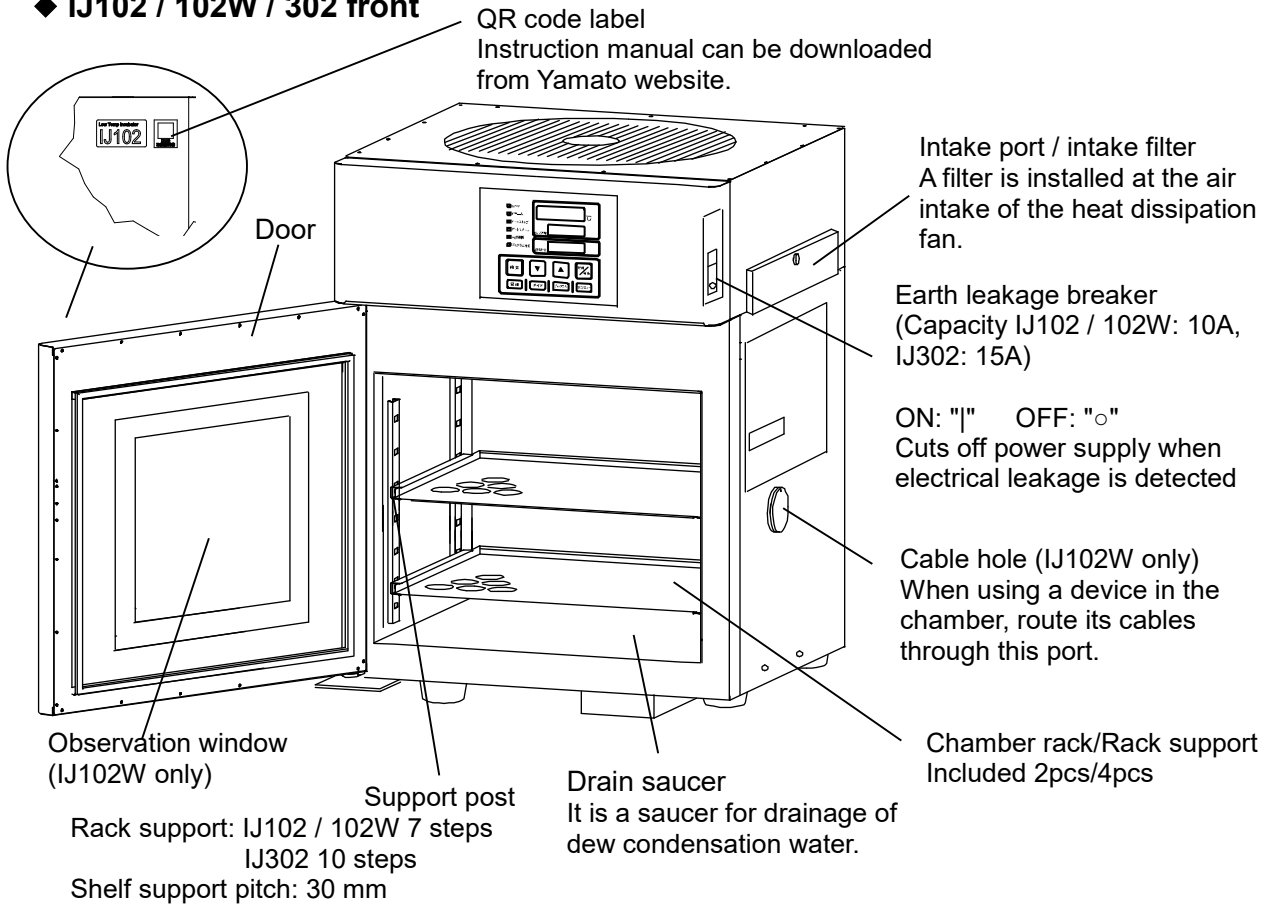
| Daily inspection/maintenance | | | | |
|------------------------------|-----------------|------------------------|---|---------------|
| No. | Degree of risks | Risk description | Protective measures taken by the user | Relevant page |
| 27 | WARNING | Fire/Electric shock | Be sure to disconnect power cable before daily inspection and maintenance. | P.48 |
| 28 | WARNING | Burn | Perform inspections and maintenance when unit is at room temperature. | P.48 |
| 29 | CAUTION | Injury, electric shock | Be sure to disconnect the power cord when cleaning the heat dissipation fins. | P.49 |
| 30 | WARNING | Fire/Electric shock | DO NOT disassemble or modify equipment. | P.3 |

| Extended storage/disposal | | | | |
|---------------------------|-----------------|---------------------|---|---------------|
| No. | Degree of risks | Risk description | Protective measures taken by the user | Relevant page |
| 31 | WARNING | Fire/Electric shock | Turn OFF (○) ELB and disconnect power cable from facility outlet or terminal. | P.50 |
| 32 | CAUTION | Injury | Do not leave unit in a location where children may have access | P.50 |
| 33 | CAUTION | Injury Lock-in | Remove door handle and hinges, etc to prevent it from locking. | P.50 |

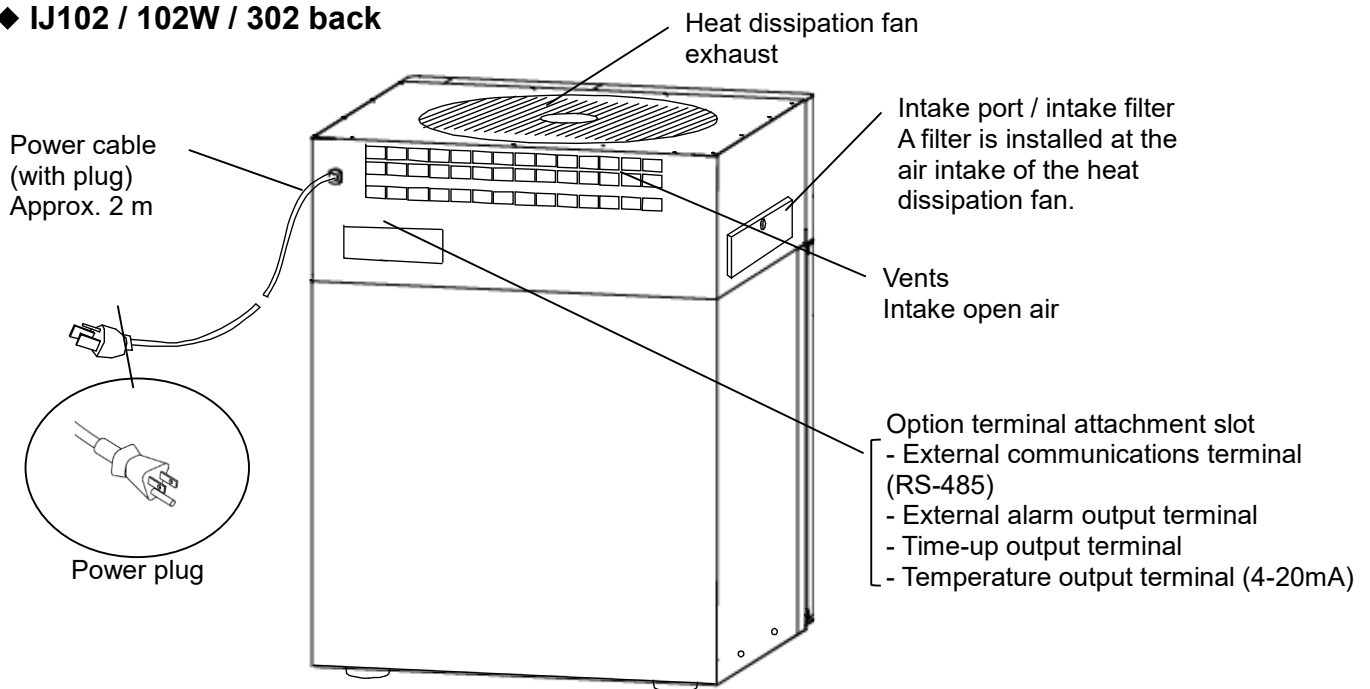
2. COMPONENT NAMES AND FUNCTIONS

This product (IJ102 / 102W / 302)

◆ IJ102 / 102W / 302 front



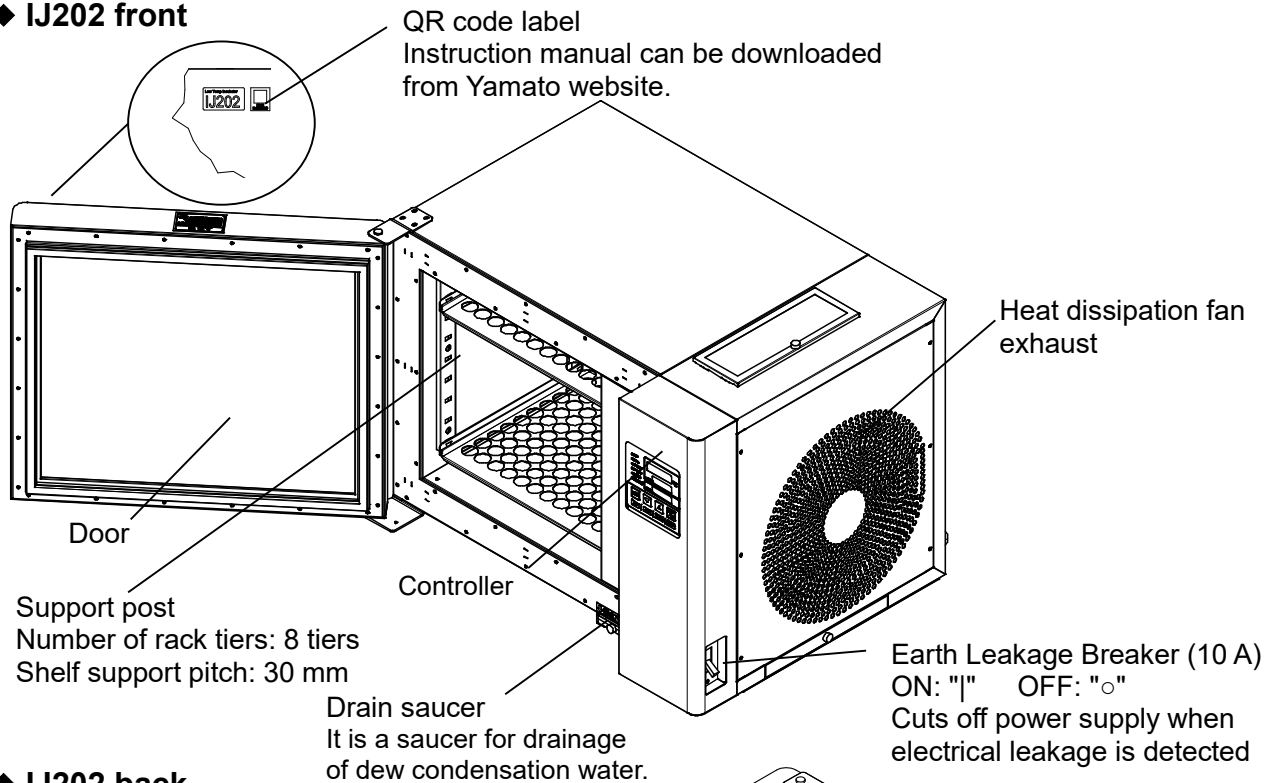
◆ IJ102 / 102W / 302 back



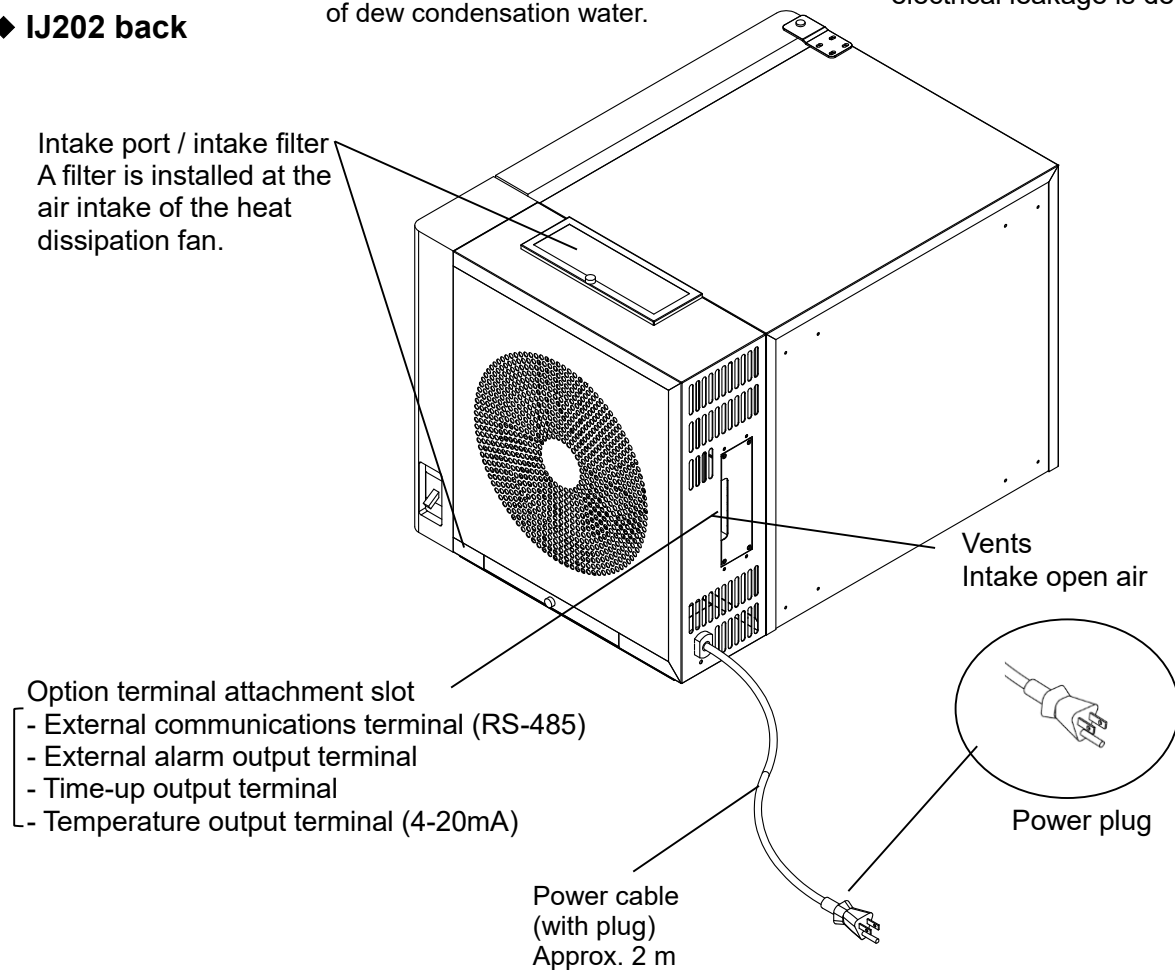
2. COMPONENT NAMES AND FUNCTIONS

This product (IJ202)

◆ IJ202 front

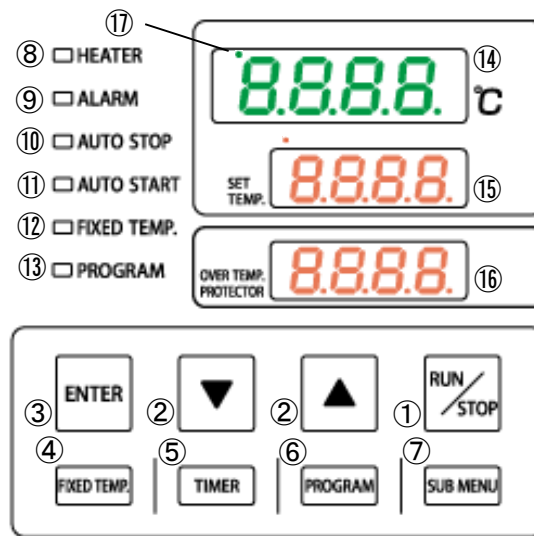


◆ IJ202 back



2. COMPONENT NAMES AND FUNCTIONS

Control panel



| No | Panel Item | Description |
|----|-----------------------------|---|
| ① | RUN/STOP Key | Press one second to start or stop an operation |
| ② | ▼▲keys | Press to increase or decrease the setting value Pressing the ▼ key during operation other than Fixed temperature operation switches indications described in ⑮ |
| ③ | ENTER key | Press to finalize setting |
| ④ | FIXED TEMP Key | Press to select Fixed temperature operation |
| ⑤ | TIMER key | Press to select and set a timed operation Quick auto stop, Auto stop, Auto start, and Program operations may be selected * Quick auto stop is available only in Fixed temperature operation |
| ⑥ | PROGRAM key | Press to begin creating programs or to select Program operation Total of 6 programs (PrG1-6) may be set |
| ⑦ | SUB MENU Key | Press and hold for two seconds to enter Submenu Overheat prevention temperature setting, Calibration offset, Keypad lock, Auto-resume function, Wait function, and Program repeat function may be set |
| ⑧ | HEATER lamp | Illuminates when heater is on and drawing power |
| ⑨ | ALARM lamp | Illuminates when an error occurs |
| ⑩ | AUTO STOP lamp | ⑫ illuminates in Fixed temperature operation, flashes while setting ⑩⑫ illuminate in Auto stop and Quick auto stop operations, flash while setting * |
| ⑪ | AUTO START lamp | |
| ⑫ | FIXED TEMP. Lamp | |
| ⑬ | PROGRAM Lamp | ⑬ illuminates in Program operation, flashes while setting ⑪⑬ illuminate in Program auto start operation, flash while setting Illuminates while fixed temperature operation is in progress. Flashes while setting. * ⑩ does not flash while setting Quick auto stop operation |
| ⑭ | Temperature reading display | Shows current chamber temperature, setting characters, and error codes |
| ⑮ | Temperature setting display | Shows temperature setting, remaining time, operation mode, and program step number |
| ⑯ | Overheat prevention display | Shows overheat prevention temperature setting |
| ⑰ | Cooler activation lamp | Turns on when the cooler is ON during operation, and turns off when it is OFF. |

2. COMPONENT NAMES AND FUNCTIONS

Display Characters

All characters displayed when making settings and during operation are defined as follows:

| Character | Letters | Panel Item | Purpose |
|-----------|----------|-----------------------------|--|
| | Fix | Fixed temperature operation | Appears during Fixed temperature operation |
| | Sv | Temperature setting | Appears while entering temperature settings for Fixed temperature operation and timed operations |
| | AStP | Auto stop | Appears during Auto stop operation |
| | AStr | Auto start | Appears during Auto start operation |
| | PStr | program Auto start | Appears during Program auto start operation |
| | W_F | Auto stop Wait setting | Wait mode ON/OFF setting on Auto stop and Quick auto stop operations |
| | tim | Timer setting | Appears while entering timer settings |
| | PrG 1-6 | Program number | Means the program number of programs 1-6 See "Programmed Operation" (P.29) |
| | End | End of operation | Appears when a programmed operation or a timed operation is completed |
| | Sv_ 1-30 | program Temperature setting | Appears while setting temperature for each step in a program. Shows from Sv_ 1 to Sv_ 30 (for PrG1) |
| | t_ 1-30 | program Timer setting | Appears while setting timer for each step in a program Shows from t_ 1 to t_ 30 (for PrG1) |
| | W_ 1-30 | program Step Wait setting | Appears while setting Wait mode on each program step Shows from W_ 1 to W_ 30 (for PrG1) See "Wait function" (P.34) |
| | PS_ 1-30 | Point of return | Appears when selecting step numbers to be repeated in a program Shows from PS_ 1 to PS_ 30 (for PrG1) See "Repeat Function" (P.35) |
| | Pc_ 1-30 | Number of times to repeat | Appears when setting the number of times to repeat steps in a program Shows from Pc_ 1 to Pc_ 30 (for PrG1) See "Repeat Function" (P.35) |
| | St_ 1-30 | program Step number | Appears to show the currently running step Shows from St_ 1 to St_ 30 (for PrG1) |
| | SKiP | Step Skip function | Appears when selecting which program step to skip |
| | HoLd | Step Hold function | Appears while setting step hold function |
| | oH | Overheat prevention | Appears while setting activation temperature for overheat prevention device See "Overheat Prevention Device Setup" (P.19) |
| | cAL | Calibration Offset function | Appears while entering offset temperature values See "Other Functions: Calibration Offset" (P.38) |
| | LoCk | Keypad lock | Appears while setting Keypad lock function See "Other Functions: Keypad Lock" (P.39) |
| | Pon | Auto-resume mode select | Appears while setting Auto-resume function See "Other Functions: Auto-resume Function" (P.40) |

* For more information about key operation flow, see "Mode & Function Flow" (P.17-18)

3. PRE-OPERATION PROCEDURES

Installation Precautions



Choose an appropriate installation site.

