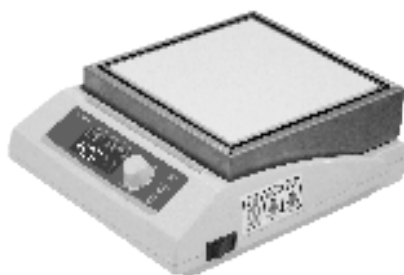


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1-4601-31-90 NDK-1A-F  
 1-4601-31-91 NDK-1A-I  
 1-4601-32-90 NDK-2A-F  
 1-4601-32-91 NDK-2A-I



Thank you for your selecting Digital Hotplate NDK Series.





For your safety & life span of the product, please read this "instruction manual" fully before using and keep these instructions.  
 After reading this instruction, keep it in a place where you can see it at any time.  
 Make sure that this instruction with the product should be given to the following users for safe use.



## Safety considerations

Please read "Safety considerations" before using and use the product correctly.  
The suggestions below have possible to connect the serious result.  
Please keep these instructions for safety.









### • Warning mark & meaning

|   |  |
|---|--|
|  <b>Danger</b>     | Danger of death or serious injury is near at hand with wrong handling. |
|  <b>Warning</b>    | Riskiness of death or serious injury may occur with wrong handling.    |
|  <b>Caution</b>    | Injury and physical loss only may occur with wrong handling.           |
|  <b>Suggestion</b> | Caution is required for safety.  |

Also, the instructions described in this section may have serious results depending on the circumstances.

All of them contain essential safety information, so be sure to follow them.

### • Indication mark for the safety

|   |  |   |  |
|---|--|---|--|
|    | This indicates the general notice, warning, forbidden items.   |    | This indicates the prohibition the case can cause the electric shock with disassemble or reorganization the product. |
|  | This indicates the prohibition of touching a specific part of the device under certain conditions, reducing the performance. |  | This indicates the caution of high temperature under certain conditions, reducing the performance.                   |
|  | This indicates the risk of electric shock under certain conditions.  |  | This indicates the caution for explosion risk under certain conditions.  |
|  | This indicates the connection of the line, in case of the machine with the terminal blocks for safe.                         |  | This indicates the handling instruction for general user.  |



## Caution during use

When you receive the product, inspect it to check any problems from the delivery or damages. If the product is damaged or does not work as specifications, contact the purchasing place.

### ◆ Caution for shipping

When shipping the product after opening it, use the packaging materials used for the original packaging.

### Caution

Use the product safely and correctly; be sure to read the following precautions carefully to avoid personal injury or economic loss. Also, keep it in a place where you can see it at any time. Make sure that this manual with the product should be given to the following users for safe use.







\*This Hot plate is for indoor, please do not use in other places.

\*This Hotplate is for an experiment.

Do not use in a driving without a person and in an assembly line.

### Warning

If the product is handled wrongly, it reduce the life span, also may cause the malfunction and injury, please keep the below suggestions.

- Please use it at the rated power supply. When it used in environment with different rated power supply, it may cause the malfunction or accident.
- Please do not process, change excessively, damage a power cable, and plug or do not put heavy things on them. Also, when using the cable and plug, do not bundle or place them close to high-temperature parts. Use the power cable after confirming that there is no dust or moisture.
- The ambient temperature is +5 to +35°C. Please do not operate in beyond of the range. 
- The ambient humidity is 35 to 85% RH. Please use it in no condensation.
- Please use it in the place where is no corrosive or flammable gas etc. 
- Please do not use the product in the place where is nearby water because inner part of the body includes electronic accessories and do not pour water into the body.
- Please do not handle the product and plug with a wet hand. 
- In case, the body is dropped and broken, please turn off the power switch instantly, unplug the power plug from the outlet and request a repair to the purchasing place.
- When there is a strange sound, smell or smoke, please turn off the power switch instantly, unplug the power plug from the outlet and request a repair to the purchasing place.
- Please do not disassemble the body and if there is a malfunction, the user must be followed instruction of the maker. 
- Please do not modify the product. It is beyond our warranty, and we are not responsible for it.
- Do not move the product due to there is a danger of burns during and after using the product.

### Caution

Please unplug the power plug from the outlet when it is not used for the safety.





