R00

EYELA

Aluminum block
Thermostat

Dry thermobath

Instruction Manual

MG-3100

This instruction manual is designed to use the product safely with keeping its best performance.

IMPORTANT **Be sure to read “Safety precautions” before use.**

Please keep this manual in a place easily accessible to every users.

Tokyo Rikakikai Co., Ltd.

FORWARD

Thank you very much for your kind patronage of EYELA.

Get to know your EYELA products, but before using, to be sure to read this manual well.

EYELA cannot be held responsible for the malfunctions resulting from the use of EYELA products other than as specified in this manual.

WARRANTY

EYELA products are warranted against defects in materials and workmanship for a period of year following the date of shipments.

EYELA will make repairs or replacements free of charge upon return to the factory, transportation paid, of the defective item except following cases.

This warranty does not cover finishes nor does it cover damage resulting from accident, misuse, abuse, tampering, servicing performed or attempted by unauthorized service agency.

The consumable parts are not warranted even if they are within the warranty period.

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Tokyo Rikakikai Co., Ltd. has no control over the set up, use, connection to other equipment, or data generated by means of EYELA products.

Therefore in no event shall Tokyo Rikakikai Co., Ltd. be liable for any incidental or consequential damages, losses, or liability which may result from improper use of its products, either in connection with other equipment or in the generation, reporting, or application of data and results.

SERVICE

1. Before asking our service agency, check your instrument again with trouble shooting on this manual.
2. We shall repair the instrument subject to WARRANTY CLAUSE.
3. Ask our authorized service agency for repairing.

Safety Precautions

1. Signal Words for Warnings

If you use this product with combustible or flammable solution, mishandling of it may cause unintended injury or accident.
In addition, due to the product's functions and characteristics, operation at high temperature may cause degradation of performance or troubles. However, if you know such risks in advance, you can avoid most of accidents.

Therefore, important safety information on matters to be noted is defined as follows and indicated with the following alert symbols and signal words. Be sure to follow these instructions and use the product safely.

Alert mark Signal word	Definition
⚠ **WARNING**	Wrong handling is assumed to cause the possibility of the death or heavy injury of the user.
⚠ **CAUTION**	Wrong handling is assumed to cause the risk of injury of the operator or physical damages.

We have undertaken thorough verification concerning the possible occurrence of risk in the course of use of the product, but prediction of all and every kind of risk is extremely difficult. Namely, cautions contained in this manual are not necessarily all of possible risks.

However, if the product is operated according to the procedure described in this manual, the safe operation and work is ensured. Be sure to pay utmost care during handling of the product to prevent accident or failure of the product.

2. Warning signs on the product

For particularly important warning instructions, the warning label is provided to the product main body.

The labelling position is shown below.

When using the product, be sure to pay due attention to the description of the warning.

* If damaged and illegible, be sure to change the warning label to the new one.
  Send the request for the new label to us.

①

Warning

Flammable warning

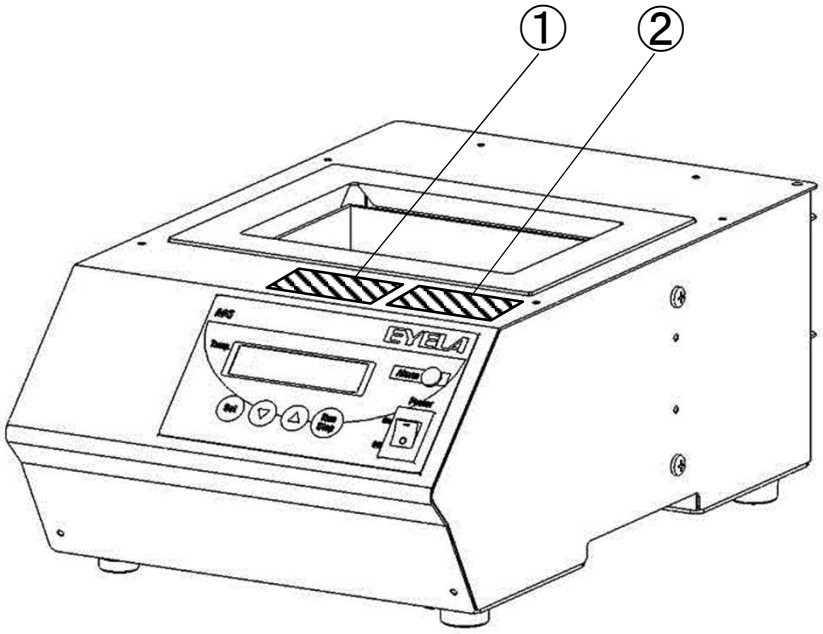
Use extreme care when handling inflammable or combustible solution.

②

Caution

Hot surface

Touching aluminum block during and right after operation may burn yourself.



Thank you for choosing
EYELA

Introduction

This manual describes the procedure of setup, operation, troubleshooting, maintenance, check-up and disposal of **Aluminum block thermostat**, MG-3100.

Please read this manual carefully before use.

Contents

Items contained in your packing

Be sure to check the types and quantities of parts before installation.

Aluminum block is not included in the product. Separately prepare one depending on the container such as test tube.

	Content	Quantity
1	Main body	1
2	Fuse (extra)	1 (2A)
3	Instruction Manual	1
4	Warranty	1

1 For your safety use

This product is subject to have high temperature.
Use extreme care when handling the product.

Warning

Use extreme caution when using inflammable and combustible solution.

If inflammable and flammable solution (methanol) is allowed to stand at higher (or lower depending on the solution) than the room temperature, it gasifies and may lead to catching fire or burning due to a certain source of ignition.
Be sure to ventilate the room and pay careful attention in use.

Caution

Pay attention to the number of aluminum blocks set.

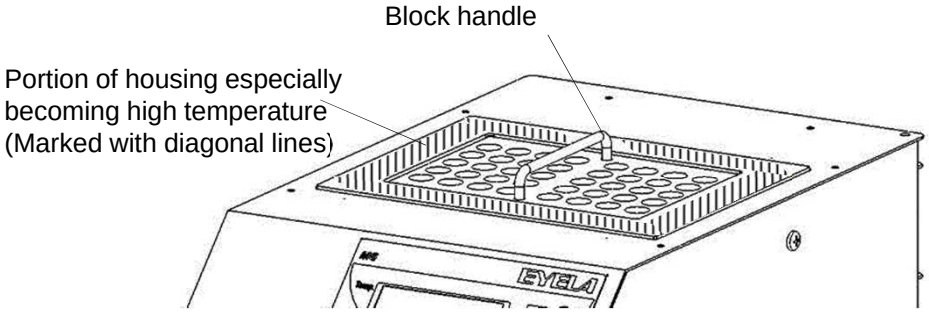
Set up required number of aluminum block on each unit before operation.
Without the block, temperature distribution may be worsened or the unit may have bad effect.

Caution

Do not touch aluminum block or block handle during operation and for a while after operation.

When preset temperature is high, aluminum block, block handle and also around these parts are subject to have high temperature during operation and for a while after operation. Take care not to burn yourself.

If carrying about aluminum blocks, check that they are cooled down and lift the block handle.



Caution

Be sure to wear safety equipment when using the product

Be sure to wear safety equipment (protective glasses, mask, etc.) compatible with dangerous/hazardous materials before operating the product.

If safety equipment is insufficient or deficient, it is very dangerous when the solution or oil flies off, injury may occur from the protruding portion or inflammable gas is generated.

2 Outline of the product

2-1 Usage

⚠ Warning

Do not remodel the product. Make sure that it should not be used out of intended use. Remodeling and improper use may cause electric shock or breakdown.

This product is a dry and clean thermostat without using water or oil and is suitable for condensing a hydrophobic sample such as moisture.

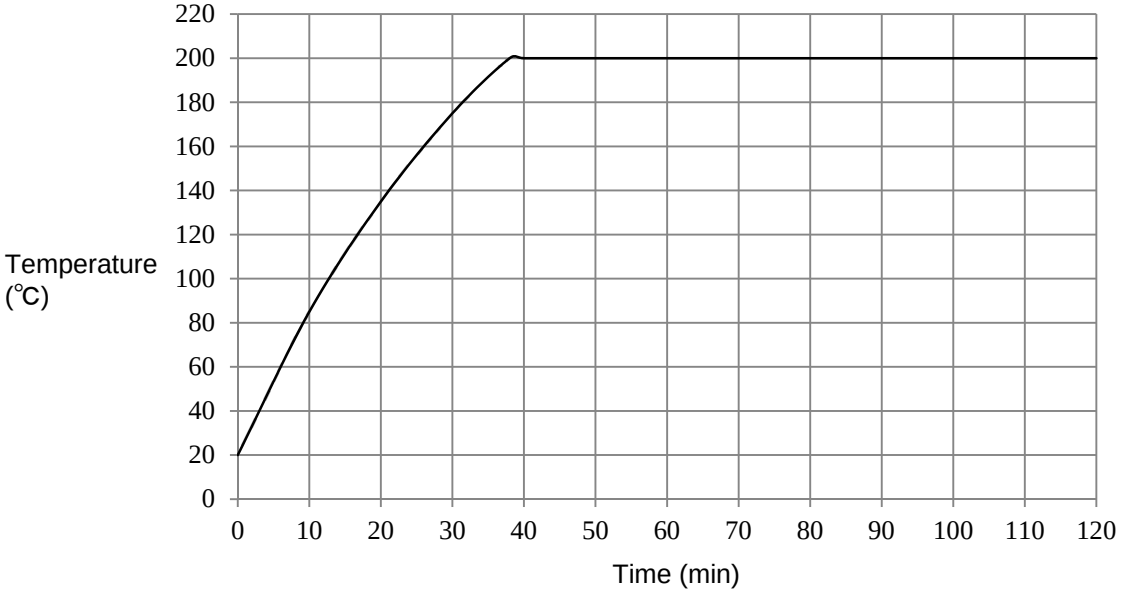
2-2 仕様

Product name		Aluminum block thermostat
Model		MG-3100
Performance	Range of temperature control (Range of temperature setting)	Room temperature +5.0 to 200.0℃ (10.0 to 200.0℃)
	Accuracy of temperature control *1	±0.1℃～
	Required time for rising temperature *1	20→100℃ Approx. 15 min. 20→200℃ Approx. 40 min.
	Range of temperature distribution *2	5.0℃ 200℃ (When setting up 200℃) 3.0℃ (When setting up 120℃) 2.0℃ (When setting up 37℃)
Function	Temperature control	PIDcontrol with auto-tuning
	Setting up temp. • display	Sheet key input, digital display
	Attached function *3	Auto Stop, Auto Start, 8-step program, Compensating temperature display, auto tuning, setup for recovery from power failure, setup for buzzer
	Setup time for timer	0 min. to 99 hrs. 59 min.
	Safety functions	Self-diagnosis function (Upper limit temperature limiter, loop abnormality, Sensor disconnection) Fuse, fixed temperature overheat prevention device)
Composition	Temperature sensor	Platinum resistance temperature detectorPt100Ω
	Heater	Maika heater 235 W
Specification/Standard	Block dimensions *4	Model MGBH: 90W x 62.5D x 70H Model MGB: 90W x 125D x 70H
	Number of blocks *4	Model MGBH: 2 Model MGB: 1
Ambient temperature range in use		5 ~ 35℃
Outer dimensions (mm)		200W x 315D x 125H
Mass *5		About3.9kg
Power input		2.5A 250VA
Rated power		AC100V 50/60Hz

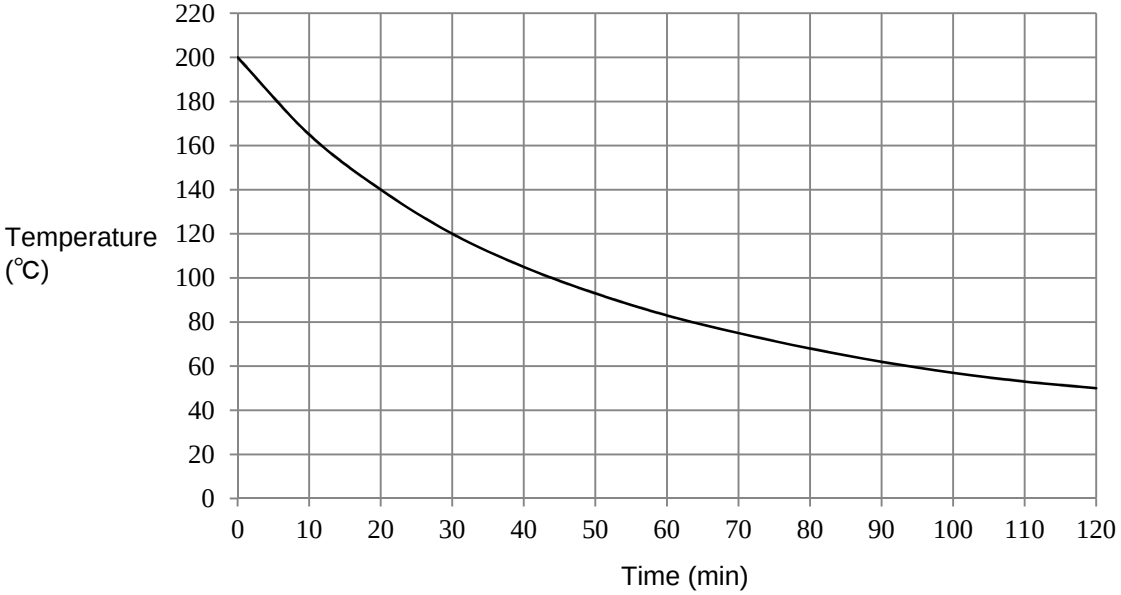
*1 Room temperature at 20ºC, rated power supply-voltage, regular block model MGB-1524, without sample/container, without sample temperature sensor.
* 2 Temperature in aluminum block
*3 If sample temperature sensor is used, it may not be controllable under the conditions that the sample thermal capacity is large, the container thermal conductivity is small, etc.
*4 Aluminum block is one of the optional accessories (sold separately).
As for the types of aluminum block, please refer to “Options” on page 37.
*5 Weight of aluminum block is not included.

