

**EYELA**

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Vacuum Oven

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VOS-201SD, -301SD,  
451SD, -601SD  
VOC-301SD, -401SD

**Key Operation manual**

Thank you for choosing **EYELA** products.

## Introduction

This key operation manual describes the procedure of key operations for Vacuum oven model VOC-301SD, 401SD, VOS-201SD, 301SD, 451SD, 601SD.

Read this manual carefully before operation.

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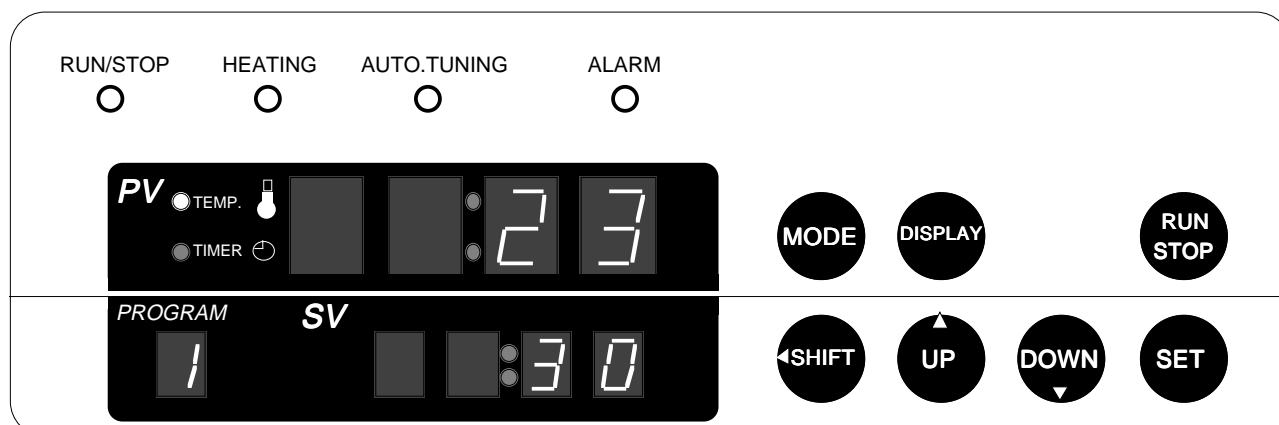
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# 1 Descriptions and functions of panel key



\* Descriptions and functions except panel keys are shown in the chapter [Control panel] on the page of instruction manual.

| Description  | Function   |
|--|--|
|  Shift key     | Moves the setting digit.<br>It is active while setting   |
|  UP key       | Increases +1 the active digit.<br>Or changes the set character indicator<br>It is active while setting.  |
|  DOWN key     | Decreases +1 the active digit.<br>Or changes the set character indicator<br>It is active while setting.  |
|  Set key      | Enters the set value and goes to the next set parameter.<br>Changes to the set mode while controlling.<br>It is not accepted while changing indications by [DISP] key.   |
|  Mode key     | Switches between program mode and adjustment mode.<br>It is not accepted while changing indications by [DISP] key  |
|  Display key  | Switches indication during the control, releases alarm, and clears the input data. Some alarms cannot be released by this key. Refer the releasing alarm on the page 8. It is not accepted while setting and displaying the adjustment mode. |
|  RUN/STOP key | Starts and stops controlling.  |



## Remark Set character

It shows that the set value indication is character or mark not number. It is indicated when the setting after power failure or set indication of adjustment mode is displayed.

Recovery after power failure : PoFF, Repetition time : n, Step No. : St-\*, Auto tuning : Auto  
\* is the number of step.

## 2 Operation

This unit has 7 patterns of program mode and adjustment mode. You can set temperature, time, repetition time and recovery after power failure in control mode, and in adjustment mode you can set compensation of temperature display, auto tuning, upper and lower limit of temperature alarm, and control data lock.

### 2-1 Program mode

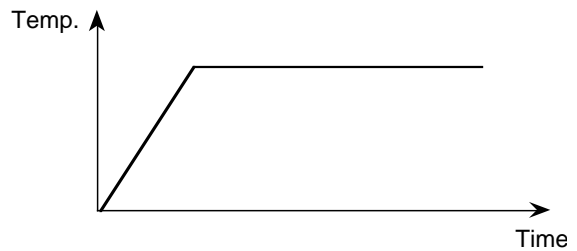
#### Program 1

- Continuous operation

A certain temperature is set and the temperature is kept while operating. To start and stop operation, press



key



Refer to the section program 1 on the page 10.

#### Program 2

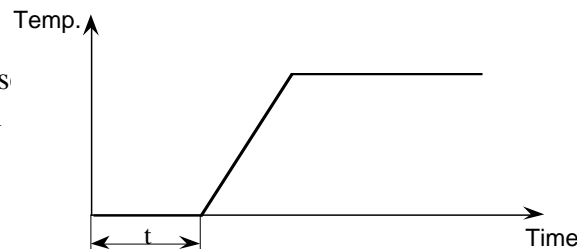
- Auto start

A certain period of time and temperature can be set and when the set time has elapsed, the operation starts automatically at the set point.

To start or stop operation, press



key.



Refer to the section program 2 on the page 14.

#### Program 3

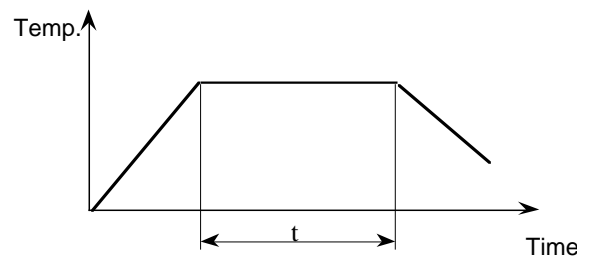
- Auto stop

A certain period of time and temperature can be set and when the unit attains to the set point, the operation continues during the set time (t). When the set time has elapsed, the operation stops automatically.

To start or stop operation, press



key.



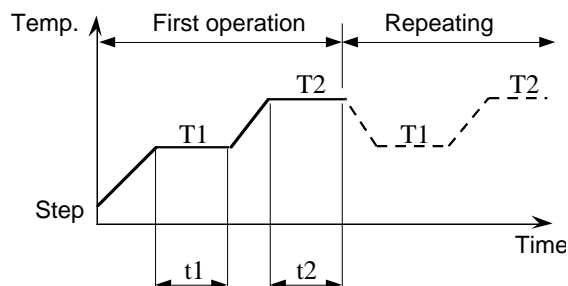
Refer to the section program 3 on the page 18.

### Program 4

Step operation A (Temp prior control)  
 You set 2 steps and they are repeated.  
 You can set one pair of temperature and time in one step. (When the unit attains to the set temperature, the operation continues during the set time.) To start or stop operation, press



key.



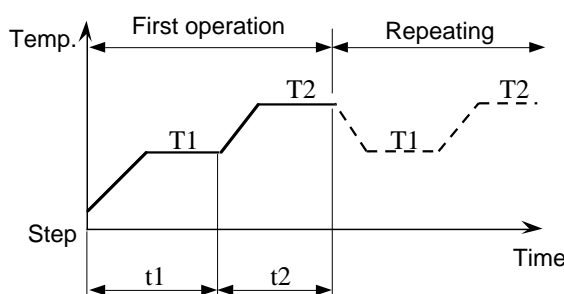
Refer to the section program 4 on the page 22

### Program 5

Step operation B (Time prior control)  
 You set 2 steps and they are repeated.  
 You can set one pair of temperature and time in one step. (Heat up time and cool down time are included in the set time (t).) To start or stop operation, press



key.



Refer to the section program 5 on the page 27



#### Repetition times

You can set operating times of program.  
 Set and run times are shown as below.

- Only one time operation (Not repeated)  
 Repetition time --> 1
- 2 ~ 99 times operation  
 Repetition time --> 2 ~ 99
- Repeating until key is pressed.  
 Repetition time --> 0



#### Steps

Step means a process of program. Operation is started from the step 1. After the unit attains to the set temperature and controls during the set time, the operation goes to the next step.



#### Temperature prior control

In the temperature prior control, the temperature is key for the set time after the unit attains to the set temperature.



#### Time prior control

In the time prior control, when the set time has elapsed the operation goes to the next step. Heat up time and cool down time are included in the set time.

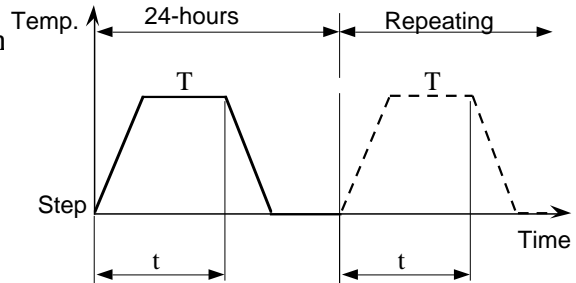
**Program 6**

- 24 hours cycle operation (Time prior operation)  
 You can set one pair of time and temperature, and the operation is repeated at these set time and temperature by 24 hours cycle.  
 To start or stop operation, press



key.

Refer to the section program 6 on the page 33.



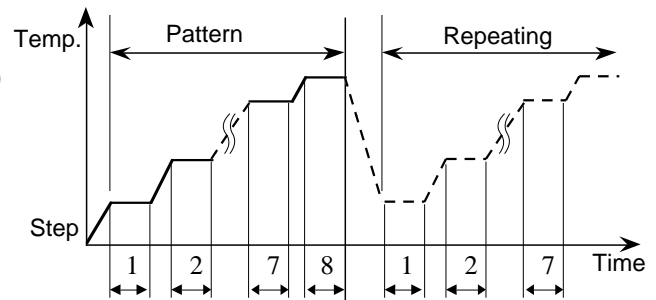
**Program 7**

- 8 steps operation (Temperature prior operation)  
 You can set 8 steps. One pair of time and temperature can be set in one step.  
 Steps are combined each other, and they can be repeated. To start or stop operation, press



key.

Refer to the section program 7 on the page 38.




## 2-2 Adjustment mode

## Auto

## • Auto tuning

This unit is controlled by a built-in microprocessor based on PID control. The most suitable PID constant is set before shipment. If the temperature accuracy becomes low, PID constant is tuned automatically.

To set auto-tuning, press

 key to switch to the adjustment

mode. And then press

   keys.

Refer to the section [Auto-tuning] on the page 46.

## Sns



## AL-H

- Upper limit temperature alarm (Over shooting)  
Set upper limit temperature alarm. Press

 key

to switch to the adjustment mode.

And then press

    keys.

Refer to the section [Setting upper limit alarm] on the page 50.

## AL-L

- Lower limit temperature alarm (Under shooting)  
Set lower limit temperature alarm. Press

 key

to switch to the adjustment mode.

And then press

    keys.

Refer to the section [Setting lower limit alarm] on the page 52.

## Loc

- Locking adjustment data  
Data of adjustment mode is locked.  
Press

 key

to switch to the adjustment mode.


And then press

   keys.

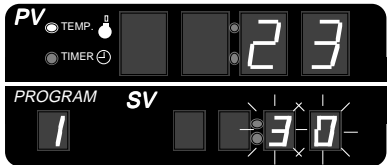
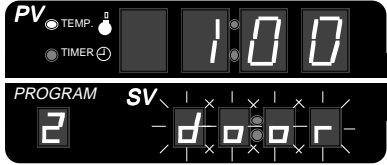
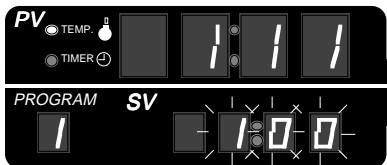
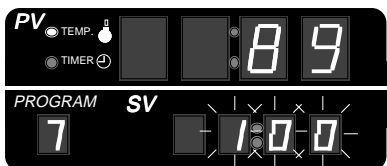
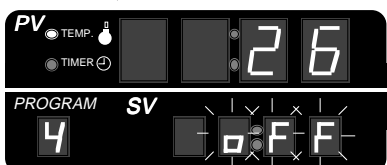
Refer to the section [Setting data lock] on the page 55.

## 2-3 Alarm function

This unit has the following alarm functions




 The buzzer is heard for 10seconds

 The control operation stops.


| Indications and actions  | Alarm descriptions and cause  |
|--|---|
|   | <ul style="list-style-type: none"> <li>• <b>Setting error alarm</b><br/>Occurs when you set any data out of its range.<br/>The set data (SV indication) blinks for 3 seconds</li> </ul>   |
|   | <ul style="list-style-type: none"> <li>• <b>Door alarm</b><br/>Occurs when you start control when the door is left opening, or when you open the door while controlling.<br/>[door] is displayed on SV indicator and it blinks.</li> </ul>  |
|    | <ul style="list-style-type: none"> <li>• <b>Upper limit temperature alarm (Over shooting)</b><br/>Occurs when the chamber temperature exceeds the upper limit value. In this function the detection starts after the measured temperature attains to the upper limit alarm range.<br/>The set value (SV indication) blinks.</li> </ul>        |
|   | <ul style="list-style-type: none"> <li>• <b>Lower limit temperature alarm (Under shooting)</b><br/>Occurs when the chamber temperature is lower than the upper limit value. In this function the detection starts after the measured temperature attains to the lower limit alarm range.<br/>The set value (SV indication) blinks.</li> </ul> |
|  <p>The control stops by setting for recovering from power failure.</p> | <ul style="list-style-type: none"> <li>• <b>Power failure alarm</b><br/>Detects power failure while controlling, and the alarm occurs when power recovers.<br/>The operation depends on settings for recovering from power failure.<br/>[oFF] is displayed on SV indicator and it blinks.</li> </ul>  |




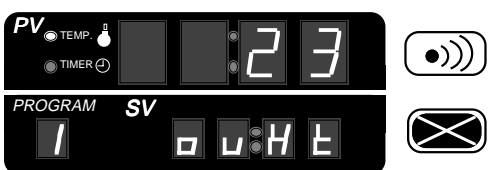
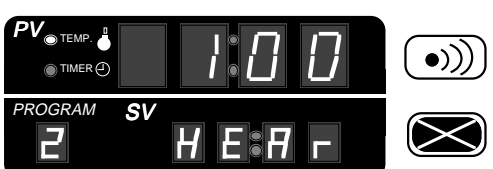
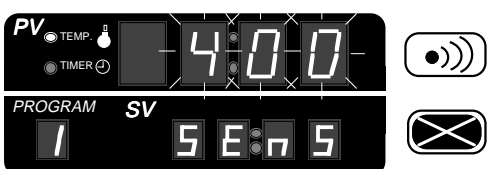
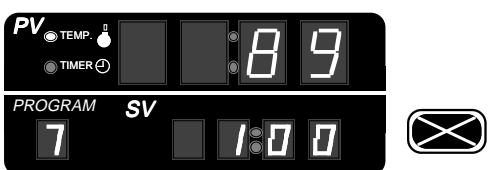
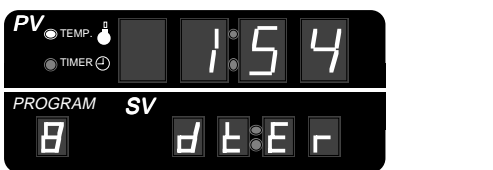
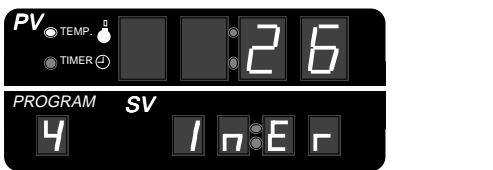

### LED indications




 Indicates ( Illumination.  
Blinking.  
Darkness



 The buzzer is heard for 10seconds

 The control operation stops.

| Indications and actions  | Alarm descriptions and cause  |
|--|---|
| <p>RUN/STOP   HEATING   AUTO.TUNING   ALARM</p> <p></p>   | <ul style="list-style-type: none"> <li>• Cover heat alarm<br/>Occurs when the SSR is broken which turns on and off the heater.<br/>[ovHt] is displayed on SV indicator.</li> </ul>  |
| <p>RUN/STOP   HEATING   AUTO.TUNING   ALARM</p> <p></p>   | <ul style="list-style-type: none"> <li>• Heater alarm<br/>Occurs when the heater is disconnected<br/>[HEAr] is displayed on SV indicator.</li> </ul>  |
| <p>RUN/STOP   HEATING   AUTO.TUNING   ALARM</p> <p></p>  | <ul style="list-style-type: none"> <li>• Sensor alarm<br/>Occurs when the sensor is disconnected.<br/>The measured value (PV indication) is 400 and : blinks.<br/>[SEnS] is displayed on SV indicator.</li> </ul>   |
| <p>RUN/STOP   HEATING   AUTO.TUNING   ALARM</p> <p></p> <p>RUN/STOP   HEATING   AUTO.TUNING   ALARM</p> <p></p> <p>RUN/STOP   HEATING   AUTO.TUNING   ALARM</p> <p></p> | <ul style="list-style-type: none"> <li>• Watch-dog system<br/>Detects over running of CPC by extreme noise, and reset the unit.<br/>When this system functions, any key operation is not accepted, and displays have not meaning. All output are turned off. If causes are solved, the unit can recover by turning on the switch. Yet backup data may be damaged.<br/>If you restart the unit, press and hold  key, and turn on the mains switch to execute zero clear operation.<br/><u>All set data of program mode and adjustment mode are cleared.</u></li> </ul> |



## Releasing alarm

### Watch-dog system

-> Turn off the mains switch once, and turn on it again to release alarm.