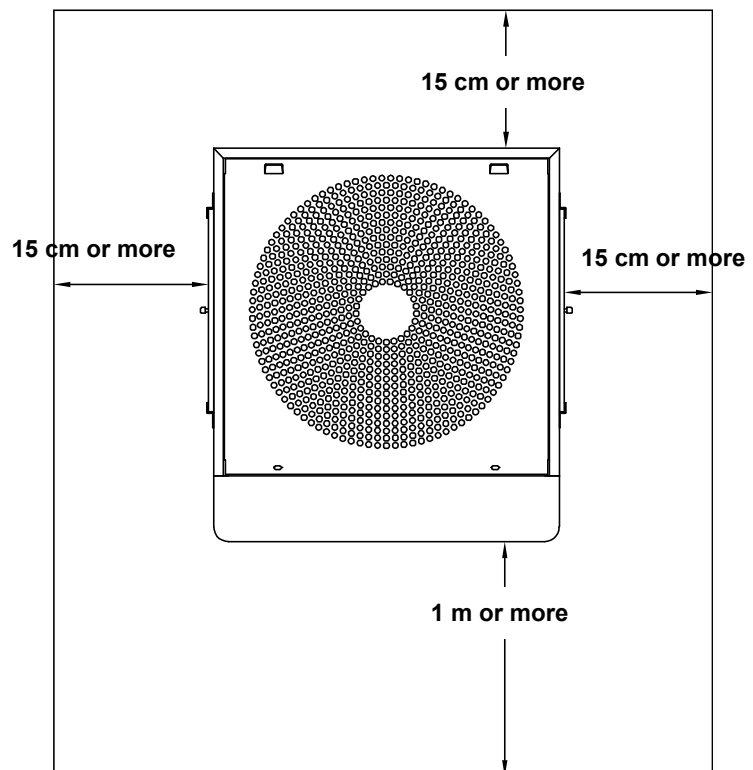
DO NOT install unit:

- where installation surface is not completely level, not even or not clean.
- where flammable or corrosive gases/fumes may be present
- Where the ambient temperature is 25 ° C (IJ202 / 302) / 30 ° C or higher (IJ102 / 102W) or 5 ° C or lower. Performance may deteriorate depending on the ambient temperature.
- where liquid is assumed to splash on unit
- A place with a large temperature difference.
- in excessively humid or dusty locations.
- in direct sunlight or outdoors.
- where there is constant vibration.
- in direct contact with the outside air
- where power supply is erratic.
- where there is combustible material nearby.
- in the proximity of, particularly right below a fire alarm.
- where there is a risk of freezing or condensation.
- where exposed to a strong wind.



Install unit in a location with sufficient space, as specified below.

* The figure is IJ102.



Leave 60 cm or more space above unit

The recommended space is described in reference to the Tokyo Fire Prevention Ordinance.

Install unit as stipulated by the ordinance of each prefecture.

3. PRE-OPERATION PROCEDURES

Installation Precautions



Use cargo-handling equipment for transportation and installation.

Always use cargo-handling equipment to move or install unit. Transport unit with sufficient number of people and an appropriate work method when carrying out manually.

Body weight : IJ102 : Approximately 20kg IJ102W : Approximately 22kg
 IJ202 : Approximately 25kg IJ302 : Approximately 37kg



Install unit on a level surface.

Install unit on level and even surface. Failure to do so may cause abnormal vibrations or noise, possibly resulting in complications and/or malfunction.



Take appropriate safety measures when installing.

Implement appropriate safety measures for the installation environment. Unit may tip over or fall, causing injury or death during an earthquake or other unforeseen incident.



Install equipment in a well-ventilated place

Install unit so that side and rear panel vents are unobstructed and allowed to sufficiently diffuse heat.

Doing so may result in excessive temperatures inside the unit control panel, causing possible degraded CPU board performance, malfunction or fire.

See "COMPONENT NAMES AND FUNCTIONS" (P.8~10) for location



Always connect power cable to appropriate facility outlet or terminal.

Connect power cable to a suitable facility outlet or terminal, according to the electrical requirements.

Electrical requirements : IJ102 (W): AC100V 50 / 60Hz Rated current 4A (breaker capacity 10A)
 IJ202: AC100V 50 / 60Hz Rated current 4.5A (breaker capacity 10A)
 IJ302: AC100V 50 / 60Hz Rated current 9A (breaker capacity 10A)

Operational voltage range is $\pm 10\%$ of power rating, performance guarantee voltage range is $\pm 5\%$, and frequency is $\pm 1\%$

* Check the line voltage on distribution board and properly evaluate whether to utilize a line being shared by other equipment. If unit is not activated by turning on ELB, take an appropriate course of action, such as connecting unit to a dedicated power source. Inserting multiple cords into a single outlet, using branch outlets or extension cords, may cause a drop in voltage, which may affect performance, resulting in failure to control or maintain proper temperature.

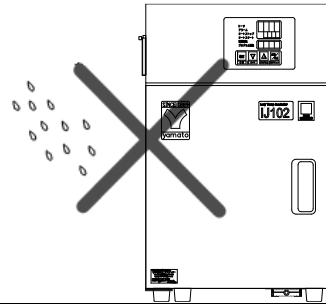
3. PRE-OPERATION PROCEDURES

Installation Precautions



Install in a dry location.

Install unit where it will be free from liquid spray and other moisture. Failure to do so may result in control mechanisms becoming wet, causing malfunction, electrical shock and/or fire.



Use optional stacking hardware for double stacking

When using this product in layers, be sure to use a stacking rack for IJ102 (W) / 302 and a stacking bracket (optional) for IJ202, and do not stack more than one.

Unit may tip over or fall, causing injury or death during an earthquake or other unforeseen incident.

See. "OPTIONAL ACCESSORIES" (P.56)



About drainage of dew condensation water.

If the cooler is operating, condensation may form on the cooling surface. Condensed water is drained from the drain at the bottom right of the front of the main unit, so be sure to set the attached drain tray.



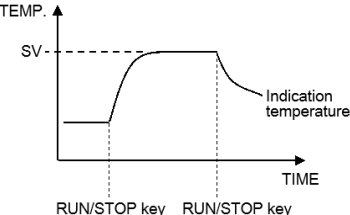
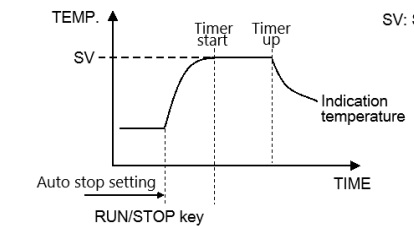
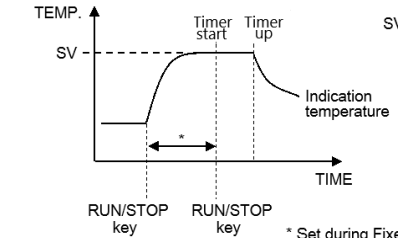
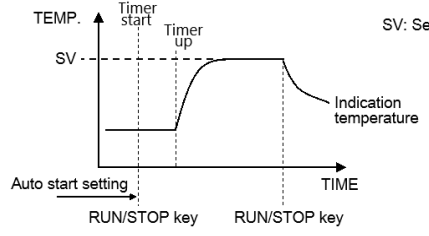
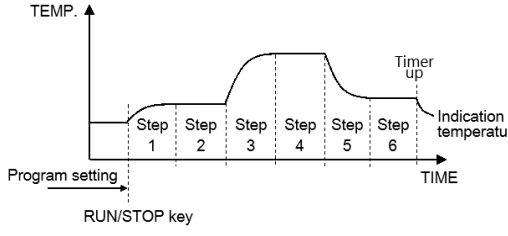
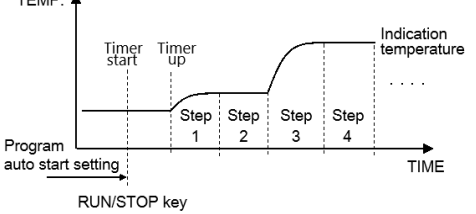
About the cooler (Pelche element).

The cooling capacity of the cooler (Pelche element) used in this product changes depending on the change in ambient temperature. In an environment where the ambient temperature is 15 ° C or less, the cooling capacity becomes strong, and the temperature rise time may be delayed or the maximum temperature may not be reached. Also, please note that in an environment of 25 ° C or higher, the cooling capacity may decrease and the minimum temperature may not be reached.

4. PRE-OPERATIVE PREPARATIONS

Operation Modes and Functions

Operation modes for this unit are defined in the table below

| Description | Page |
|--|--|
| <p>Fixed temperature operation This mode runs unit at a constant selected temperature.</p> |  <p>SV: Set temp.</p> <p>P.21</p> |
| <p>Auto stop operation This mode is used to automatically terminate an operation when a specified time period has passed (decided before operation). Timer begins counting down when chamber temperature reaches the temperature setting, and operation stops automatically when timer reaches 0.00</p> |  <p>SV: Set temp.</p> <p>P.23</p> |
| <p>Quick auto stop operation This mode is used to automatically terminate an operation when a specified time period has passed (decided during operation).</p> |  <p>SV: Set temp.</p> <p>P.22</p> <p>* Set during Fixed temp. operation</p> |
| <p>Auto start operation Fixed temperature operation will start after the time is up.</p> |  <p>SV: Set temp.</p> <p>P.25</p> |
| <p>Program operation This operation is used to run a combination of temperatures, times and modes as one operation. In the figure at right, the line pattern which indicates time variation of the set temperature is called "program", and each straight line which is a combination of set temperature and set time is called "step".</p> |  <p>P.29</p> |
| <p>Program operation auto start This mode is used to specify an automatic start time for constant temperature operation. Program operation will start after the time is up.</p> |  <p>P.27</p> |

4. PRE-OPERATIVE PREPARATIONS

Operation Modes and Functions

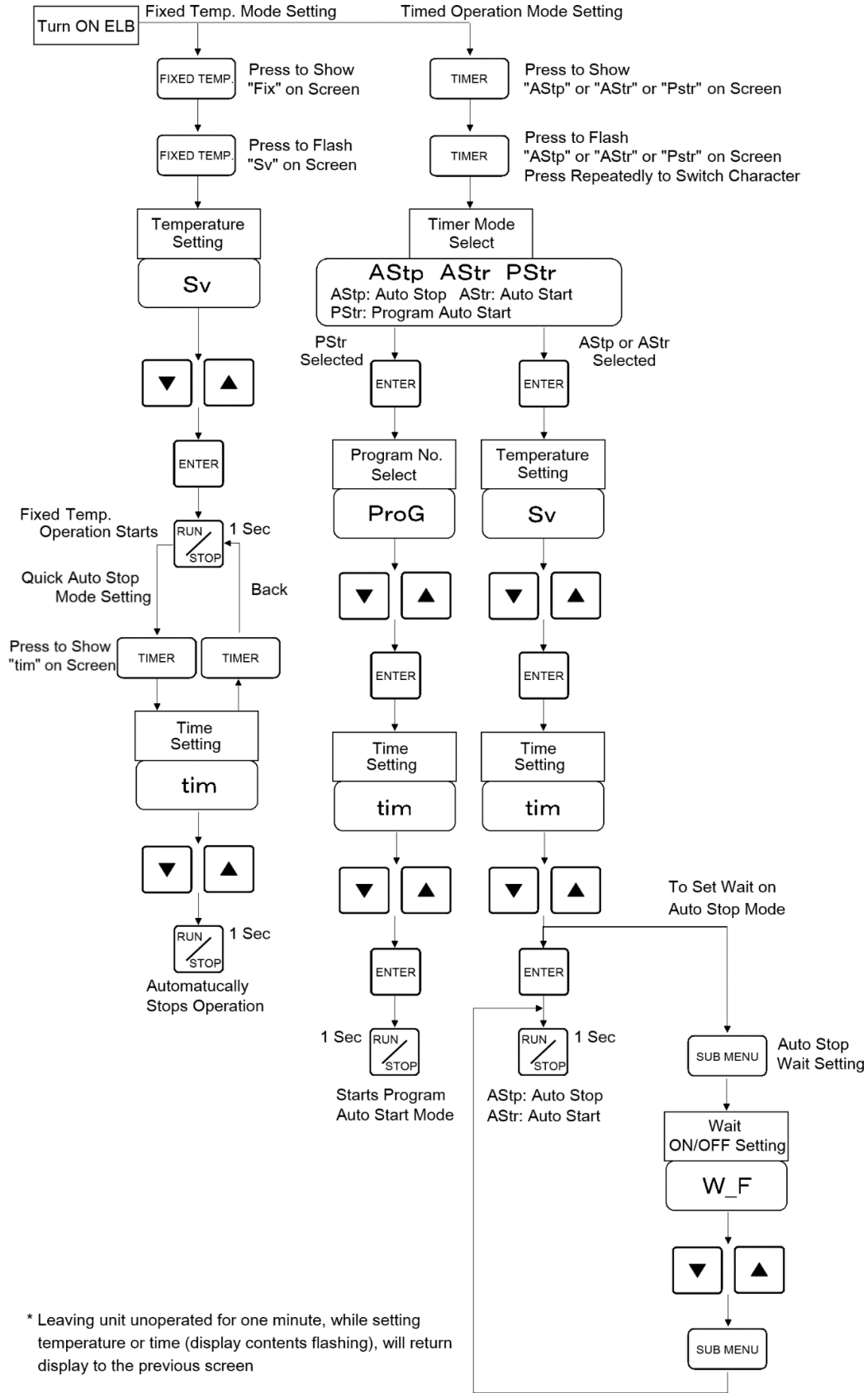
Operation functions for this unit are defined in the table below:

| Description | Page |
|--|------|
| <p>Automatic overheat prevention This function is set to automatically activate when chamber temperature exceeds the temperature setting by 6 °C.</p> <p>Unit will restart heater control when chamber temperature comes within temperature setting +6 °C (Error code is not displayed)</p> | — |
| <p>Overheat prevention device (oH) Although this device uses the same power source, display, and keypad as the control panel, it has an independent temperature monitoring circuit and sensor.</p> <p>When chamber temperature exceeds temperature setting of the overheat prevention device, power supply to heater is shut off and error lamp illuminates. Operation may be restarted when ELB is switched off (wait 5 seconds), then back on again.</p> <p>(manual reset) This setting can be made from Submenu.</p> | P.19 |
| <p>Calibration offset (cAL) Calibration offset function is to compensate for differences in the temperature reading (as taken by unit sensor) and actual chamber temperature (as taken manually with a thermograph).</p> <p>Unit can be offset to either the positive or negative side of temperature line for entire temperature range of unit This setting can be made from Submenu.</p> | P.38 |
| <p>Overheat prevention temperature calibration function The temperature specified for the overheat prevention device is automatically recalibrated when temperature reading is corrected with Calibration offset.</p> | — |
| <p>Keypad lock (Lock) This function locks all the keys that may change setting values. This setting can be made from Submenu.</p> | P.39 |
| <p>Auto-resume mode select (Pon) This is to select whether unit remain standby or resume operation at the time of recovery from power failure. Unit can begin operation again with the same settings (in memory) as before the power failure occurred. This setting can be made from Submenu.</p> | P.40 |

4. PRE-OPERATIVE PREPARATIONS

Mode & Function Flow

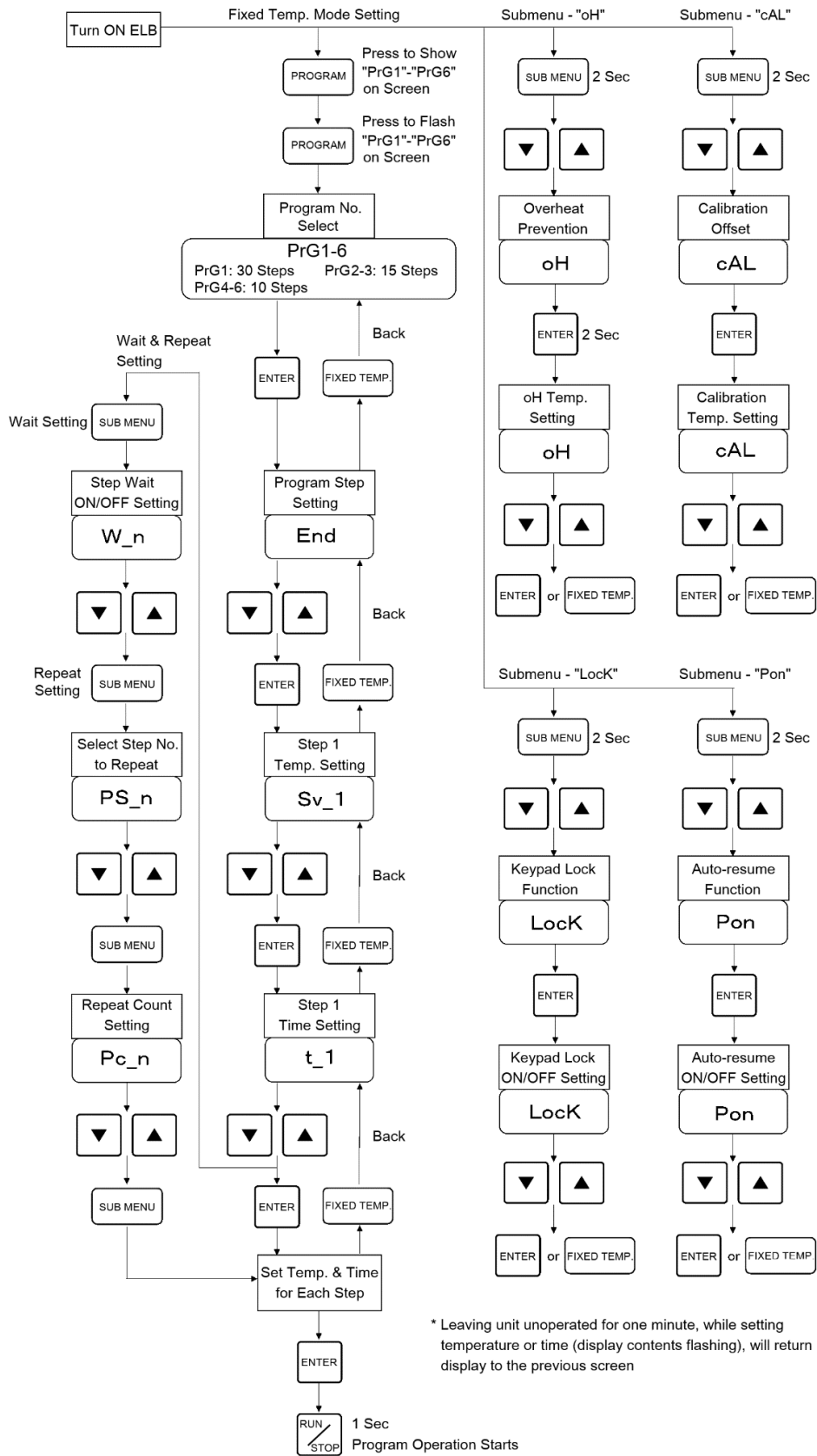
The following chart illustrates operation flow of Fixed temperature operation and timed operations.