2-3 Temperature rise/drop curve (reference data)

MG-3100



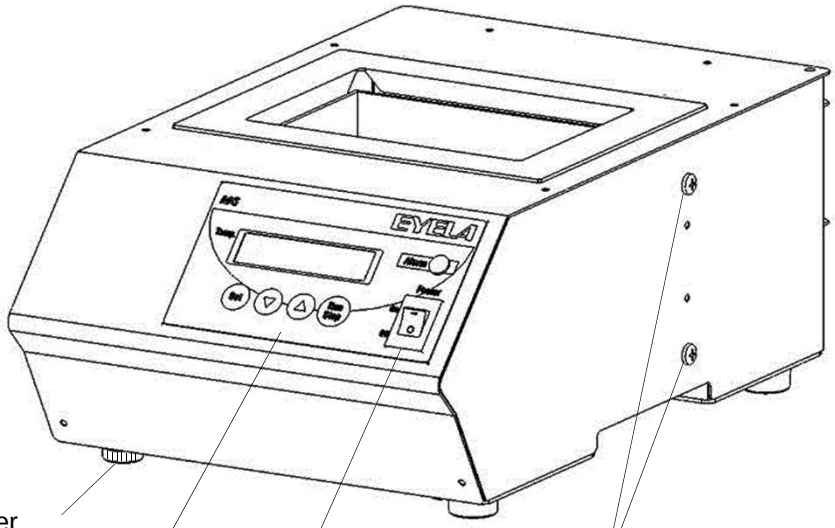
Condition: Room temperature at 20ºC, rated power-supply voltage,
regular block model MGB-1524, without sample/container, without sample temperature sensor.



Condition: Room temperature at 20ºC, rated power-supply voltage,
regular block model MGB-1524, without sample/container, without sample temperature sensor.

2-4 Names of parts

Front



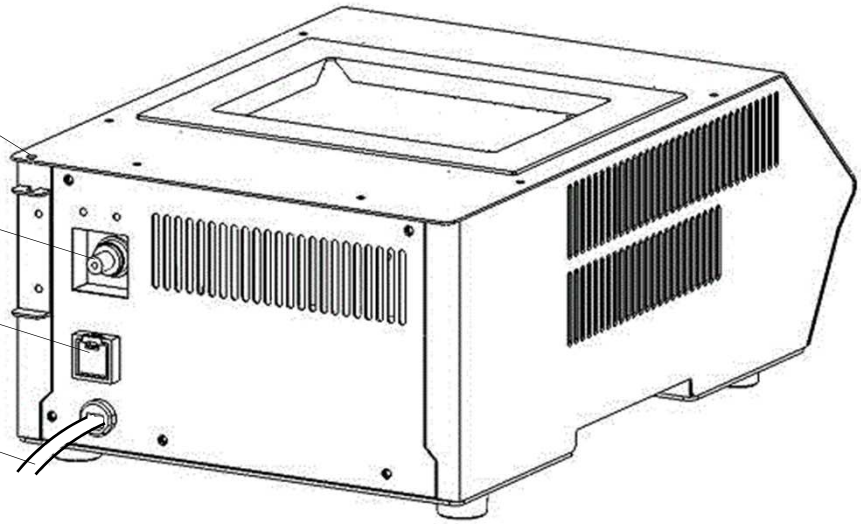
Adjuster

Control panel

Power switch

Screw for option installation

Back



Sensor holder

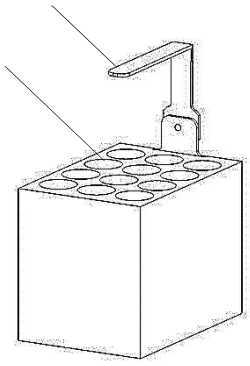
Temperature sensor
(With cover)

Fuse holder

Power cord

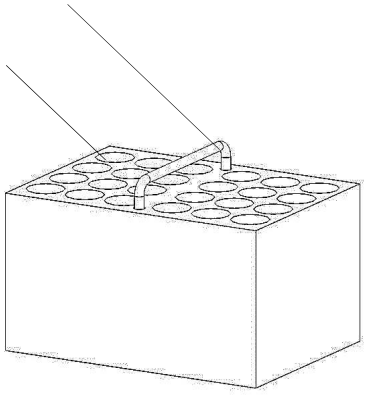
Block handle

Half block
(Option)



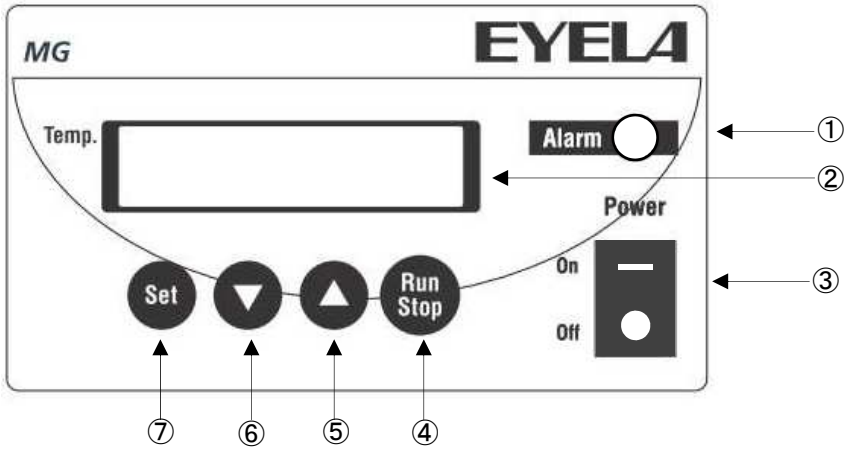
Block handle

Regular block
(Option)



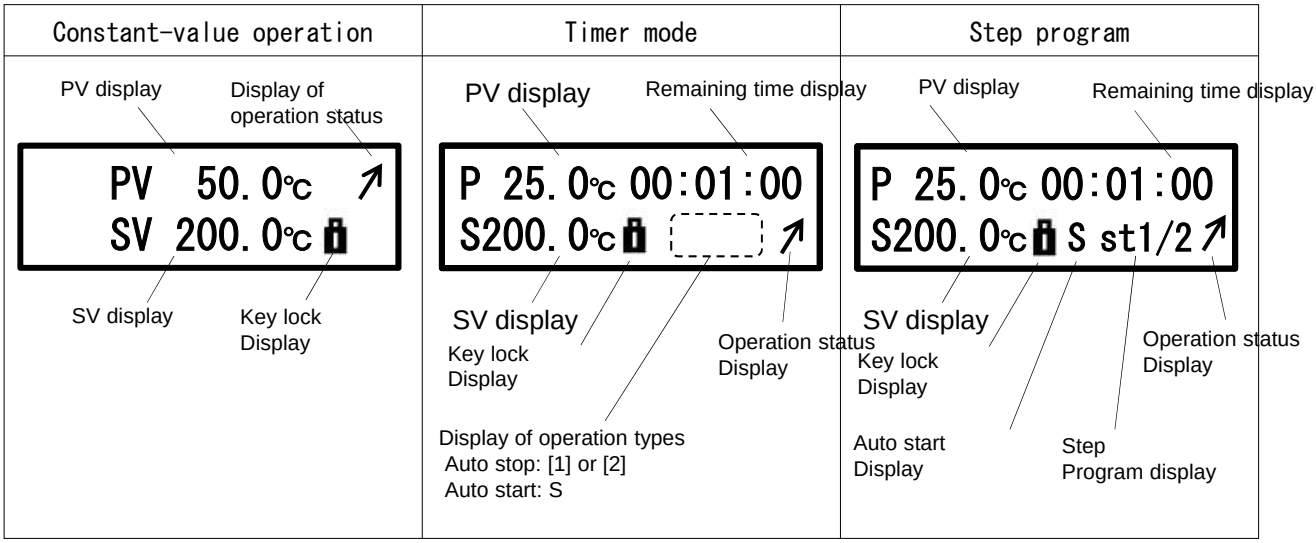
3 Names and function of operating parts

3-1 Control panel



No.	Name	Function	
①	Alarm lamp	This is lit only when bimetal is in operation.	
②	Display (LCD)	The set temperature, measured temperature, operation status and alarm are displayed.	
③	Power switch	Power is turned ON/OFF.	
④	RUN/STOP key	Temperature control is switched from RUN/STOP.	
⑤	UP key	Being entered	Press it and the value will increase one by one. Holding it down for more than 1 second will continuously increase the value and holding it down for more than 10 seconds will even faster increase the value.
		Standard screen	If this is pressed while connected to the sample temperature sensor, it will switch to the block temperature. If it is pressed again, it will return to the sample temperature again.
⑥	DOWN key	Being entered	Press it and the value will decrease one by one. Holding it down for more than 1 second will continuously decrease the value and holding it down for more than 10 seconds will even faster decrease the value.
		Standard screen	If the key lock function is set, long press for more than 3 seconds will switch the key lock function to effective. Long press for more than 3 seconds will switch it to ineffective.
⑦	SET key	Switches various settings and confirms set items. When a certain alarm occurs, the alarm display will be cleared.	

3-2 Display (Standard screen)



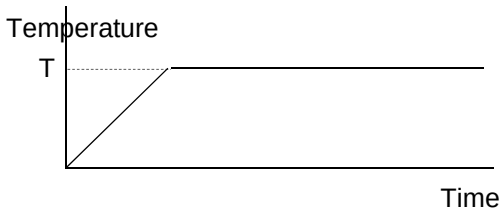
3-3 Constant-value operation, timer mode, step program

This product enables a step program to control the maximum eight set temperatures, including continuous operation in constant-value operation, auto start and auto stop combining timer mode, in turn.

Constant-value operation

Raises the temperature to the set temperature "T," and after the set temperature "T" is reached continuously operates until operation is stopped.

- Range of temperature setting:
- 10.0 - 200.0 ºC (Block control)
  10.0 -170.0ºC (Liquid temperature control)



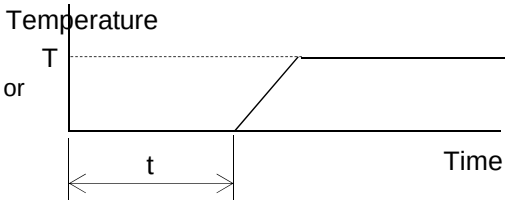
Timer mode

The use of the timer mode allows operation start at an optional time or operation stop at an optional time.

1.Auto start mode

After operation starts, the time count alone starts and after elapse of a set time "t," the temperature starts to raise to the set temperature "T" in constant-value operation or step program.

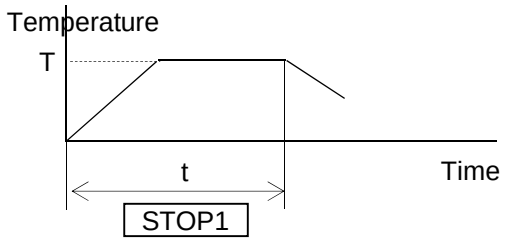
After the set temperature "T" is reached, constant-value operation is run and in the case of the step program, stepwise operation is run.



2. Auto stop mode [STOP 1]

After operation start, the time count starts to raise the temperature to the temperature "T" set in constant-value operation and once the temperature "T" is reached, the constant-value operation starts.

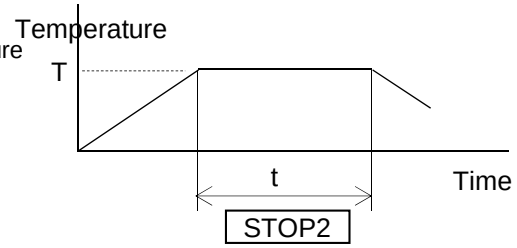
After elapse of the set time "t," the operation automatically stops. (Even if the set temperature "T" is not reached, the operation stops)



3. Auto stop mode [STOP 2]

After operation start, the temperature raises to the temperature "T" set in constant-value operation and once the set temperature "T" is reached, the time count starts.

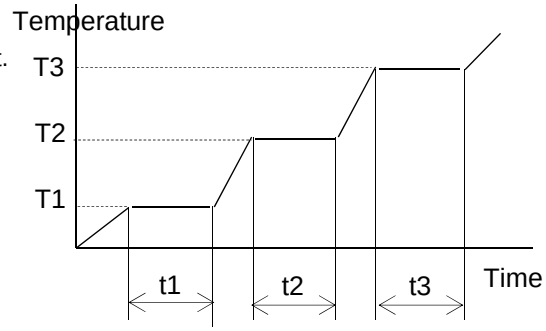
After elapse of the set time "t," the operation automatically stops.



* Range of temperature setting:
10.0 - 200.0 ºC (Block control)
10.0 -170.0ºC (Liquid temperature control)
*Range of time setting: 1 min - 99 hrs. and 59 min

Step program

Maximum eight-stepped temperature "T" and time "t" are set.
After operation start, the temperature raises to the set temperature "T" at each step and once the set temperature "T" is reached, the time count starts.
After elapse of the set time "t," the operation automatically moves to the next step.
Upon completion of the final step, the operation stops.



* Range of temperature setting:
10.0 - 200.0 ºC (Block control)
10.0 -170.0ºC (Liquid temperature control)
*Range of time setting: 1 min - 99 hrs. and 59 min

3-4 Safety and alarm functions

This product is equipped with the following safety and alarm functions.
If an abnormality occurs, see "6. Causes of trouble and countermeasures" on page 32 and take appropriate action.

Safety functions

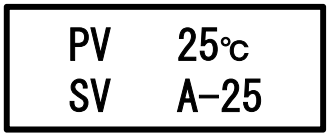
Safety mechanism	Movement	Cause of movement	Recovery method
Fuse	If overcurrent flows, the fuse is blown out, shutting down power.	Power circuit is short-circuited or overcurrent flows.	See page 35 "7-1 Replacement of fuse"
Fixed temperature Overheat protector	If the heating plate temperature goes up to about 220ºC, power is shut down, stopping the control. The Alarm lamp is lit.	• Excessive overshoot occurred because PID setting was not matched or the load was large . • The temperature of the heating plate goes up to more than about 220ºC as the temperature controller went out of order.	Check that the heating plate temperature goes down, and turn on the power again. If this frequently occurs, immediately stop operation and contact the company from which you purchased the product or the nearby service center.
Temperature controller Self-diagnostic function (Upper temperature limiter))	When the heating plate temperature exceeds the set temperature of the upper temperature limiter, all controls stop. Alarm is displayed.	Excessive overshoot occurred because PID setting was not matched or the load was large.	See page 14 "5-4-1 Upper temperature limiter"

Alarm display

PV 270℃ SV A-0	[A-0] Upper temperature limiter	
	Major cause of occurrence	The measured temperature exceeded the "set temperature + upper temperature limiter" * Range of upper temperature limiter set: 0 - 60ºC
	Movement	Temperature control stops Alarm display on the display
	How to release the alarm	If returned to the range of measurable temperatures, it can be released with "Set" key. Even during alarm, long press of "Set" key enables the set temperature of the upper temperature limiter to be changed.