### Power failure alarm

-> Press  key to release alarm.

### Setting error alarm

-> The set value blinks for 3 seconds, and the unit recovers automatically.

### Door alarm

-> When the door is closed, the unit recovers automatically. Or stop controlling operation to release alarm. If you start operation when the door is left opening, door alarm occurs again.

### Upper and lower limit temperature alarm

-> Press  key to release alarm.

Or the unit recovers automatically, when the measured value attains to the upper or lower limit band.

### Other alarms

-> Press  key to release alarm.

Though alarm occurs again if the cause is not solved.



## Zero clear

If you press and hold

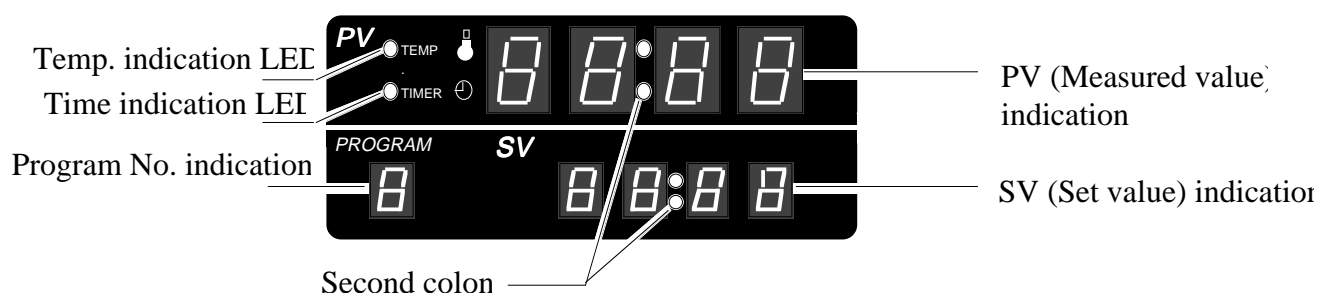


key, and turn on the mains switch,

all settings of program mode and adjustment mode are cleared. And all set data return to initial data before shipment.

All set data of program mode and adjustment mode are cleared.

## 2-4 Display



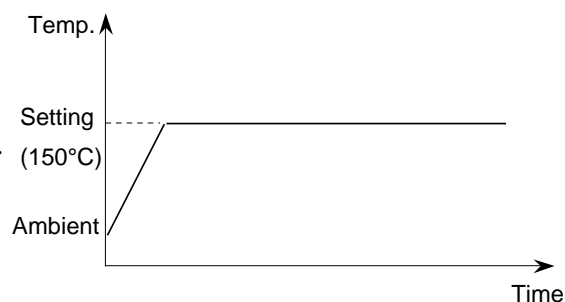
| Display | Content   |
|---------|---|
|         | <p>Temperature indication</p> <p>Temperature indication LED illuminates, the measured temperature (in the program 7, step No. St-*) is displayed on PV indicator and the set temperature is displayed on SV indicator.</p>  |
|         | <p>Time indication</p> <p>Time indication LED illuminates, the measured time (in the program 3, step No.:St-*) is displayed on PV indicator and the set time is displayed on SV indicator. The 2 digits of left side indicate the hour, the 2 digits of right side indicate the minute.</p> |
|         | <p>Repetition time indication (while setting)</p> <p>Temperature and time indication LED darken, the repetition character (n) is indicated on PV indicator and the set repetition time is indicated on SV indicator.</p>  |
|         | <p>Repetition time indication (while controlling)</p> <p>Temperature and time indication LED darken, the current repeating times is indicated on PV indicator and the set repetition time is indicated on SV indicator.</p>   |
|         | <p>Power failure indication</p> <p>Temperature and time indication LED darken, the recovering character (PoFF) is indicated on PV indicator and the set recovering character from power failure (oFF, On, or Cont) is indicated on SV indicator.</p>  |
|         | <p>Power failure indication</p> <p>(Only when "On" is set in the program 5)</p> <p>Temperature and time indication LED darken, the recovering character (On) is indicated on PV indicator and the set temperature for recovering operation is indicated on SV indicator.</p>                |

## 3 Setting and executing program

### 3-1 Program 1 (Continuous operation)

Program 1 is operated at a set temperature.

(Example) The unit controlled at 150°C constantly.  
After recovering from power failure,  
the control operation is continued.



#### Setting Program 1

| Procedure  | Key operation                                   | Indication  |
|--|---|---|
| Turning on the mains switch                                      | Turn on the mains switch.                       | <p>When the switch is turned on, all digits indicate [8] and all LED lamp illuminate. Then each [8] changes to the previous program No, set value and the current measured value.</p> |
| Selecting program No.  | Press  or  key to indicate the program No. [1]. | <p>Program No. indication blinks.<br/>If the previous program No. is [1], the [1] is indicated without any key operation.</p>   |
| Entering program No. 1 and switching to temperature setting mode | Press  key.                                     | <p>The most right digit of SV indicator blinks.</p>   |

Temperature setting range




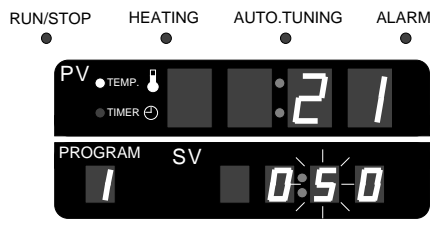



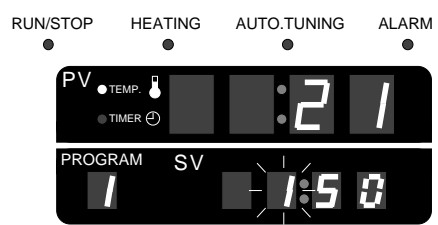

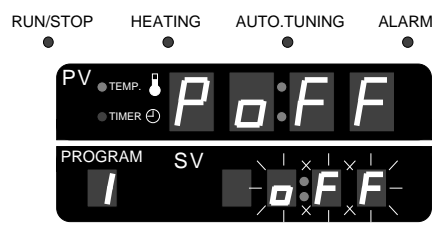


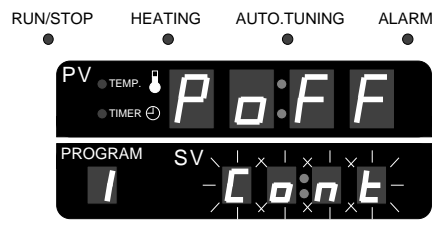

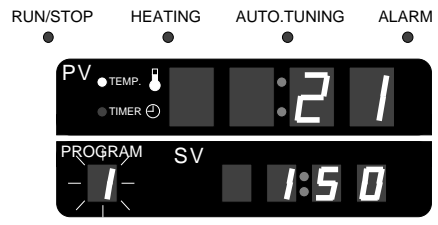
( VOS-201, 301, 451SD : 40 ~ 240°C )  
( VOS-601, VOC-301, 401SD : 40 ~ 200°C )

You can set by 1 °C (in all programs).

Program No. indication





The previous program No. is indicated. In initial operation or after zero clear operation, [1] is indicated.

## Setting Program 1

| Procedure   | Key operation  | Indication   |
|---|--|--|
| Input of set temperature  | Press  key to be active the second digit.<br>Press  or  key to display [5]. |  <p>The active digit blinks.</p>             |
| Input of set temperature  | Press  key to be active the third digit.<br>Press  or  key to display [1].  |  <p>The active digit blinks.</p>             |
| Entering the set temperature and switching to setting mode of recovering after power failure. | Press  key.  |  <p>The set character blinks.</p>           |
| Input of recovering after power failure   | Press  or  key to indicate set character [Cont].   |  <p>The set character blinks.</p>          |
| Entering recovery after power failure<br><br>And then settings are completed.                 | Press  key.   |  <p>The program No. indication blinks.</p> |

To be continued to the next page.

## Starting and stopping control operation of Program 1

| Procedure             | Key operation  | Indication  |
|-----------------------|--|---|
| Starting controlling. | Press  key. |  <p>[RUN/STOP] LED blinks and control operation starts.<br/>If the heater works, [HEATING] LED illuminates.</p> |
| Starting controlling. | Press  key. |  <p>[RUN/STOP] LED darkens and control operation stops.<br/>Program No. indication blinks.</p>                 |



### How to use the setting of recovering from power failure

You can select a control operation for when the unit recovers from power failure in case it occurs while controlling.

- [oFF]  
After the unit recovers, the control operation stops.
- [On]  
It cannot be set in the program 1 and 2.  
After the unit recovers, the set point control starts at a temperature you set.
- [Cont]  
After the unit recovers, the control operation starts again from the stopping point.




### SV indication while setting

The current set temperature, set time and set character are displayed. If the unit is left for a minute without any key operation, the display returns to [Selecting Program No.] automatically and the previous program No. is displayed. If the unit is under controlling operation, the current program No. is displayed.




### PV indication while setting

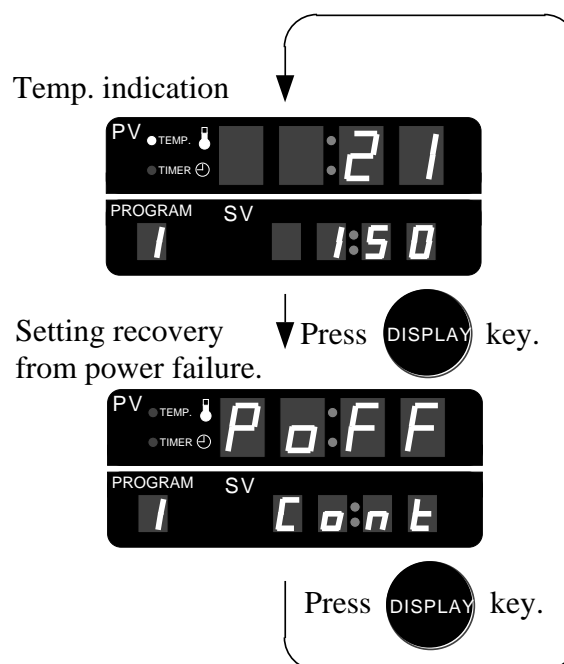
While setting, the current measured temperature, time and set character are displayed.

 Changing set value while controlling of Program 1

Press **SET** key. Even if the control is active, the display can be changed to the mode of [Selecting program No.]  
If you change program No. in [Selecting Program No.], the other program setting can be changed.  
Refer to the section [Setting of Program \* ].  
\* : Program No.

 Changing indication while controlling of Program 1

Press **DISPLAY** key. Even if the control is active, the display can be changed, and can check set values. Displays change as follows.  
If the unit is left for a minute without any key operation, the display changes to the previous indications automatically.



 Remark SV and PV indication while setting

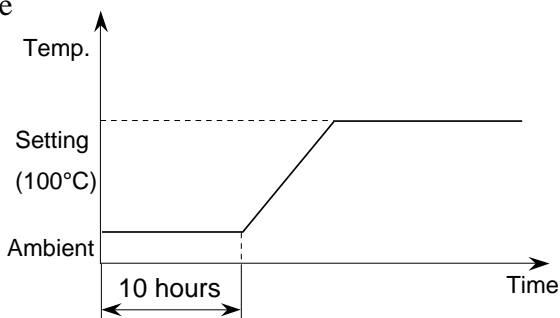
| Control                          |              | SV indicator                              | PV indicator   |
|----------------------------------|--------------|---|--|
| Temp. control                    | Time setting |   |  |
| During heat-up or cool-down      | Nil          | The current set temperature is indicated. | The current measured temperature is indicated.             |
| While controlling at a set point | Nil          | The current set temperature is indicated. | The current measured temperature is indicated.             |
| While controlling at a set point |              | The current set time is indicated.        | The current measured time (additive time) is indicated. *1 |

\*1 In the time prior control, the display changes to time indication after the temperature attains to set point (when the unit start the set point control operation). The display indicates aggregated measured time.

3-2 Program 2 (Auto start)

You set time and temperature. When the set time has elapsed, the operation starts automatically at the set temperature. The waiting time before starting operation can be set within 1 ~ 99 hours and 59 minutes by 1 minute.

(Example) Temperature is set at 100°C, and the operation start after 10 hours. If power failure occurs while controlling, it stops after the unit recovers.






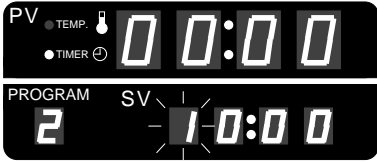







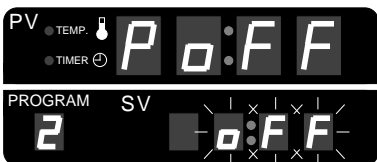


Setting Program 2

| Procedure   | Key operation  | Indication  |
|---|--|---|
| Turning on the mains switch                               | Turn on the mains switch.                              | <p>When the switch is turned on, all digits indicate [8] and all LED lamp illuminate. Then each [8] changes to the previous program No, set value and the current measured value.</p> |
| Selecting program No.                                     | Press  or  key to indicate the program No. [2].        | <p>Program No. indication blinks. If the previous program No. is [2], the [2] is indicated without any key operation.</p>   |
| Entering program No. 2 and switching to time setting mode | Press  key.<br>The setting digit (first digit) blinks. | <p>The most right digit of SV indicator blinks.</p>   |

To be continued to the next page.


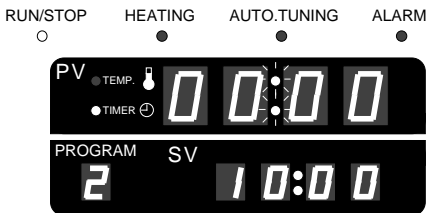

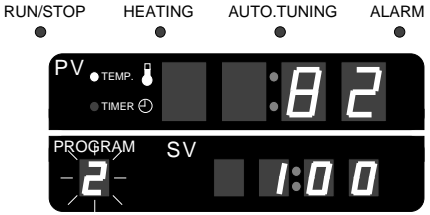



## Setting Program 2


| Procedure   | Key operation  | Indication   |
|---|--|--|
| Input of set time   | Press  key to be active the second digit.<br>Press  or  key to display [1].     |  <p>The active digit blinks.</p>                     |
| Entering the set time and switching to temperature setting mode.                              | Press  key.   |  <p>The most right digit of SV indicator blinks.</p> |
| Input of set temperature  | Press  key to be active the third digit.<br>Press  or  key to display [1]. |  <p>The active digit blinks.</p>                   |
| Entering the set temperature and switching to setting mode of recovering after power failure. | Press  key.   |  <p>The set character blinks.</p>                  |
| Entering recovery after power failure<br><br>And then settings are completed.                 | Press  key.   |  <p>The program No. indication blinks.</p>         |

To be continued to the next page.

## Starting and stopping control operation of Program 2

| Procedure             | Key operation  | Indication   |
|-----------------------|--|--|
| Starting controlling. | Press  key. |  <p>[RUN/STOP] LED blinks and control operation starts.<br/>The measured value indication changes to the time indication, and [Second colon] LED blinks.<br/>If the heater works, [HEATING] LED illuminates.</p> |
| Starting controlling. | Press  key. |  <p>[RUN/STOP] LED darkens and control operation stops.<br/>Program No. indication blinks.</p>  |

 Changing set value while controlling of Program 2

Press  key. Even if the control is active,


the display can be changed to the mode of [Selecting program No.]


If you change the set time during count up of the time, it is not accepted. (It is accepted after the control stops.)

If you change program No. in [Selecting Program No.], the other program setting can be changed.

Refer to the section [Setting of Program \* ].

\* : Program No.