4. PRE-OPERATIVE PREPARATIONS

Mode & Function Flow

The following chart illustrates operation flow of Program operation and Submenu.



4. PRE-OPERATIVE PREPARATIONS

Overheat Prevention Device Setup

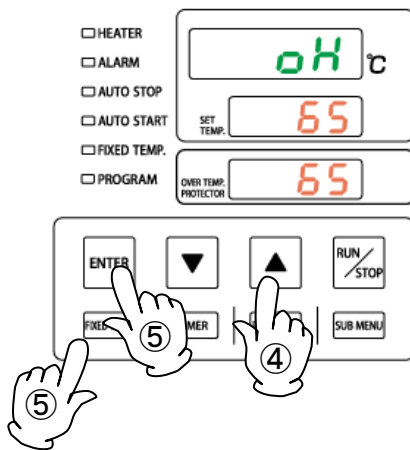
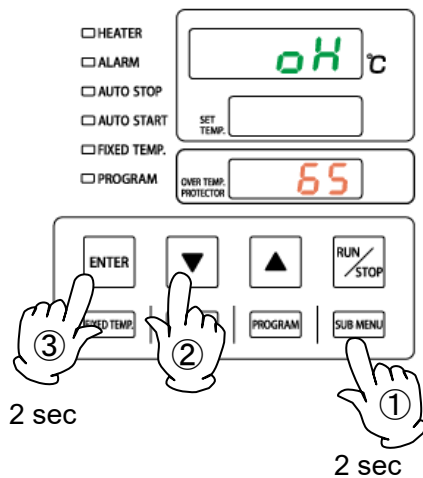
Setting range/function

The overheat prevention device temperature setting range is from 0 °C to 50 °C beyond the maximum temperature setting of this unit.

When chamber temperature exceeds objective temperature setting and reaches that of the overheat prevention device, the heater circuit is shut off and error code "Er19" is shown flashing in the control panel display, accompanied by a sounding alarm.

Once activated, "Er19" continues to be displayed until ELB is turned off, then back on.

• Setting temperature for overheat prevention



1. Turn ON (I) ELB

Initial values will be shown for about five seconds after power-on, then displays will switch to the initial settings screen, showing current chamber temperature (top), operation mode character (center) and overheat prevention setting (bottom).

2. Set temperature for overheat prevention

- ① Press the **SUB MENU** key for about two seconds. Character in top display will flash.
- ② Press the **▼▲** keys several times until "oH" shows in top display.
- ③ Press the **ENTER** key for about two seconds. The temperature setting will be shown flashing in center display.

Note: To prevent false errors, set the value 5 °C or more above the main temperature setting.

- ④ Set the temperature using the **▼▲** keys.
- ⑤ Press the **ENTER** key or the **FIXED TEMP.** key to finalize the setting.

* Setting change can also be made during operation.

CAUTION

- ① Overheat prevention device is designed to protect unit against overheating, to prevent damage to human body, not to protect test samples against damage caused by overheating, nor to protect against injury or death resulting from negligence from processing explosives, inflammables or other hazardous substances in this unit.
- ② Operation may be terminated by overheat prevention device activation, when overheat prevention device temperature setting and unit target temperature are less than 5 °C apart.
The default setting is 65 °C.

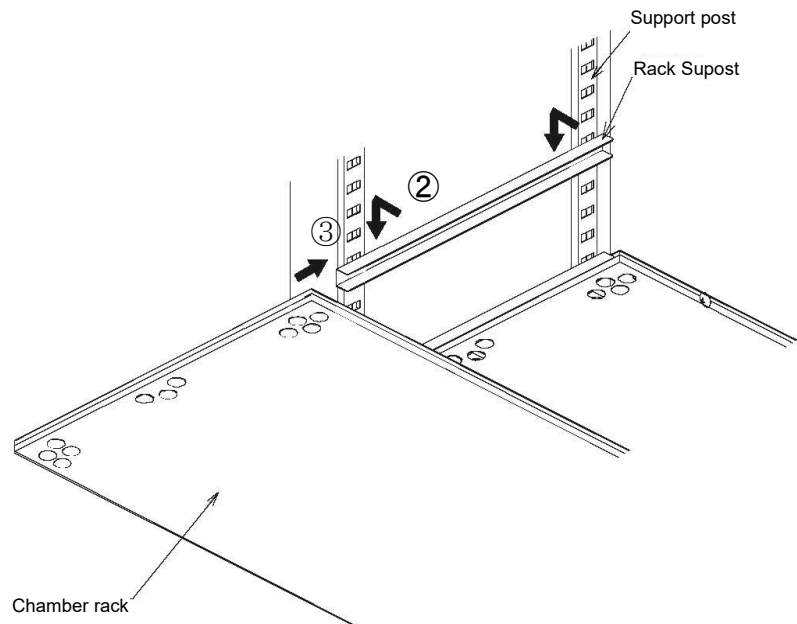
4. PRE-OPERATIVE PREPARATIONS

Shelf board placement

The position of shelf boards can be arranged by size and volume of test samples.

<Installation>

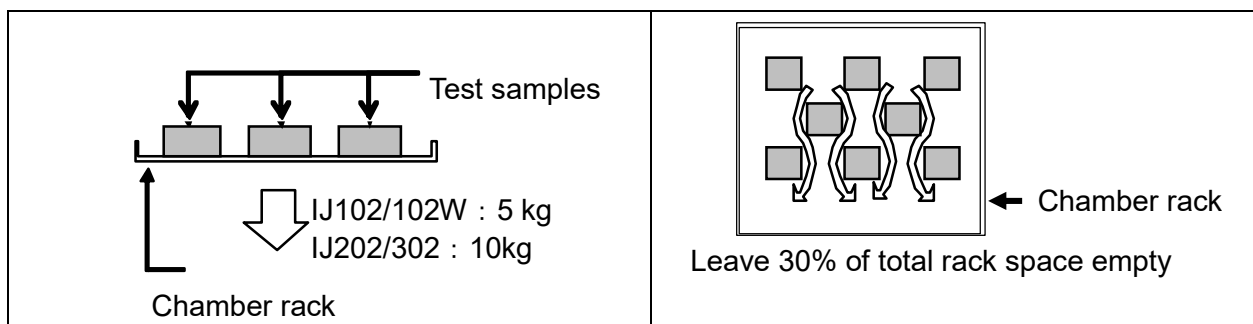
- ① Open the door.
- ② Place rack supports at the desired height.
 - * Make sure that the rack supports on both sides are at the same level and are fit properly.
- ③ Slide the rack in the rack supports.
 - * Make sure that the rack is properly in place and does not rattle or fall.



CAUTION

Always place test samples considering air flow in the chamber, in order to maintain the temperature control performance.

Rack support post of this unit has several installation openings to adjust the height of shelf boards. Placing shelf boards on all tiers may impair the air flow, degrading temperature control performance. The load capacity of each shelf board is evenly divided, 5 kg for IJ102 / 102W and 10 kg for IJ202 / 302. Arrange test samples evenly on racks, leaving as much space between them as possible. Bunching items together to get more onto a rack may prevent proper temperature control. Place samples alternately to keep air to flow during operation. As a rule of thumb, use approximately 70% of entire rack space or less, when placing items, to ensure better temperature control accuracy.



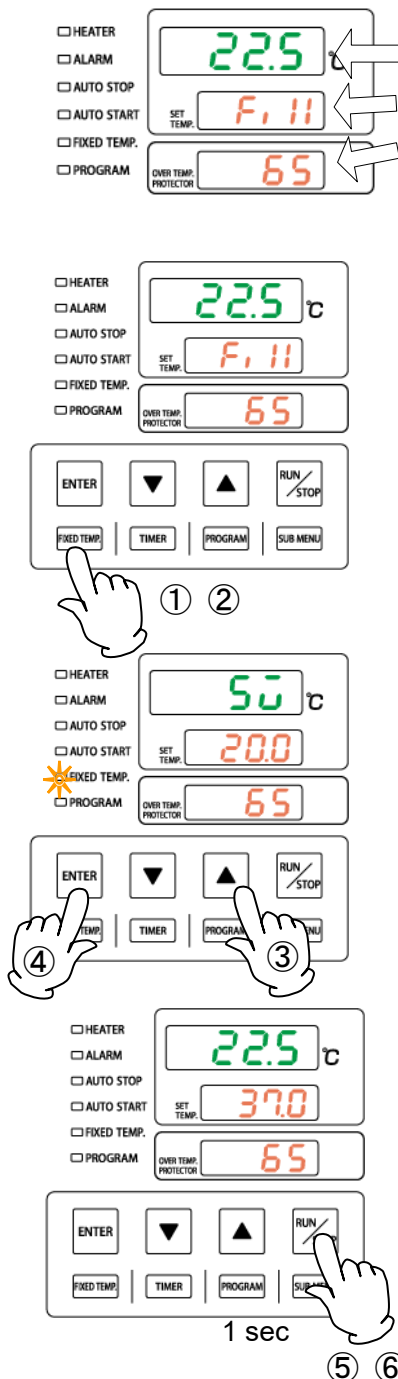
DO NOT place items on bottom surface of chamber

Operating unit with test samples placed directly on bottom surface of chamber may cause unit to perform poorly. Likewise, chamber temperature may become excessive, causing malfunction or damage. Always use the supplied shelf boards, supported on the standard rack supports, and avoid placing any items on bottom surface. Do not allow test samples to contact chamber walls.

5. OPERATION PROCEDURES

Fixed Temperature Operation

Run a Fixed temperature operation



1. Turn ON (I) power (ELB)

Initial values will be shown for about five seconds after power-on, then displays will switch to the initial settings screen, showing current chamber temperature (top), operation mode character (center) and overheat prevention setting (bottom).

Temperature reading display: Shows current temperature in the bath and other setting information

Temperature setting display: Shows temperature setting and other setting information

Overheat prevention display: Displays the temperature setting of overheat prevention device

For more on mode and setting characters, see "Display Characters" (P.11)

2. Select operation mode

① Press the FIXED TEMP key.

F.11, signifying Fixed temperature operation, will show in center display.

3. Set the temperature

② Press the FIXED TEMP key again.

50, signifying temperature setting, will show in top display. Current temperature will flash in center display. FIXED TEMP lamp also flashes.

③ Set the temperature using the ▼▲ keys.

④ Press the ENTER key to finalize the setting.

4. Start operation

⑤ Press the RUN/STOP key for about one second.

Unit will begin operation and FIXED TEMP lamp will illuminate. In addition, the cooler operates at a set temperature of 39.8 °C or lower for IJ102 / 102W and 44.8 °C or lower for IJ202 / 302, and the cooler operation lamp lights up.

* The cooler operation lamp is a common operation in each operation mode.

5. Stop operation

⑥ Press the RUN/STOP key for about one second.

Operation will stop (terminate) and the FIXED TEMP lamp will go out. Control panel reverts to initial settings screen.

• Setting value loop function

When setting temperature or time by the ▼ or ▲ key, the setting value cycles in the setting range; when it reaches the maximum settable value, it returns to minimum and goes up again.

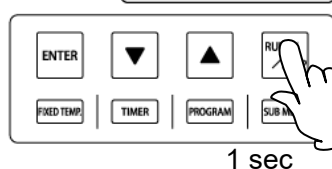
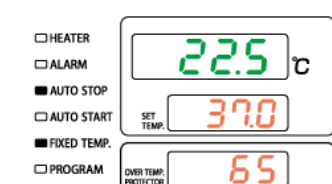
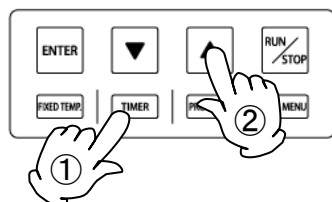
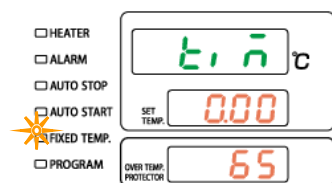
• Editing and confirming settings

Changing Temperature during operation is possible by pressing the **FIXED TEMP** key. Use the ▼▲ keysto change the setting values. Press the **ENTER** key when changes have been entered.

5. OPERATION PROCEDURES

Quick Auto Stop Operation

• Run a Quick auto stop operation



③ ④

1. Set timer during Fixed temperature operation

- ① Make sure that unit is running Fixed temperature operation by confirming that **FIXED TEMP.** lamp is illuminated, then press the **TIMER** key.

The character tim indicating the set time is displayed on the measurement temperature display.

Pressing the **TIMER** key in this state returns display to Fixed temperature mode.

- ② Set the timer using the **▼▲** keys.

2. 運転の開始

- ③ Press the **RUN/STOP** key for about one second after setting the timer. **FIXED TEMP.** and **AUTO STOP** lamps will illuminate, indicating Quick auto stop operation has started.

3. Stop operation

- ④ Operation stops automatically when the timer reaches 0.00, and an accompanying alarm sounds for approximately five seconds after operation terminates.

Center display will show **End**, indicating end of operation, with **FIXED TEMP.** and **AUTO STOP** lamps illuminated.

Press the **RUN/STOP** key to finish Quick auto stop operation. Displays will return to initial settings screen.

Pressing the **RUN/STOP** key for about one second during operation will terminate operation and the displays will return to initial settings screen.

• Wait mode for Quick auto stop operation

Check whether Wait setting (**W-F**) is "oFF" or "on" before starting an operation.

With this function "on", timer stops counting down when temperature reading goes out of the range of target temperature ± 1 °C, and resumes counting when it comes within the range again.

When "oFF" is set, quick auto stop operation starts regardless of the relationship between the measured temperature and the set temperature.

• Editing or confirming settings

Changing temperature during operation is possible by pressing the **FIXED TEMP.** key. Use the **▼▲** keys to change the setting values. Press the

ENTER key when changes have been entered.

Changing the timer setting during operation can be done without terminating operation, simply by pressing the **TIMER** key. Use the **▼▲** keys to change the setting values. Press the

TIMER key when changes have been entered. Note that the time which has already elapsed will be subtracted from the new setting.

Press the **▼** key at any time during operation to see temperature setting, operation mode and remaining time in center display.

• Timer function

Maximum value for timer is "999 hours and 50 minutes". The time can be set in increments of one minute under 99 hours and 59 minutes, and ten minutes after 100 hours.

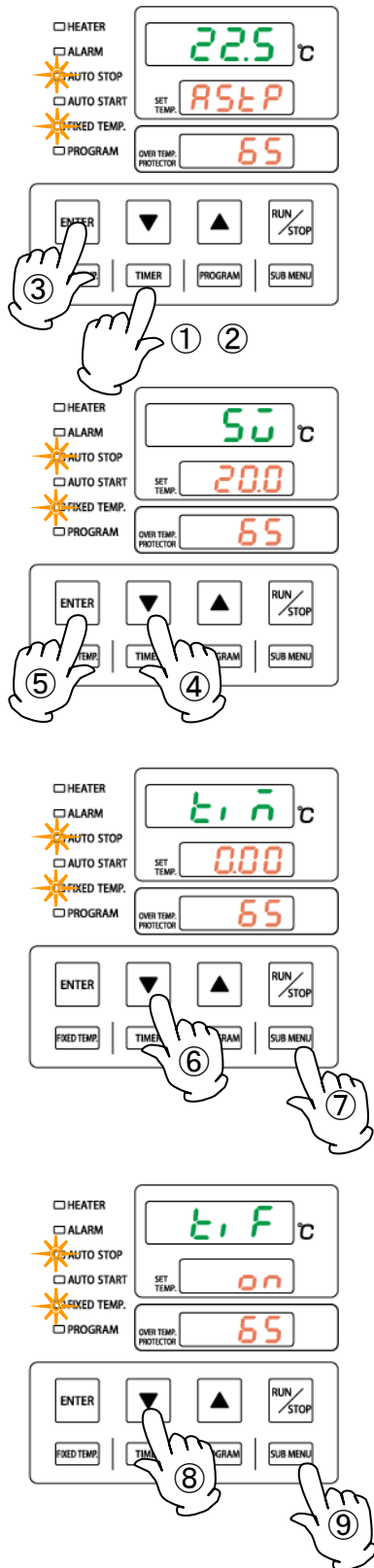
When the **▼▲** keys are held down, values advance perpetually. Press repeatedly for incremental adjustment.