PV 25℃ SV A-3	[A-3] Loop abnormality alarm	
	Major cause of occurrence	If the temperature rise for 10 minutes is not more than 1ºC in the 100% state of temperature control calculation result (heater output).
	Movement	[During block control] Temperature control continues and the display shows the alarm alternately [During liquid temperature control] Temperature control stops and the display shows the alarm
	How to release the alarm	Released with "Set" key.

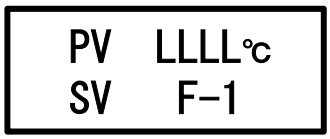
PV 25℃ SV A-4	[A-4] Blackout recovery alarm	
	Major cause of occurrence	Power supply stopped once during temperature control and was later recovered.
	Movement	[During STOP set] Temperature control stops and the display shows the alarm [During CONT set] The temperature control continues and the display shows the alarm alternately *If movement occurs during auto-tuning, the control stops and the display shows the alarm.
	How to release the alarm	Released with "Set" key.



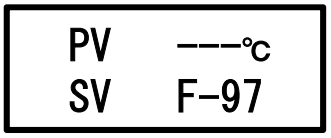
[A-25] Auto-tuning error (Block control)	
Major cause of occurrence	During auto-tuning by the internal temperature sensor, it occurs in any one of the following conditions: • If deviated from the measurement range • If the heater is off for more than 3 hours
Movement	Auto-tuning stop Alarm display on the display
How to release the alarm	Released with "Set" key.

[A-26] Auto-tuning error (Liquid temperature control)	
Major cause of occurrence	During auto-tuning by the sample temperature sensor, it occurs in any one of the following conditions: • If deviated from the measurement range • If the heater is off for more than 3 hours
Movement	Auto-tuning stop Alarm display on the display
How to release the alarm	Released with "Set" key.

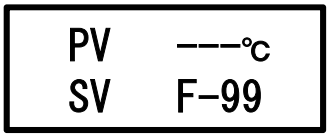
[HHHH][F-1] Measured temperature upper limit alarm	
Major cause of occurrence	(i) The temperature exceeds the measurable temperature of the temperature sensor. * Range of measurable temperatures: -50～-350ºC (ii) The sample temperature sensor is disconnected or the connector comes off.
Movement	Temperature control stops Alarm display on the display
How to release the alarm	(i) If recovered to the measurable range, the alarm can be released with "Set" key. If the displayed temperature is clearly away from the actual temperature, stop the operation and contact the company from which you purchased the product or the nearby service center. (ii) After turning off the power switch, reconnect the sample temperature sensor.



[LLLL][F-1] Measured temperature lower limit alarm	
Major cause of occurrence	The temperature goes below the measurable range of the temperature sensor. * Range of measurable temperature: -50 to 350℃
Movement	Temperature control stops Alarm display on the display
How to release the alarm	If returned to the range of measurable temperatures, it can be released with "Set" key. If the displayed temperature is clearly away from the actual temperature, stop the operation and contact the company from which you purchased the product or the nearby service center



[F-97] AD alarm	
Major cause of occurrence	This occurs when an abnormality occurs in the temperature input circuit
Movement	Temperature control stops Alarm display on the display
How to release the alarm	Auto recovery. If the alarm is not released, stop the operation and contact the company from which you purchased the product or the nearby service center.



[F-99] Memory alarm	
Major cause of occurrence	This occurs when the set value memorized by the control substrate is abnormal
Movement	Temperature control stops Alarm display on the display
How to release the alarm	Stop the operation and contact the company from which you purchased the product or the nearby service center.

4 Installation

4-1 Installation environment

⚠ Warning

Do not install the product in a place with a hazardous atmosphere

This product is not explosion proof specification. Use in a hazardous atmosphere may cause fire.

⚠ Caution

Do not put any inflammables near the installed place.

This product is subject to very high temperatures. Inflammable in the vicinity may cause fire.

⚠ Warning

When handling a deleterious or poisonous solvent, use it in a drought chamber.

When handling a deleterious or poisonous solvent or a similar solvent, wrong handling may lead to unexpected accidents.
Furthermore, please obtain the material safety data sheet (SDS) from the company from which you purchased the product for your safety use.

⚠ Caution

Precautions for the installation environment

A poor installation environment may accelerate damage to the product or fail to fully demonstrate its performance.

When installing the product, select the following place and install it.

- Free of flammable solid, liquid or gas in the surrounding.
- With out exposure to direct sunshine.
- The ambient temperature is between 5 and 35ºC.
- Well ventilated. Or can be fully ventilated.

- Not condensing.
- Has a little humidity and does not have water droplet.
- Has a little dust.
- Horizontal, stable and robust.
  (Check the weight in operation of the product)

4-2 Installation conditions

⚠ Caution

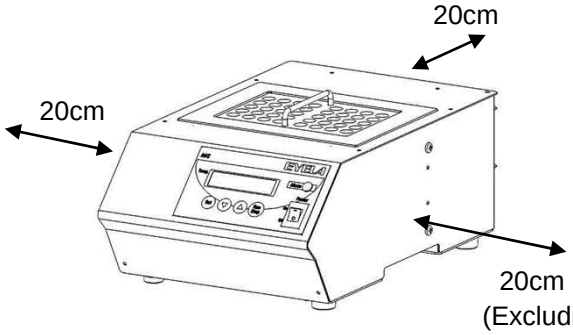
Secure space around the device

Be sure to secure space as shown in the figure away from the wall surface, ceiling surface, etc.

⚠ Caution

Be careful about the handling of aluminum blocks

When carrying about aluminum blocks, firmly hold the handle.
If you drop a block on your hand or foot, you may get injured.



(Excluding the heating unit which is an option)

4-3 Connecting utilities

⚠ Warning

Check the voltage, phase and capacity of power and correctly connect it

Wrong connection of power source
may cause fire or electric shock accidents.

⚠ Warning

Correctly connect ground wires

Never connect ground wires to the gas or water pipe to prevent electric shock accidents.

⚠ Warning

Do not use branched output or table tap

It may cause
cable burning or fire from overcurrent.

(1) Check the voltage, phase and capacity of power source to connect to the product model.
Power source to which the product connects is as follows.

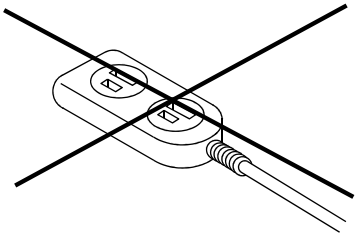
Product model	Power source necessary for connection	
	Voltage	Capacity
MG-3100	AC100V	15A

(2) Check the outlet at the installation place.
Prepare an outlet with grounding.

* Do not connect the power plug to the outlet, yet.

* Check that the covering of the power cord is not damaged.

There is a fear of electric shock.
* When connecting to the power source, do not use branched outlet or table tap.



Specification of power cord

Cable		Power plug	Section area of electric wire (AWG)
Length	Thickness (outer diameter)		
About 2 m	About 7 mm	3 poles with grounding	0.75 mm^2 (AWG18)

5 Operation

5-1 Preparation for operation

⚠ Caution

Pay attention to the number of aluminum blocks

Be sure to set the maximum number of aluminum blocks for each device before operation. It may cause degradation of and temperature distribution or abnormal heat of the heater.

⚠ Caution

Be careful about the temperature when replacing aluminum blocks

Check that the aluminum blocks and block handle are cooled down before working on them. Touch at high temperatures may lead to burn.

⚠ Caution

Use only designated aluminum blocks.

Use of an aluminum block other than those designated may worsen temperature control or temperature distribution and may cause unexpected accidents.

⚠ Caution

Be fully careful about the use of inflammable and flammable solutions

An inflammable, flammable solution (methanol etc.) turns into gas if allowed to stand at more than the room temperature (or below it depending on a solution), potentially leading to catching fire or burning with a certain source of ignition.
For use, be sure to ventilate the room and exercise full cautions.

⚠ Caution

A liquid spilt over the heating plate or top surface of the device should be wiped off promptly.

Water or a solution spilt over the top surface of the device or the heating plate should be wiped off promptly.

If it is left to stand, the heating plate may get corroded or infiltration into the device may lead to an accident such as electric leakage.

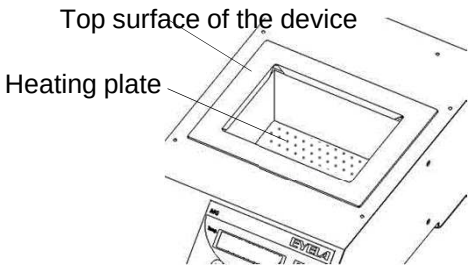
(1) Prepare aluminum blocks suitable for the container to be used.
See the right table for the types and required number of aluminum blocks.

See "Option" on page 37 for types of blocks.

Half block	Regular block
Model MGBH: 2	Model MGB: 1

* If you use a container other than glass, please check the temperature limit before use.
Depending on the temperature in use, the container may dissolve.

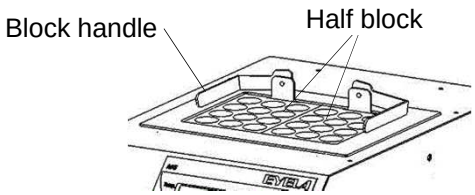
* When changing aluminum blocks, do not place high temperature aluminum block on the top surface of the device. The device may go out of order.

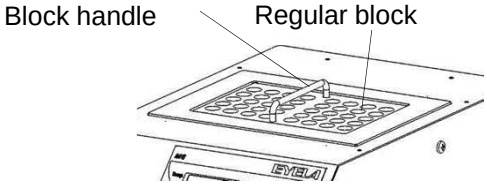


(2) Check that the heating plate and bottom surface of aluminum blocks are free of deformation or attachment of trash, stains, etc.

* Deformation of the heating plate or attachment of trash, stains, etc. may worsen temperature precision or temperature distribution.

(3) Gently place the required number of blocks.
The block handle of a regular block should be placed inside the block.
The block handle of a half block should be caracoled and placed on the top surface of the device.





(4) Check that the power switch is OFF and insert the power plug into the outlet.

5-2 Start/stop of temperature control

This starts/stops temperature control.

* Setting method is common to block control and liquid temperature control.
  - Block control: Control temperature of aluminum blocks
  - Liquid temperature control: Control liquid temperature with a sample temperature sensor, which is an opti

⚠ Caution

Do not heat with a container sealed

If you close the cover and heat to high temperatures in an airtight state,
the pressure inside the container increases and the container may get broken.

Check the set temperature and the state of the solution and cover before starting operation.

⚠ Caution

Do not touch the aluminum blocks and block handle during and after use

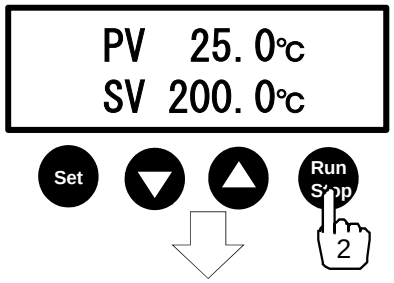
If the set temperature is high, the aluminum blocks and block handle are at high temperatures during and after use.
If you touch any of them, you may get burned. Be careful.

1) Turn on the power switch.
The mode and version are displayed and then the standard screen appears.

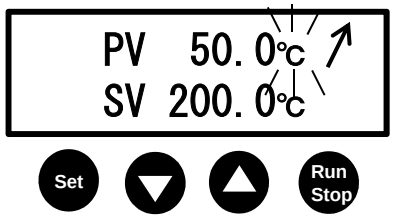
2) Start temperature control
Press "Run/Stop" key.
"ºC" in PV column switches to blinking, starting temperature control.

* The blinking display is not interlocked with energization of the heater.
During temperature rise, "↗" is displayed. "→" is displayed during temperature control.

Standard screen

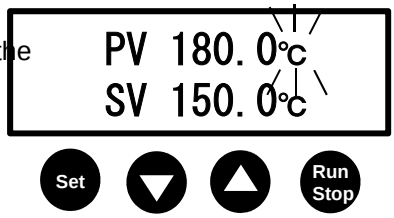


During temperature rise

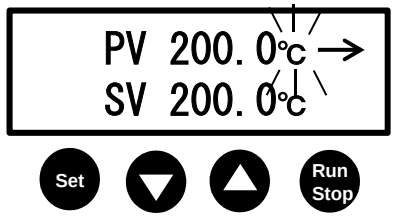


During suspension of temperature control

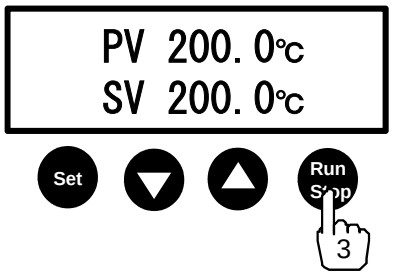
(The situation that the liquid temperature exceed the set temperature)



During temperature control



3) Stop temperature control
Press "Run/Stop" key.
"ºC" in PV column switches to lighting, stopping temperature control.



Processing after operation

When you terminate operation,
stop temperature control before turning OFF the power switch. If you do not use the device for a long time, unplug from the outlet.

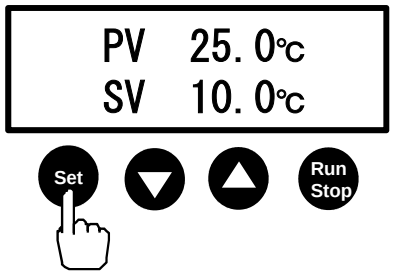
5-3 Temperature setting

Set the temperature you want to control.

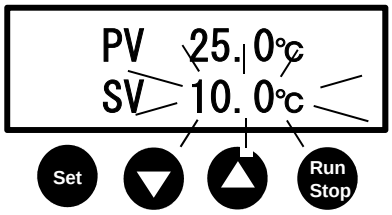
* Setting method is common to block control and liquid temperature control.
  • Block control: Control temperature of aluminum blocks
  • Liquid temperature control: Control liquid temperature with a sample temperature sensor, which is an option
* The temperature set can be changed during temperature control or stop of temperature control.