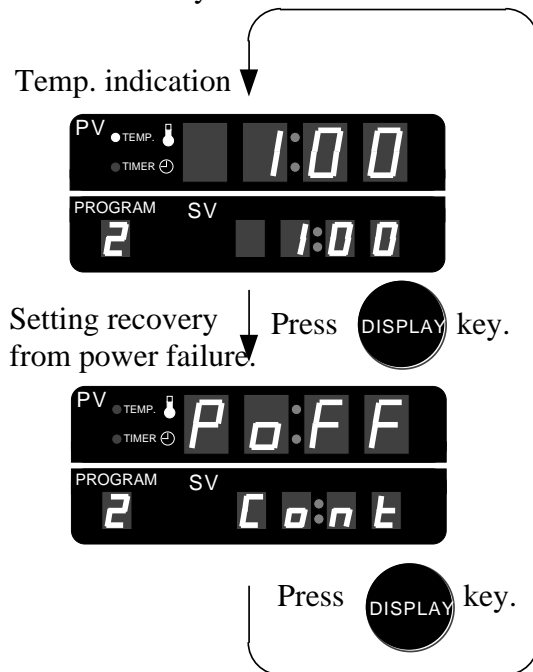
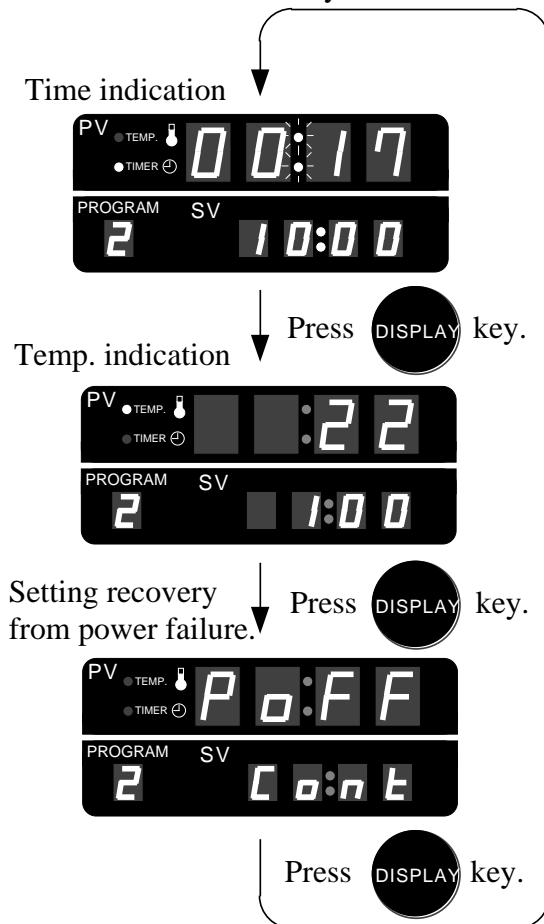
 Changing indication while controlling of Program 2

Press  key. Even if the control is active,

the display can be changed, and can check set values.

Displays during count up of time is changed as follows. If the unit is left for a minute without any key operation, the display changes to the previous indications automatically.

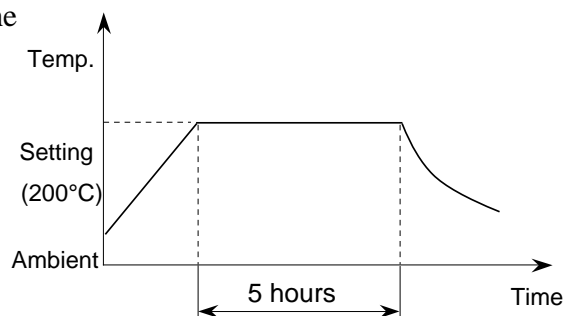
Displays after count up of time is changed as follows. If the unit is left for a minute without any key operation, the display changes to the previous indications automatically.



## 3-3 Program 3 (Auto stop)

You set time and temperature. When the set time has elapsed, the operation starts automatically at the set temperature. The waiting time before starting operation can be set within 1 ~ 99 hours and 59 minutes by 1 minute.

(Example) Temperature is set at 200°C, and the operation stops after 5 hours. If power failure occurs while controlling, the unit continues after the unit recovers.




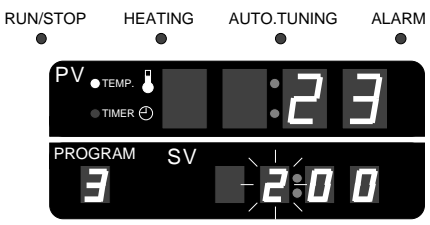

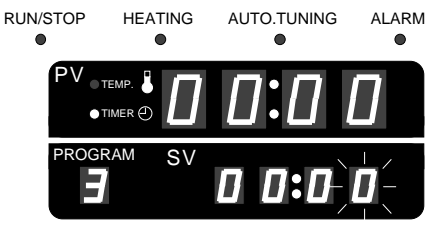



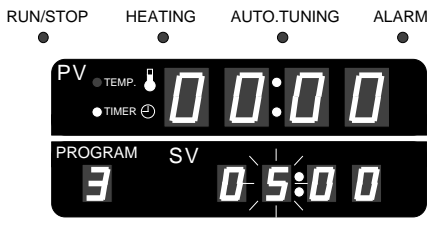

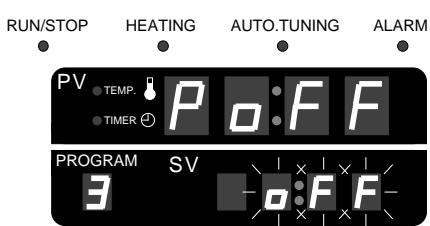


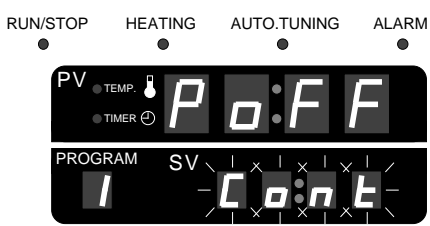


## Setting Program 3

| Procedure   | Key operation  | Indication  |
|---|--|---|
| Turning on the mains switch                               | Turn on the mains switch.                              | <p>When the switch is turned on, all digits indicate [8] and all LED lamp illuminate. Then each [8] changes to the previous program No, set value and the current measured value.</p> |
| Selecting program No.                                     | Press  or  key to indicate the program No. [3].        | <p>Program No. indication blinks.<br/>If the previous program No. is [3], the [3] is indicated without any key operation.</p>   |
| Entering program No. 3 and switching to time setting mode | Press  key.<br>The setting digit (first digit) blinks. | <p>The most right digit of SV indicator blinks.</p>   |







To be continued to the next page.


Setting Program 3


| Procedure   | Key operation   | Indication   |
|---|---|--|
| <p>Input of set temperature</p>   | <p>Press  key to be active the second digit.</p> <p>↓</p> <p>Press  or  key to display [2].</p>    |  <p>The active digit blinks.</p>                     |
| <p>Entering the set temperature and switching to time setting mode.</p>                       | <p>Press  key.</p>   |  <p>The most right digit of SV indicator blinks.</p> |
| <p>Input of set time</p>  | <p>Press  key to be active the hour digit.</p> <p>↓</p> <p>Press  or  key to display [5].</p> |  <p>The active digit blinks.</p>                    |
| <p>Entering the set time and switching to setting mode of recovering after power failure.</p> | <p>Press  key.</p>   |  <p>The set character blinks.</p>                  |
| <p>Input of the set recovery from power failure</p>   | <p>Press  or  key to indicate the set character [Cont].</p>   |  <p>The set character blinks.</p>                  |

To be continued to the next page.

## Starting and stopping control operation of Program 3

| Procedure   | Key operation  | Indication   |
|---|--|--|
| Entering recovery after power failure<br><br>And then settings are completed. | Press  key.   |  <p>The set character blinks.</p>  |
| Starting controlling.   | Press  key.   |  <p>[RUN/STOP] LED blinks and control operation starts.<br/>If the heater works, [HEATING] LED illuminates. The program No. indication blinks.</p> |
| Starting controlling.   | Press  key. |  <p>[RUN/STOP] LED darkens and control operation stops.<br/>Program No. indication blinks.</p>   |

 Changing set value while controlling of Program 3

Press  key. Even if the control is active, the display can be changed to the mode of [Selecting program No.]  
If you change the set time and temperature during count up of the time, it is not accepted. (It is accepted after the control stops.)

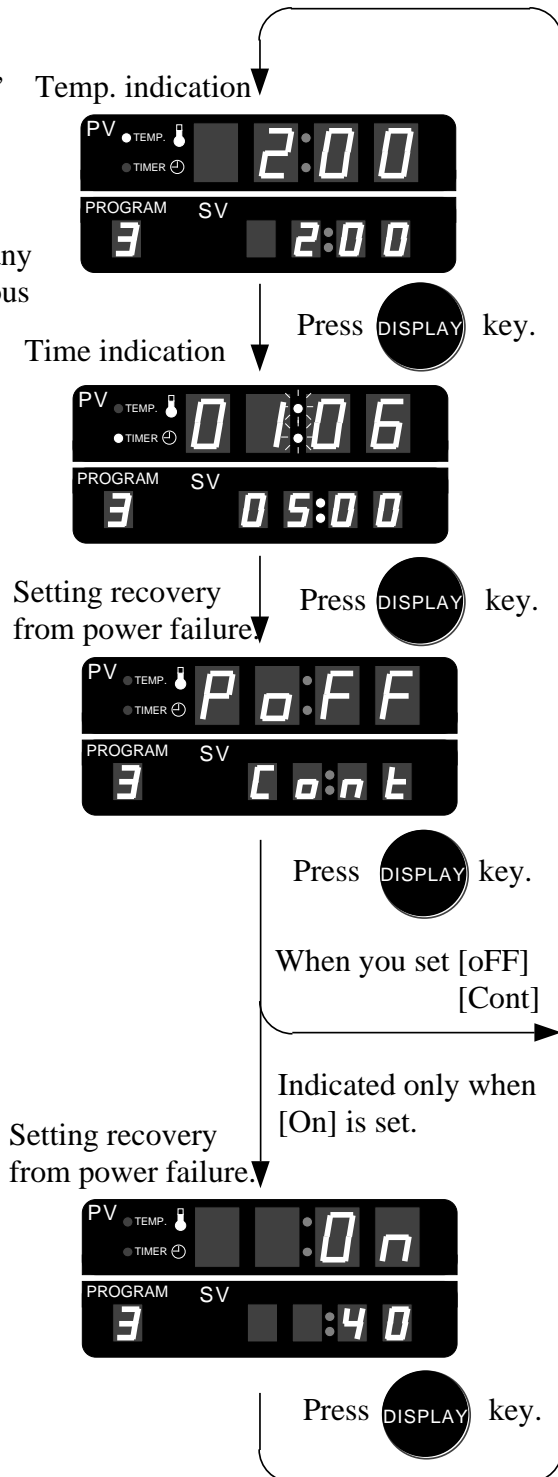
If you change program No. in [Selecting Program No.], the other program setting can be changed.  
Refer to the section [Setting of Program \* ].  
\* : Program No.



Changing indication while controlling of Program 3

Press **DISPLAY** key. Even if the control is active, the display can be changed, and can check set values.

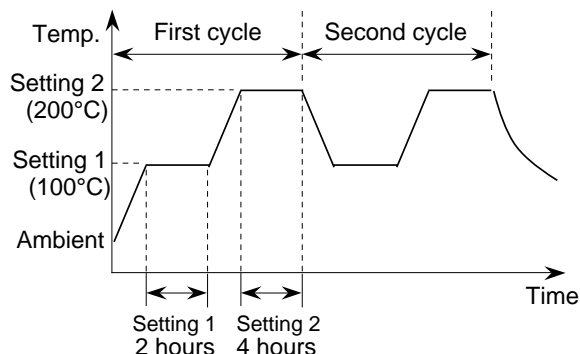
Displays during count up of time is changed as follows. If the unit is left for a minute without any key operation, the display changes to the previous indications automatically.



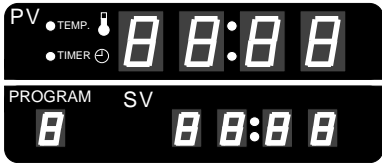



3-4 Program 4 (Step A)

This program can have 2 steps, and they can be repeated. One pair of temperature and time can be set in each step. This control is temperature prior operation.  
 You can set time within 1 ~ 99 hours and 59 minutes by 1 minute.  
 The repetition times can be set within 0 ~ 99 times.  
 If you set [0], the operation is repeated until you stop the operation.

(Example) The unit is controlled for 2 hours at 100°C, and then controlled for 4 hours at 200°C. The second step is repeated 2 cycle. If power failure occurs while controlling, the unit continues after the unit recovers.




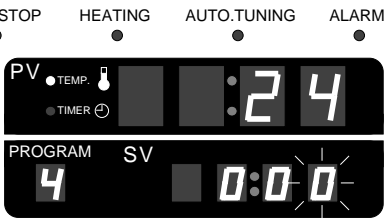



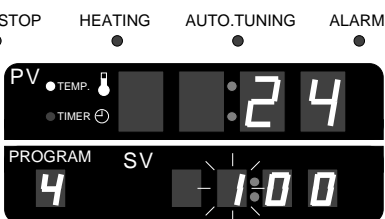

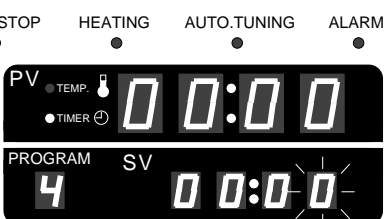



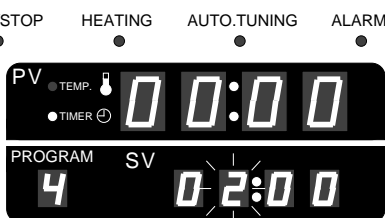

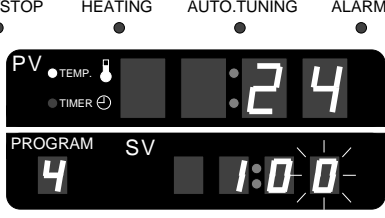
Setting Program 4

| Procedure                   | Key operation   | Indication   |
|-----------------------------|---|--|
| Turning on the mains switch | Turn on the mains switch.   |  <p>When the switch is turned on, all digits indicate [8] and all LED lamp illuminate. Then each [8] changes to the previous program No, set value and the current measured value.</p> |
| Selecting program No.       | Press  or  key to indicate the program No. [4]. |  <p>Program No. indication blinks. If the previous program No. is [4], the [4] is indicated without any key operation.</p>   |

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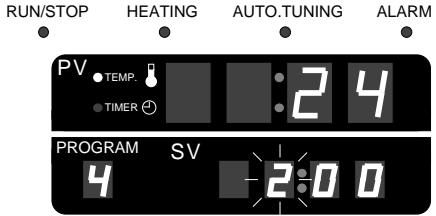

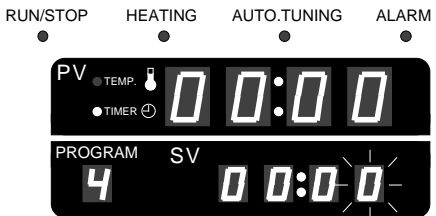



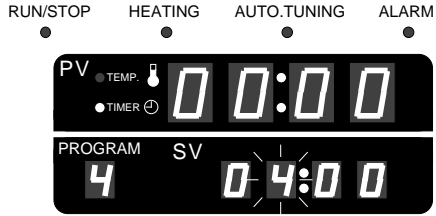

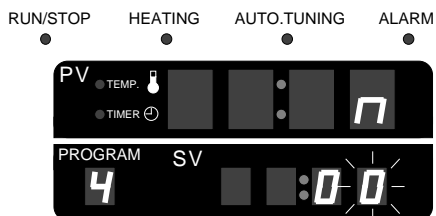


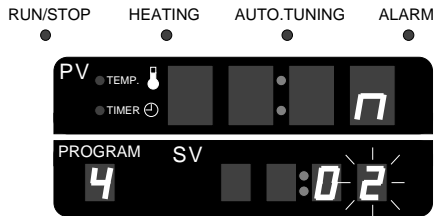


## Setting Program 4

| Procedure  | Key operation   | Indication  |
|--|---|---|
| Entering program No. 4 and switching to temperature setting mode     | Press  key.  |  <p>The most right digit of SV indicator blinks.</p>   |
| Input of set temperature 1   | Press  key to be active the second digit.<br>↓<br>Press  or  key to display [1].     |  <p>The active digit blinks.</p>                       |
| Entering the set temperature 1 and switching to time 1 setting mode. | Press  key.  |  <p>The most right digit of SV indicator blinks.</p> |
| Input of set time 1  | Press  key to be active the hour digit.<br>↓<br>Press  or  key to display [2]. |  <p>The active digit blinks.</p>                     |
| Entering the set time 1 and switching to temperature 2 setting mode. | Press  key.  |  <p>The set character blinks.</p>                    |


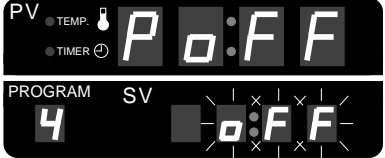


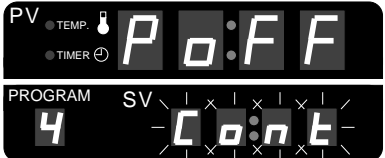






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## Setting Program 4


| Procedure   | Key operation   | Indication   |
|---|---|--|
| Input of set temperature 2  | Press  key to be active the second digit.<br>↓<br>Press  or  key to display [2].     |  <p>The active digit blinks.</p>                       |
| Entering the set temperature 2 and switching to time 2 setting mode.    | Press  key.  |  <p>The most right digit of SV indicator blinks.</p>   |
| Input of set time 2   | Press  key to be active the hour digit.<br>↓<br>Press  or  key to display [4]. |  <p>The active digit blinks.</p>                     |
| Entering the set time 2 and switching to repetition times setting mode. | Press  key.  |  <p>The most right digit of SV indicator blinks.</p> |
| Input of set repetition times   | Press  or  key to display [2].  |  <p>The active digit blinks.</p>                     |

To be continued to the next page.