※ This is common to all the operation modes except for Fixed temperature mode.

5. OPERATION PROCEDURES

Auto Stop Operation

• Run an Auto stop operation



1. Set stop time

- Press the **TIMER** key on the initial settings screen. Mode used in the previous session will be shown in center display.
- Press the **TIMER** key again and center display will begin flashing. Press the **TIMER** key repeatedly to select, signifying Auto stop operation. **AUTO STOP** and **FIXED TEMP** lamps will begin flashing.
- Press the **ENTER** key. **5.0**, signifying temperature setting, will show in top display. Current temperature will flash in center display.
- Set the temperature using the **DOWN**/**UP** keys.
- Press the **ENTER** key. Top display will show **6.0**, signifying the timer setting. Current timer setting will flash in center display.
- Set the timer using the **DOWN**/**UP** keys.
- Press the **SUB MENU** key. Top display will show **6.0**, signifying Wait setting, and center display will show "OFF" or "on".
- Press the **DOWN**/**UP** key to select preferred setting. The default setting is "on".
- Press the **SUB MENU** key to finalize the setting.

※ Wait setting can be skipped by pressing the **ENTER** key after STEP ⑥.

5. OPERATION PROCEDURES

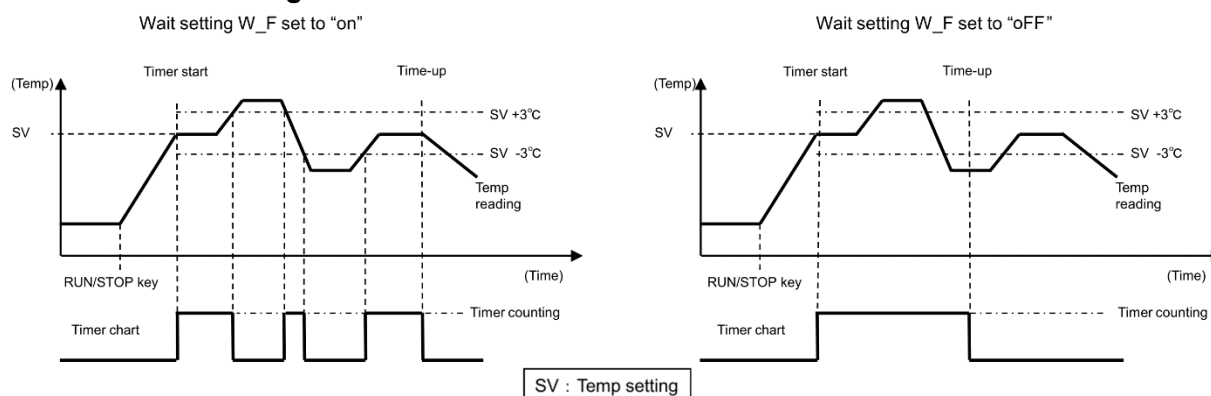
Auto Stop Operation

• Wait mode for Auto stop operation

Timer will start counting down after chamber temperature reaches the target temperature. When Wait W_F is set to "on" and temperature reading comes outside the range of target temperature $\pm 1^\circ\text{C}$, timer will stop counting.

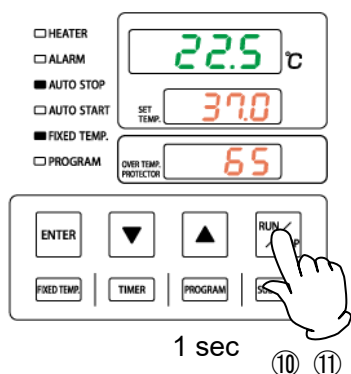
When set to "oFF", timer continues counting regardless of the difference between temperature reading and temperature setting.

※ The default setting is "on".



2. 運転の開始

- ⑩ Press the key for about one second after setting the timer. FIXED TEMP and AUTO STOP lamps will illuminate, indicating Auto stop operation has started. Timer begins counting down when chamber temperature reaches the set temperature.



3. Stop operation

- ⑪ Operation stops automatically when timer reaches 0.00, and an accompanying alarm sounds for approximately five seconds after operation terminates.

Center display will show , indicating end of operation, with FIXED TEMP and AUTO STOP lamps illuminated.

Press the key to finish Auto stop operation.

Displays will return to initial settings screen.

Pressing the key for about one second during operation will terminate operation and the displays will return to initial settings screen.

• Editing or confirming settings

Changing temperature setting or timer setting during operation can be done by pressing the key. Use the keys to change the setting values. Press the key when changes have been entered as desired.

Note that the time which has already elapsed will be subtracted from the new setting.

Press the key at any time during operation to see temperature setting, operation mode and remaining time in center display.

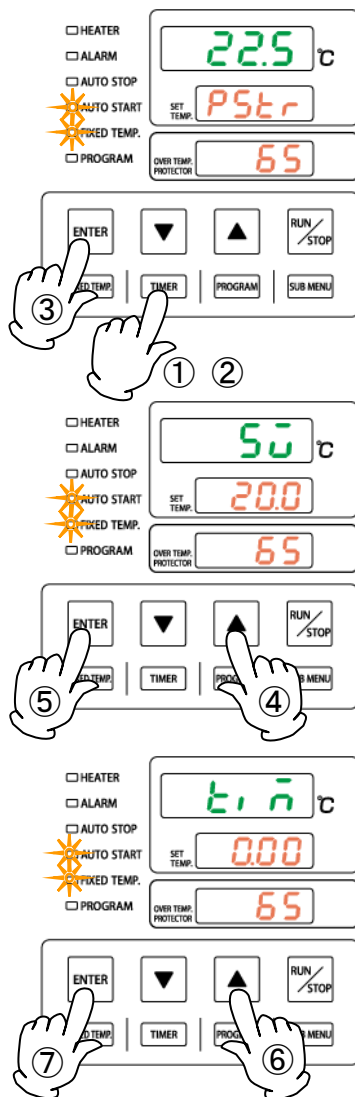
Remaining time may be seen with decimal point constant as an indicator that unit is in wait status while temperature rises or falls toward the set temperature. When decimal point begins flashing, timer is counting down.

5. OPERATION PROCEDURES

Auto Start Operation

• Run an Auto start operation

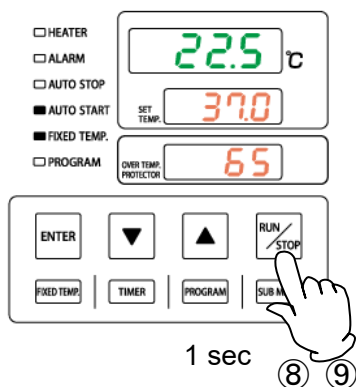
1. Set start time



- ① Press the **TIMER** key on the initial settings screen. Mode used in the previous session will be shown in center display.
- ② Press the **TIMER** key again and center display will begin flashing. Press the **TIMER** key repeatedly to select **PStc**, signifying Auto start operation. AUTO START and FIXED TEMP lamps will begin flashing.
- ③ Press the **ENTER** key. **5.0**, signifying temperature setting, will show in top display. Current temperature will flash in center display.
- ④ Set the temperature using the **▼▲** keys.
- ⑤ Press the **ENTER** key. Top display will show **5.0**, signifying the timer setting. Current timer setting will flash in center display.
- ⑥ Set the timer using the **▼▲** keys.
- ⑦ Press the **ENTER** key to finalize the setting.

5. OPERATION PROCEDURES

Auto Start Operation



2. 運転の開始

- ⑧ Press the **RUN/STOP** key for about one second after setting the timer.

FIXED TEMP and AUTO START lamps will illuminate, indicating Auto start operation has started.

Operation begins automatically when timer reaches 0.00.

3. Stop operation

- ⑨ Press the **RUN/STOP** key for about one second.

Operation will stop (terminate) and the FIXED TEMP lamp will go out. Control panel reverts to initial settings screen.

• Editing or confirming settings

Changing temperature setting or timer setting during operation can be done by pressing the **TIMER** key. Use the **▼▲** keys to change the setting values. Press the **ENTER** key when changes have been entered as desired.

Note that the time which has already elapsed will be subtracted from the new setting.

Setting change made after operation has begun will not apply to the currently running operation.

Press the **▼** key at any time during operation to see temperature setting, operation mode and remaining time in center display.

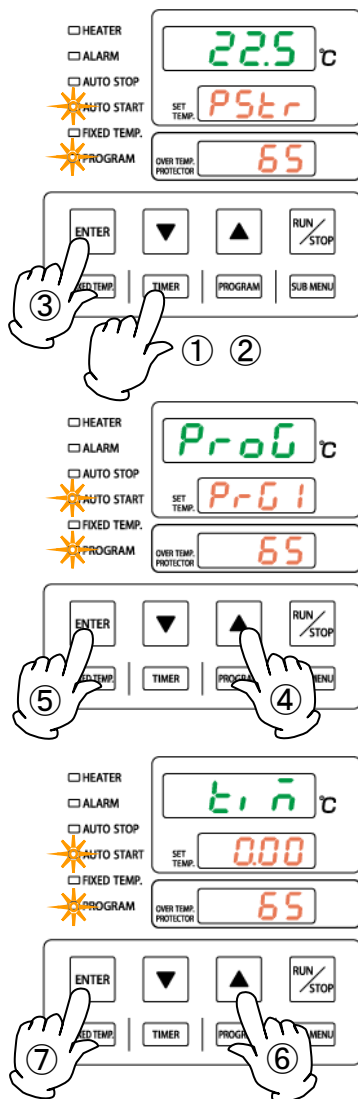
5. OPERATION PROCEDURES

Program Operation Auto Start

• Run a Program auto start operation

1. Set start time

For details on entering programs, see "Program Operation" (P.29)



① Press the **TIMER** key on the initial settings screen. Mode used in the previous session will be shown in center display.

② Press the **TIMER** key again and center display will begin flashing.

Press the **TIMER** key repeatedly to select **P5tr**, signifying Program operation auto start. AUTO START and PROGRAM lamps will begin flashing.

③ Press the **ENTER** key.

Top display will show **Prog**, signifying program number, and any character from PrG1 to PrG6 will flash in center display.

④ Select program number to set Auto start mode by using the **▼▲** keys.

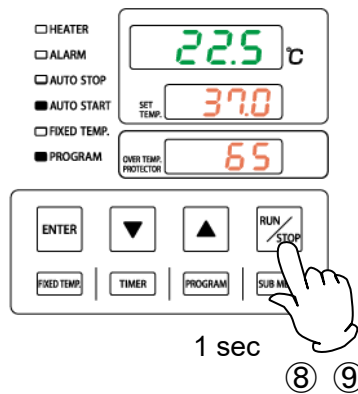
⑤ Press the **ENTER** key. Top display will show **Prog**, signifying the timer setting. Current timer setting will flash in center display.

⑥ Set the timer using the **▼▲** keys.

⑦ Press the **ENTER** key to finalize the setting.

5. OPERATION PROCEDURES

Program Operation Auto Start



2. Start operation

- ⑧ Press the **RUN/STOP** key for about one second after setting the timer. AUTO START and PROGRAM lamps will illuminate, indicating Program auto start mode has started. Program operation starts automatically when timer reaches 0.00.

3. Stop operation

- ⑨ Press the **RUN/STOP** key for about one second after setting the timer. Press the **RUN/STOP** key to finish Program operation. Displays will return to initial settings screen. Pressing the **RUN/STOP** key for about one second during operation will terminate operation and the displays will return to initial settings screen.

• Editing or confirming settings

Changing timer setting during operation can be done by pressing the **TIMER** key. Use the **▼▲** keys to change the setting values. Press the **ENTER** key when changes have been entered as desired. Note that the time which has already elapsed will be subtracted from the new setting. Setting change made after operation has begun will not apply to the currently running operation.

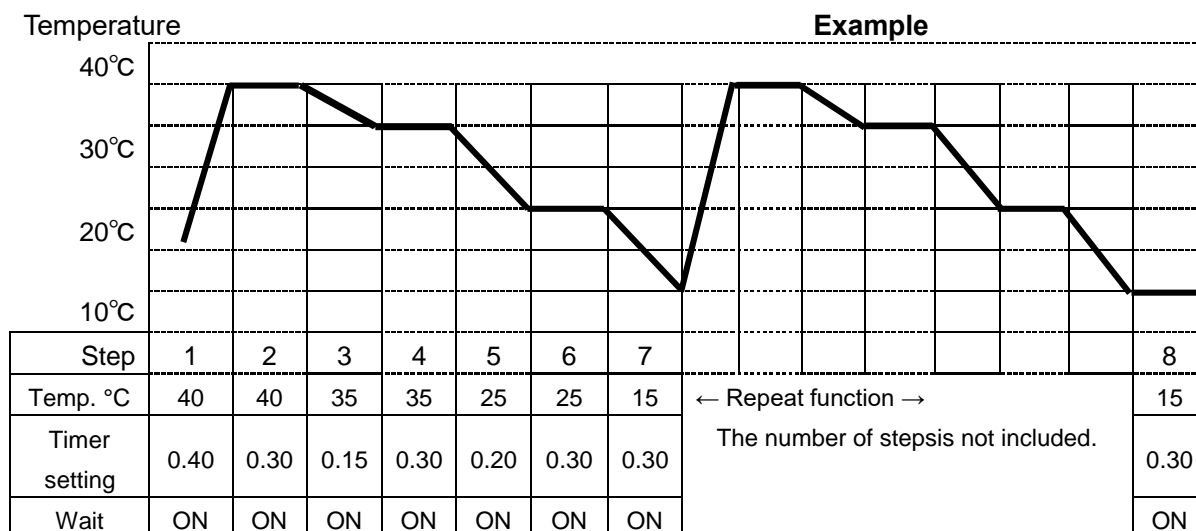
Press the **▼** key at any time during operation to see temperature setting, operation mode and remaining time in center display. Displayed temperature setting is for Auto start operation.

5. OPERATION PROCEDURES

Program Operation

• Program operation

This operation is used to run a combination of temperatures, times and modes as one operation. In the figure below, the line pattern which indicates time variation of the set temperature is called "program", and each straight line which is a combination of set temperature and set time is called "step".



• Program types

A maximum of six program patterns can be entered.

Each program can include steps as shown below

| | |
|------|--|
| PrG1 | A Program pattern using up to 30 steps can be entered. |
| PrG2 | Program patterns using up to 15 steps can be entered. |
| PrG3 | |
| PrG4 | |
| PrG5 | Program patterns using up to 10 steps can be entered. |
| PrG6 | |

• Before program entry

Enter program patterns before attempting to run a programmed operation.

- ① Confirm the number of steps in a program composition, and its temperatures/times before entering. Using the program planning worksheet on pages 36~37 is recommended.
- ② Check the temperature rise capacity and temperature decrease capacity of this product. It is necessary to set the time after understanding the temperature rise capacity and temperature decrease capacity of this product.
For example, if unit is capable of increasing or decreasing temperature by 3°C in 10 minutes, approximately 35 minutes will be needed to increase or decrease temperature by 10°C from a given temperature.
- ③ Confirm that the program has a sufficient number of patterns free to allow for the number of steps to be created.
For example, for programs that require 20 steps, only PrG1 is applicable.
However, steps using the repeat function are not counted.

• Useful function

The repeat function is a convenient feature that can be used, when a series of steps, identical to ones already created, are needed to fill the remainder or remaining part of a program pattern. See "Repeat Function" (P.35) for detailed instructions.

5. OPERATION PROCEDURES

Program Operation

• Temperature rise / fall time

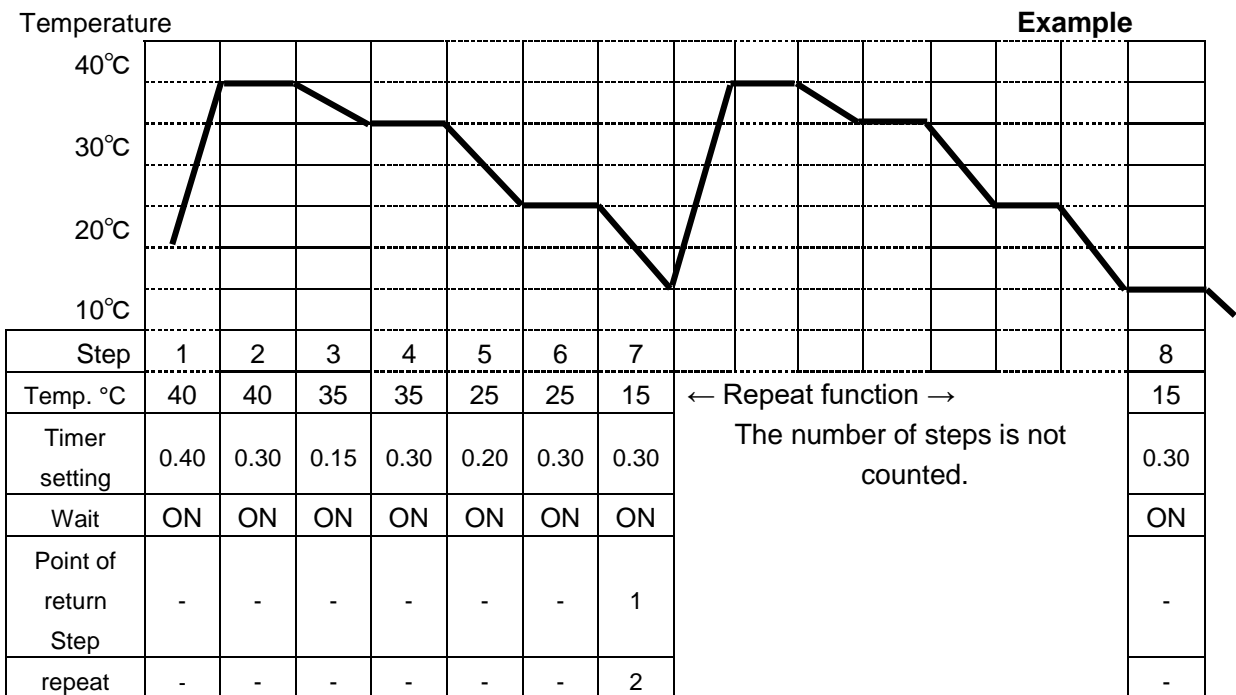
The temperature rise and fall times for each 10 °C temperature difference are as follows. Numeric values signify time needed (in minutes) for temperature to rise or fall. [Example: The time required to raise the temperature of IJ102 from 30 °C to 40 °C is approximately 11 minutes] Since the lowering and rising times vary depending on the load, the temperature stabilization time after reaching each set temperature is added or lowered separately. *ime*, be sure to perform a trial run and set an appropriate time.