> **⚠ Caution**
>
> **Pay attention to the set temperature**
>
> Setting temperature beyond the ignition point of the solution may result in burning.
>
> Check the solution to be used and the set temperature.

1) Press "Set" key on the standard screen.



2) SV (set temperature) switches to blinking, enabling temperature to be set.



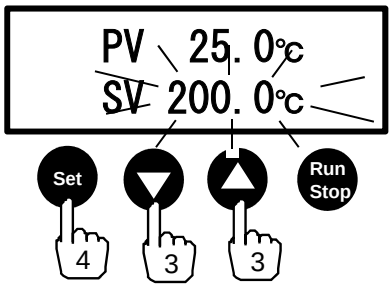
3) Press "▲" or "▼" to enter the set temperature:

if you continue pressing it, the value continuously changes.

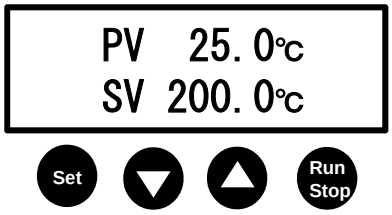
Range of setting

• Block control: 10.0 to 200.0ºC (Default 10.0ºC)
• Liquid temperature control:10.0 to 170.0ºC

4) Press "Set" key to confirm.



5) SV (set temperature) switches to the normal display.

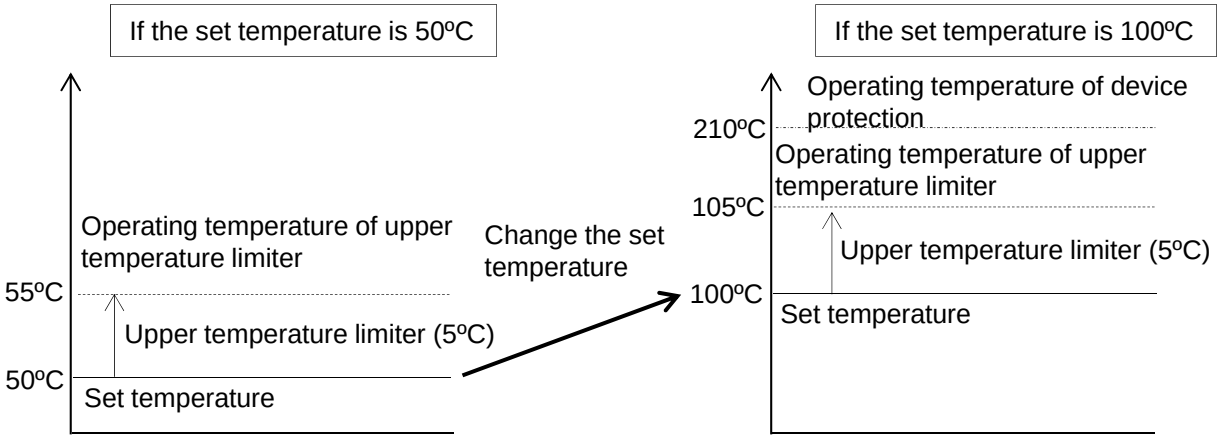


5-4 Setting mode

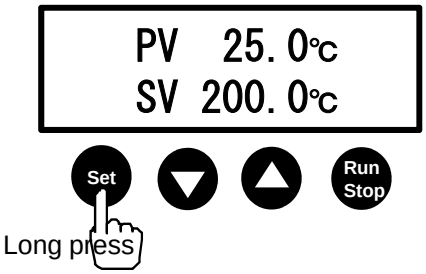
5-4-1 Upper temperature limiter

If the set temperature exceeds "Set temperature + Upper temperature limiter," the alarm is displayed, stopping temperature control.

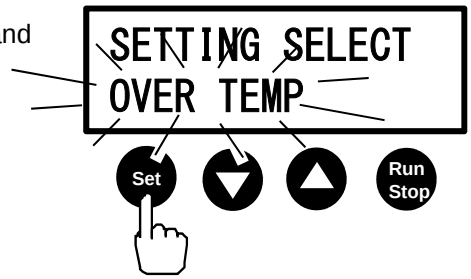
* The set temperature is changed but the set value of the upper temperature limiter remain unchanged (See the figure below)
* The device operates as the device protection even beyond 210ºC.
* Both block control and liquid temperature control are effective.



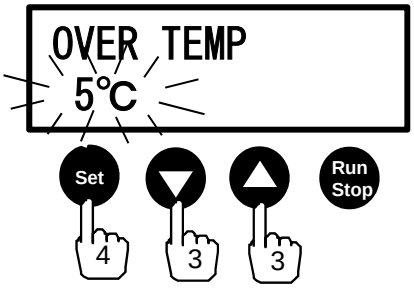
1) Long press "Set" key on the standard screen.



2) Press "▼" or "▲" key, check that "OVER TEMP" is blinking and press "Set" key.



3)Press "▲" or "▼" key and enter the set value.

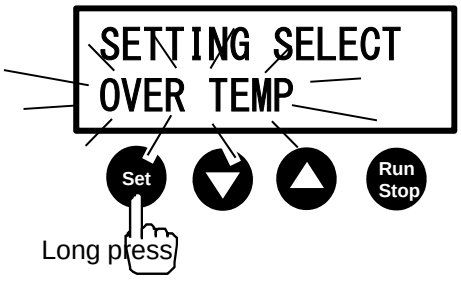


if you continue pressing it, the value continuously changes.

Range of setting: 0-60ºC (Default 5ºC)

4) Press "Set" key to confirm.

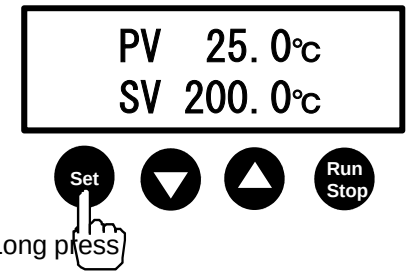
5) Long press "Set" key.
It returns to the initial standard screen.



5-4-2 Timer mode, step program

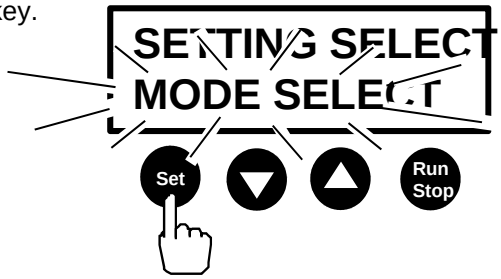
Functions of auto start, auto stop and step program can be set.
Step program can be set up to 8 steps.

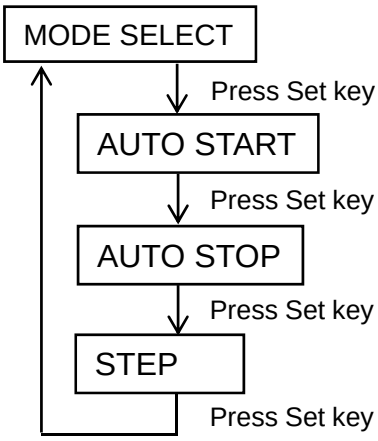
1) Long press "Set" key on the standard screen.



2) Check that "MODE SELECT" is blinking and press "Set" key.

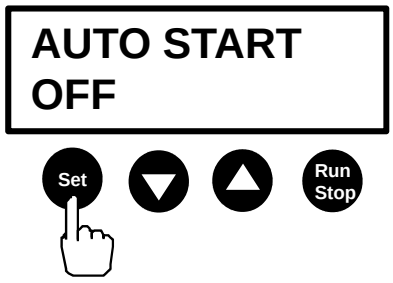
Set screen of each mode is displayed in the following order.





3) The setting screen for **AUTO START** is displayed.

Press "Set" key while the auto start is invalid "OFF" and the screen moves to the setting screen in (8) Auto stop.

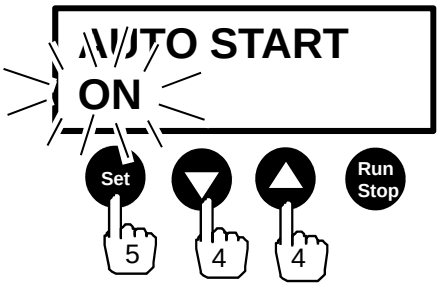


4) To turn "ON" the Auto start, press "▲" or "▼" key.

The blinking display switches "ON"←→"OFF."

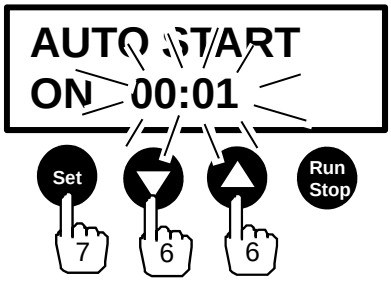
* Even if you change it to OFF, the condition you set once will not be erased.

5) Press "Set" key to confirm.



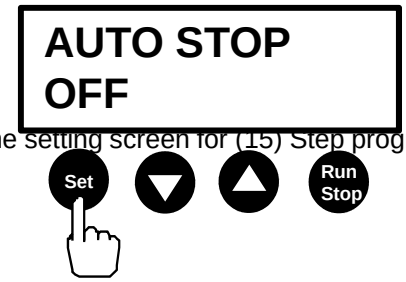
6) Press "▲" or "▼" key to enter the time to operation start.

Range of setting: 1 min to 99 hrs. and 59 min (Default 1 min)



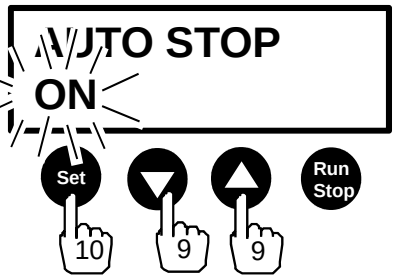
7) Press "Set" key to confirm.
It moves to the setting screen for Auto stop.

8) **AUTO STOP** setting screen appears.



Press "Set" key while the auto stop is turned OFF and it moves to the setting screen for (15) Step program.

9) Select Effective or Non-effective of Auto stop.
Press "▲" or "▼" key to switch to "ON"←→"OFF" blinking display.



* Even if you change it to OFF, the condition you set once will not be erased.

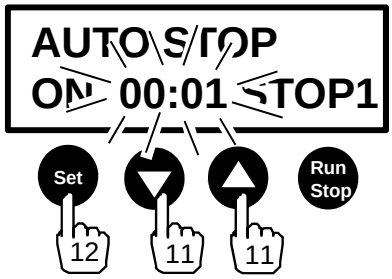
* You may not be able to set Auto stop and Step program at the same time.

If Step program is turned ON, Auto stop will automatically switch to OFF.

If Auto stop is turned ON, Step program will automatically be switched OFF.

10) Press "Set" key to confirm.

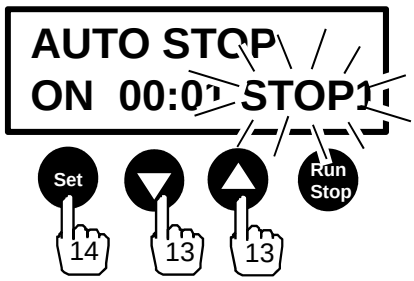
11) Press "▲" or "▼" key to enter the time to operation stop.



Range of setting: 1 min to 99 hrs. and 59 min (Default 1 min)

12) Press "Set" key to confirm.

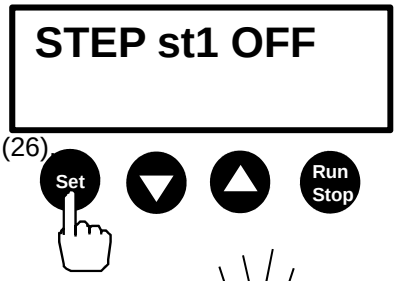
13)Press "▲" or "▼" key to enter the condition for start counting.



STOP1: Start counting at the same time as operation start.
STOP2: Start counting after the set temperature is reached.

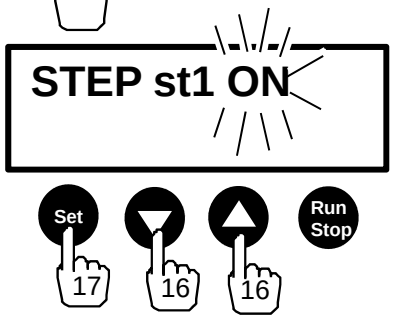
14) Press "Set" key to confirm.

15) **STEP** setting screen appears.



Press "Set" key while Step program is turned "OFF" and it moves to (26).

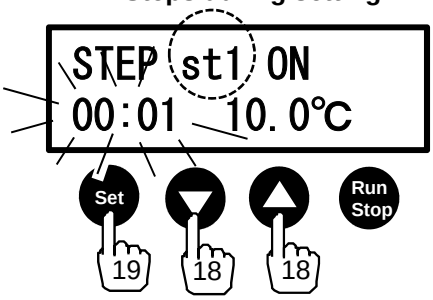
16)Select Effective or Non-effective of Step program.
Press "▲" or "▼" key to switch to "ON"←→"OFF" blinking display.



* Even if you change it to OFF, the condition you set once will not be erased.

17) Press "Set" key to confirm.

Steps during setting



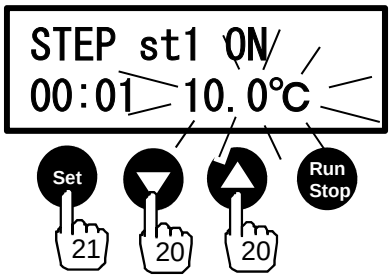
18) Conditions for "Step" being displayed should be set.
Press "▲" or "▼" key to enter the time of duration.

Range of setting: 1 min to 99 hrs. and 59 min (Default 1 min)

19) Press "Set" key to confirm.

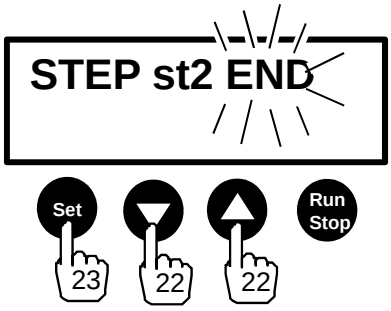
20)Press "▲" or "▼" key to enter the setting temperature.