## Starting and stopping control operation of Program 4


| Procedure  | Key operation  | Indication   |
|--|--|--|
| Entering the set repetition times and switching to setting mode of recovering after power failure. | Press  key.   |  <p>The set character blinks.</p>  |
| Input of the set recovery from power failure   | Press  or  key to indicate the set character [Cont]. |  <p>The set character blinks.</p>  |
| Entering recovery after power failure<br><br>And then settings are completed.                      | Press  key.  |  <p>The set character blinks.</p>  |
| Starting controlling.  | Press  key.   |  <p>[RUN/STOP] LED blinks and control operation starts.<br/>If the heater works, [HEATING] LED illuminates. The program No. indication blinks.</p> |
| Stopping controlling.  | Press  key.   |  <p>[RUN/STOP] LED darkens and control operation stops.<br/>Program No. indication blinks.</p>   |

 Changing set value while controlling of Program 4

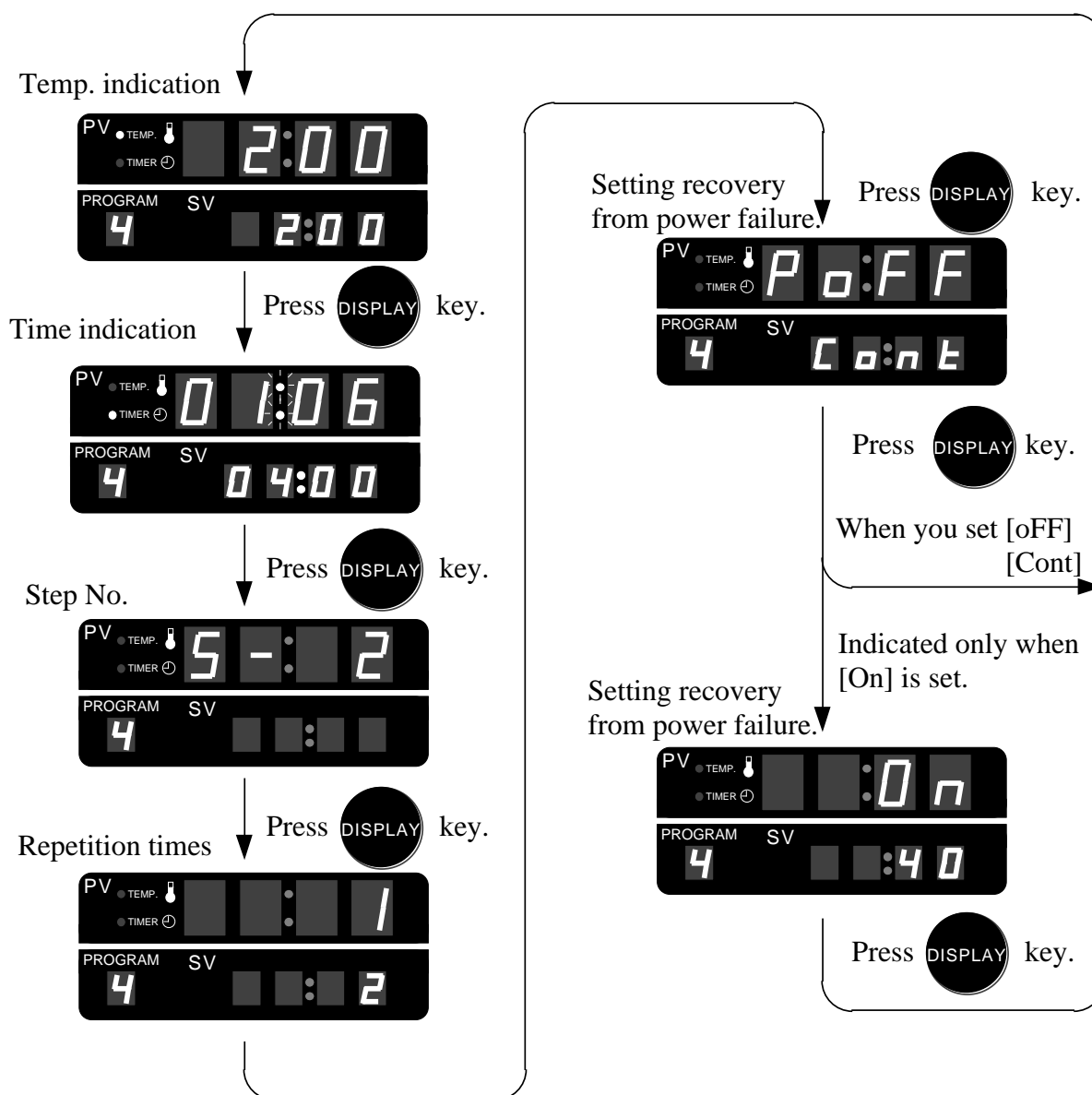
Press  key. Even if the control is active, the display can be changed to the mode of [Selecting program No.]  
The current executing step cannot be accepted the change (both time and temperature). The change can be accepted from the next operating cycle.

If you change program No. in [Selecting Program No.], the other program setting can be changed.  
Refer to the section [Setting of Program \* ].  
\* : Program No.

 Changing indication while controlling of Program 4

Press  key. Even if the control is active, the display can be changed, and can check set values of the current executing step..

Displays during count up of time is changed as follows. If the unit is left for a minute without any key operation, the display changes to the previous indications automatically.



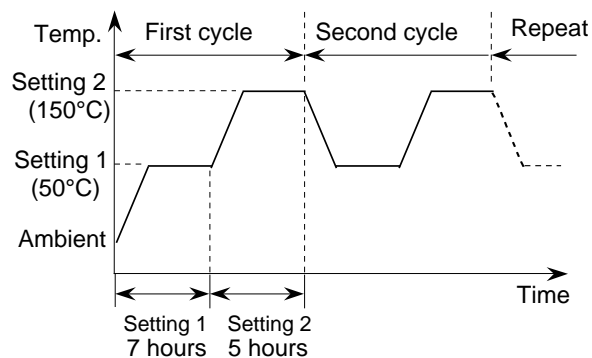
## 3-5 Program 5 (Step B)

This program can have 2 steps, and they can be repeated. One pair of temperature and time can be set in each step. This control is temperature prior operation.

You can set time within 1 ~ 99 hours and 59 minutes by 1 minute.

The repetition times can be set within 0 ~ 99 times. If you set [0], the operation is repeated until you stop the operation.

(Example) The unit is controlled for 2 hours at 100°C, and then controlled for 4 hours at 200°C. The second step is repeated 2 cycle. If power failure occurs while controlling, the unit continues after the unit recovers.




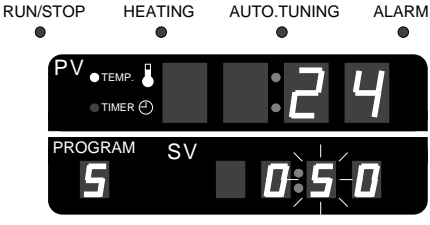

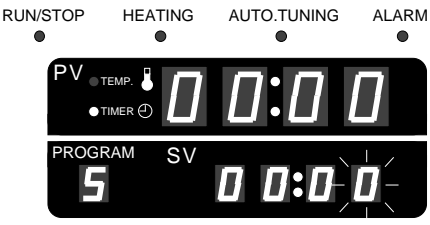



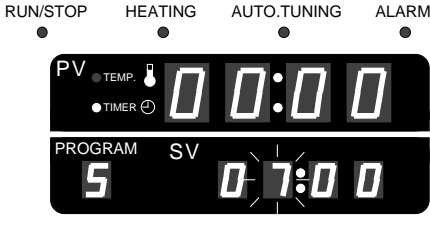

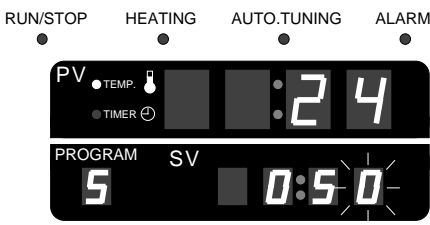



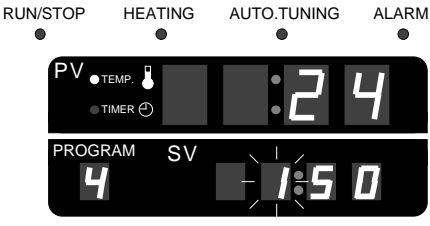


## Setting Program 5

| Procedure  | Key operation                                   | Indication  |
|--|---|---|
| Turning on the mains switch                                      | Turn on the mains switch.                       | <p>When the switch is turned on, all digits indicate [8] and all LED lamp illuminate. Then each [8] changes to the previous program No, set value and the current measured value.</p> |
| Selecting program No.  | Press  or  key to indicate the program No. [5]. | <p>Program No. indication blinks. If the previous program No. is [5], the [5] is indicated without any key operation.</p>   |
| Entering program No. 5 and switching to temperature setting mode | Press  key.                                     | <p>The most right digit of SV indicator blinks.</p>   |


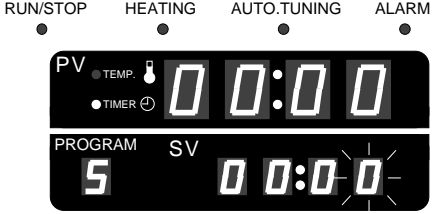



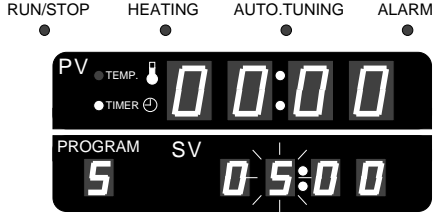

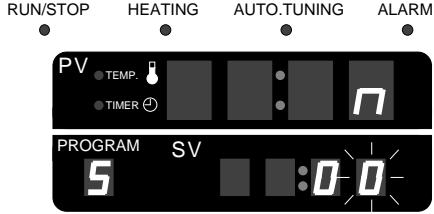


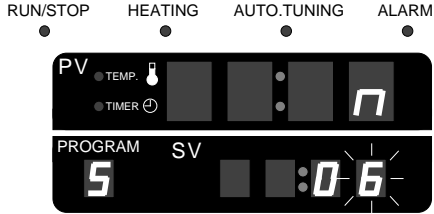

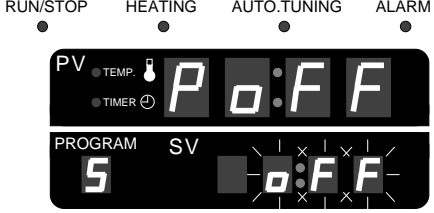
To be continued to the next page.

## Setting Program 5

| Procedure  | Key operation   | Indication   |
|--|---|--|
| Input of set temperature 1   | Press  key to be active the second digit.<br><br>Press  or  key to display [5].        |  <p>The active digit blinks.</p>                     |
| Entering the set temperature 1 and switching to time 1 setting mode. | Press  key.  |  <p>The most right digit of SV indicator blinks.</p> |
| Input of set time 1  | Press  key to be active the hour digit.<br>↓<br>Press  or  key to display [7].   |  <p>The active digit blinks.</p>                   |
| Entering the set time 1 and switching to temperature 2 setting mode. | Press  key.  |  <p>The set character blinks.</p>                  |
| Input of set temperature 2   | Press  key to be active the second digit.<br>↓<br>Press  or  key to display [1]. |  <p>The active digit blinks.</p>                   |



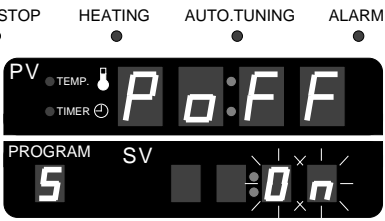

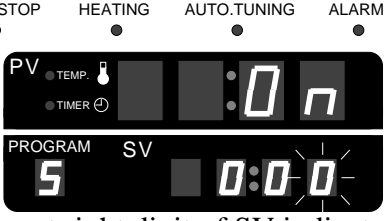



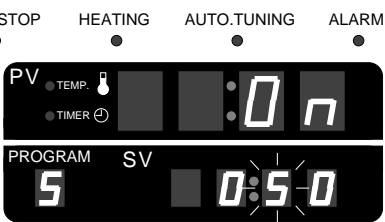

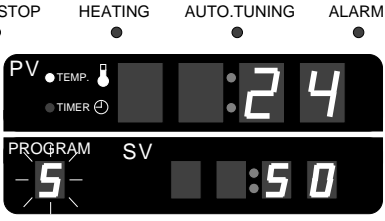

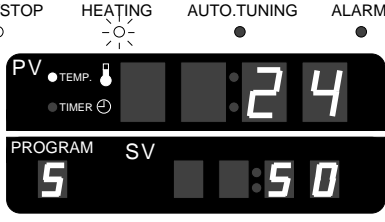
To be continued to the next page.

Setting Program 5

| Procedure  | Key operation  | Indication   |
|--|--|--|
| Entering the set temperature 2 and switching to time 2 setting mode.                               | Press  key.   |  <p>The most right digit of SV indicator blinks.</p>   |
| Input of set time 2  | Press  key to be active the hour digit.<br>Press  or  key to display [5]. |  <p>The active digit blinks.</p>                       |
| Entering the set time 2 and switching to repetition times setting mode.                            | Press  key.   |  <p>The most right digit of SV indicator blinks.</p> |
| Input of set repetition times  | Press  or  key to display [6].   |  <p>The active digit blinks.</p>                     |
| Entering the set repetition times and switching to setting mode of recovering after power failure. | Press  key.   |  <p>The set character blinks.</p>                    |


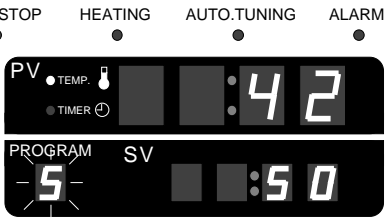
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Starting and stopping control operation of Program 5


| Procedure   | Key operation  | Indication   |
|---|--|--|
| Input of the set recovery from power failure                                  | Press  or  key to indicate the set character [On].   |  <p>The set character blinks.</p>  |
| Input of the set recovery from power failure                                  | Press  key.   |  <p>The most right digit of SV indicator blinks.</p>   |
| Input of the set recovery from power failure                                  | Press  key to be active the hour digit.<br>↓<br>Press  or  key to display [5]. |  <p>The active digit blinks.</p>  |
| Entering recovery after power failure<br><br>And then settings are completed. | Press  key.   |  <p>The set program No. blinks.</p>  |
| Starting controlling.   | Press  key.   |  <p>[RUN/STOP] LED blinks and control operation starts.<br/>If the heater works, [HEATING] LED illuminates. The program No. indication blinks.</p> |



## Stopping control operation of Program 5


| Procedure             | Key operation  | Indication   |
|-----------------------|--|--|
| Stopping controlling. | Press  key. |  <p>[RUN/STOP] LED darkens and control operation stops.<br/>Program No. indication blinks.</p> |

 Changing set value while controlling of Program 5

Press  key. Even if the control is active, the display can be changed to the mode of [Selecting program No.]  
The current executing step cannot be accepted the change (both time and temperature). The change can be accepted from the next operating cycle.