## Installation instructions

- This product works well in rated power supply and frequency.  
Before supplying the power, be sure to check the rated power and frequency.
- Use the included power cable. Also, do not use this with other devices.
- Please set the product in firm and flat place.
- Do not install the product in place near the heat source or direct sunlight. The ambient temperature is +5 to +35°C, and the ambient humidity is 35 to 85% RH. (However, it is rated at no freezing or condensation.)
- Do not set the product if there is machinery generates high frequency noise around.
- Do not set in place there is flammable, corrosive gas and materials around.  
(This product is not explosion-proof equipment.)
- Please avoid the place where there is dust or is generated.
- Please avoid the place where there is a shock and vibration.
- Please take an enough space for a test easily. (Front/Rear/Left/Right: min. 15cm, upper part: min. 100cm)
- Use this product in an environment that cannot be easily reached by infants or unrelated persons.



Please put ground connection into right place firmly.  
It may cause an electronic shock in case of the malfunction or a short circuit.  
Please ask to electrical manufacturing company in case there is not a ground connection an outlet.



The protection device may not be worked when the machinery is not used in specified ambient environment.



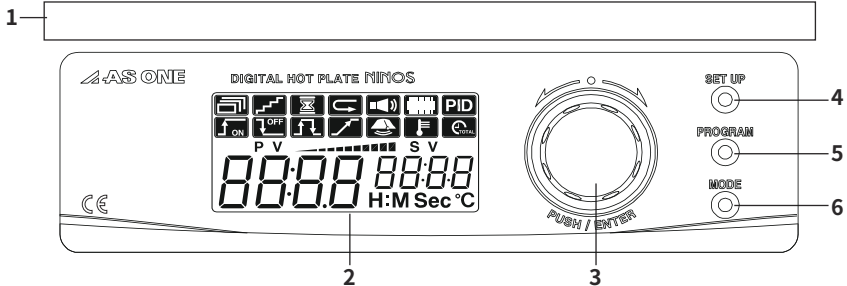
Do not cover the body and top plate with an aluminum box.  
Also, do not use the product in sealed containers.  
It may cause product failure or the safety device may not work.



## Product overview

### ■ Unit Description

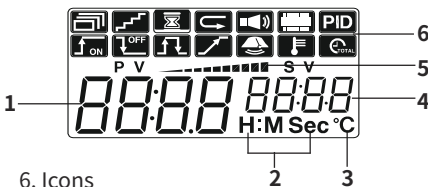
#### ◆ The front side



1. LED bar: LED lights up or blinks based on the operating status (normal / error) and the temperature of the top plate when the operation stops.
2. LCD indicator: It displays icons from the setting, set temperature (SV), present temperature (PV), and the amount of control output.
3. JOG switch: Press over 3 seconds to start / stop temperature control as the set temperature (SV).
  - During the run mode: Changes the set temperature (SV).
  - Stop mode: Changes the parameter setting value.
4. SETUP key: Enter the SETUP group. Press the front key over 3 seconds to lock / unlock.
5. PROGRAM key: Set the program.
6. MODE key: Set the time for the timer to operate. Displays operating time \* during the operation.
 

※Operating time: Time to perform temperature control by the JOG switch

#### - LCD indication part

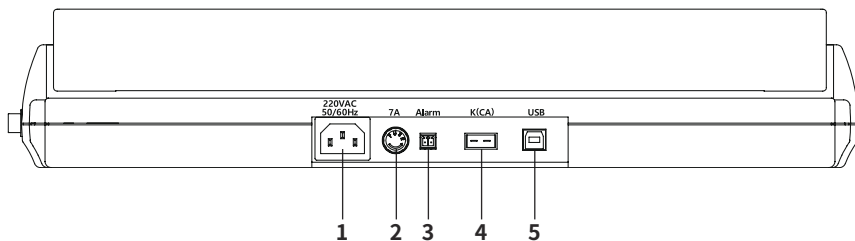


1. Present measured value (PV)
2. Time unit (H:M Sec, Hour:Minute Second)
3. Temperature unit (°C)
4. Setting value (SV)
5. Control output

| Icon | Description  | Icon | Description   |
|------|--|------|---|
|      | Use program control  |      | ON timer (T-1)  |
|      | Progress ramp section of program control                       |      | OFF timer (T-2)   |
|      | Progress waiting section of program control                    |      | ON/OFF timer (T-3)  |
|      | Use repeat function of program control                         |      | SV timer (T-4)  |
|      | Use the notification sound                                     |      | Use alarm   |
|      | Use the sampling   |      | Use temperature correction function                                   |
|      | PID control (It does not appear when using the ON/OFF control) |      | Total operating time (When checking the indication of operating time) |



### ◆ The back side



1. Power input terminal  
: External power cable (approx. 1.8m)
2. Fuse holder  
: Fuse specifications (250V 7A Ø6.4×30mm)
3. Alarm output terminal  
: It is a connector to connect alarm output (relay contacts) wires.
4. External thermocouple input terminal  
: It is a connector to connect thermocouple sensor (K(CA), sold separately).
5. Communication USB connector  
: It is a connector to connect communication cable (USB 2.0 B type, sold separately).