21) Press "Set" key to confirm.
The following "Steps" appear.



* Confirm at Step 8 and it moves to (26).

22) Conditions for "Step" being displayed should be selected.
Press "▲" or "▼" key to switch to
"ON" □□"END"□□"SKIP"□□"CONT" blinking display.

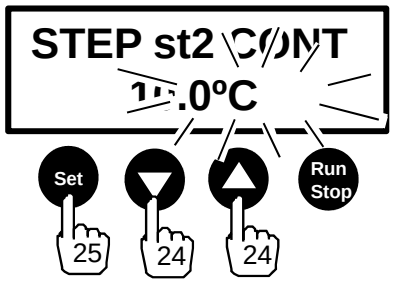


ON	Move to Step being displayed. After reaching the set temperature, start counting at the set time. After completion of counting, move to the next step.
END	Stop control with Step being displayed.
SKIP	Skip one step being displayed and move to the next step If Step 8 is set to SKIP, control stops at Step 8 (When you want to skip the Step without changing set values for all Steps)
CONT	Move to the Step Number being displayed. Move to the constant-value operation after reaching the set temperature.

23) Press "Set" key to confirm.
If "ON", it moves to (18) Step.
If "END," it moves to (26) Step.
If "SKIP," it moves to (18) Step.
(If Step 8 is set to SKIP, it moves to (26) Step)
If "CONT," it moves to the next step.

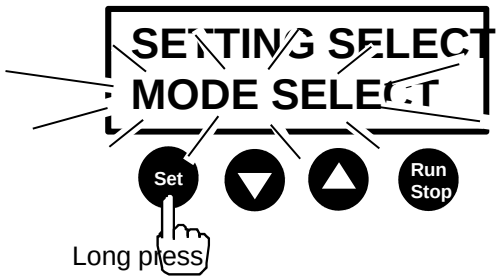
24) Set the temperature to move to the constant-value operation. Press "▲" or "▼" key to enter the set temperature.

25) Press "Set" key to confirm.

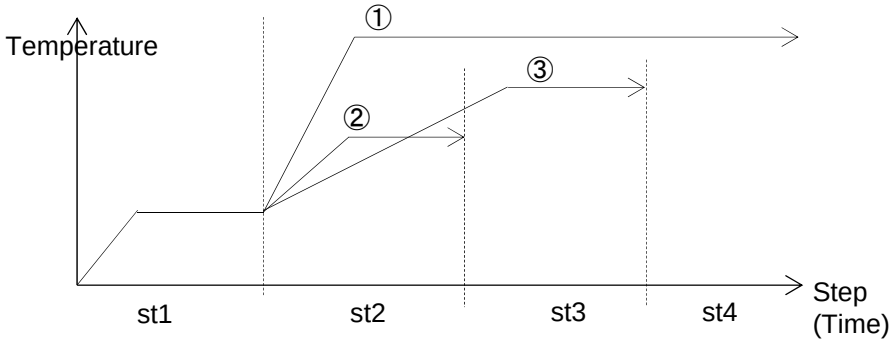


26) Setting of respective modes is completed.
It returns to "MODE SELECT" blinking screen as in (2).

27) Long press "Set" key.
It returns to the initial standard screen.



Example of Step program



Example (i) If CONT is used in the last step

st1	ON	After the set temperature is reached, control temperature until the set time finishes
st2	CONT	Move to the constant-value operation after reaching the set temperature. Temperature control continues until control is stopped.

Example (ii) If END is used in the last step

st1	ON	After the set temperature is reached, control temperature until the set time finishes
st2	ON	After the set temperature is reached, control temperature until the set time finishes
st3	END	Stop control at the same time as movement to Step 3

Example (iii) If SKIP is used on the way

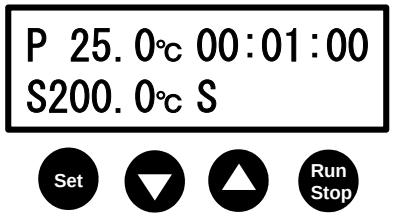
st1	ON	After the set temperature is reached, control temperature until the set time finishes
st2	SKIP	Skip to Step 2 and move to Step 3.
st3	ON	After the set temperature is reached, control temperature until the set time finishes
st4	END	Stop control at the same time as movement to Step 4

Standard screen of each mode and operation

●Auto start
- Counting number is displayed upper right
- "S" is displayed lower right

1) Press "Run/Stop" key and counting starts.
"S" blinks
2) Temperature control starts upon counting zero.
"S" is hidden

*If you press "Run/Stop" key during counting or temperature control, control stops and counting is reset.

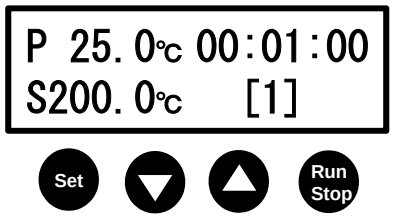


●Auto stop
- Counting number is displayed upper right
- If STOP1 lower right, [1] is displayed and If STOP2, [2] is displayed

1) If you press "Run/Stop" key, temperature control starts
2) Counting starts under the set Auto stop condition.

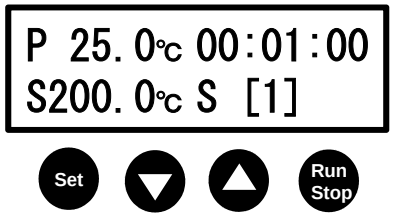
[1] or [2] blinks.
3) Control stops upon counting zero.

*Press "Run/Stop" key during temperature control or counting and control stops and counting is reset.



●Auto start and Auto stop
- Counting number is displayed upper right
- "S" is displayed lower right
- If STOP1 lower right, [1] is displayed and If STOP2, [2] is displayed

1) Press "Run/Stop" key and counting starts.
2) Upon counting zero it moves to Auto stop.



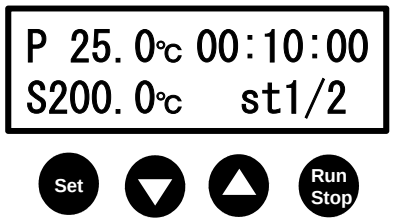
●Step program
- The counting number to the current Step is displayed upper right
- "Current Step/All Steps" are displayed lower right

1) Press "Run/Stop" key and control starts in the current Step condition.

The current Step number blinks.
2) Move to the next step upon counting zero.
3) If all Steps are complete, control stops.

* Long press "▲" during temperature control and the current Step is SKIPPED.

* Press "Run/Stop" key during temperature control and control stops, returning to the initial Step.



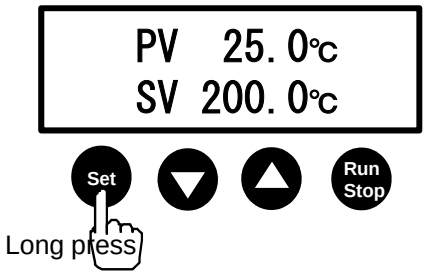
●Auto start and Step program
- Counting number is displayed upper right
  (While control is stopped, counting number for Auto start is displayed)
- "S" is displayed lower right
- "Current Step/All Steps" are displayed lower right

1) Press "Run/Stop" key and counting starts.
2) Move to the Step program upon counting zero.

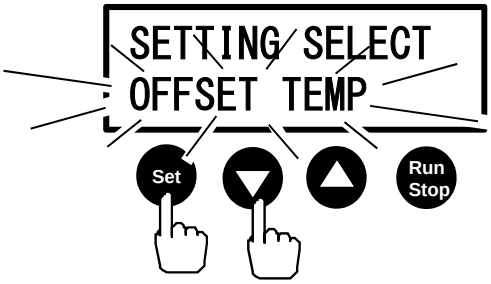
5-4-3 Temperature correction

Display temperature can be corrected by setting an optional value.

1) Long press "Set" key on the standard screen.

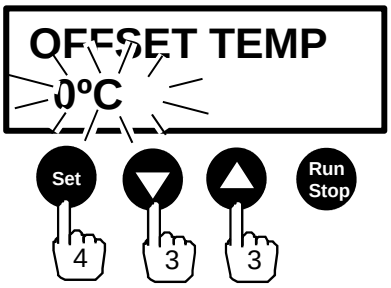


2) Press "▼" or "▲" key, check that "OFFSET TEMP" blinks and press "Set" key.

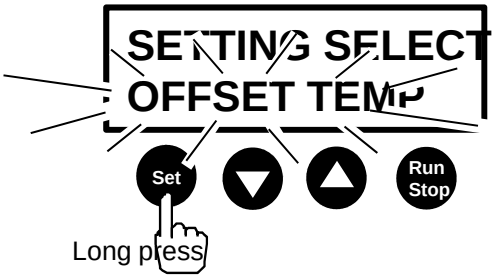


3) Press "▲" or "▼" to enter the set temperature:
if you continue pressing it, the value continuously changes.
Setting range: -3.0 - 10.0ºC (Default 0ºC)

4) Press "Set" key to confirm.



5) Long press "Set" key.
It returns to the initial standard screen.



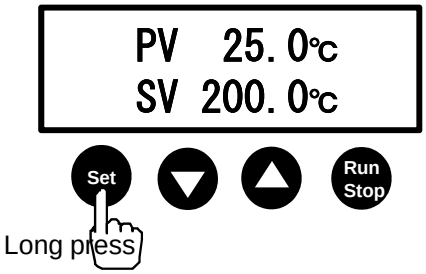
5-4-4 Blackout recovery

Movement after recovery of blackout occurring during temperature control can be set.
(When power supply to product during temperature control is once turned OFF and ON)

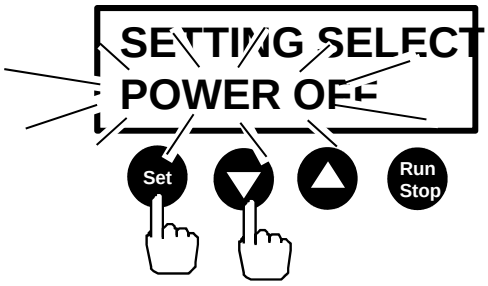
* Setting method is common to block control and liquid temperature control.

OFF	Control starts in the pre-recovery state (no alarm displayed)
STOP	Control stops (A-4 alarm displayed)
CONT	Control starts in the pre-blackout state (A-4 alarm displayed alternately)

1) Long press "Set" key on the standard screen.

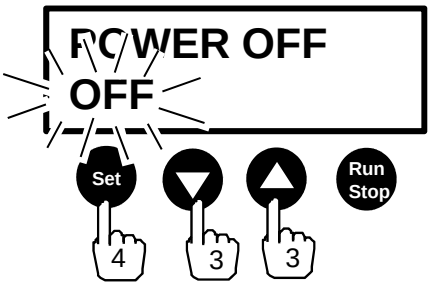


2)Press "▼" or "▲" key, check that "POWER OFF" is blinking and press "Set" key.



3) Press "▲" or "▼" each time and “OFF”←→”STOP”←→”CONT” blinking display switches in this order.

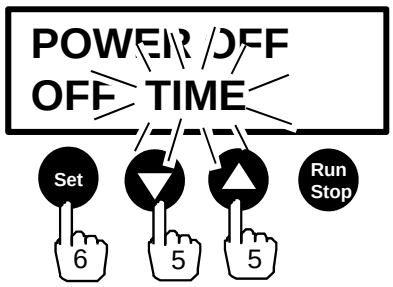
4) Press "Set" key to confirm.
In case of "STOP," move to (7).



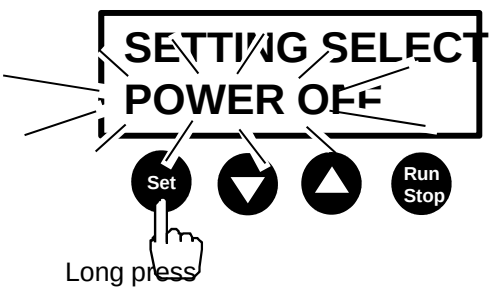
5) Press "▲" or "▼" key and "TIME"←→"TEMP" blinking display switches.

TIME: Counting restarts upon recovery
TEMP: Counting restarts once the set temperature is reached

6) Press "Set" key to confirm.



7) Long press "Set" key.
It returns to the initial standard screen.

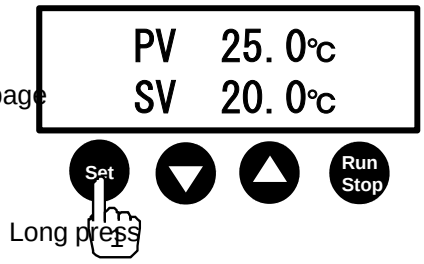


5-4-5 Auto tuning (Block control)

Temperature control precision for blocks is automatically adjusted.

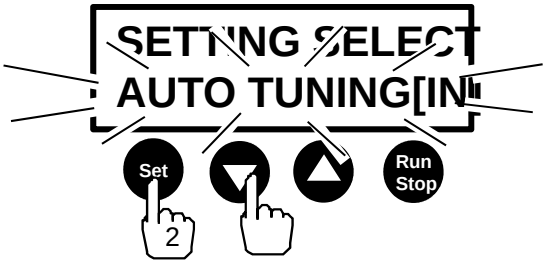
* Temperature control precision may get worse depending on the condition. In this case see "5-4-7 PID setting (Block control)" on page 24 and you can return to the default.

* When the sample temperature sensor is connected, Auto tuning for block control is possible.

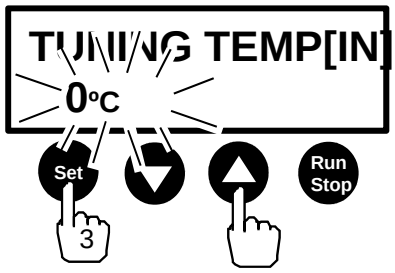


1) Long press "Set" key on the standard screen.

* Operate after stopping temperature control.



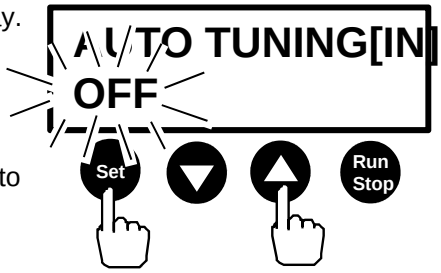
2) Press "▼" or "▲" key, check that "AUTO TUNING [IN]" is blinking, and press "Set" key.