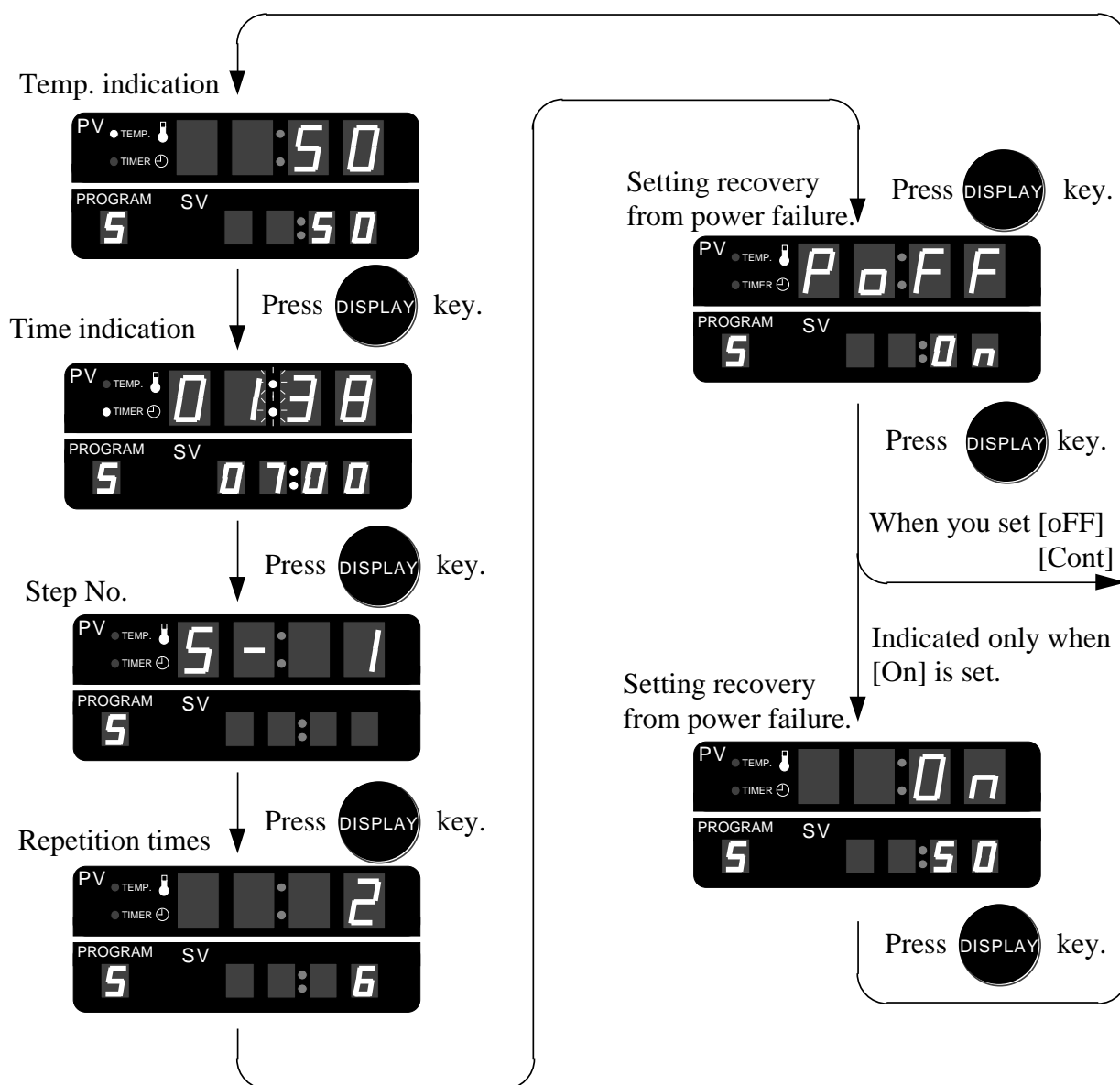
If you change program No. in [Selecting Program No.], the other program setting can be changed.

Refer to the section [Setting of Program \* ].  
\* : Program No.

 **Changing indication while controlling of Program 5**

Press **DISPLAY** key. Even if the control is active, the display can be changed, and can check set values of the current executing step..

Displays during count up of time is changed as follows. If the unit is left for a minute without any key operation, the display changes to the previous indications automatically.



## 3-6 Program 6 (24 hours cycle)

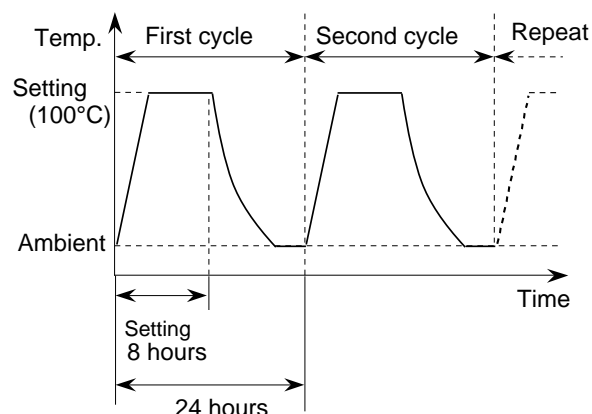
One pair of temperature and time can be set, and it can be repeated by 24 hours cycle. This control is time prior operation.

You can set time within 1 ~ 23 hours and 59 minutes by 1 minute.

The repetition times can be set within 0 ~ 99 times.

If you set [0], the operation is repeated until you stop the operation.

(Example) The unit is controlled for 8 hours at 100°C, and it is repeated for 10 cycles (10 days), and then stops. If power failure occurs while controlling, the unit continues after the unit recovers at 40°C.




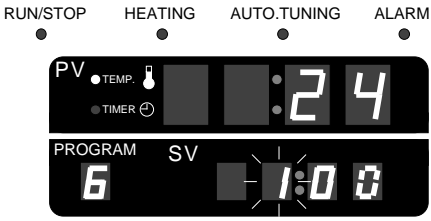

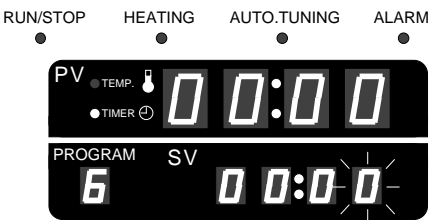



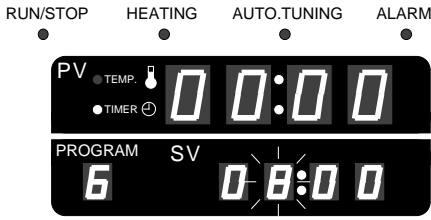

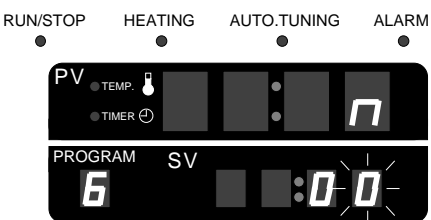



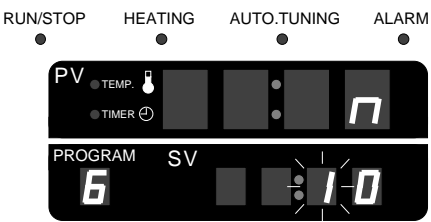


## Setting Program 6

| Procedure  | Key operation                                   | Indication  |
|--|---|---|
| Turning on the mains switch                                      | Turn on the mains switch.                       | <p>When the switch is turned on, all digits indicate [8] and all LED lamp illuminate. Then each [8] changes to the previous program No, set value and the current measured value.</p> |
| Selecting program No.  | Press  or  key to indicate the program No. [6]. | <p>Program No. indication blinks. If the previous program No. is [6], the [6] is indicated without any key operation.</p>   |
| Entering program No. 6 and switching to temperature setting mode | Press  key.                                     | <p>The most right digit of SV indicator blinks.</p>   |


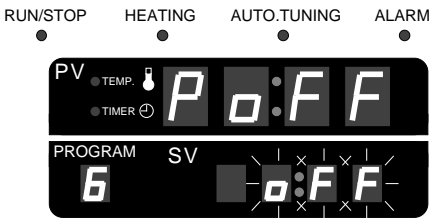


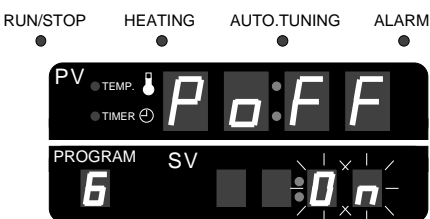

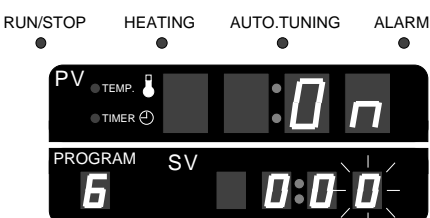



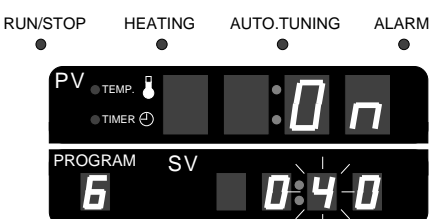

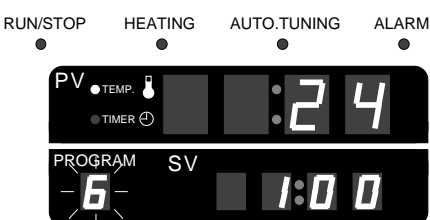
To be continued to the next page.

## Setting Program 6

| Procedure   | Key operation  | Indication   |
|---|--|--|
| Input of set temperature 1  | Press  key to be active the second digit.<br><br>Press  or  key to display [1].         |  <p>The active digit blinks.</p>                       |
| Entering the set temperature and switching to time setting mode.      | Press  key.   |  <p>The most right digit of SV indicator blinks.</p>   |
| Input of set time   | Press  key to be active the hour digit.<br>↓<br>Press  or  key to display [8].    |  <p>The active digit blinks.</p>                     |
| Entering the set time and switching to repetition times setting mode. | Press  key.   |  <p>The most right digit of SV indicator blinks.</p> |
| Input of set repetition times   | Press  key to be active the second digit.<br>↓<br>Press  or  key to display [10]. |  <p>The active digit blinks.</p>                     |


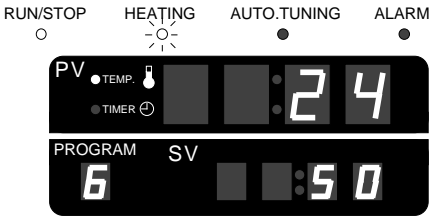

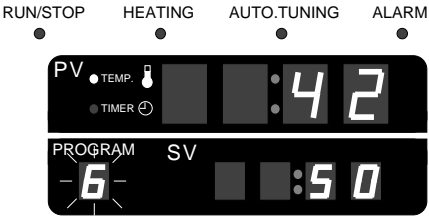
To be continued to the next page.


## Setting Program 6


| Procedure  | Key operation   | Indication  |
|--|---|---|
| Entering the set repetition times and switching to setting mode of recovering after power failure. | Press  key.  |  <p>The set character blinks.</p>                     |
| Input of the set recovery from power failure   | Press  or  key to indicate the set character [On].  |  <p>The set character blinks.</p>                     |
| Input of the set recovery from power failure   | Press  key.   |  <p>The most right digit of SV indicator blinks.</p> |
| Input of the set recovery from power failure   | Press  key to be active the hour digit.<br>↓<br>Press  or  key to display [4]. |  <p>The active digit blinks.</p>                    |
| Entering recovery after power failure<br><br>And then settings are completed.                      | Press  key.  |  <p>The set program No. blinks.</p>                 |

To be continued to the next page.


## Starting and stopping control operation of Program 6

| Procedure             | Key operation  | Indication   |
|-----------------------|--|--|
| Starting controlling. | Press  key. |  <p>[RUN/STOP] LED blinks and control operation starts.<br/>If the heater works, [HEATING] LED illuminates. The program No. indication blinks.</p> |
| Stopping controlling. | Press  key. |  <p>[RUN/STOP] LED darkens and control operation stops.<br/>Program No. indication blinks.</p>  |

 Changing set value while controlling of Program 6

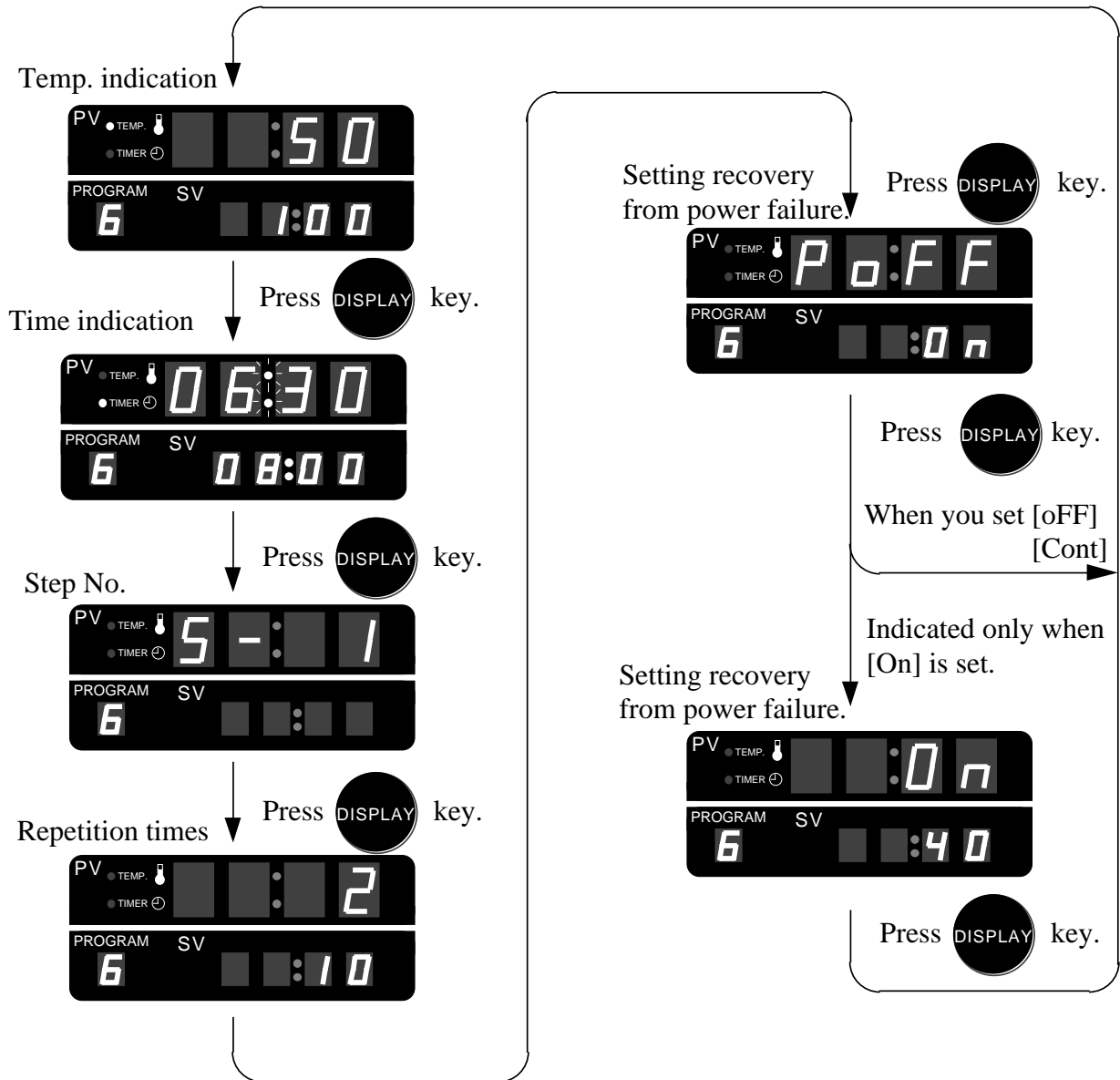
Press  key. Even if the control is active, the display can be changed to the mode of [Selecting program No.]  
The current executing step cannot be accepted the change (both time and temperature). The change can be accepted from the next operating cycle.

If you change program No. in [Selecting Program No.], the other program setting can be changed.  
Refer to the section [Setting of Program \* ].  
\* : Program No.

 Changing indication while controlling of Program 6

Press **DISPLAY** key. Even if the control is active, the display can be changed, and can check set values of the current executing step..

Displays during count up of time is changed as follows. If the unit is left for a minute without any key operation, the display changes to the previous indications automatically.



### 3-7 Program 7 (8 steps)

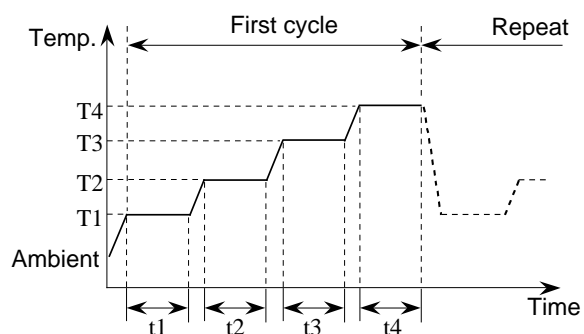
One pair of temperature and time can be set in each 8 steps, and they can be repeated. This control is temperature prior operation.

You can set time within 1 ~ 99 hours and 59 minutes by 1 minute.

The repetition times can be set within 0 ~ 99 times.

If you set [0], the operation is repeated until you stop the operation.

(Example) Step 1 : 50°C (T1) for 10 hours (t1)  
 Step 2 : 150°C (T2) for 50 minutes (t2)  
 Step 3 : 180°C (T3) for 1 hours (t3)  
 Step 4 : 200°C (T4) for 30 minutes (t4)  
 The unit is controlled as following the above steps, and it is repeated for 20 times, and then stops. If power failure occurs while controlling, the unit continues after the unit recovers.




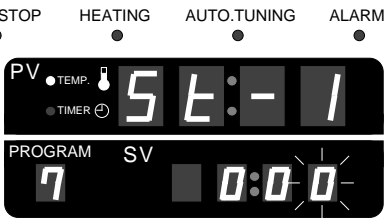



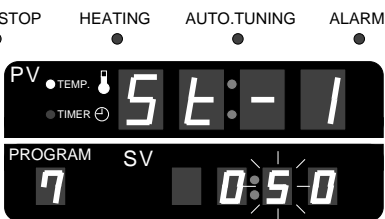

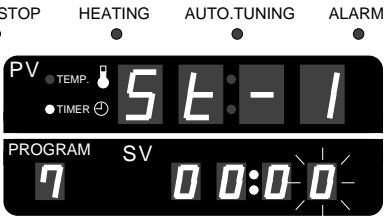



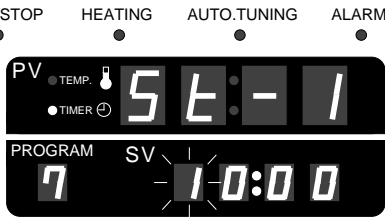

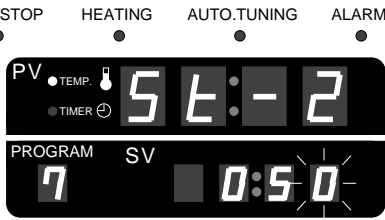
#### Setting Program 7

| Procedure                   | Key operation                                   | Indication  |
|-----------------------------|---|---|
| Turning on the mains switch | Turn on the mains switch.                       | <p>When the switch is turned on, all digits indicate [8] and all LED lamp illuminate. Then each [8] changes to the previous program No, set value and the current measured value.</p> |
| Selecting program No.       | Press  or  key to indicate the program No. [7]. | <p>Program No. indication blinks.<br/>         If the previous program No. is [7], the [7] is indicated without any key operation.</p>  |

To be continued to the next page.