Conditions: room temperature 20 °C, no load, (unit: minute)

| Temperature | IJ102 (W) | | IJ202 | | IJ302 | |
|-------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | Temperature fall time | Temperature rise time | Temperature fall time | Temperature rise time | Temperature fall time | Temperature rise time |
| 60 °C | — | 46 | — | 10 | — | 10 |
| 50 °C | 20 | 30 | 15 | 10 | 15 | 10 |
| 40 °C | 20 | 11 | 20 | 10 | 20 | 10 |
| 30 °C | 15 | 35 | 10 | 10 | 10 | 10 |
| 20 °C | 20 | 17 | 15 | 6 | 10 | 10 |
| 10 °C | 25 | 11 | 25 | 5 | 20 | 10 |
| 10 °C | 70 | — | 40 | — | 45 | — |

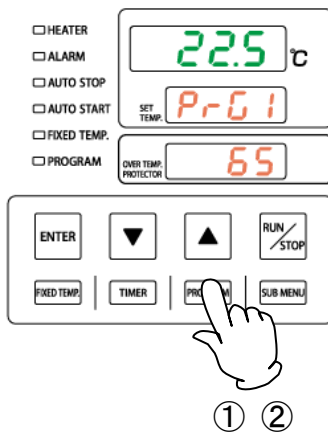
Building Programs

The program pattern below will be used as an example for building programs



5. OPERATION PROCEDURES

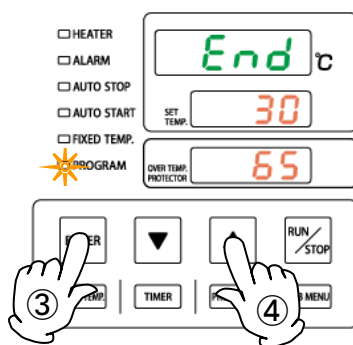
Program Operation



1. Select program number

① Press the **PROGRAM** key.
The top display will show previously used program.

② Press the **PROGRAM** key again and program number will begin flashing. Press the **PROGRAM** key repeatedly to select a program number to edit.
PROGRAM lamp will begin flashing.



2. Enter program

③ Press the **ENTER** key. Top display will show **End**, signifying the total number of program steps. The number of steps already entered will flash in center display.

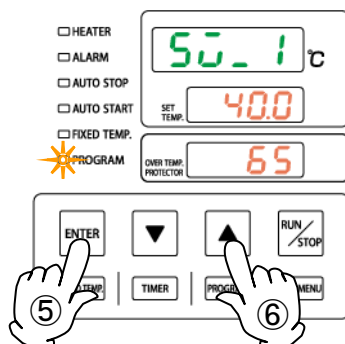
※Program steps can be set up to 30 steps for PrG1, 15 steps for PrG2 and PrG3, and 10 steps for PrG4 to PrG6.

Since only 8 steps are used for the program example above, any program number can be selected from PrG1 to PrG6.

④ Enter the total number of steps to use, using the **▲▼** keys.
"End" indicates the total step numbers to be used. In the example above, "8" would be entered here.

The 8-step program above will be entered as an example for building programs

Enter the number of steps, temperature and time for each step (use the program planning worksheet).

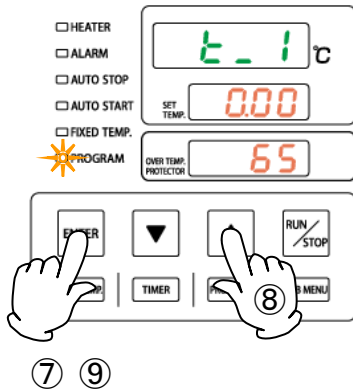


⑤ Press the **ENTER** key. **50.1**, signifying temperature setting for step 1, will show in top display. Current temperature setting will also be displayed flashing in center display.

⑥ Set the temperature for step 1 using the **▲▼** keys.

5. OPERATION PROCEDURES

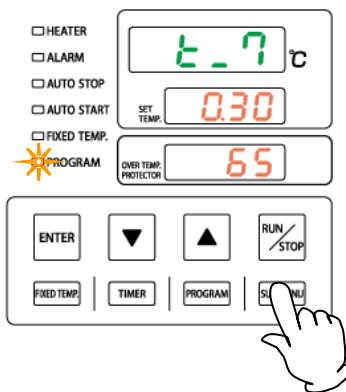
Program Operation



⑦ Press the **ENTER** key. **t-1**, indicating timer setting for step 1, will be shown in top display. Current timer setting will also be shown flashing in center display.

- ⑧ Set the timer for step 1 using the **▲▼** keys.
- ※ Before setting the timer, be sure to confirm temperature rise/fall capability of unit.
 - ※ Enter "0.00" to allow temperature to rise or fall in the shortest time. Be sure to set Wait for the corresponding steps to "on". Default setting is "on" for all steps. See "Wait function" (P.34) for detailed instructions.
 - ※ Maximum timer setting for each step is 999 hours and 50 minutes.

⑨ When timer is set, press the **ENTER** key. **50.2**, indicating temperature setting for step 2, will show in top display.



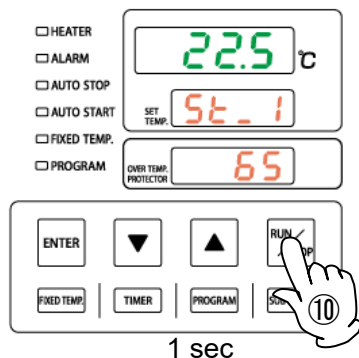
Enter temperature and time using the same procedure, described thus far, for all steps (use the program planning worksheet). Display returns to the initial settings screen after setting temperature and timer in the final step.

When the repeat function becomes necessary, press the **SUBMENU** key after setting timer in the step where repeat operation is to be used (step 7 in the above example). See "Repeat Function" (P.35) for detailed instructions.

• Verification run

Confirm temperatures and times in a newly entered program by running program with unit unloaded once, before using program on actual test samples.

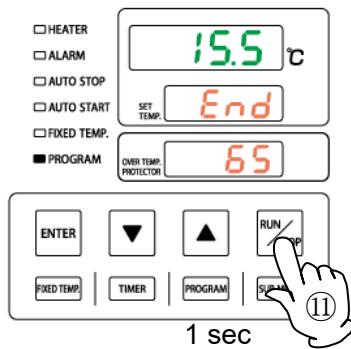
3. Run Program operation



- ⑩ Press the **RUN/STOP** key for about one second. Selected program will begin running. **PROGRAM** lamp illuminates and the top display will show **5t-1**, signifying that step 1 is currently under way.
- ※ Use the **▼** key to monitor temperature and time (top display) remaining in a currently running step. Remaining time may be seen with decimal point constant as an indicator that unit is in wait status while temperature rises or falls toward the set temperature. When decimal point begins flashing, timer is counting down.

5. OPERATION PROCEDURES

Program Operation



4. End Program operation

⑪ A buzzer sounds for about five seconds when program ends.

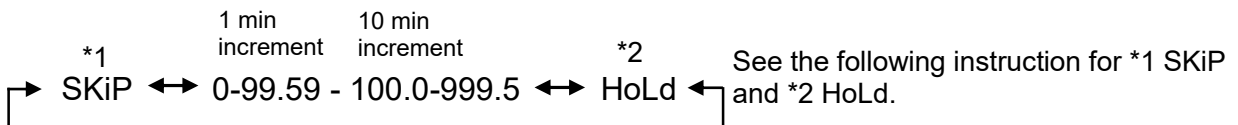
Top display will show **End**, indicating that program has finished.

Press the **RUN/STOP** key to finish Program operation. Displays will return to initial settings screen.

Pressing the **RUN/STOP** key for about one second during operation will terminate operation and the displays will return to initial settings screen.

• Timer function

Maximum timer setting for each step is 999 hours and 50 minutes. The time can be set in increments of one minute under 99 hours and 59 minutes, and ten minutes after 100 hours.



When the **▼▲** keys are held down, values advance perpetually. Press repeatedly for incremental adjustment.

• Step skip function

This function is to skip processing program steps. This setting can be made on each step. Select steps to skip by following the procedure below. Selected steps will be canceled and program will proceed to next step.

See STEP ⑧ in the previous page and enter time setting mode t_n (n: step number) for the step to skip. While the current set time is flashing select **SkiP**, signifying Step skip, by using the **▼▲** keys. Press the **ENTER** key.

* Pressing the **▼** key once with the time setting "0.00" allows to show SKiP.

• Step hold function

This function is to continue operation with the settings of the selected step. This setting can be made on each step. Select steps to hold by following the procedure below. Unit will keep running the selected step.

See STEP ⑧ in the previous page and enter time setting mode t_n (n: step number) for the step to hold. While the current set time is flashing select **HoLd**, signifying Step hold, by using the **▼▲** keys. Press the **ENTER** key.

* Pressing the **▼** key twice with the time setting "0.00" allows to show HoLd.

* Pressing the **▼** key while unit is running a step in hold mode will show HoLd in center display, indicating the step is set to hold.

• To return to the previous step while building or checking programs

Press the **FIXED TEMP** key to return to the previous step.

Display cannot go back while setting Wait and Repeat functions.

5. OPERATION PROCEDURES

Wait Function

• Wait Function

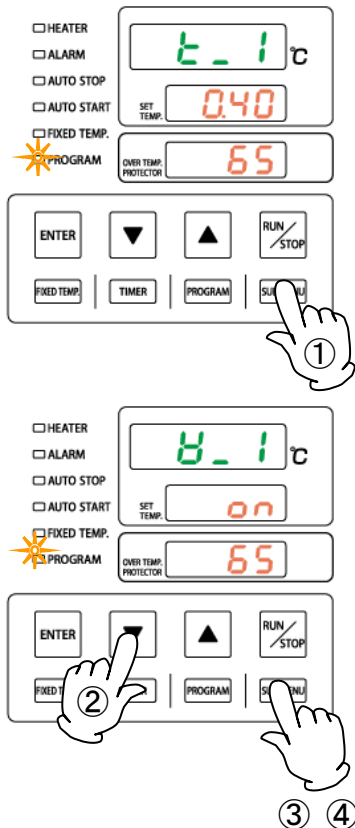
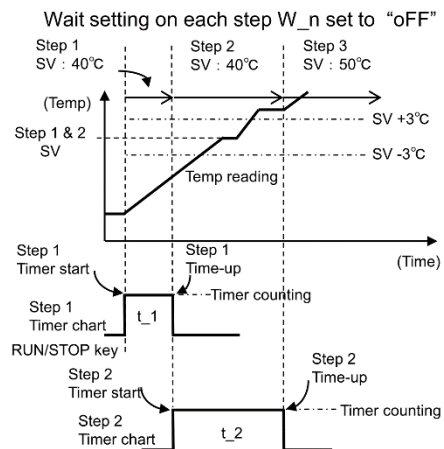
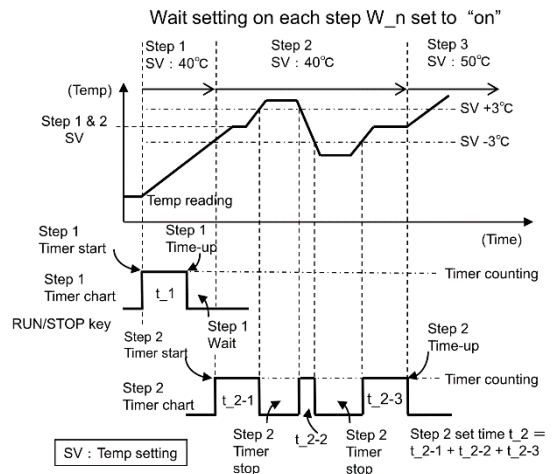
Wait mode for Program operation is to prevent operation to proceed next step, or to pause timer count while chamber temperature is outside the range of target temperature $\pm 1^\circ\text{C}$. This setting can be made on each step.

With this mode "on", unit will not move to the next step unless the temperature reaches the target temperature $\pm 1^\circ\text{C}$, even when the preset time has passed.

Unit will go on to next step when the temperature comes within the range of target temperature $\pm 1^\circ\text{C}$

Timer stops counting down when temperature reading goes out of the range of target temperature $\pm 1^\circ\text{C}$, and resumes counting when it comes within the range again.

When set to "off", unit proceed to next step as soon as the timer reaches "0.00" regardless of the difference between temperature reading and temperature setting.



Wait setting on program steps

This section illustrates how to use the program step wait mode for the example in "2. Enter program" (P.32).

Set Wait "W_n" (n = step number) on each step according to the following procedures.

* Default setting is "on" for all steps.

- ① After the time setting t_n (n: step number) on the step to set Wait mode, press the **SUBMENU** key instead of the **ENTER** key to move to Wait setting mode.
- ② Character W_n 8_1 (n: step number) shows in top display, and "on" or "off" flashes in center display. Use the **▼▲** keys to select preferred setting.
- ③ Pressing the **SUBMENU** key displays PS_n (Repeat step), and pressing it again displays Pc_n (Repeat count). See the following page for detailed instruction on Repeat function.
- ④ Press the **SUBMENU** key to go on to the temperature setting of next step.

* Display cannot go back while setting Wait and Repeat functions.

5. OPERATION PROCEDURES

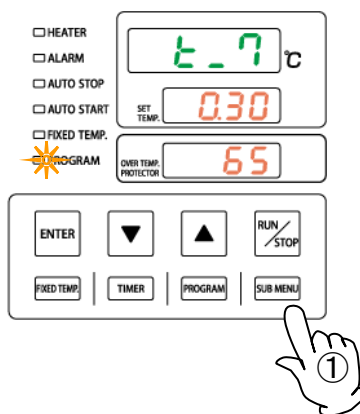
Repeat Function

Repeat function

This section illustrates how to use the repeat function (repeat a program pattern) in a programmed operation.

Repeat setting

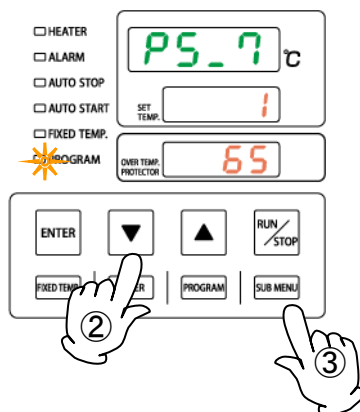
Set the step number to be repeated "PS_n", and number of times to repeat "Pc_n" (n = step number) for the example in "2. Enter program" (P.32).



- ① After setting the timer for the step to repeat (Step 7 in the preceding example), press the **SUBMENU** key twice. This brings up the Repeat function setting mode.

- ② Top display will show "PS_n" (n: step number), indicating the step to be repeated in the program pattern. PS_7 would be shown in the example above.

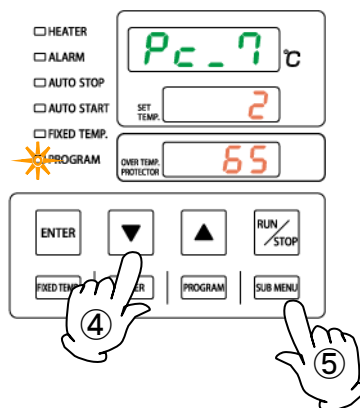
Step numbers 1 to 7 can be entered into center display. Enter the number (1 in the example) using the **▲▼** keys.



- ③ Press the SUB MENU key. Top display will show "Pc_n" (n: step number), indicating the number of times to repeat, and the number will flash in center display.

- ④ Enter the value (2 in the example) into center display with the **▲▼** keys.

※ When the number is "1", the step is not repeated.



- ⑤ Press the **SUBMENU** key to go on to the temperature setting of next step. Temperature setting for step 8 (Sv_8) would be shown in the example above.

※ Display cannot go back while setting Wait and Repeat functions.

5. OPERATION PROCEDURES

Program Planning Worksheet

Do not write in this manual. Please make copies.

| | | | | | | | | |
|--------------|------|------|------|------|------|------|------------|--|
| Input into: | PrG1 | PrG2 | PrG3 | PrG4 | PrG5 | PrG6 | No. | |
| Project Name | | | | | | | Date | |
| | | | | | | | Programmer | |

Input value

| | Temperature setting (°C) | Timer setting (Hours: minutes) | Wait setting (ON/OFF) | Repeat function (Point of return: number of times) |
|---------|--------------------------|--------------------------------|-----------------------|--|
| Step 1 | | : | | : |
| Step 2 | | : | | : |
| Step 3 | | : | | : |
| Step 4 | | : | | : |
| Step 5 | | : | | : |
| Step 6 | | : | | : |
| Step 7 | | : | | : |
| Step 8 | | : | | : |
| Step 9 | | : | | : |
| Step 10 | | : | | : |
| Step 11 | | : | | : |
| Step 12 | | : | | : |
| Step 13 | | : | | : |
| Step 14 | | : | | : |
| Step 15 | | : | | : |
| Step 16 | | : | | : |
| Step 17 | | : | | : |
| Step 18 | | : | | : |
| Step 19 | | : | | : |
| Step 20 | | : | | : |
| Step 21 | | : | | : |
| Step 22 | | : | | : |
| Step 23 | | : | | : |
| Step 24 | | : | | : |
| Step 25 | | : | | : |
| Step 26 | | : | | : |
| Step 27 | | : | | : |
| Step 28 | | : | | : |
| Step 29 | | : | | : |
| Step 30 | | : | | : |

5. OPERATION PROCEDURES

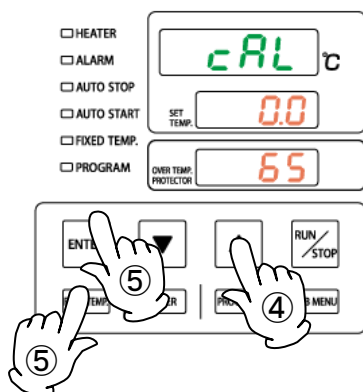
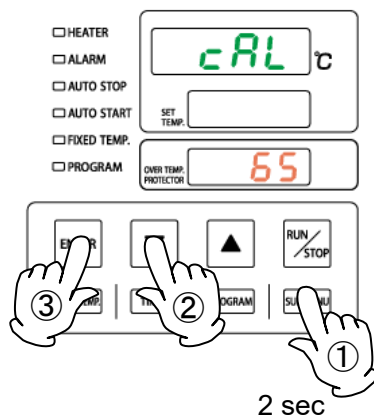
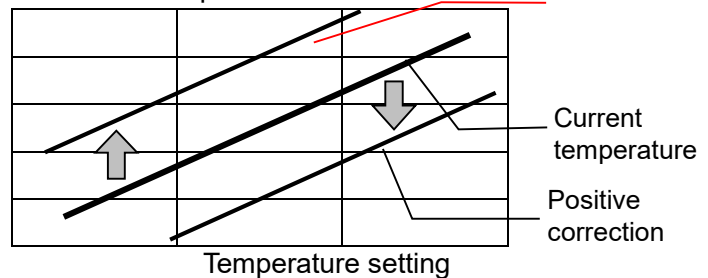
Other Functions: Calibration Offset

Using calibration offset

The calibration offset feature makes it possible to compensate for any difference between temperature reading on the control panel and actual chamber temperature (taken manually). This enables parallel compensation in either direction (+ or -) over the entire temperature setting range.