3) Press "▲" or "▼" key to enter the setting temperature.

if you continue pressing it, the value continuously changes.
Press "Set" key to confirm.

* The temperature range for PID value automatically switches in line with the set temperature.



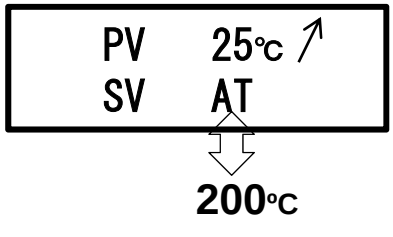
4)Press "▲" or "▼" key to switch to "OFF"←→"ON" blinking display.

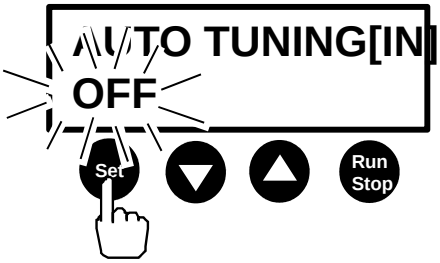
If "Set" key is pressed with "ON," the screen switches to the standard screen, starting Auto tuning.

If "OFF" is selected, the screen goes to (5) without performing Auto tuning.

During Auto tuning

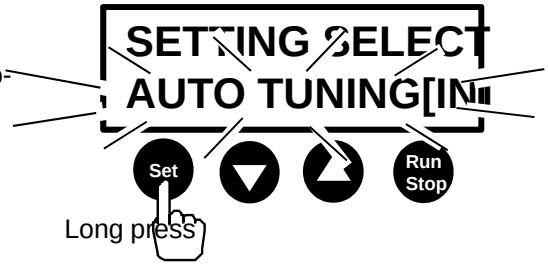
"AT" and "set temperature" are displayed alternately in SV column.
"ºC" switches to blinking display, indicating that temperature is being controlled.
* *Press "Run/Stop" key and Auto tuning can be forced to stop. If Auto tuning is stopped on the way, the PID value remains unchanged.
* During tuning, the device automatically stops in about 3 hours upon reaching the set temperature.





5) Once tuning is complete, the display switched to the one in the right figure.
Press "Set" key while "OFF" is blinking.

6) See the step in "5-4-7 PID setting (Block control)" on page 24.

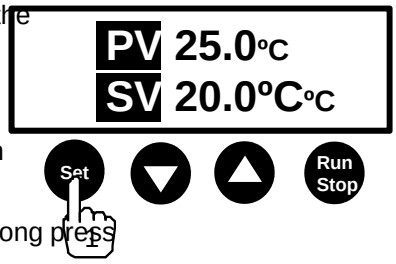


7) Long press "Set" key.
It returns to the initial standard screen.
SV (set temperature) switches to the set temperature auto-tuned.

5-4-6 Auto tuning (Liquid temperature control)

Temperature control precision of sample automatically adjusts with the sample temperature sensor.

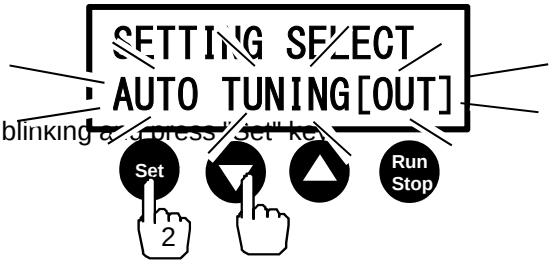
* Temperature control precision may get worse depending on the condition.
  In this case, see "5-4-8 PID setting (Liquid temperature control)" on page 25 to return to the default.



*Only while the sample temperature sensor is connected, this setting screen appears.

* Operate after stopping temperature control.

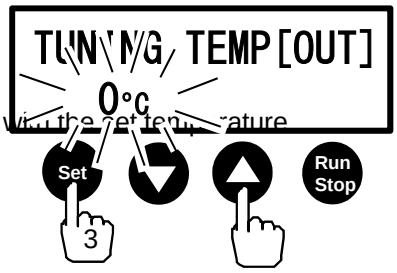
1) Long press "Set" key on the standard screen.



2) Press "▼" or "▲" key, check that "AUTO TUNING[OUT]" is blinking and press "Set" key.

3) Press "▲" or "▼" key to enter the setting temperature.

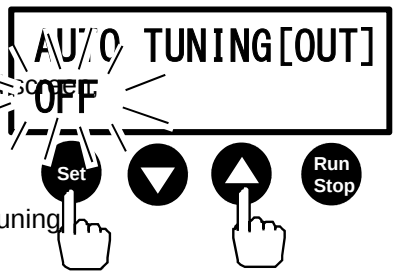
If you continue pressing it, the value continuously changes.
Press "Set" key to confirm.



* The temperature range for PID value automatically switches in line with the set temperature.

There is a fear of overshoot by 5 to 10°C.
It is recommended that Auto tuning is performed with a sample having no impact.

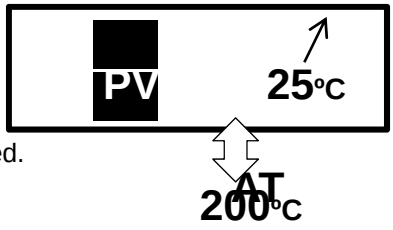
4)Press "▲" or "▼" key to switch to "OFF"←→"ON" blinking display.
If "Set" key is pressed with "ON," the screen switches to the standard screen starting Auto tuning.



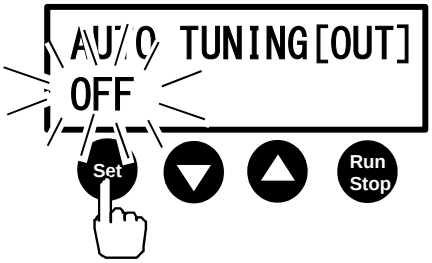
If "OFF" is selected, the screen goes to (5) without performing Auto tuning.

During Auto tuning

"AT" and "set temperature" are displayed alternately in SV column.
"°C" switches to blinking display, indicating that temperature is being controlled.
* Press "Run/Stop" key and Auto tuning can be forced to stop.
If Auto tuning is stopped on the way, the PID value remains unchanged.
* During tuning, the device automatically stops in about 3 hours upon reaching the set temperature.

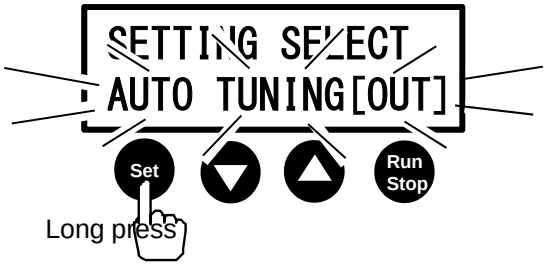


5) Once tuning is complete, the display switched to the one in the right figure.
Press "Set" key while "OFF" is blinking.



6) To confirm PID, see the step in "5-4-8 PID setting (Liquid temperature control)" on page 25.

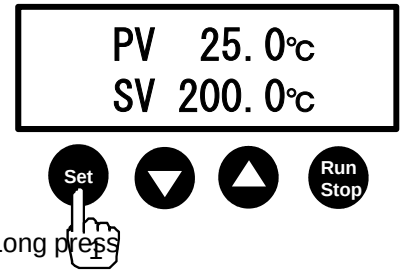
7) Long press "Set" key.
It returns to the initial standard screen.
SV (set temperature) switches to the set temperature auto-tuned.



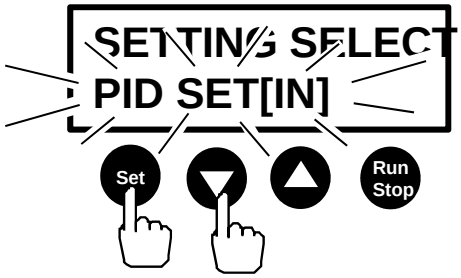
5-4-7 PID setting (Block control)

PID value related to the block temperature control precision can be changed manually.
* PID value can be individually set in the low and high temperature areas of the set temperature.

* If you return to the default, see "5-4-12 Default of parameter set value" on page 29.



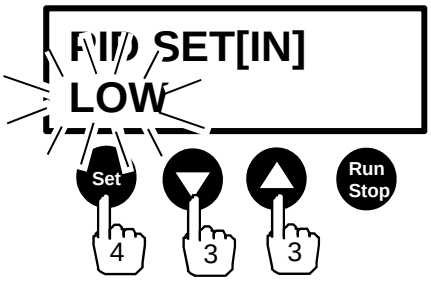
1) Long press "Set" key on the standard screen.



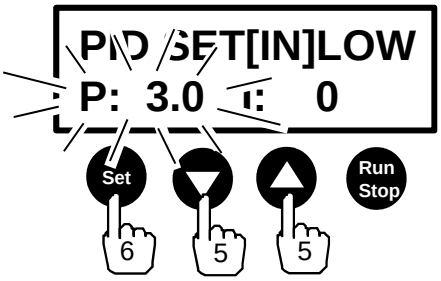
2) Press "▼" or "▲" key, check that "PID SET[IN]" is blinking and press "Set" key.

3) Press "▼" and/or "▲" key to select the temperature range.
Blinking display switches to "LOW"←→"HIGH."

Temperature range
LOW :10.0ºC-59.9ºC
HIGH: 60.0ºC-200.0ºC



4) Press "Set" key to confirm.



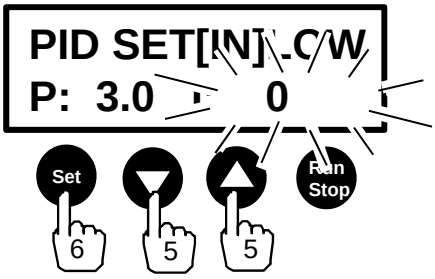
5) Check that the value of "P: *" is blinking.

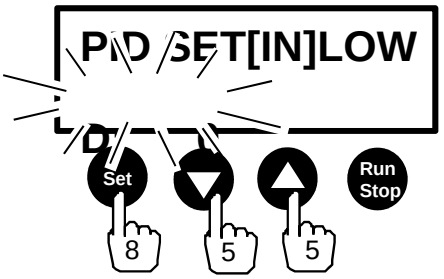
Press "▲" or "▼" key to enter the P value.

if you continue pressing it, the value continuously changes.

6) Press "Set" key to confirm.
The blinking display moves to the next item.

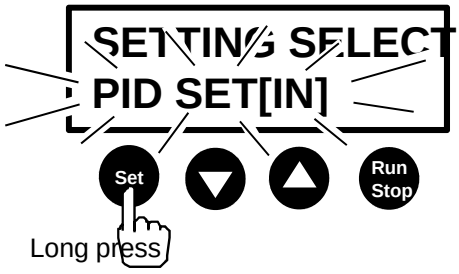
7) Repeat steps in (5) to (6) to confirm the remaining "I" and "D."





8) Once "D" is confirmed, the screen returns to one step before.

9) Long press "Set" key.
It returns to the initial standard screen.

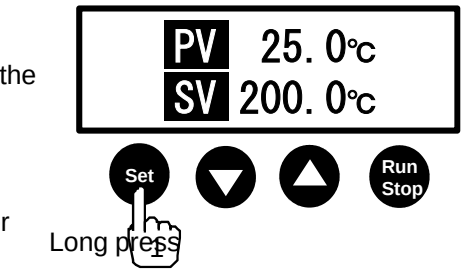


5-4-8 PID setting (Liquid temperature control)

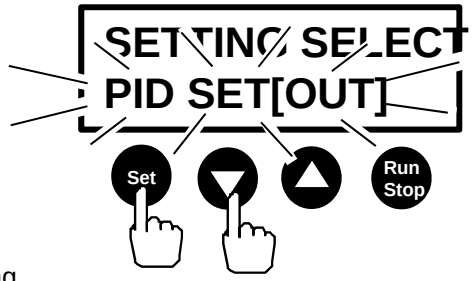
The PID value related to the temperature control precision of the sample temperature sensor can be changed manually.
* PID value can be individually set in the low and high temperature areas of the set temperature.

* *If you return to the default, see "5-4-12 Default of parameter set value" on page 29.

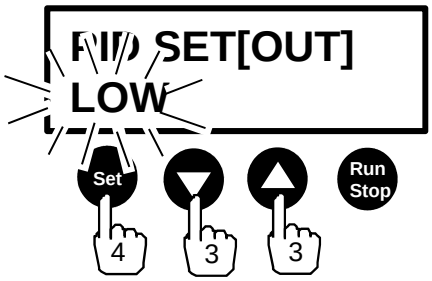
* Only while the sample temperature sensor is connected, this setting screen appears.



1) Long press "Set" key on the standard screen.



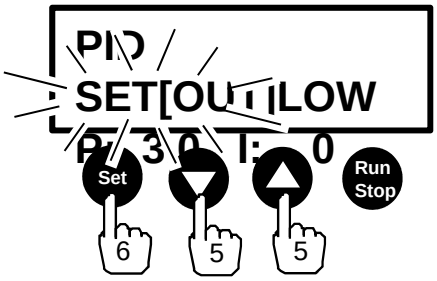
2) Press "▼" or "▲" key, check that "PID SET[OUT]" is blinking, and press "Set" key.



3) Press "▼" and/or "▲" key to select the temperature range.
Blinking display switches to "LOW"←→"HIGH."

Temperature range
LOW :10.0ºC-59.9ºC
HIGH: 60.0ºC-170.0ºC

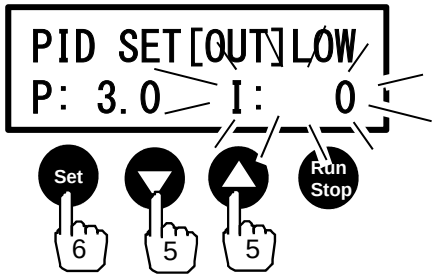
4) Press "Set" key to confirm.



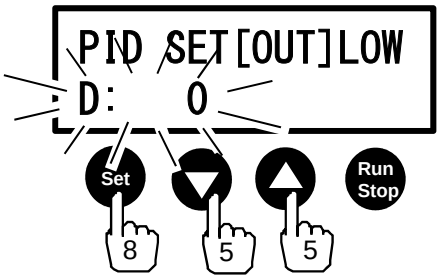
5)Check that the value of "P: *" is blinking.