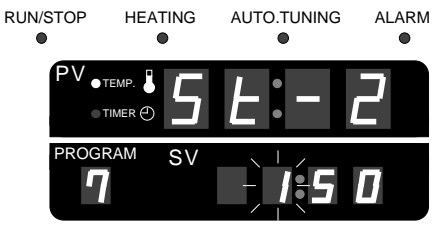

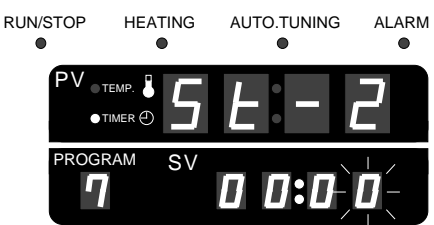



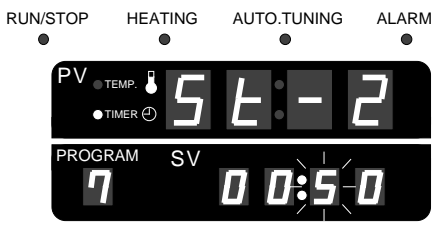

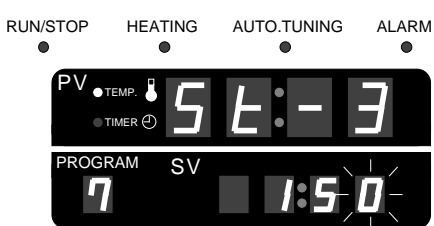



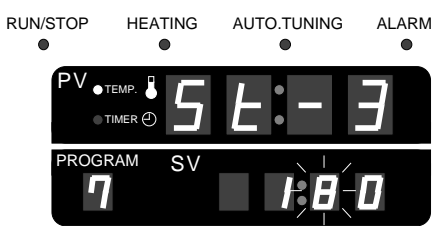


## Setting Program 7

















| Procedure  | Key operation   | Indication  |
|--|---|---|
| Entering program No. 7 and switching to temperature setting mode     | Press  key.  |  <p>The most right digit of SV indicator blinks.</p>   |
| Input of set temperature 1   | Press  key to be active the second digit.<br><br>Press  or  key to display [5].      |  <p>The active digit blinks.</p>   |
| Entering the set temperature 1 and switching to time 1 setting mode. | Press  key.  |  <p>The most right digit of SV indicator blinks.</p>   |
| Input of set time 1  | Press  key to be active the hour digit.<br>↓<br>Press  or  key to display [1]. |  <p>The active digit blinks.</p>   |
| Entering the set time 1 and switching to temperature 2 setting mode. | Press  key.  |  <p>The most right digit of SV indicator blinks. The set temperature of step 1 is displayed.</p> |

To be continued to the next page.

## Setting Program 7


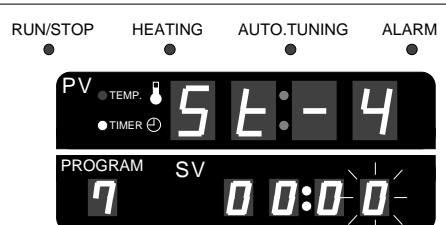



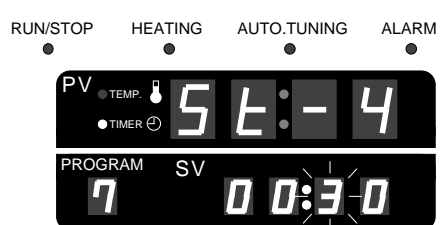

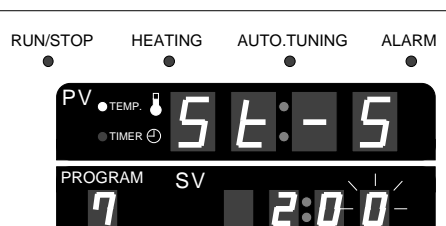


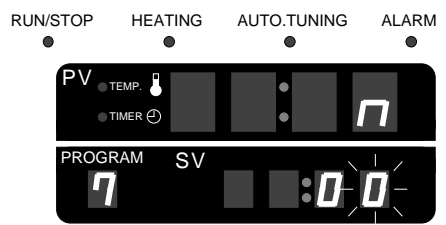
| Procedure  | Key operation   | Indication   |
|--|---|--|
| Input of set temperature 2   | Press  key to be active the third digit.<br><br>Press  or  key to display [1].         |  <p>The active digit blinks.</p>   |
| Entering the set temperature 2 and switching to time 2 setting mode. | Press  key.  |  <p>The most right digit of SV indicator blinks.</p>   |
| Input of set time 2  | Press  key to be active the minute digit.<br>↓<br>Press  or  key to display [5]. |  <p>The active digit blinks.</p>   |
| Entering the set time 2 and switching to temperature 3 setting mode. | Press  key.  |  <p>The most right digit of SV indicator blinks. The set temperature of step 2 is displayed.</p> |
| Input of set temperature 3   | Press  key to be active the minute digit.<br><br>Press  or  key to display [8].  |  <p>The active digit blinks.</p>   |

## Setting Program 7

| Procedure  | Key operation  | Indication   |
|--|--|--|
| Entering the set temperature 3 and switching to time 3 setting mode. | Press  key.   |  <p>The most right digit of SV indicator blinks.</p>   |
| Input of set time 3  | Press  key to be active the hour digit.<br>↓<br>Press  or  key to display [1].        |  <p>The active digit blinks.</p>   |
| Entering the set time 3 and switching to temperature 4 setting mode. | Press  key.  |  <p>The most right digit of SV indicator blinks. The set temperature of step 3 is displayed.</p> |
| Input of set temperature 4   | Press  key to be active the second digit.<br><br>Press  or  key to display [0]. |  <p>The active digit blinks.</p>   |
| Input of set temperature 4   | Press  key to be active the third digit.<br><br>Press  or  key to display [2].  |  <p>The active digit blinks.</p>   |

To be continued to the next page.

## Setting Program 7

| Procedure  | Key operation  | Indication  |
|--|--|---|
| Entering the set temperature 4 and switching to time 4 setting mode.       | Press  key.   |  <p>The most right digit of SV indicator blinks.</p>  |
| Input of set time 4  | Press  key to be active the minutes digit.<br>↓<br>Press  or  key to display [3]. |  <p>The active digit blinks.</p>  |
| Entering the set time 4 and switching to temperature 5 setting mode.       | Press  key.  |  <p>The most right digit of SV indicator blinks. The set temperature of step 4 is displayed.</p> |
| Entering the terminal step and switching to repetition times setting mode. | Press and hold  key and press  key.  |  <p>The most right digit of SV indicator blinks.</p>  |

To be continued to the next page.




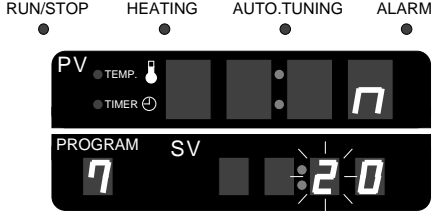

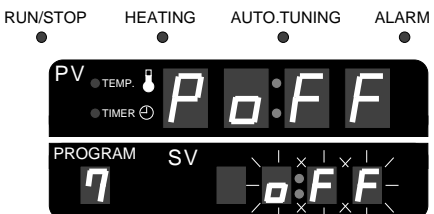


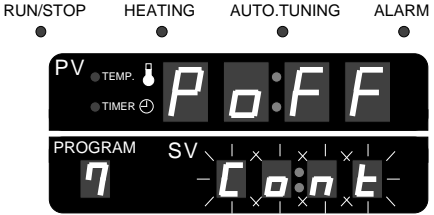

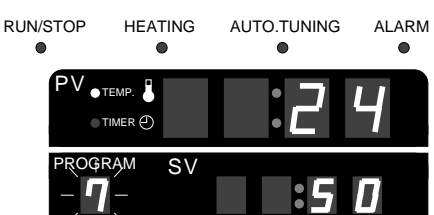

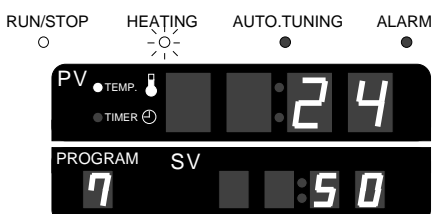


## Terminal step


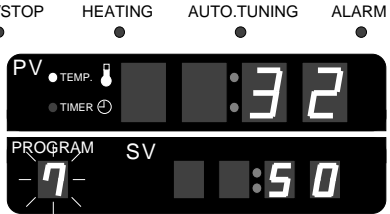
This step indicated quitting of the program.


- If you enter the terminal step, all entered steps including the previous step are accepted to the program.
- If you enter the terminal step, later steps are not executed even if any data are included in them.
- To check the program, the terminal step is indicated as the blinking step No.


## Setting and starting control operation of Program 7

| Procedure  | Key operation  | Indication   |
|--|--|--|
| Input of set repetition times  | Press  key to be active the second digit.<br>Press  or  key to display [2]. |  <p>The active digit blinks.</p>   |
| Entering the set repetition times and switching to setting mode of recovering after power failure. | Press  key.   |  <p>The set character blinks.</p>  |
| Input of the set recovery from power failure   | Press  or  key to indicate the set character [Cont].   |  <p>The set character blinks.</p>  |
| Entering recovery after power failure<br><br>And then settings are completed.                      | Press  key.   |  <p>The set program No. blinks.</p>  |
| Starting controlling.  | Press  key.   |  <p>[RUN/STOP] LED blinks and control operation starts.<br/>If the heater works, [HEATING] LED illuminates. The program No. indication blinks.</p> |


## Starting and stopping control operation of Program 7

| Procedure             | Key operation  | Indication  |
|-----------------------|--|---|
| Stopping controlling. | Press  key. |  <p data-bbox="901 616 1316 728">[RUN/STOP] LED darkens and control operation stops.<br/>Program No. indication blinks.</p> |

 Changing set value while controlling of Program 7

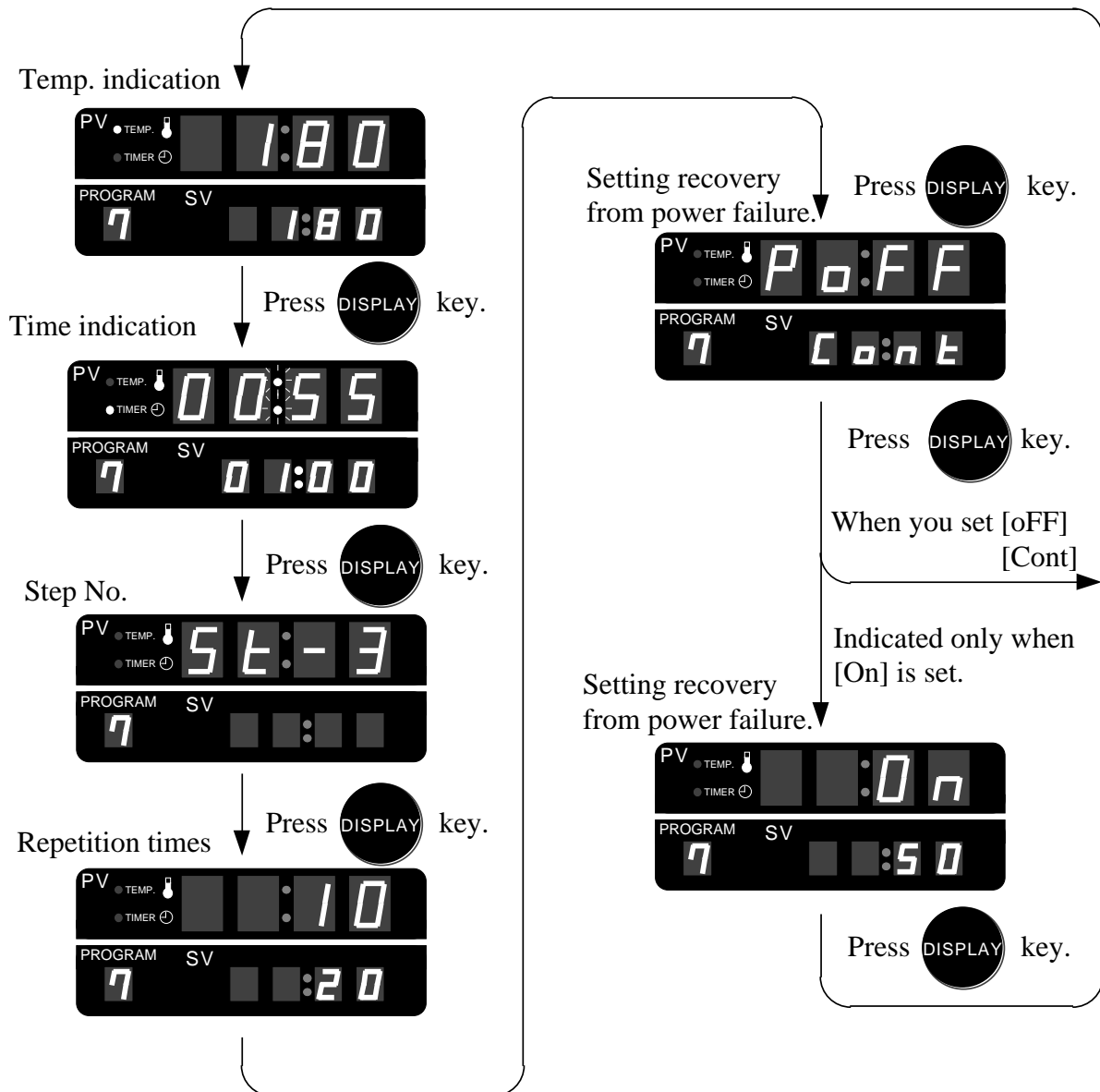
Press  key. Even if the control is active, the display can be changed to the mode of [Selecting program No.]  
The current executing step cannot be accepted the change (both time and temperature). The change can be accepted from the next operating cycle.

If you change program No. in [Selecting Program No.], the other program setting can be changed.  
Refer to the section [Setting of Program \* ].  
\* : Program No.

 **Changing indication while controlling of Program 7**

Press **DISPLAY** key. Even if the control is active, the display can be changed, and can check set values of the current executing step..

Displays during count up of time is changed as follows. If the unit is left for a minute without any key operation, the display changes to the previous indications automatically.



## 4 Setting and executing of adjustment mode

### 4-1 Auto tuning

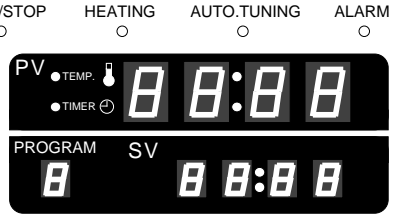

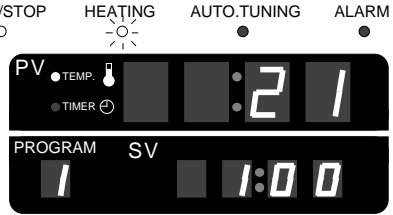

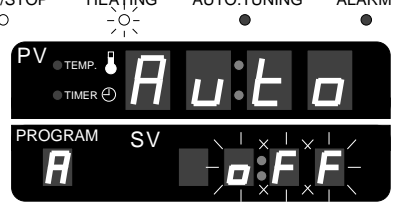
This unit is controlled by a built-in microprocessor based on PID control. The most suitable PID constant is set before shipment. If the temperature accuracy becomes low, PID constant is tuned automatically.

While stopping control operation, auto tuning cannot be set and executed. Set and execute while controlling.

PID constant can be returned to initial data before shipment by zero clear operation. All set data of program mode and adjustment mode are cleared.

Example) Auto tuning is executed in the program 1 at 100°C.