Default setting is "0.0 °C", and setting range is "-10.0 to +10.0 °C"

Actual chamber temperature



- Run unit in Fixed temperature operation. When temperature stabilizes, gauge chamber temperature with a thermograph.
- Check the differences between display temperature and chamber temperature.

- ① Press the **SUB MENU** key for about two seconds.
- ② Select **cAL**, signifying calibration offset, using the **▲▼** keys.
- ③ Press the **ENTER** key.
- ④ Enter a value that brings temperature display (top display) and chamber temperature into agreement, using the **▲▼** keys.
- ⑤ Press the **ENTER** key or the **FIXED TEMP.** key to finalize the setting.

※ Setting change can also be made during operation.

※ Calibration offset can be set either the positive or negative side of 0.

Setting calibration offset to the negative side of 0 increases actual temperature by the negative value entered (i.e. entering a value of -3 increases actual temperature by 3°C)
 Setting calibration offset to the positive side of 0 decreases actual temperature by positive value entered (i.e. entering +3 decreases actual temperature by 3°C)

※ Entering excessive compensation values may cause a precariously large discrepancy between actual temperature and temperature reading.

※ In addition to the calibration offset function, this unit has a two-point offset function built in, which has some compensating effects in low and high temperature zones. These offsets have already been entered at the factory.

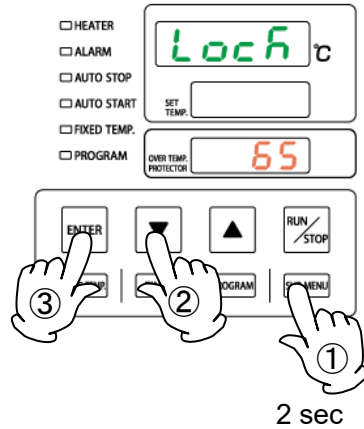
※ Contact original dealer of purchase when it becomes necessary to validate temperature controller.

5. OPERATION PROCEDURES

Other Functions: Keypad Lock

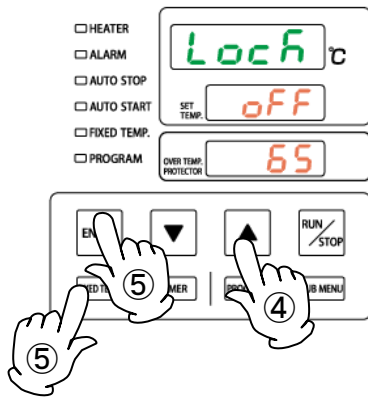
• Using keypad lock

This function locks all the keys that may change setting values. With the keypad lock function ON, all keys become unresponsive except the **RUN/STOP** and **SUBMENU** keys. (will show in top display)



Default setting is "oFF".

- ① Press the **SUB MENU** key for about two seconds.
- ② Select **Lock**, signifying Keypad lock function, using the **▲▼**.
- ③ Press the **ENTER** key.
- ④ Center display will read "oFF" or "on". Use the **▲▼** keys to change the setting.



- ⑤ Press the **ENTER** key or the **FIXED TEMP.** key to finalize the setting.

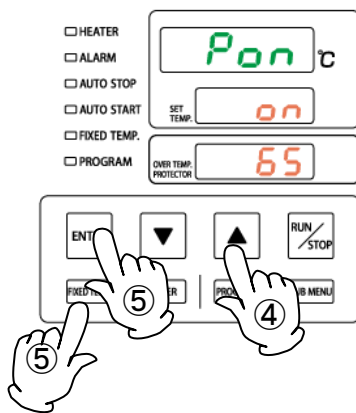
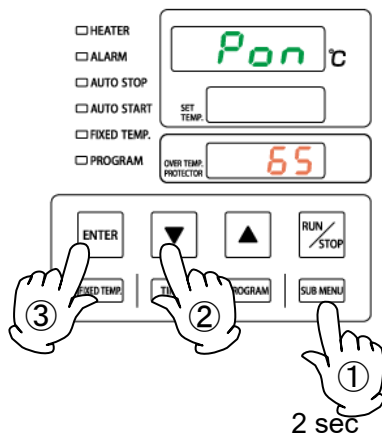
* Setting change can also be made during operation.

5. OPERATION PROCEDURES

Other Functions: Auto-resume Function

Auto-resume mode select

Unit may restart operation or may be switched into standby state after power failure, by selecting “on” or “oFF” of this mode. With this setting “on” unit automatically resume operation, and remain standby when set to “oFF”. If power failure occurs during timed operation, timer will start counting again from that point when power is restored. Default setting is “on”.




- ① Press the **SUB MENU** key for about two seconds.
- ② Select **Pon**, signifying Auto-resume function, using the **▲▼** keys.
- ③ Press the **ENTER** key.
- ④ Center display will read "oFF" or “on”. Use the **▼▲** keys to change the setting.
- ⑤ Press the **ENTER** key or the **FIXED TEMP.** key to finalize the setting.

※ Settings cannot be changed during operation. **no**, indicating that the setting cannot be changed, will show in STEP ④.


5. OPERATION PROCEDURES

Options (Output Terminal)


•Before use

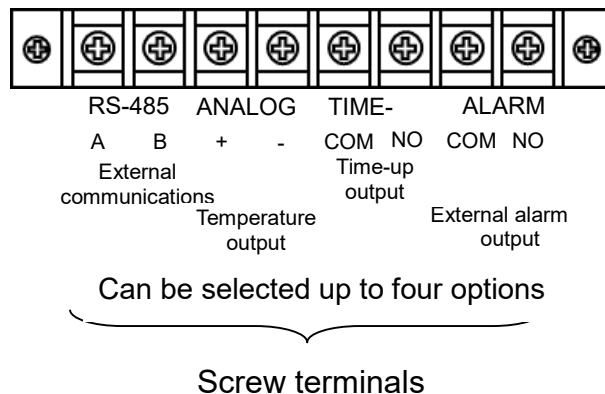
 Operate this unit according to the procedure described in this Instruction manual. Failure to follow the operation procedure described herein may result in a problem. The guarantee will not apply if you operate the unit in a wrong manner.

 CAUTION

- | | |
|---|--|
|  | 1. Turn OFF (○) ELB before connecting the cables. |
| | 2. For Time-up output and External alarm output, ensure that the input current is no greater than contact capacity shown in the specification table. |
| | 3. Connect a recorder or another appliance of 600Ω or less in input impedance to the temperature output terminal. |
| | 4. Securely fasten all connections with the screws attached to the terminal block. |

Connection instructions

- | | |
|---|---|
|  | Connect the cables to the appropriate terminals. |
| | Time-up output and External alarm output are "ON" (relay contact closed) at the time of output. |
| | Use a shielded wire for the cable to be connected to prevent noise. |



※ The above four options can be installed together.

5. OPERATION PROCEDURES

Options (Output Terminal)

Specifications

| | |
|---|---|
| External communications terminal (RS-485) | <ul style="list-style-type: none"> • Connection: M4 screw terminal block See next page for overview of the standards. |
| Temperature output terminal (ANALOG) | <ul style="list-style-type: none"> • Outputs the voltage (DC) corresponding to the measured temperature • Output temperature range: 0 to 60 °C • this is default setting and can be changed. Output current: 4 to 20 mA • Output accuracy: ± 2 °C • Connection: M4 screw terminal block |
| Time-up output terminal (TIME UP) | <ul style="list-style-type: none"> • Outputs "ON" signal (relay contact closed) when timer for Auto stop or Quick auto stop reaches "0.00", or a programmed operation ends. Stops output while errors occur. • No voltage a contact (relay contact) • Contact capacity: 250 V AC 3 A (resistance load) 30 V DC 3 A (resistance load) • Connection: M4 screw terminal block Ensure that the input current is no greater than contact capacity shown above. |
| External alarm output terminal (ALARM) | <ul style="list-style-type: none"> • Outputs "ON" signal (relay contact closed) when an error is detected. See "Reading Error Codes" (P.51) for details on errors. • No voltage a contact (relay contact) • Contact capacity: 250 V AC 3 A (resistance load) 30 V DC 3 A (resistance load) • Connection: M4 screw terminal block ※ Ensure that the input current is no greater than contact capacity shown above. |

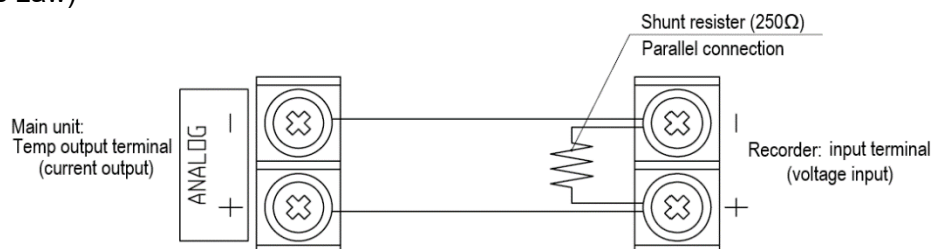
Temperature output terminal Temperature vs. Output Current conversion table

| Temperature (°C) | Output Current (mA) | Voltage Conversion* (V) |
|------------------|---------------------|-------------------------|
| 0 | 4.0 | 1.0 |
| 15 | 8.0 | 2.0 |
| 30 | 12.0 | 3.0 |
| 45 | 16.0 | 4.0 |
| 60 | 20.0 | 5.0 |

The conversion table above is based on default output temperature range. Output temperature range can be changed.

* Temperature to current/voltage reference table for voltage input devices

Values calculated for having a shunt resistor (250Ω) connected in parallel to voltage input (V=RI:Ohm's Law)



5. OPERATION PROCEDURES

Options (External Communications Terminal)

1. Overview of communication methods

1.1 RS-485 communication

RS-485 allows to set or monitor data of the controller of this unit by building a program on host computer.

1.2 Communication specifications

| Item | Communication settings |
|----------------------------------|---|
| Communication interface standard | EIA standard, based on RS-485 |
| Synchronous method | Asynchronous communication method |
| Communication method | Two-wire half-duplex |
| Transmission code | ASCII |
| Communication rate | 2400/4800/9600/19200/38400bps |
| Communication range | Up to 500 m (results may vary depending on the environment) |
| Network | Multi-drop method (max 31 hosts to each node) |
| Stop bit length | 1/2bits |
| Data length | 7/8bits |
| Parity bit | None/Odd/Even |
| Error detection | <ul style="list-style-type: none"> · Toho : BCC · Modbus-RTU : CRC-16 · Modbus-ASCII : LRC |
| Response delay time | 0 to 250 msec |

Note: is default setting.

1.3 Connection

■ PC

· A USB interface is used

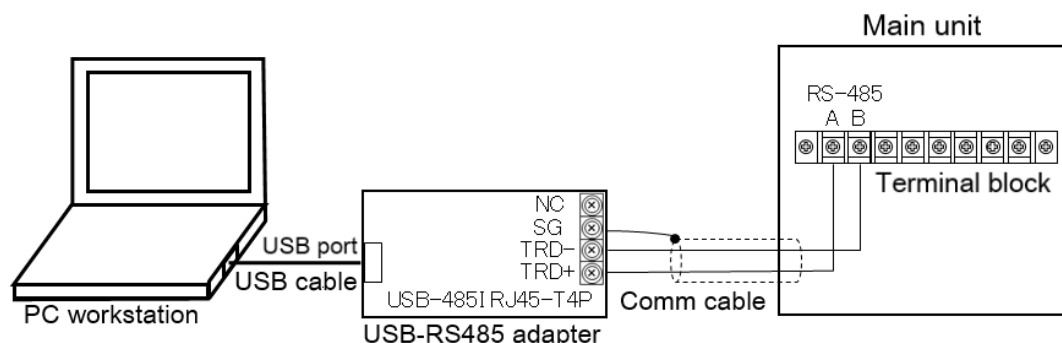
■ USB-RS485 converter unit

· For the converter, System Sacom's USB-485 is applicable.

· Optional accessory "External communications adapter (RS485-USB) OA017" permits the following connections.

(PC not included)

Sample program → <http://www.yamato-net.co.jp/support/program/index.htm>



USB-RS485 converter unit: System Sacom USB-485I RJ45-T4P

Communication cable: UL2464TASB 2-lead AWG20 cable 3 m, with Y terminal on main unit side.

USB cable: 1.8 m, included with USB-485I

* It may be effective to use a commercial braided shield USB cable for noise resistance.

5. OPERATION PROCEDURES

Options (External Communications Terminal)

1.4 Communication settings

Setting items and parameters for this controller is defined in the table below.

| | Item | Communication settings | Default values |
|---|------------------------|---|-----------------|
| 1 | Communication protocol | Toho (0)/Modbus-RTU (1)/ Modbus-ASCII (2) | Toho (0) |
| 2 | BCC check | Enable (b)/Disable (n) | Enable (b) |
| 3 | Data length | 7/8 bits | 8 bits |
| 4 | Parity bit | None (n)/odd (o)/even (E) | None (n) |
| 5 | Stop bit length | 1/2 bits | 2 bits |
| 6 | Communication rate | 2400 (24)/4800 (48)/ 9600 (96)/19200 (192)/ 38400 (384) bps | 4800 (48) bps |
| 7 | Auxiliary address | 1-99 units (1:31 stations at maximum) | 1 |
| 8 | Response delay time | 0-250 msec | 0 msec |
| 9 | Communication mode | Read only (ro)/ Read/Write (rW) | Read/Write (rW) |

6. HANDLING PRECAUTIONS

Warnings and Cautions



WARNING



NEVER process explosive or flammable substances

Never attempt to process explosives, flammables or any items which contain explosives or flammables. Fire or explosion may result.
See "LIST OF HAZARDOUS SUBSTANCES" (P.60)



DO NOT insert foreign objects into unit openings.

In the event that a foreign object accidentally falls inside, turn OFF(○) ELB immediately, disconnect power cable and contact original dealer of purchase for assistance. Failure to do so may result in fire or electric shock.



Check overheat prevention device.

Confirm that overheat prevention device temperature is set 5 °C above unit temperature setting.
Check overheat prevention device performance before extended operations.
See "Overheat Prevention Device Setup" (P.19)

6. HANDLING PRECAUTIONS

Warnings and Cautions



CAUTION



Opening/Closing door

When opening or closing the door keep hands and face away from area that the door swings. The door may impact with them causing an injury.



DO NOT process corrosive items.

Do not process items containing corrosive chemicals of any kind. Potent acids may corrode unit interior despite stainless steel construction.



ALWAYS run equipment within specified temperature range

Operate unit within the temperature setting range specified in the specifications. Never attempt to operate unit outside of the specified temperature range. Equipment malfunction or accident may result.



Power loss recovery

In the event of a power loss, unit automatically reverts to status just before power loss and begin operation once again from that point. This function may be turned off through Submenu. Confirm the setting before starting an operation.



Sample moisture precaution

When processing excessively wet samples, remove as much of the moisture as possible beforehand. Rust, corrosion, and condensation may occur inside and outside chamber, and the electrical system may be adversely affected due to excessive humidity rise, resulting in electrical leakage or equipment malfunction.



Exercise caution when processing heat-generating substances.

Note that temperature reading may not be consistent when processing heat-generating samples. (samples mentioned herein shall not have risk of explosion or ignition)

6. HANDLING PRECAUTIONS

Warnings and Cautions



Use calibration offset function to correct temperature reading.

If there is a discrepancy between temperature reading and actual chamber temperature, refer to "Calibration Offset" (P.38) to perform temperature correction.



Inspect regularly.

ELB and overheat prevention device are key devices in maintaining this unit safety, and must be inspected/maintained regularly. See "Maintenance and Inspection" (P.48) for detailed instructions.



Be aware of performance degradation when using the IJ102W cable holes.

Whenever a manual temperature gauging sensor or probe is inserted through the cable port, close the port cover as fully as possible and completely seal any gaps with heat-resistant insulation or sealant.

If the seal is inadequate, temperature characteristics or other performance properties will be degraded and inaccurate.



Be careful of drying the sample.

Be careful of drying the sample. A fan is used for circulation in the chamber of this product, and it is always in a ventilation state.



About drainage of dew condensation water.

If the cooler is operating, condensation may form on the cooling surface.

Condensed water is drained from the drain port to the drain tray (set at the bottom right of the front of the main unit with the door open). Check the amount of water in a timely manner and be careful not to overflow.



Do not stack directly.



Do not stack this unit directly. When stacking two layers, use the dedicated stacking rack for IJ102 (W) / 302 and the stacking bracket for IJ202. If you do not use a stacking rack, not only will it not be possible to secure sufficient heat exhaust space and performance will be affected, but it will also cause a fall accident. Therefore, be sure to use a stacking rack that has a fixing mechanism to prevent it from tipping over.



Sample placement

Test sample load total for each rack should not exceed this specification. Arrange test samples evenly on racks, leaving as much space between them as possible.

Do not place too many test samples on rack at once. Doing so may hinder proper temperature control in chamber. Distribute samples evenly and leave approximately 30% of rack space open for best results.

The performance of this unit can be cooled to 0 ° C when the ambient temperature is 20 ° C and there is no load. The minimum temperature reached may change depending on the amount of sample, dirt on the heat radiation fins, dirt on the filter, etc. In addition, there is a suction port for circulation in the chamber on the lower side or back of the interior. When installing the sample, set it on the shelf board so as not to block the suction port.

7. MAINTENANCE PROCEDURES

Precautions before Inspection

WARNING

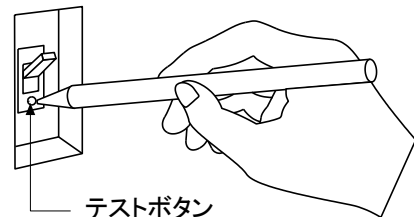
- Be sure to disconnect power cable before daily inspection and maintenance.
- Perform inspections and maintenance when unit is at room temperature.
- Never attempt to disassemble unit.