Press "▲" or "▼" key to enter the P value.
If you continue pressing it, the value continuously changes.

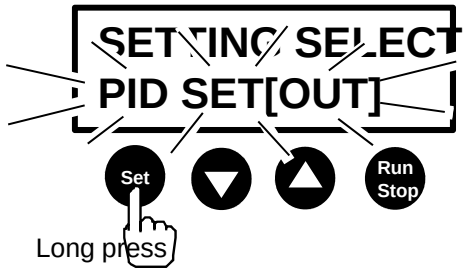
6) Press "Set" key to confirm.
The blinking display moves to the next item.



7) Repeat steps in (5) to (6) to confirm the remaining "I" and "D."



8) Once "D" is confirmed, the screen returns to one step before.



9) Long press "Set" key. It returns to the initial standard screen.

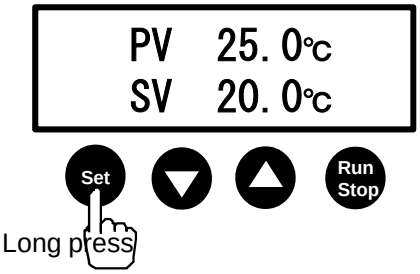
5-4-9 Key lock

Key switch locking function can be set.

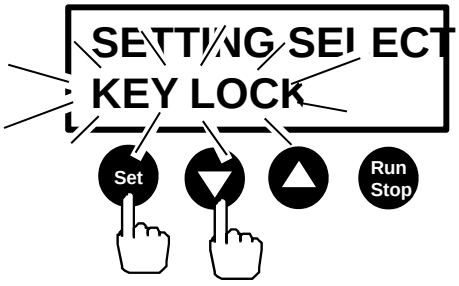
OFF	Locking function is not used
ALL	Lock the set mode (long press of Set key) and change to SV (press Set key)
T-LOCK	Lock change to SV (press Set key)
S-LOCK	Lock setting mode (long press of Set key)

● **Select key lock**

1) Long press "Set" key on the standard screen.

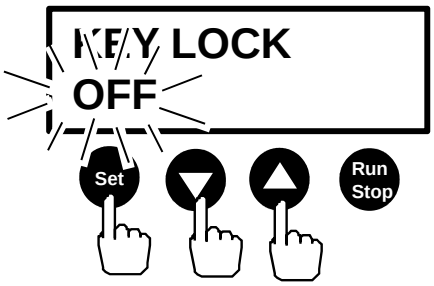


2) Press "▼" or "▲" key, check that "KEY LOCK" is blinking and press "Set" key.

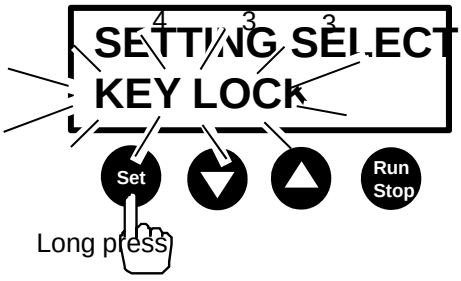


3) Each time you press "▼" or "▲" key, the blinking display switches in the order of "OFF"←→"ALL"←→"T-LOCK"←→"S-LOCK".

4) Press "Set" key to confirm.



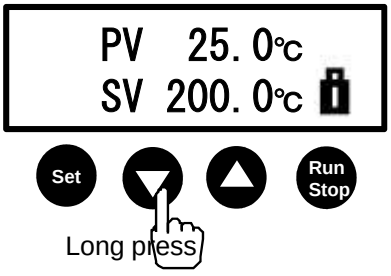
5) Long press "Set" key.
It returns to the initial standard screen.



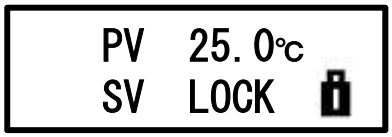
● **Effective/Non-effective of key lock**

1) Long press "▼" key and "key mark" appears, switching the key lock to becoming effective.

2) Long press "▼" key again and the "key mark" is hidden, switching the key lock to becoming non-effective.



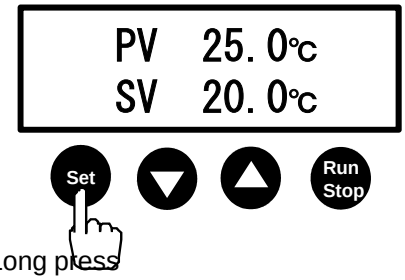
If a locked function (key) is pressed, "LOCK" appears in SV column.



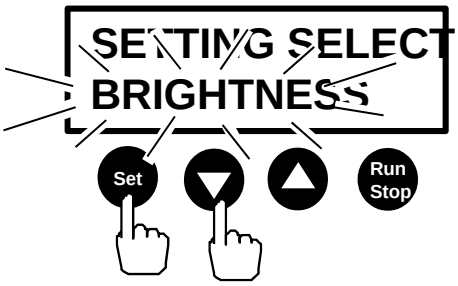
5-4-10 Back light adjustment

The intensity of the back light for the display can be adjusted.

1) Long press "Set" key on the standard screen.

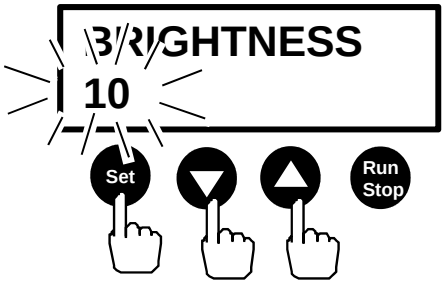


2) Press "▼" or "▲" key, check that "BRIGHTNESS]" is blinking and press "Set" key.



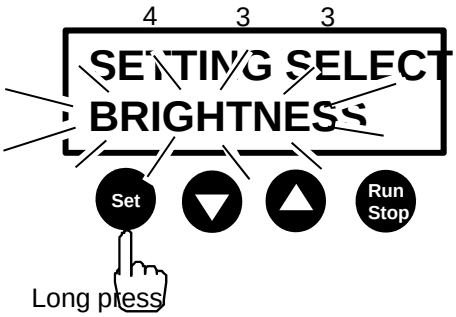
3) Press "▲" or "▼" key to change the value and adjust the intensity of light.

Adjustment range: 0-10 (0: Back light out)



4) Press "Set" key to confirm.

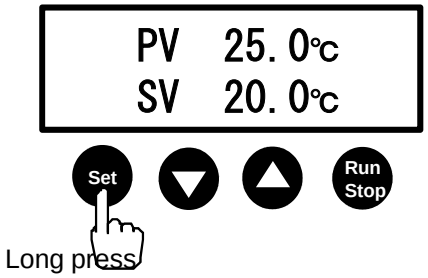
5) Long press "Set" key.
It returns to the initial standard screen.



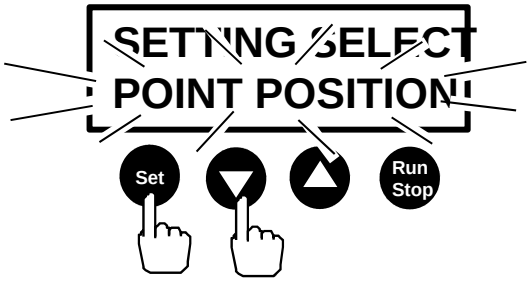
5-4-11 Changing decimal point position

This is the method of displaying the first decimal place.

1) Long press "Set" key on the standard screen.

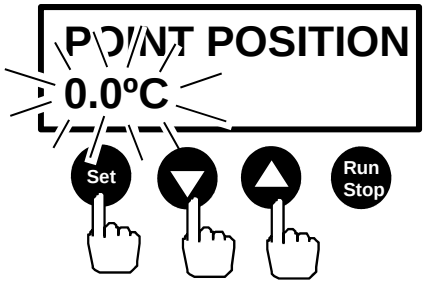


2) Press "▼" or "▲" key, check that "POINT POSITION" is blinking and press "Set" key.

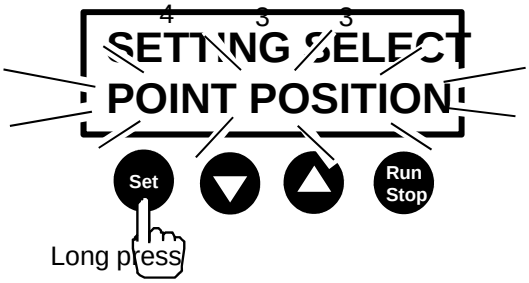


3) Press "▲" or "▼" key
Blinking display switches to "0ºC"←→"0ºC."

4) Press "Set" key to confirm.



5) Long press "Set" key.
It returns to the initial standard screen.



5-4-12 Default of the parameter set value

The default of each parameter set value is shown in the table below.
If you changed a set value by mistake, revert it to the value in the table below.

Item	Display	Default
Auto start	AUTO START [SET]	OFF
Auto start setting time	AUTO START [TIME]	00:01
Auto stop	AUTO STOP [SET]	OFF
Auto stop setting time	AUTO STOP [TIME]	00:01
Auto stop starting condition	AUTO STOP [TYPE]	STOP1
Step 1 *1	STEP st1 [SET]	OFF
Step 1 setting time *1	STEP st1 [TIME]	00:01
Step 1 setting temperature *1	STEP st1 [TEMP]	10
Upper temperature limiter	OVER TEMP	5
Temperature correction	OFFSET TEMP	0.0
Blackout recovery	POWER OFF	OFF
Auto tuning (Block control)	AUTO TUNING [IN]	OFF
Auto tuning (Liquid temperature control)	AUTO TUNING [OUT]	OFF
PID setting (Block control) in the low temperature range	PID SET[IN] LOW (10.0-59.9ºC)	P:1.0 I:21 D:5
PID setting (Block control) in the high temperature range	PID SET[IN] HIGH (60.0ºC-200ºC)	P:1.0 I:21 D:5
PID setting (Liquid temperature control) in the low temperature range	PID SET[OUT] LOW (10.0ºC-59.9ºC)	P:12.5 I:420 D:225
PID setting (Liquid temperature control) in the high temperature range	PID SET[OUT] HIGH (60.0ºC-170.0ºC)	P:11.8 I:650 D:163
Key lock	KEY LOCK	OFF
Back light adjustment	BRIGHTNESS	10
Changing decimal point position	POINT POSITION	0.0

*1 The defaults for Steps 1-8 are all the same.

5-5 Connecting sample temperature sensor (Option)

By using the sample temperature sensor, it is possible to directly control the sample temperature.

Sample temperature sensor (sold separately)
MG-SENS-MT Code No. 274550
MG-SENS-TT Code No. 274560

⚠ Caution

Pay attention to forgetting to place the sample temperature sensor

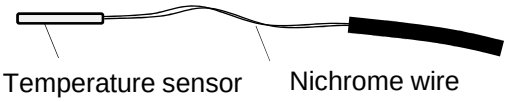
The sample temperature sensor cannot measure the liquid temperature with aluminum blocks subject to high temperatures, potentially leading to the sample in a dangerous state such as boiling and evaporation.
Be sure to check, before operation start, that the sample temperature sensor is immersed in the sample.

⚠ Caution

Pay attention to the handling of the sample temperature sensor

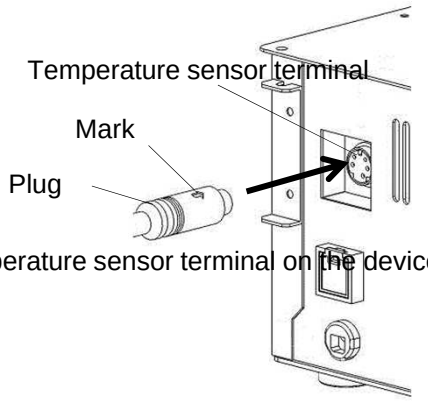
If handling MG-SENS-MT (for microtube), do not extremely bend the temperature sensor and nichrome wire or forcibly apply power.

Disconnection may occur.



(1) Turn OFF the main body power switch.

* If the sample temperature sensor is attached/removed while the power switch is ON, alarm [F-1] appears.



(3) Connect the sample temperature sensor plug to the temperature sensor terminal on the device.

(2) Remove the cap attached to the temperature sensor terminal.

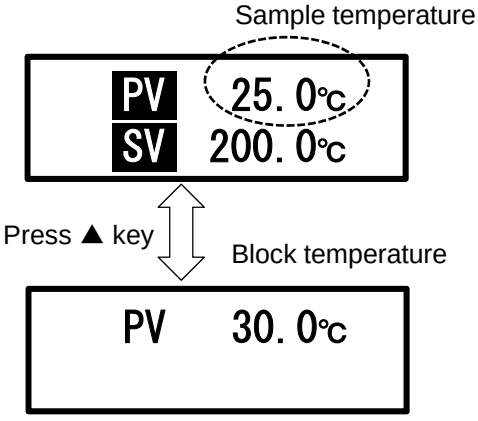
* Place the "⇨" mark on the plug upward and insert it.

(4) Turn ON the main body power switch.

If the sample temperature sensor is connected, a black frame is displayed on "PV" and "SV."

Press "▲" key and the display can switch from the sample temperature to the block temperature, vice versa.

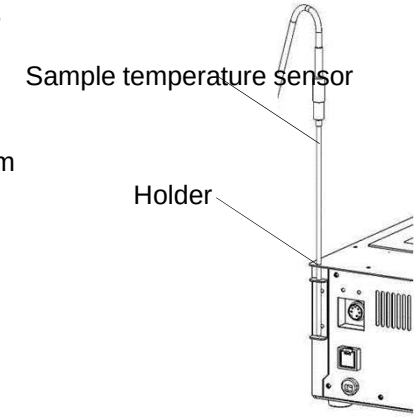
When the sample temperature rise is slow, you may display the block temperature to check the heating condition.



(5) Immerse the sample temperature sensor in the sample.

* Fixate the sample temperature sensor with clamp or much to ensure that it does not come off from the sample during use.

* In case of MG-SENS-MT, immerse 15 mm or longer from the tip in the sample.
In case of MG-SENS-TT, immerse 30 mm or longer from the tip in the sample.



• When the sample temperature sensor is not used, you can insert it in the holder of the device.