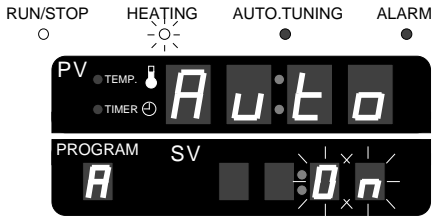

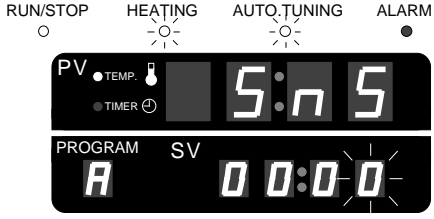

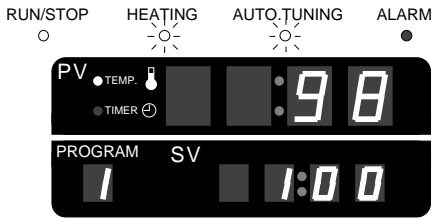
#### Setting Auto tuning


| Procedure   | Key operation  | Indication  |
|---|--|---|
| Turning on the mains switch                                       | Turn on the mains switch.  |  <p>When the switch is turned on, all digits indicate [8] and all LED lamp illuminate. Then each [8] changes to the previous program No, set value and the current measured value.</p> |
| Setting the program 1 at 100°C                                    | Refer to the section [Setting Program 1 on the page 10.  |   |
| Starting program control  | Press  key. |  <p>Program No. indication blinks.</p>  |
| Switching to adjustment mode and changing to auto tuning set mode | Press  key. |  <p>The set character blinks.</p>   |

To be continued to the next page.




## Setting and executing auto tuning

| Procedure  | Key operation  | Indication  |
|--|--|---|
| Setting auto tuning                                    | Press  or  key to indicate set character [Cont]. |  <p>The set character blinks.</p>                                       |
| Executing of auto tuning and switching to program mode | Press  key.   |  <p>[AUTO.TUNING] LED illuminates and auto tuning operation starts.</p> |
| Returning to program mode                              | Press  key.   |  <p>[AUTO.TUNING] LED darkens automatically when it completes.</p>    |

 To stop auto tuning operation










Switching to adjustment mode once and turn to [oFF] the auto tuning setting.  
Or stop control operation. In this case the PID constant is not changed from the previous value.


 To change to the initial PID constant

If the power is shut down, the PID constant is memorized in the battery. The unit is controlled by same constant until auto tuning is executed. Execute zero clear operation to return to the initial settings.

All set data of program mode and adjustment mode are cleared.

## Setting and executing upper limit temperature alarm

| Procedure   | Key operation  | Indication   |
|---|--|--|
| Entering the temperature compensation value and switching to setting mode of upper limit temperature alarm      | Press  key.   |  <p>The active digit blinks.</p>                            |
| Input of upper limit temperature alarm value  | Press  or  key to display [5]. |  <p>The active digit blinks.</p>                            |
| Entering the upper limit temperature alarm value and switching to setting mode of lower limit temperature alarm | Press  key.  |  <p>The smallest digit of set indication (SV) blinks.</p> |
| Returning to the program mode   | Press  key.   |  <p>Program No. indication blinks.</p>                    |

 Upper limit temperature alarm

If you set upper limit temperature alarm value too small, the alarm occurs often. Set the alarm more than 5°C.

If the power is shut down, the upper limit temperature alarm value is memorized in the battery. The unit is controlled by same value until you change the alarm value.

Execute zero clear operation to return to the initial settings.

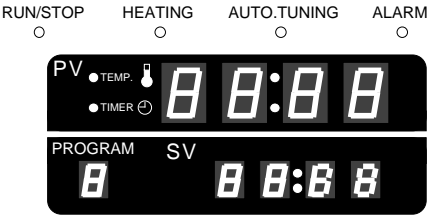
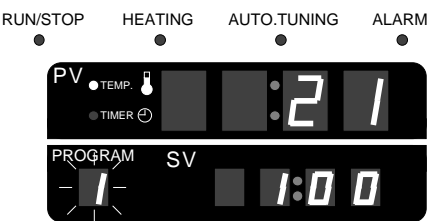

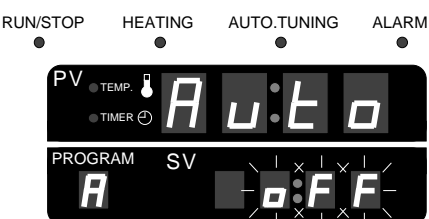

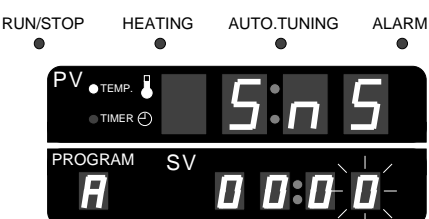
Or switch to the adjustment mode once, and set upper limit temperature alarm value [10]°C. All set data of program mode and adjustment mode are cleared.

4-2 Temperature indication compensation

The temperature sensor of this unit can be adjusted. Temperature indication compensation  
When you calibrate the temperature by a standard thermometer, the temperature indication compensation can also be set within the range  $\pm 20^{\circ}\text{C}$ .

Even while controlling, temperature compensation can be set and executed.



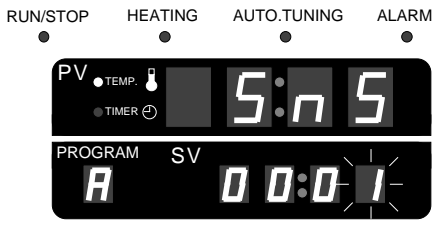



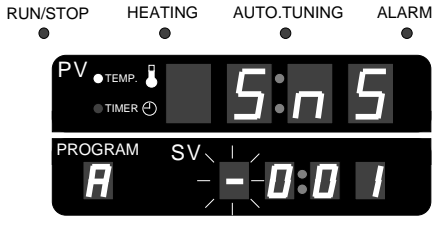

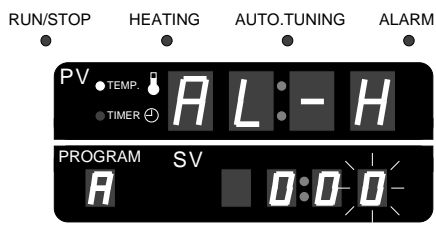

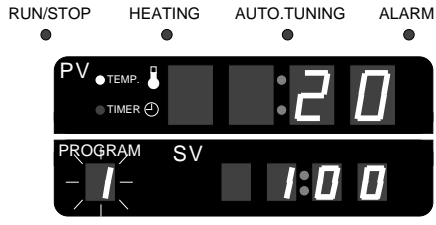
Setting Temperature indication compensation


| Procedure   | Key operation  | Indication   |
|---|--|--|
| Turning on the mains switch                                       | Turn on the mains switch.  |  <p>When the switch is turned on, all digits indicate [8] and all LED lamp illuminate. Then each [8] changes to the previous program No, set value and the current measured value.</p> |
| Selecting program No.   |  |  <p>The previous program No. indication blinks.</p>  |
| Switching to adjustment mode and changing to auto tuning set mode | Press  key. |  <p>The set character blinks.</p>  |
| Executing of auto tuning and switching to program mode            | Press  key. |  <p>The smallest digit of set indication (SV) blinks.</p>  |

To be continued to the next page.

## Setting Temperature indication compensation

1

| Procedure  | Key operation   | Indication   |
|--|---|--|
| Input of temperature compensation value  | Press  or  key to display [1].  |  <p>The active digit blinks.</p>                           |
| Input of temperature compensation value  | Press  key to be active the third digit.<br>Press  or  key to display [1]. |  <p>The active digit blinks.</p>                           |
| Entering the temperature compensation value and switching to setting mode of upper temperature alarm | Press  key.  |  <p>The smallest digit of set indication (SV) blinks.</p> |
| Returning to the program mode  | Press  key.  |  <p>Program No. indication blinks.</p>                   |

 To return the temperature compensation value to [0].

If the power is shut down, the temperature compensation value is memorized in the battery. The unit is controlled by same value until temperature compensation is executed. Execute zero clear operation to return to the initial settings. All set data of program mode and adjustment mode are cleared.

Or switch to the adjustment mode once, and set temperature indication compensation value [0000]°C.

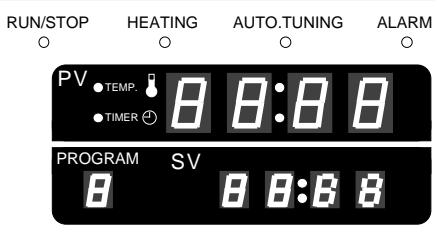
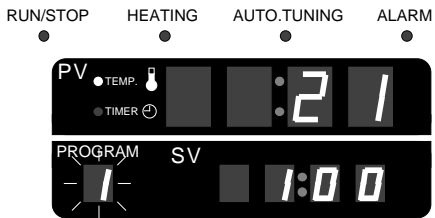
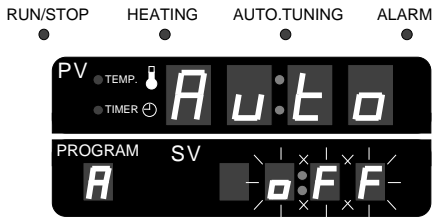
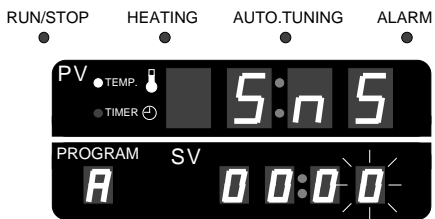
## 4-3 Upper limit temperature alarm (Over shoot)

You can change the upper temperature alarm value. It can be set and executed both while controlling or stopping.

The range of upper limit alarm value is 0 ~ 99°C.  
The initial setting is 10°C.

Example) Change the upper limit temperature alarm value 15°C.

## Setting Upper limit temperature alarm

| Procedure   | Key operation             | Indication   |
|---|---------------------------|--|
| Turning on the mains switch   | Turn on the mains switch. |  <p>When the switch is turned on, all digits indicate [8] and all LED lamp illuminate. Then each [8] changes to the previous program No, set value and the current measured value.</p> |
| Selecting a program No.   |                           |  <p>The previous program No. indication blinks.</p>  |
| Switching to adjustment mode and changing to auto tuning set mode                   | Press <b>MODE</b> key.    |  <p>The set character blinks.</p>  |
| Entering the auto tuning setting and switching to temperature compensation set mode | Press <b>SET</b> key.     |  <p>The smallest digit of set indication (SV) blinks.</p>  |

To be continued to the next page.

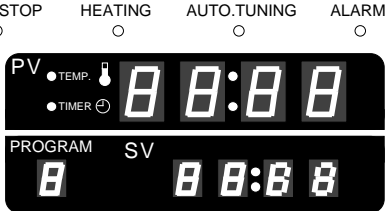
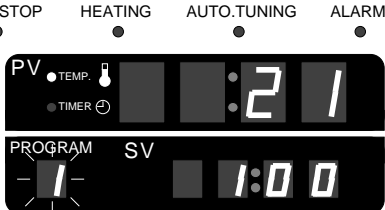

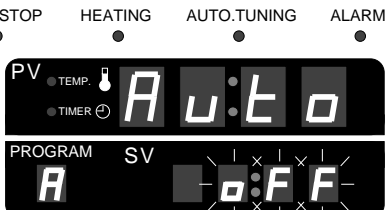

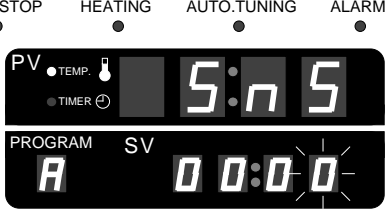
## 4-4 Lower limit temperature alarm (Under shoot)

You can change the lower temperature alarm value. It can be set and executed both while controlling or stopping.

The range of lower limit alarm value is 0 ~ 99°C.  
The initial setting is 10°C.


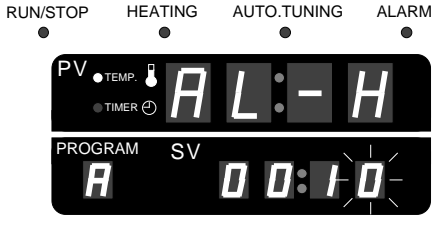

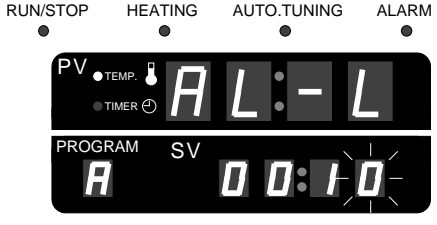


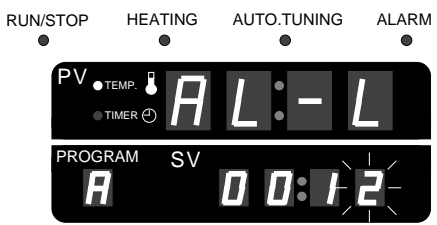

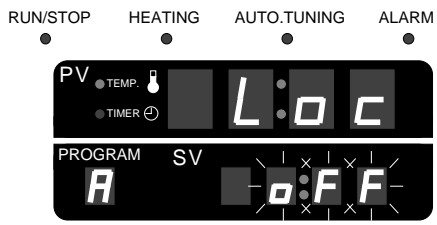

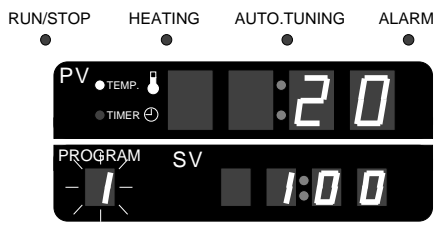
Example) Change the lower limit temperature alarm value 12°C.

## Setting Upper limit temperature alarm

| Procedure   | Key operation  | Indication   |
|---|--|--|
| Turning on the mains switch   | Turn on the mains switch.  |  <p>When the switch is turned on, all digits indicate [8] and all LED lamp illuminate. Then each [8] changes to the previous program No, set value and the current measured value.</p> |
| Selecting a program No.   |  |  <p>The previous program No. indication blinks.</p>  |
| Switching to adjustment mode and changing to auto tuning set mode                   | Press  key. |  <p>The set character blinks.</p>  |
| Entering the auto tuning setting and switching to temperature compensation set mode | Press  key. |  <p>The smallest digit of set indication (SV) blinks.</p>  |

To be continued to the next page.

## Setting and executing upper limit temperature alarm

| Procedure   | Key operation  | Indication   |
|---|--|--|
| Entering the temperature compensation value and switching to setting mode of lower limit temperature alarm      | Press  key.   |  <p>The active digit blinks.</p>                           |
| Entering the upper limit temperature alarm value and switching to setting mode of lower limit temperature alarm | Press  key.   |  <p>The active digit blinks.</p>                           |
| Input of lower limit temperature alarm value  | Press  or  key to display [2]. |  <p>The smallest digit of set indication (SV) blinks.</p> |
| Entering the lower limit temperature alarm value and switching to setting mode of data lock                     | Press  key.   |  <p>The set character blinks.</p>                        |
| Returning to the program mode   | Press  key.   |  <p>Program No. indication blinks.</p>                   |



### Lower limit temperature alarm

If you set lower limit temperature alarm value too small, the alarm occurs often. Set the alarm more than 5°C.

If the power is shut down, the lower limit temperature alarm value is memorized in the battery. The unit is controlled by same value until you change the alarm value.

Execute zero clear operation to return to the initial settings.

All set data of program mode and adjustment mode are cleared.

Or switch to the adjustment mode once, and set lower limit temperature alarm value [10]°C.



## 4-5 Adjustment data lock

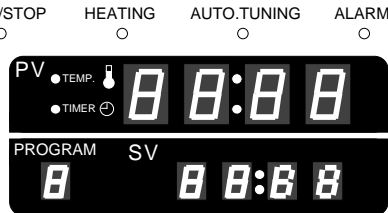
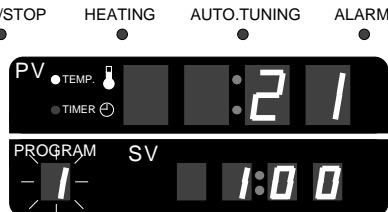

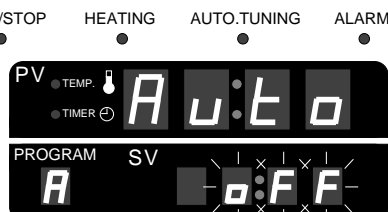

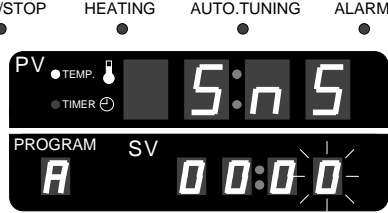
You can lock the set values of adjustment data. When the adjustment mode data lock is active (turned [On]), set data cannot be changed except unlocked data.

Data of program mode can be changed.

Data lock can be set and executed both while controlling or stopping.