CAUTION

- Clean unit using soft damp cloth. Never use benzene, paint thinner, scouring powder, scrubbing brush or other abrasives and solvents to clean unit. Superficial damage and/or discoloration, as well as deformity to some components may result.

Maintenance and Inspection

- Inspect ELB ON and OFF function.
 - Prepare unit for inspection by connecting power cable to a facility outlet or terminal.
 - Turn ON(●) ELB.
 - Press the test button on ELB using a ball-point pen or other fine-tipped object. If ELB shuts OFF (○), it is functioning normally.
 - Check overheat prevention device.
 - Set the overheat prevention device temperature 5 °C higher than the unit objective temperature.
 - Operate unit in Fixed temperature mode and wait until chamber temperature becomes stable.
 - Lower the overheat prevention device temperature by 1 °C.
 - If overheat prevention device is functioning normally, heater will shut off within few seconds and error code “Er19” will appear in top display. An alarm will also sound and ALARM lamp will illuminate.
 - Check power plug for damage
 - Visually check the cutting edge of the power plug for dust and dirt. If there is dust or dirt on it, remove it.
 - Confirm that the prongs of power plug are not bent or damaged. Replace if bent or damaged.
 - Check the power plug for discoloration or abnormal heat generation. If there is discoloration or abnormal heating, the internal contact of the outlet may be faulty.
- * ELB and overheat prevention device must be inspected, as prescribed above, prior to every instance of extended or overnight operation.



- ◆ Contact original dealer of purchase, if further questions arise concerning maintenance procedures.

7. MAINTENANCE PROCEDURES

Maintenance and Inspection

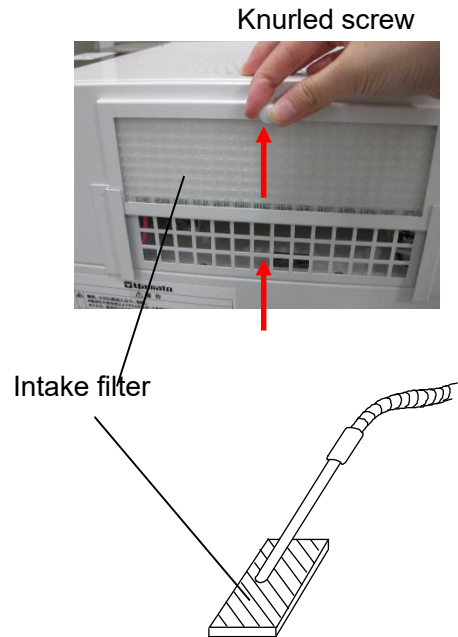
- Clean the intake filter.

If the filter is clogged, the cooling capacity will decrease. It can also cause a malfunction.

The clogging condition varies depending on the surrounding environment and usage time, so clean it regularly according to the usage conditions.

Pinch the knurled screw (1) attached to the intake filter on the right and left sides of the main unit and slide it up to remove the intake filter.

Use a vacuum cleaner to remove dust on the surface of the intake filter.



- Clean the radiating fins.

⚠ CAUTION :

Be sure to unplug the power cord when cleaning.

If the heat dissipation fins are clogged, the cooling capacity will decrease.

It can also cause a malfunction.

The clogging condition varies depending on the surrounding environment and usage time, so clean it regularly according to the usage conditions.

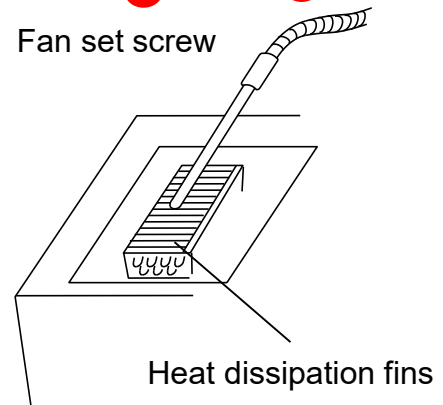
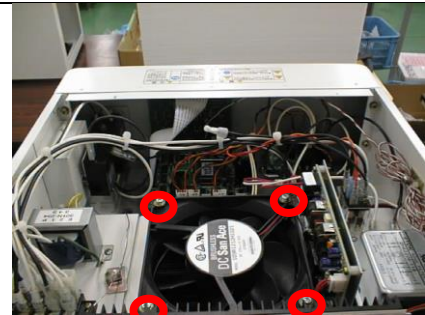
Loosen the ceiling plate mounting screws (2) on the top of the main unit and remove the ceiling plate. (For IJ202, remove the side plate.)

Remove the fan set screws (4).

When you remove the fan, there are heat dissipation fins, so remove the dust on the surface with a vacuum cleaner.

After cleaning, install in the reverse order.



⚠ CAUTION : Be careful not to crush the fins when cleaning.



Contact original dealer of purchase, if further questions arise concerning maintenance procedures.

8. EXTENDED STORAGE AND DISPOSAL

Extended storage

|  WARNING |  CAUTION |
|---|---|
| Extended storage ● Turn OFF (○) ELB and disconnect power cable from facility outlet or terminal. | Unit disposal ● Remove door handle and hinges to prevent it from locking. Contact original dealer of purchase when there is some question about disassembling the door unit. ● Do not leave unit in a location where children may have access. |

Disposal Considerations

Dispose of this unit in accordance with local laws and regulations. Dispose of or recycle this unit in a responsible and environmentally friendly manner.

Yamato Scientific Co., Ltd. strongly recommends disassembling unit, as far as is possible, in order to separate parts and recycle them in contribution to preserving the global environment. Major components and materials, comprising this unit are listed in the table below

| Component Name | Material |
|--|---|
| Main | |
| Exterior | Chromium-free electrogalvanized steel sheet, baked-on finish |
| Interior | Stainless steel sheet metal |
| Door | Magnet entrance packing, acrylic resin observation window |
| Observation window | Glass, aluminum, silicone rubber |
| Air jacket (Optional) | Aluminum, neoprene rubber packing |
| Inner door (Optional) | acrylic resin |
| Labels | PET resin film |
| Main components of the cooling unit | |
| Heat dissipation fins | aluminum |
| Heat dissipation fins | Copper and lead solder |
| Heat dissipation cover | Steel plate, melamine resin baking finish |
| Various parts mounting plate | Steel plate, melamine resin baking finish |
| Electrical Parts | |
| Heater | stainless steel |
| Fan | Aluminum, copper wire and other composite products |
| Substrates | Substrate, capacitor, resistance, complex products such as transformers |
| Power cord and wiring material Others | Wiring materials with synthetic rubber coating and resin coating |

9. TROUBLESHOOTING









Reading Error Codes

Unit has a self-diagnostic function built into the CPU board. The table below shows possible causes when safety function is triggered. If unit does not reset by turning OFF (○) and ON (⌋) ELB, contact original dealer of purchase.

[Error Codes]

When an operational error or malfunction occurs, ALARM lamp on the control panel illuminates, an error code is displayed, and an alarm sounds. Press any key to stop the alarm.

When an error occurs, confirm the error code and terminate operation immediately. For abnormal temperature reading, the controller shows only “----” on display (no lamps go on, and no alarm sounds).

| Safety functions | Symptom | Possible causes |
|--|--|--|
| Sensor failure | ALARM lamp ON  on screen | <ul style="list-style-type: none"> ● Failure in temperature input circuit of the controller ● Disconnection or short circuit of control temperature sensor |
| SSR short circuit | ALARM lamp ON  on screen | <ul style="list-style-type: none"> ● Short circuit in SSR |
| Heater line disconnection | ALARM lamp ON  on screen | <ul style="list-style-type: none"> ● Heater interruption or disconnection ● Current sensing element failure, disconnection ● Drop in power supply voltage |
| Main relay Contact short circuit abnormality detection | ALARM lamp ON  on screen | <ul style="list-style-type: none"> ● Main relay contact short circuit |
| Memory error | ALARM lamp ON  on screen | <ul style="list-style-type: none"> ● Error in CPU storage setting on the controller. |
| Internal communication error | ALARM lamp ON  on screen | <ul style="list-style-type: none"> ● Internal communication error, temperature input circuit failure |
| Overheating | ALARM lamp ON  on screen | <ul style="list-style-type: none"> ● Settings on overheat prevention device is not appropriate Turn ELB OFF, then back ON (reset). Check both chamber temperature and temperature setting for overheat prevention. If unit does not reset, it may be a result from sensor disconnection. ● Temperature sensor for overheat prevention is interrupted or disconnected ● Failure in temperature input circuit of the controller |
| Abnormal temperature reading |  on screen | <ul style="list-style-type: none"> ● Temperature reading is out of display range (-110 to 310 °C) |

9. TROUBLESHOOTING

Troubleshooting Guide

Troubles

| Symptom | Possible causes |
|--|---|
| Unit does not turn on when main power switch is turned "ON" | <ul style="list-style-type: none"> ● Power cable is not connected securely to power terminal or outlet. ● Power failure in progress ● No power from power supply, or supply voltage is low. |
| Condensation | <ul style="list-style-type: none"> ● The room temperature is too high. ● The sample is too moist. |
| Temperature in chamber does not fall | <ul style="list-style-type: none"> ● The room temperature is too high. ● Temperature setting is inappropriate ● Power supply voltage has dropped ● The ambient temperature is out of operable temperature range ⇒The available ambient temperature is 5 ° C to 30 ° C for IJ102 (W) and 15 ° C to 25 ° C for IJ202 / 302. ● The amount of test samples is excessive ● The sample generates a lot of heat. ● The filter is clogged. ● The heat dissipation fins are dirty. ● The area around the vent is blocked. |
| Temperature does not rise. | <ul style="list-style-type: none"> ● Temperature setting is inappropriate ● Power supply voltage has dropped ● The ambient temperature is out of operable temperature range ⇒The available ambient temperature is 5 ° C to 30 ° C for IJ102 (W) and 15 ° C to 25 ° C for IJ202 / 302. ● The amount of test samples is excessive |
| Temperature fluctuates during operation | <ul style="list-style-type: none"> ● Temperature setting is inappropriate ● Power supply voltage is unstable ● Ambient temperature is too high or too low. ⇒The available ambient temperature is 5 ° C to 30 ° C for IJ102 (W) and 15 ° C to 25 ° C for IJ202 / 302. ● The amount of test samples is excessive ● The sample generates a lot of heat. ● The sample is too moist. ● Test samples are not arranged properly ● The filter is clogged. ● The heat dissipation fins are dirty. ● The wind from the air conditioner is directly hit. |
| Temperature reading differs from manually measured temperature | <ul style="list-style-type: none"> ● Calibration offset value is inappropriate. See "Calibration Offset" (P.38) and confirm calibration offset setting. |

◆ If problem persists or is not applicable to any of errors above, turn off power immediately, disconnect power cable and contact original dealer of purchase for assistance.

10. SERVICE & REPAIR

Requests for Repair

Warranty card (attached separately)

Warranty card will be handed by dealer or Yamato personnel upon delivery and installation, or will be attached to equipment if no one from dealer or Yamato is to be present at delivery and installation.

Register warranty card at <https://www.yamato-net.co.jp/support/warranty.htm>
<https://www.yamato-net.co.jp/support/warranty.htm>

- Keep warranty card safe.

Requests for Repair

If abnormalities remain after confirming "Troubleshooting Guide", terminate operation, turn OFF (O) ELB, and disconnect power cable. Contact original dealer of purchase for assistance.

The following information is required for all repairs.

- Product Name
 - Model
 - Serial Number
 - Date (year/month/day) of Delivery
 - Description of problem in as much detail as possible
- } Refer to warranty card.
- Repair this equipment for free of charge according to the contents on warranty card. Warranty period is 1 (one) year from date of purchase.
 - Consult with original dealer of purchase or Yamato sales office for any repair after warranty ended. Charged repair service of this equipment will be available on customer's request when it can be maintained functional by its repair.

*Be sure to present warranty card to the service representative.

Guaranteed Supply Period for Repair Parts

Guaranteed maximum supply period for repair parts is 7 (seven) years from date of discontinuation for this equipment.

"Repair parts" is defined as components which, when installed, allow for continued equipment operation.

11. SPECIFICATIONS

| Model | | IJ102 | IJ102W | IJ202 | IJ302 | |
|-------------------------------------|-----------------------------------|---|-------------------------|---|------------------------------------|------|
| System | | Forced convection | | | | |
| Operating ambient temperature range | | 5~30 °C | | 15~25 °C | | |
| Performance*1 | Temperature control range | 5-60 °C (ambient temperature condition: at 25 °C) | | | | |
| | Temperature control accuracy | ±0.3 °C (at37 °C JTM K05) | | ±0.5 °C (at37 °C JTM K05) | | |
| | Temperature fluctuation | 0.6 °C (at37 °C JIS) | | | | |
| | Temperature distribution accuracy | ±1.0 °C(at37 °C JTM K05) | | | | |
| | Temperature gradient | 2.0 °C (at37 °C JIS) | 2.5 °C (at37 °C JIS) | 2.0 °C (at37 °C JIS) | | |
| | Temperature rise time | Approx. 100minutes (20 °C→60 °C) | | Approx. 50minutes (20 °C→60 °C) | Approx. 60minutes (20 °C→60 °C) | |
| | Temperature fall time | Approx. 100minutes(20 °C→5 °C) | | Approx. 120minutes(20 °C→5 °C) | | |
| Configuration | Exterior | Chromium-free electrogalvanized steel sheet, baked-on finish | | | | |
| | Interior | Stainless steel sheet metal | | | | |
| | Heat insulator | Glass wool | | | | |
| | Door | Single door, opening and closing by magnet packing | | | | |
| | Heater | Type | Tube heater | | | |
| | | Capacity * 2 | 120W | | 150W | 300W |
| | Cooler | Forced heat dissipation method | | | | |
| | | Pelche element : two | | | Pelche element : Four | |
| | | Continuous operation at a set temperature of 39.8 °C or less (Always OFF when the set temperature exceeds 39.8 °C) | | Continuous operation at a set temperature of 44.8 °C or less (Always OFF when the set temperature exceeds 44.8 °C) | | |
| | DC axial flow fan | | | | | |
| Cable port | — | φ30 right side | | — | | |
| Observation window | — | 180×180 Pair glass and tempered glass | | — | | |

*1 Performance data above based on 100 V AC supplied power, 23 ±5 °C room temperature, 65%RH ±20% humidity, and no process load.

If the power supply voltage falls below 100V, the temperature rise time may be delayed and the maximum may not be reached.

The operating environment temperature range is 5 °C to 30 °C for IJ102 (W) and 15 to 25 °C for IJ202 / 302.

If the upper limit of each range is exceeded, the cooling capacity may be insufficient, and if the lower limit of the range is exceeded, the temperature rise time may be delayed.

The minimum temperature reached is (room temperature -20 °C).

*2 It is the heater capacity in voltage conversion.

11. SPECIFICATIONS

| Model | | IJ102 | IJ102W | IJ202 | IJ302 |
|----------------|--|--|---------------|--------------------------------------|---------------------------|
| Controller | Temperature control system | PID control by microcomputer | | | |
| | Temperature setting system | Digital setting with menu keys and the ▼▲ keys | | | |
| | Temperature display system | Temperature reading display: Green 4-digit LED digital display Temperature setting display: Red 4-digit LED digital display | | | |
| | Temperature resolution | 0.1 °C | | | |
| | Timer function | 0 to 99 hours 59 minutes, 100 hours to 999 hours 50 minutes | | | |
| | Timer resolution | 1 minute increments under 99 hours and 59 minutes, 10 minutes after 100 hours. | | | |
| | Wait Function | Timer wait function (ON/OFF setting) | | | |
| | Operation modes | Fixed temperature, Program, Program auto start, Auto stop, Auto start, Quick auto stop operations | | | |
| | Program modes | 6 patterns (PrG1: 30 steps, PrG2-3: 15 steps, PrG4-6: 10 steps), Step wait, Repeat, Step hold, Step skip functions | | | |
| | Additional functions | Calibration offset, Keypad lock, Auto-resume mode select | | | |
| | Sensor | Platinum temperature measurement resistor Pt100Ω (for temperature control) K thermocouple (for overheating prevention device) | | | |
| Safety devices | | Self-diagnostic functions (Automatic overheat prevention, Temperature sensor failure, Heater disconnection, SSR short circuit, main relay failure, memory error, internal communication error, abnormal temperature reading), Overcurrent ELB, Overheat prevention device | | | |
| Standard | External dimensions * 3 (W × D × H) mm | 350 x 399x 565 | | 580×419×437 | 450×499×665 |
| | Internal dimensions * 3,4 (W × D × H) mm | 250×250×250 (200×200×200) | | 300×300×300 (250×250×250) | 350×350×350 (300×300×300) |
| | Internal Capacity* 4 | 15.6L (8L) | | 27L (15.6L) | 43L (27L) |
| | Shelf board | Perforated stainless steel plate | | | |
| | Number of tiers/rack support pitch | 7tiers/30 mm | | 8tiers/30 mm | 10tiers/30 mm |
| | Number of racks/rack supports | 2/4 | | | |
| | Shelf board load capacity * 5 | 5 kg/rack, total load capacity 10kg | | 10 kg/rack, total load capacity 20kg | |
| | Power supply (ELB capacity) | AC100 V 4 A (10 A) | | AC100V 4.5A (10A) | AC100V 9A (15A) |
| | Approx. weight | Approx. 20 kg | Approx. 22 kg | Approx. 25 kg | Approx. 37 kg |
| Accessories | | Shelf board, Rack support, Drain tray, Instruction manual, Warranty card | | | |

*3 Dimensions do not include protrusions.

·For product improvement, above specifications are subject to change without notice.

12. OPTIONAL ACCESSORIES

List of Options

Table 12.1 and Table 12.2 show the option setting list.

The IJ series has options.