5-6 Adjusting adjuster

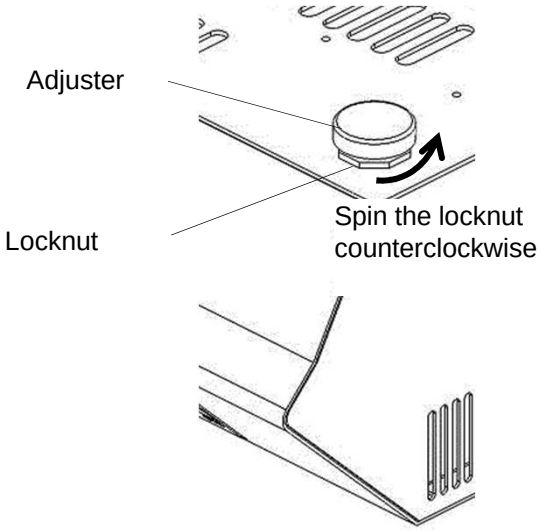
Rattling of the device can be adjusted.

* The height has been adjusted at factory shipment.
  In your normal use, no adjustment is required.

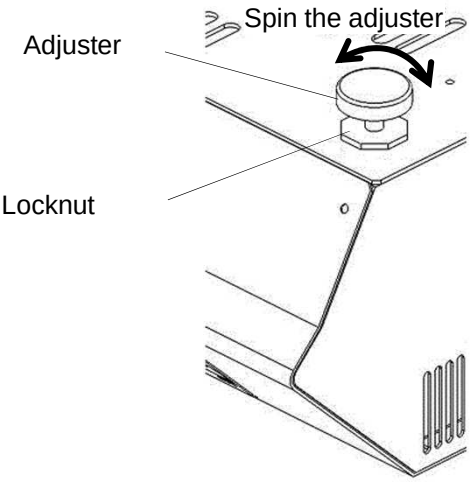
(1) Unplug from the outlet.
Take out aluminum blocks.

(2) Invert the device and place it on the base.

(3) Pinch the locknut and spin counterclockwise to loosen it.
If it does not loosen with fingers, use a spanner with opposite side of 22 mm.



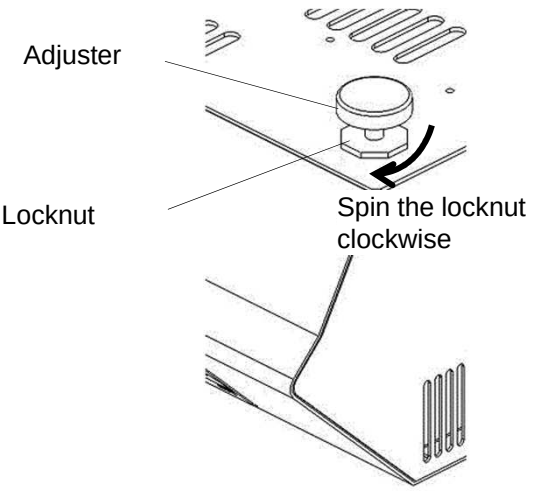
(4) Hold the locknut with a finger, rotate the adjuster to adjust the height.



(5) Return the device to its original position, check it is free of rattling and again invert the device.

(6) Hold down the adjuster with a finger, rotate the locknut clockwise to fix it.
If the locknut easily gets loosened, use a spanner.

(7) Return the device to its original position.



6 Causes of trouble and countermeasures

Contact the company from which you purchased the product or the nearby service center for trouble not listed here.

Situation	Cause	Countermeasure
Turn ON the power switch, but the display does not appear.	The plug is removed from the outlet. Or it is not securely inserted.	Turn OFF the power switch and insert the power plug into the outlet.
	Power is not supplied.	Turn ON the breaker on the distribution board.
	Movement of the fixed temperature overheat protector is not released.	Check that the heating plate temperature goes down and turn on the power.
	The power switch is out of order.	Immediately stop the operation and contact the company from which you purchased the product or the nearby service center.
	The temperature controller is out of order.	
Temperature control stops during operation. (During auto-tuning it stops on the way	The fixed temperature overheat protector is working.	Check that the heating plate temperature goes down, turn on the power and it will get back. If it is released but immediately reactivates, immediately stop the operation and contact the company from which you purchased the product or the nearby service center.
	The upper temperature limiter activated.	Increase the set temperature of the upper temperature limiter. If it still activates, immediately stop the operation and contact the company from which you purchased the product or the nearby service center.
	While the sample temperature sensor is in use, [A-3] loop abnormality alarm activated.	When the sample is too much in the quantity or is highly viscous, temperature does not go up easily, leading to activation of the alarm. Reduce the quantity of the sample or change the height of the sample temperature sensor.
	Overcurrent flowed and the fuse is blown out.	Eliminate the cause of overcurrent flow and replace the accessory fuse in accordance with 7-1 Replacement of fuse. If the fuse is run out, contact the company from which you purchased the product or the nearby service center.
	The temperature controller is out of order.	Immediately stop the operation and contact the company from which you purchased the product or the nearby service center.
Temperature does not go up. Temperature does not reach the set temperature.	The set temperature is low.	Check the set temperature.
	The temperature controller is out of order.	Immediately stop the operation and contact the company from which you purchased the product or the nearby service center.
	The heater is disconnected.	
	The temperature sensor inside the product is disconnected	
	Wind blows directly from the air-conditioner, cooling down the product.	Avoid direct blow of wind from the air-condition.
	The exhaust rate inside the drought is so fast and cool down.	Slow the exhaust rate inside the drought.
	The ambient temperature is low.	Make the ambient temperature increase to 5ºC or higher.
	Power source voltage is low.	Improve the power source voltage.
	The quantity of the sample is plenty	Reduce the sample or check it for viscosity. Or reset PID in accordance with the steps in 5-4-6 Auto-tuning (Liquid temperature control).
	The viscosity of the sample is high.	
	The sample is reduced	Please refill
	The tip of the sample temperature sensor is not sufficiently immersed in the sample. Or it is not immersed and measures the room temperature.	Sufficiently immerse it in the sample.

Situation	Cause	Countermeasure
Temperature (temperature control) is not stabilized.	PID settings are not matched.	The current PID constant may not match the usage condition you use. In order to determine the PID constant suitable for the condition, perform auto-tuning in accordance with the steps in 5-4-5 Auto-tuning (Block control) or 5-4-6 Auto-tuning (Liquid temperature control).
	Auto-tuning was performed.	Revert to the settings at factory shipment.
	The container is filled with too much sample.	Reduce the sample
	The immersion of the sample temperature sensor in the sample is shallow	Increase the sample
It is not possible to switch block control to liquid temperature control.	The sample temperature sensor is out of order.	Immediately stop the operation and contact the company from which you purchased the product or the nearby service center.
	The temperature controller is out of order.	
	Oil mist infiltrated into the temperature sensor terminal results in contact failure	
Press the key but no reaction occurs	The key lock becomes effective	Long press DOWN key to release the key lock
	The temperature controller is out of order.	Immediately stop the operation and contact the company from which you purchased the product or the nearby service center.

7 Maintenance and inspection

⚠ Warning

Do not disassemble the device

Inside the device, there are voltage applied and high temperature portions and disassembly may lead to electric shocks and/or injury.

⚠ Caution

Use appropriate method and goods for clearing and care of the product

Do not water directly inside and outside the product or use a cleaner (polisher), thinner, petroleum, heating oil, acid and equivalent when cleaning or taking care of the product. This may cause electric shocks or damage the product.

⚠ Caution

Do not clean or take care of the product while the product is hot

If you take care while the product is hot, you may get burned.

• If the stain is light
Wipe off the entire device with a soft cloth immersed in water and squeezed out.

• If the stain is difficult to remove
Wipe off the entire device with a soft cloth infiltrated with a neutral detergent and then wipe with a soft cloth.

⚠ Caution

Unplug from the outlet if you do not use it for a long time.

If the power plug has been inserted into an outlet for a long time, gradually dust accumulates between the outlet and plug and collects humidity, resulting in repetition of spark and discharge between both poles.
And the insulation state gets worse and flow of electricity between both poles of the plug may produce heat, finally resulting in ignition.

⚠ Caution

Clean or take care of the product after removing the power plug

When you clean or take care of the product, be sure to turn off the power switch and unplug from the outlet before doing so.
If you do not, it may cause electric shocks or damage the product.

7-1 Replacement of fuse

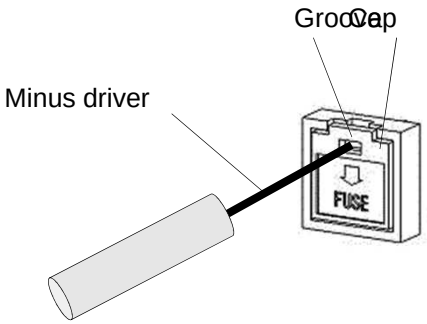
⚠ Caution

Do not use a fuse other than the designated one

If you use a fuse other than the designated one, it does not fuse when overcurrent flows, potentially causing fire.

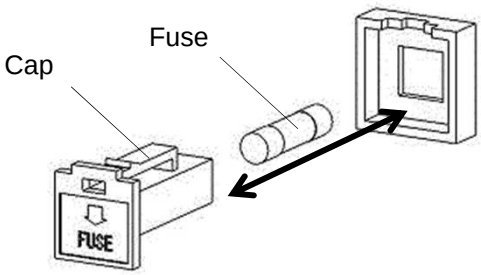
* Be sure to replace a fuse after unplugging the power cord from outlet.

1) There is a groove in the cap of the fuse holder.
Insert a small minus driver etc. there and push down the tip.



2) The cap of the fuse holder comes off and the fuse should be taken out.

3)Insert a fuse with the same specification and take backward steps to install it.



The spec of the fuse is punched on the metal portion of the fuse and commercial fuses are also usable.

Fuse 2A Code No. 126850

* If you use a fuse other than the designated one, it does not fuse when overcurrent flows, potentially causing fire.

* If the fuse replaced fuses again, immediately contact the company from which you purchased the product or the nearby service center.

8 Disposal of product

If you dispose of the product or a part, please dispose of it in accordance with the disposal method.

Major components and disposal methods

Component	Model	Weight	Outer dimensions	Disposal method
Main body	MG-3100	About 3.9kg	200W x 315D x 125H	Request a waste collection vendor to dispose.

* Packing materials should be separated by material and disposed of.

Materials of major components

Component	Major constituent	Major component	Major material
Main body	Control	Substrate	Glass epoxy resin, liquid crystal, glass, copper, Stainless steel
		Operating sheet	PET
		Power switch	Polyester resin, rubber
		Lamp	Acrylic, copper
		Switching power source	Resin, phosphor bronze, aluminum, nylon
	Housing	Plate	Stainless steel (NSSC180, SUS304)
		Fuse holder	PBT, copper
		Adjuster	Delrin (acetal resin), stainless steel
		Signal connector	Aluminum, zinc, copper
		Power cord	Vinyl, copper
	Heater	Heating plate	A5052
		Heater	Mica, copper line, glass covering
		Temperature sensor	Stainless steel (SUS304), silicon, copper line Magnesia
		Fixed temperature overheat protector	Ceramic, aluminum, brass
Sample temperature sensor			Stainless steel (SUS316), silicon, nickel line Magnesia, polyimide
Aluminum block			A5052, stainless steel (SUS304)

* When you dispose of the product, refer to the above table, separate materials and dispose of them.

9 List of consumables, replacement parts/options

1. Regular block
Aluminum block for Model MG-3100.
1 block is needed for Model MG-3100.
(Same as that for conventional Models MG-2200/2300)

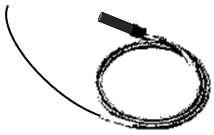
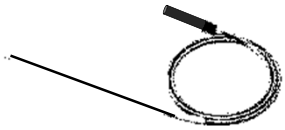
Model	Compatible container	Number of holes	Hole depth (mm)	Code No.
MGB-0548	0.5mL microtube	48	26	207570
MGB-1540	1.5mL microtube	40	35	207580
MGB-1240	Outer dia. φ12mm test tube	40	60	207590
MGB-1524	Outer dia.φ15mm test tube	24		207600
MGB-1624	Outer dia. φ16.5mm test tube	24	65	207610
MGB-1822	Outer dia. φ18mm test tube	22		207620
MGB-2116	Outer dia. φ21mm test tube	16		207630
MGB-2412	Outer dia. φ24mm test tube	12		207640
MGB-2512	Outer dia. φ25mm test tube	12		207650
MGB-3008	Outer dia. φ30mm test tube	8		207660

2. Half block
Aluminum block for Model MG-3100.
2 block is needed for Model MG-3100.
(Usable in conventional Model MG-2200/2300 as well)

Model	Compatible container	Number of holes	Hole depth (mm)	Code No.
MGBH-0524	0.5mL microtube	24	26	273890
MGBH-1520	1.5mL microtube	20	35	273920
MGBH-1220	Outer dia. φ12mm test tube	20	60	273900
MGBH-1512	Outer dia.φ15mm test tube	12		273910
MGBH-1612	Outer dia. φ16.5mm test tube	12	65	273930
MGBH-1811	Outer dia. φ18mm test tube	11		273940
MGBH-2108	Outer dia. φ21mm test tube	8		273950
MGBH-2406	Outer dia. φ24mm test tube	6		273960
MGBH-2506	Outer dia. φ25mm test tube	6		273970

3. Spray unit
This is a spray unit to be installed on Model MG-3100.
The use of a spray unit allows for use as a spray condenser.
(2 half blocks in the same type are needed)

Model	Conforming block	Number of nozzles	Nozzle length (mm)	Code No.
S-048	MGB -0548 MGBH-0524	48	155	206680
S-040	MGB -1540, 1240 MGBH-1520, 1220	40		206690
S-024	MGB -1524, 1624 MGBH-1512, 1612	24		206700
S-022	MGB -1822 MGBH-1811	22		206710
S-016	MGB -2116 MGBH-2108	16		206720
S-012	MGB -2412, 2512 MGBH-2406, 2506	12		206730

Product name	Sample temperature sensor	
Model	MG-SENS-MT	MG-SENS-TT
Code No.	274550	274560
Sensor protection pipe (mm)	φ1.6 x 35	φ3.2 x 180
Applicable container	Microtube Microplate	Test tube
		

(i) Fuse								
Code No.	Specification/Standard	Quantity						
126850	2A	2						