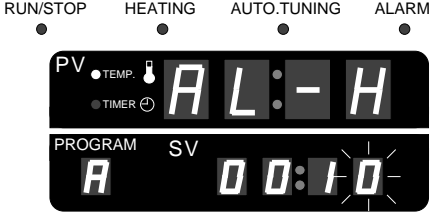

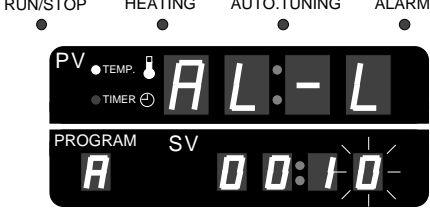

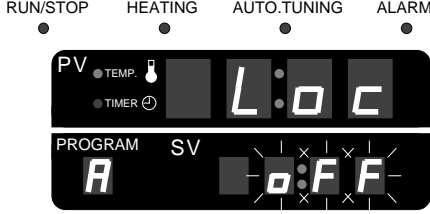


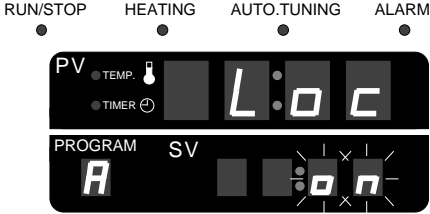

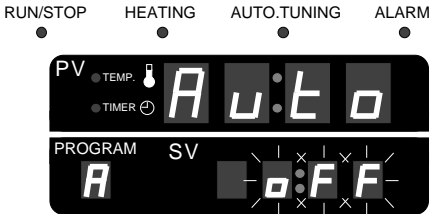
Example) Lock the adjustment data.

## Setting Adjustment data lock

| Procedure   | Key operation  | Indication   |
|---|--|--|
| Turning on the mains switch   | Turn on the mains switch.  |  <p>When the switch is turned on, all digits indicate [8] and all LED lamp illuminate. Then each [8] changes to the previous program No, set value and the current measured value.</p> |
| Selecting a program No.   |  |  <p>The previous program No. indication blinks.</p>  |
| Switching to adjustment mode and changing to auto tuning set mode                   | Press  key. |  <p>The set character blinks.</p>  |
| Entering the auto tuning setting and switching to temperature compensation set mode | Press  key. |  <p>The smallest digit of set indication (SV) blinks.</p>  |


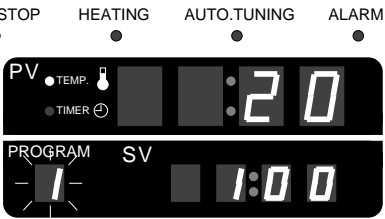
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## Setting and executing Adjustment data lock

| Procedure   | Key operation   | Indication  |
|---|---|---|
| Entering the temperature compensation value and switching to setting mode of upper limit temperature alarm      | Press  key.  |  <p>The active digit blinks.</p>    |
| Entering the upper limit temperature alarm value and switching to setting mode of lower limit temperature alarm | Press  key.  |  <p>The active digit blinks.</p>    |
| Entering the lower limit temperature alarm value and switching to setting mode of data lock                     | Press  key.  |  <p>The set character blinks.</p> |
| Input of adjustment data lock   | Press  or  key to display [on]. |  <p>The set character blinks.</p> |
| Entering the adjustment data lock and switching to setting mode of auto tuning                                  | Press  key.  |  <p>The set character blinks.</p> |

To be continued to the next page.

## Setting and executing Adjustment data lock

| Procedure                     | Key operation  | Indication  |
|-------------------------------|--|---|
| Returning to the program mode | Press  key. |  <p>Program No. indication blinks.</p> |



## Adjustment data lock

When you set adjustment data lock [on], adjustment data cannot be changed.

If the power is shut down, the adjustment data lock setting is memorized in the battery. The unit is controlled by setting until you release the adjustment data lock.

Execute zero clear operation to return to the initial settings.

All set data of program mode and adjustment mode are cleared.

Or switch to the adjustment mode once, and set adjustment data lock [oFF].

## Data setting in program mode

**Setting program No.**

PROGRAM indication can be set by **UP** **DOWN** key.

Setting range : 1 ~ 8

**Setting repetition times**

Repetition times can be set by **SHIFT** **UP** **DOWN** key.

Setting range : 0 ~ 99 times  
[0] : continues until you stop operation.

**Setting temperature**

Temperature can be set by **SHIFT** **UP** **DOWN** key.

Setting range : 40 ~ 250°C(NDO)  
40 ~ 210°C(WFO)

**Setting recovery from PF**

Recovery from PF can be set by **UP** **DOWN** key.

Setting range : oFF, On, Cont

**Setting time**

Time can be set by **SHIFT** **UP** **DOWN** key.

Setting range : 1min. ~ 99h59min.

**Setting recovery temp. from PF**

Recovery temp. from PF can be set by **SHIFT** **UP** **DOWN** key.

Setting range : 40 ~ 250°C(NDO)  
40 ~ 210°C(WFO)

**Function of key**

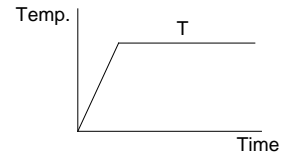
- SHIFT** key : Move a blinking (active) digit.
- UP** key : Increases the blinking value +1, or changes the set character. Press and hold this key to accelerate changing.
- DOWN** key : Increases the blinking value -1, or changes the set character. Press and hold this key to accelerate changing.

**Set data indication**

\* The previous set value is indicated.  
For the first time the initial settings are indicated.  
(Marked by )

indicates blinking.  
 indicates continuous illumination.

## Program 1 (Continuous operation)



**Setting program No.**

Setting temp. (T) **SET** key

Setting recovery from PF **SET** key

Completing setting **SET** key

Starting controlling **RUN STOP** key

- Press **DISPLAY** key to check the set value or the measured value while controlling. And then if you press **DISPLAY** key, temperature, time, repetition time, recovery from power failure or recovering temperature from power failure can be checked by every pressing **DISPLAY** key. When the unit is left for more than a minute without any key operation, the indication returns to the previous setting automatically.
- Press **SET** key to check or change the program while controlling. And then all settings of the program can be checked sequentially. When the unit is left for more than a minute without any key operation, the indication returns to the previous setting automatically. In case you change the program, if you change the current executing program, it is accepted in the next repetition or after completing operation except the program 1.
- If you stop the operation, press **RUN STOP** key. The control operation stops and the display changes to the setting mode of program No.

Program mode

**Program 2 (Auto start)**

Temp. vs Time graph showing temperature rising to T and staying constant for time t.

Setting program No.  
 PV Measured temp.  
 PROGRAM SV Set temp.

Setting time (t) SET key  
 PV Measured time  
 PROGRAM SV Setting time

Setting temp. (T) SET key  
 PV Measured temp.  
 PROGRAM SV Setting temp.

Setting recovery from PF SET key  
 PV P o F F  
 PROGRAM SV Recovery

Completing setting SET key  
 PV Measured temp.  
 PROGRAM SV Set temp.

Starting controlling RUN STOP key  
 PV Elapsed time  
 PROGRAM SV Set time

Temp. indication Time up  
 PV Measured temp.  
 PROGRAM SV Set temp.

**Program 3 (Auto stop)**

Temp. vs Time graph showing temperature rising to T, staying constant for time t, and then falling.

Setting program No.  
 PV Measured temp.  
 PROGRAM SV Set temp.

Setting temp. (T) SET key  
 PV Measured temp.  
 PROGRAM SV Setting temp.

Setting time (t) SET key  
 PV Elapsed time  
 PROGRAM SV Setting time

Setting recovery from PF SET key  
 PV P o F F  
 PROGRAM SV Recovery

Completing setting SET key when you set [oFF] or [Cont] SET key when you set [on]  
 PV O n  
 PROGRAM SV Setting temp.

Setting recovering temp. from PF  
 PV O n  
 PROGRAM SV Setting temp.

Completing setting SET key  
 PV Measured temp.  
 PROGRAM SV Set temp.

Starting controlling RUN STOP key  
 PV Measured temp.  
 PROGRAM SV Set temp.

Time indication attains to the set temp.  
 PV Elapsed time  
 PROGRAM SV Set time

Stopping controlling Time up  
 PV Measured temp.  
 PROGRAM SV Set temp.

**Program 4 (Step A)**

Temp. vs Time graph showing temperature rising to T1, staying constant for time t1, falling to T2, staying constant for time t2, and then rising.

Setting program No.  
 PV Measured temp.  
 PROGRAM SV Set temp.

Setting temp. (T1) SET key  
 PV Measured temp.  
 PROGRAM SV Setting temp.

Setting time (t1) SET key  
 PV Elapsed time  
 PROGRAM SV Setting time

Setting temp. (T2) SET key  
 PV Measured temp.  
 PROGRAM SV Setting temp.

Setting time (t2) SET key  
 PV Elapsed time  
 PROGRAM SV Setting time

Setting repetition times SET key  
 PV n  
 PROGRAM SV Setting rep. times

Setting recovery from PF SET key  
 PV P o F F  
 PROGRAM SV Recovery

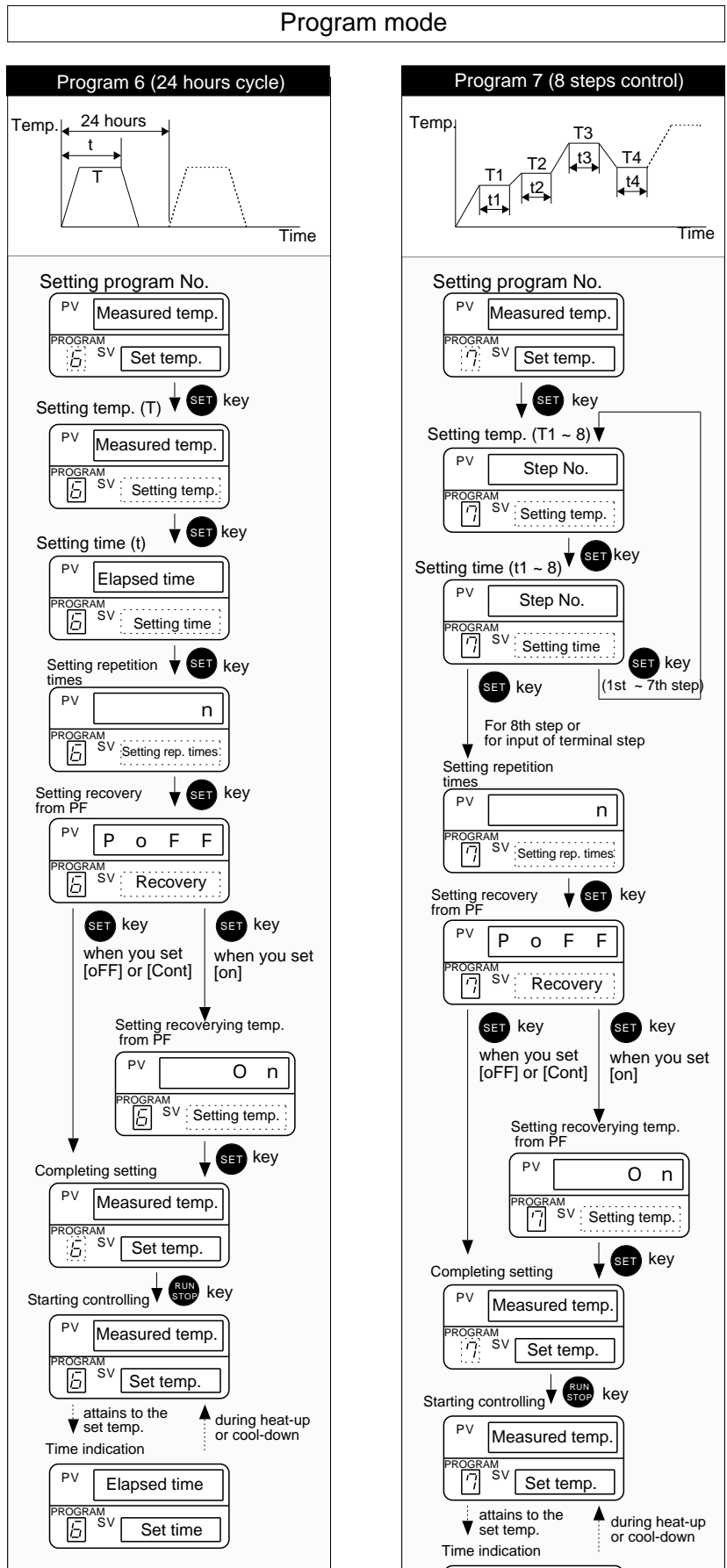
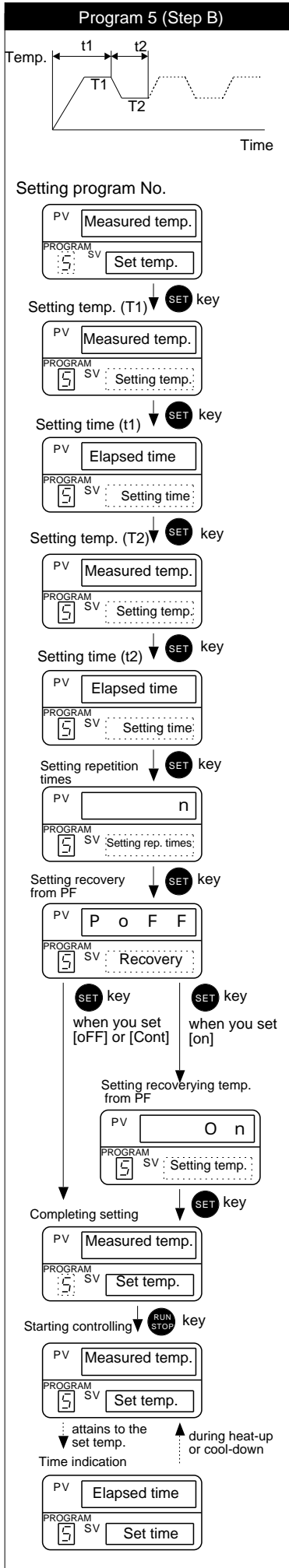
Completing setting SET key when you set [oFF] or [Cont] SET key when you set [on]  
 PV O n  
 PROGRAM SV Setting temp.

Setting recovering temp. from PF  
 PV O n  
 PROGRAM SV Setting temp.

Completing setting SET key  
 PV Measured temp.  
 PROGRAM SV Set temp.

Starting controlling RUN STOP key  
 PV Measured temp.  
 PROGRAM SV Set temp.

Time indication attains to the set temp. during heat-up or cool-down  
 PV Elapsed time  
 PROGRAM SV Set time



# Adjustment mode

## Data setting f adjustment mode

**Auto tuning**

PV **A u t o**  
PROGRAM SV **o F F**

Press **UP** **DOWN** key to set recovery from power failure

Setting range : oFF, On

**Lower limit temp. alarm**

PV **A L - L**  
PROGRAM SV **0 1 0**

Press **SHIFT** **UP** **DOWN** key to set temperature

Setting range : -20.0 ~ 20.0°C

**Temp. indication compensation**

PV **S n S**  
PROGRAM SV **0 0 0**

Press **SHIFT** **UP** **DOWN** key to set temperature

Setting range : -20.0 ~ 20.0°C

**Data lock of adjustment**

PV **L o c**  
PROGRAM SV **o F F**

Press **UP** **DOWN** key to set recovery from power failure

Setting range : oFF, On

**Upper limit temp. alarm**

PV **A L - H**  
PROGRAM SV **0 1 0**

Press **SHIFT** **UP** **DOWN** key to set temperature

Setting range : -20.0 ~ 20.0°C

**Set data indication**

\* The previous set value is indicated.  
For the first time the initial settings are indicated. (Marked by ↑ )

□ indicates blinking.  
□ indicates continuous illumination.

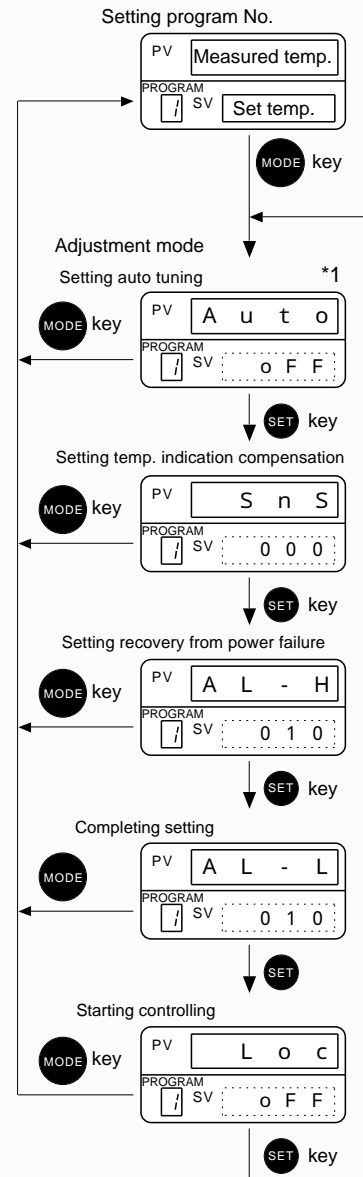
**Function of key**

**SHIFT** key : Move a blinking (active) digit.

**UP** key : Increases the blinking value +1, or changes the set character. Press and hold this key to accelerate changing.

**DOWN** key : Increases the blinking value -1, or changes the set character. Press and hold this key to accelerate changing.

## Adjustment mode



You can switch between program mode and adjustment mode by pressing **MODE** key.

\*1 Auto tuning operation is valid only while controlling operation.