* **Some options are required to be installed at the Yamato manufacturing facility.**

Table 12.1 list of Options (can be installed after delivery)

| Product name | Product code | Model | Compatible models | Description |
|---|--------------|-------|-------------------|---|
| Shelf board stainless steel punching metal (set of 1 rack & 2 supports) | 221180 | — | IJ102(W) | Same as standard shelf board; available for additional purchase. |
| | 221186 | — | IJ202 | |
| | 221187 | — | IJ302 | |
| Air jacket | 221179 | — | IJ102(W) | The inside of the chamber can be used as an air jacket. (See P.58) |
| | 221165 | — | IJ202 | |
| | 221166 | — | IJ302 | |
| Two-stage rack | 281138 | OIJ22 | IJ102(W) | It is a rack for stacking the main unit in two stages. |
| | 221168 | — | IJ302 | |
| Stacking Hardware | 221167 | — | IJ202 | It is a metal fitting for stacking the main body in two stages. |

12. OPTIONAL ACCESSORIES

List of Options

Table 12.2 List of Options (cannot be installed after delivery)

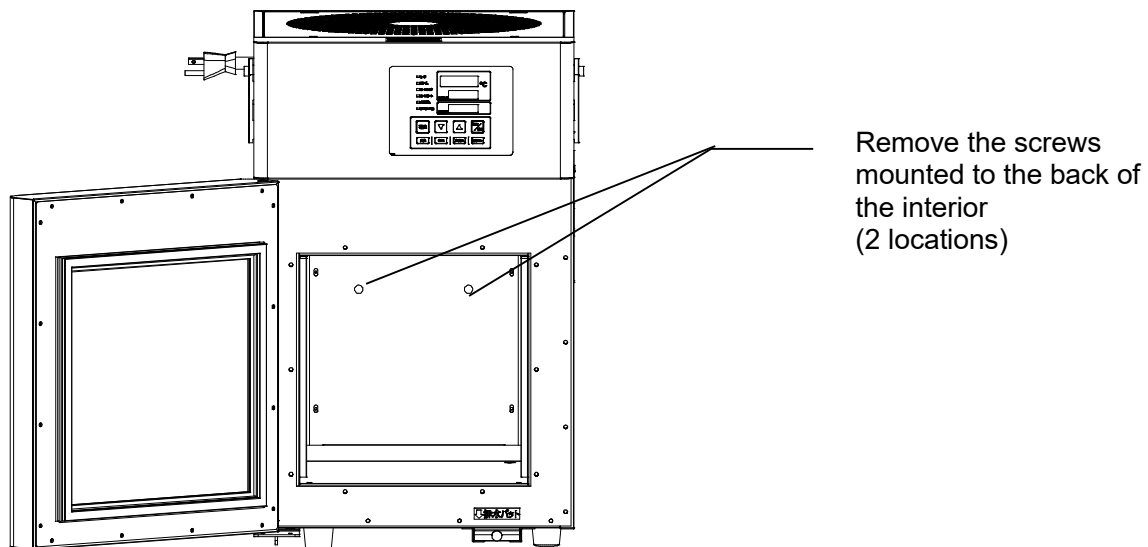
| Product name | Product code | Model | Compatible models | Description |
|--|--------------|-------|-------------------|---|
| Inner door | 281206 | OIJ30 | IJ102(W) | A glass or acrylic resin door installed between the door and the interior. |
| | 281207 | — | IJ202 | |
| | 281208 | — | IJ302 | |
| For air jacket Inner door | 281209 | OIJ32 | IJ102(W) | Use an air jacket It becomes an inner door when you do |
| | 281210 | — | IJ202 | |
| | 281211 | — | IJ302 | |
| Fall prevention bracket | ----- | OA081 | IJ102(W) | In the event of vibration such as an earthquake, it prevents the unit from tipping over or falling. |
| Right door | ----- | OA078 | IJ102 | The main unit door can be opened and closed on the right side. * Normally it is the left door. |
| | ----- | OA079 | IJ102W | |
| | ----- | OA080 | IJ302 | |
| External communications adaptor kit (RS485-USB conversion) | 281146 | OA017 | All | Adapter kit for connecting unit to remote PC workstation. |
| External communications terminal (RS-485) | 281286 | OA066 | IJ102(W) | Terminal installed on main unit for controlling and monitoring operation status from remote PC workstation. |
| | 281293 | OA070 | IJ202 | |
| | 281313 | OA074 | IJ302 | |
| External alarm output terminal | 281287 | OA067 | IJ102(W) | Output terminal for connecting an external alarm device. Specific error will be shown in the display of the control panel. |
| | 281294 | OA071 | IJ202 | |
| | 281314 | OA075 | IJ302 | |
| Time-up output Terminal | 281288 | OA068 | IJ102(W) | Output terminal for connecting an external device, which signals the end of Quick auto stop, Auto stop or Program operation. |
| | 281295 | OA072 | IJ202 | |
| | 281315 | OA076 | IJ302 | |
| Temperature output terminal | 281289 | OA069 | IJ102(W) | Terminal outputting a 4-20mA analog signal for external temperature sensor. |
| | 281312 | OA073 | IJ202 | |
| | 281316 | OA077 | IJ302 | |

For some options, it may be possible to install after delivery and installation. Contact original dealer of purchase for requests for options.

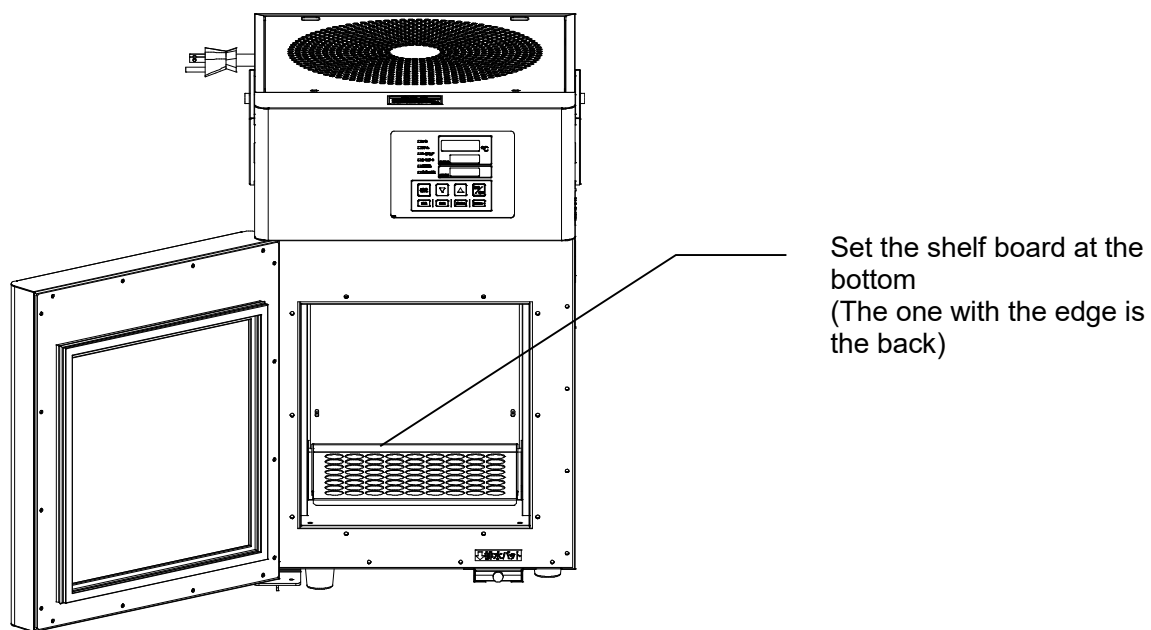
12. OPTIONAL ACCESSORIES

Option (air jacket setting procedure)

(1) Remove the screws mounted on the back of the interior.



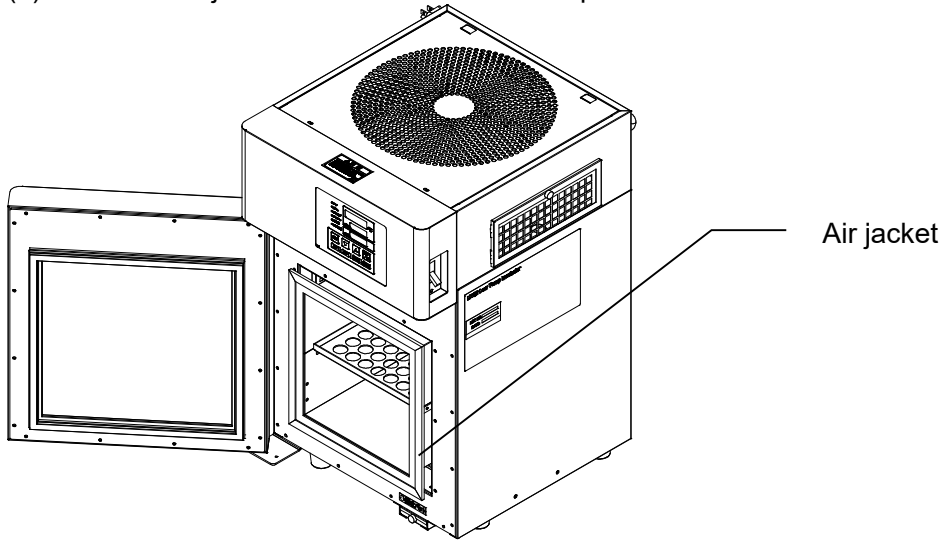
(2) Set the shelf board at the bottom. Set so that the one with the edge is in the back.



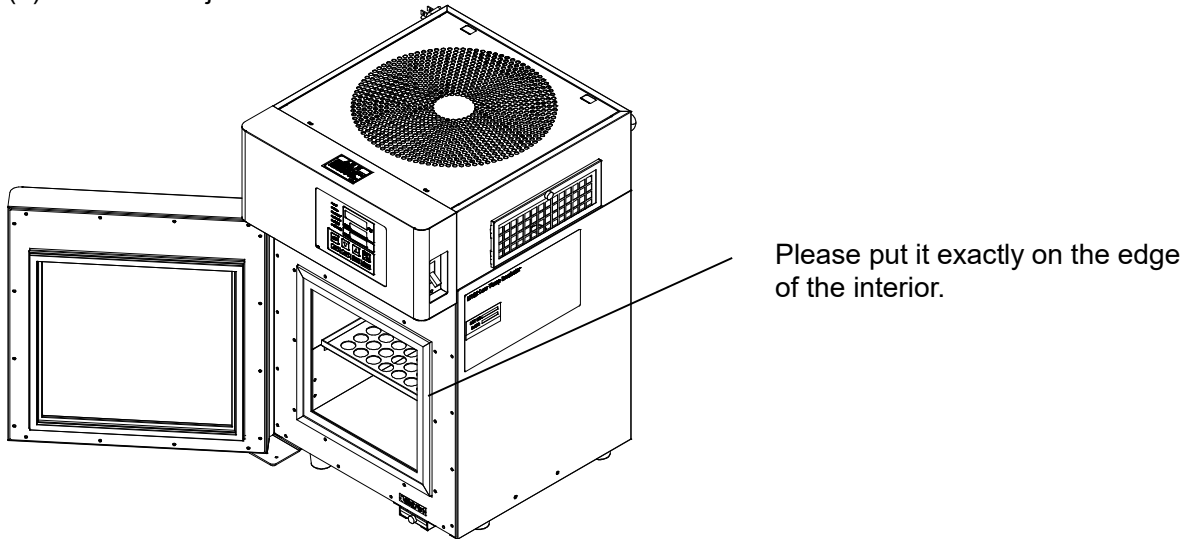
12. OPTIONAL ACCESSORIES

Option (air jacket setting procedure)

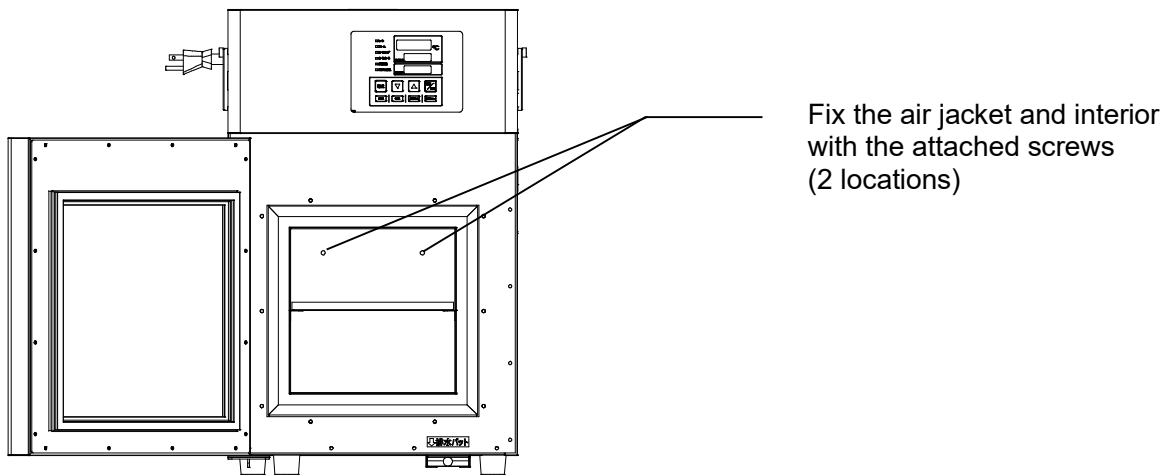
(3) Place the air jacket on the shelf board and push it in.



(4) Push the air jacket in until it hits the back.



(5) Fix the air jacket and the interior with the attached screws.



12. LIST OF HAZARDOUS SUBSTANCES



Never attempt to process explosives, flammables or any items which contain explosives or flammables.

Table 13.1 List of hazardous substances

| | |
|------------------------|---|
| Explosive substances | ① Trinitrobenzen, Trinitrotoluene, Picric Acid and other explosive nitro compounds |
| | ② Trinitrobenzen, Trinitrotoluene, Picric Acid and other explosive nitro compounds |
| | ③ Acetyl Hydroperoxide, Methyl Ethyl Ketone Peroxide, Benzoyl Peroxide and other organic peroxides |
| | ④ Metallic Azide, including Sodium Azide, etc. |
| Combustible substances | ① Metal "lithium" ② metal "potassium" ③ metal "sodium" ④ yellow phosphorus ⑤ phosphorus sulfide ⑥ red phosphorus ⑦ celluloids ⑧ calcium carbide (aka Carbide) ⑨ phosphorized lime ⑩ magnesium powder ⑪ aluminum powder ⑫ metal powder other than magnesium powder and aluminum powder ⑬ Sodium subthionate (also known as hydrosulfite) |
| Oxidizing Substances | ① Potassium Chlorate, Sodium Chlorate, Ammonium Chlorate, and other chlorates |
| | ② Potassium Perchlorate, Sodium Perchlorate, Ammonium Perchlorate, and other perchlorates |
| | ③ Potassium Peroxide, Sodium Peroxide, Barium Peroxide, and other inorganic peroxides |
| | ④ Potassium Nitrate, Sodium Nitrate, Ammonium Nitrate, and other nitrates |
| | ⑤ Sodium Chlorite and other chlorites |
| | ⑥ Calcium Hypochlorite and other hypochlorites |
| Flammable Substances | ① Ethyl Ether, Gasoline, Acetaldehyde, Propylene Chloride, Carbon Disulfide, and other substances with ignition point at 30 or more degrees below zero. |
| | ② n-hexane, Ethylene Oxide, Acetone, Benzene, Methyl Ethyl Ketone and other substances with ignition point between 30 degrees below zero and less than zero. |
| | ③ Methanol, Ethanol, Xylene, Pentyl n-acetate, (a.k.a. amyl n-acetate) and other substances with ignition point between zero and less than 30 degrees. |
| | ④ Kerosene, Light Oil, Terebinth Oil, Isopenthyll Alcohol(a.k.a. Isoamyl Alcohol), Acetic Acid and other substances with ignition point between 30 degrees and less than 65 degrees. |
| Combustible gas | hydrogen, acetylene, ethylene, methane, ethane, propane, butane and other flammable objects that are gases at 1 atm and 1 atm |

Excerpt from Table 1, Hazardous Substances, of Cabinet Order of the Occupational Safety and Health Law (substances related to Articles 1, 6, and 9)

14. STANDARD INSTALLATION MANUAL

Install this equipment according to following format (check options and special specifications separately).

| Model | Serial Number | Installation Date | Charged Personnel or Company Name for Installation | Installation proved by | Judgment |
|-------|---------------|-------------------|--|------------------------|----------|
| | | | | | |

| No | Item | Implementation method | Chapter No. & Reference page of instruction manual | Judgment |
|----------------------------------|---|--|---|----------|
| Specifications | | | | |
| 1 | Accessories | Quantity check according to the accessories column | 11. SPECIFICATIONS P.54 | |
| 2 | Installation | -Visual check of surrounding conditions Caution: Take care for environment -Securing a space | 3. PRE-OPERATION PROCEDURES -Choose an appropriate ... P.12 | |
| | | -Installing shelf board | 4. PRE-OPERATIVE PREPARATIONS -Shelf board placement P.20 | |
| Operation-related matters | | | | |
| 1 | Power supply voltage | -Measure line voltage (power distribution board of facilities, outlet etc.) with a tester. -Measure line voltage during operation (must meet required voltage) | 1. SAFETY PRECAUTIONS -Ground wire MUST be ... P.3 3. PRE-OPERATION PROCEDURES -Always connect power cable to ... P.54 11. SPECIFICATIONS -Standard-Power Supply | |
| 2 | Starting operation | -Start operation | 3. PRE-OPERATION PROCEDURES -4. PRE-OPERATIVE PREPARATIONS P.12-20 5. OPERATION PROCEDURES -Operation procedure P.21-44 | |
| Description | | | | |
| 1 | Operational descriptions | Explain operations of each component and handling precautions according to instruction manual. | 5. OPERATION PROCEDURES -Operation procedure P.21-44 1. SAFETY PRECAUTIONS -13. LIST OF HAZARDOUS SUBSTANCES P.1-60 | |
| 2 | Error codes | Error codes description,How to unlock | 9. TROUBLESHOOTING -10. SERVICE & REPAIR P.51-53 | |
| 3 | Maintenance and Inspection | Explain operations of each component and handling precautions according to instruction manual. | 7. MAINTENANCE PROCEDURES -Inspection and Maintenance P.48-49 | |
| 4 | Completion of installation Matters to be Stated | -Enter the date of installation and name of the charged personnel in the main unit nameplate -Write necessary information on warranty card and hand it over to customer - Explain how to contact service personnel | 10. SERVICE & REPAIR P.53 | |

Limited liability

Be sure to use the unit strictly following the handling and operating instructions in this operating instruction.

Yamato Scientific Co., Ltd. assumes no responsibility for an accident or a malfunction caused by use of this product in any way not specified in this operating instruction.

Never attempt to perform matters prohibited in this operation instruction.

Otherwise, an unexpected accident may result.

Notice

- **Descriptions in this operating instruction are subject to change without notice.**
- **We will replace a manual with a missing page or paging disorder.**

Instruction Manual

Low temperature incubator

IJ102/102W/202/302

First Edition June 6, 2020

Revised

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