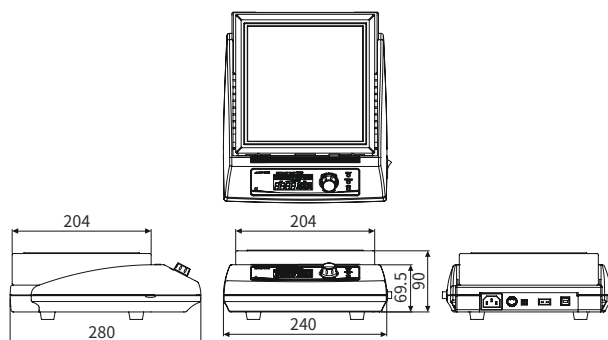


## Product overview

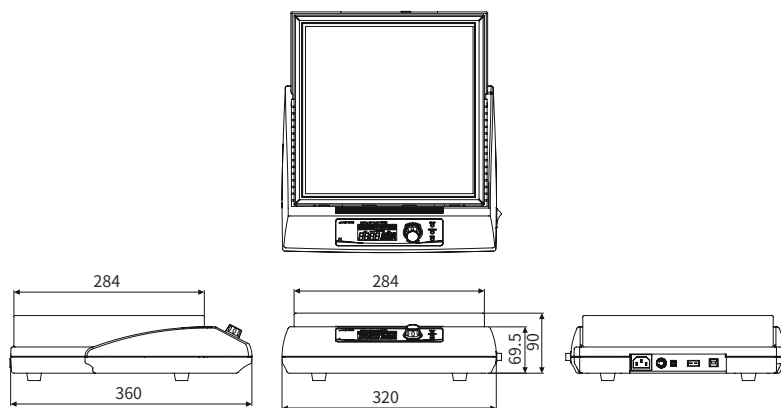
### ■ Dimensions

(Unit: mm)

#### ◆ NDK-1A-I, NDK-1A-F



#### ◆ NDK-2A-I, NDK-2A-F





## Order of the operation

### ■ Before using the product

1. You must read *caution during use* (see page 2) and *installation instructions* (see page 3), and make sure that these instructions are followed correctly.
2. When using the communication function with a PC, be sure to install the device management program (DAQMaster for ASONE) on the PC connected to the hot plate. The program can be downloaded in compressed file format by going to each product page on “AXEL-WEB : <https://axel.as-1.co.jp/>” and clicking 「専用アプリケーション (1.0.0.60) のダウンロードはこちらから」 (Japanese Only).

### 1. Check the power

- Be sure to connect the wires to the ground terminal. If the ground terminal is not connected in the right place, it may cause electric shocks.
- Make sure that the power switch is OFF.
- Make sure that the power plug is correctly connected.
- Use the rated power supply voltage and frequency.
- Do not use anything other than the additional power plug.
- Do not use the the additional power plug with other devices.

### 2. Input the power

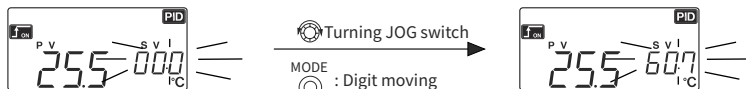
Please set the power switch to ON in the back side of the body.

After the power is on, the LCD indication part shows [P5 - I] and model name (e.g., [nd - I] for NDK-1A-I/F) for 5 seconds and then shows the state of stop operation.

### 3. Setting the set temperature (SV)

The set temperature (SV) flashes when the operation stops.

Turn the JOG switch to set the set temperature (SV), and press the JOG switch to save.

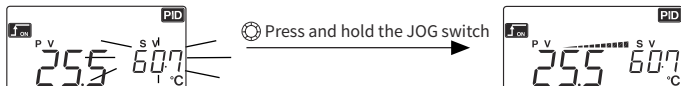


After confirm the set temperature (SV), it is saved automatically 3 seconds later. The saved setting value flashes when the operation stops.

### 4. Start running / Stop

Press the JOG switch over 3 seconds to start operation.

LCD indication part of the control output is on or blinks depending on the heater output.



※In the operating state, the set temperature (SV) lights up, and the setting can be changed by turning the jog switch.

Press the JOG switch over 3 seconds to stop the operation.



## Order of the operation



### Caution

Please unplug the power plug from the outlet when it is not used for the safety.



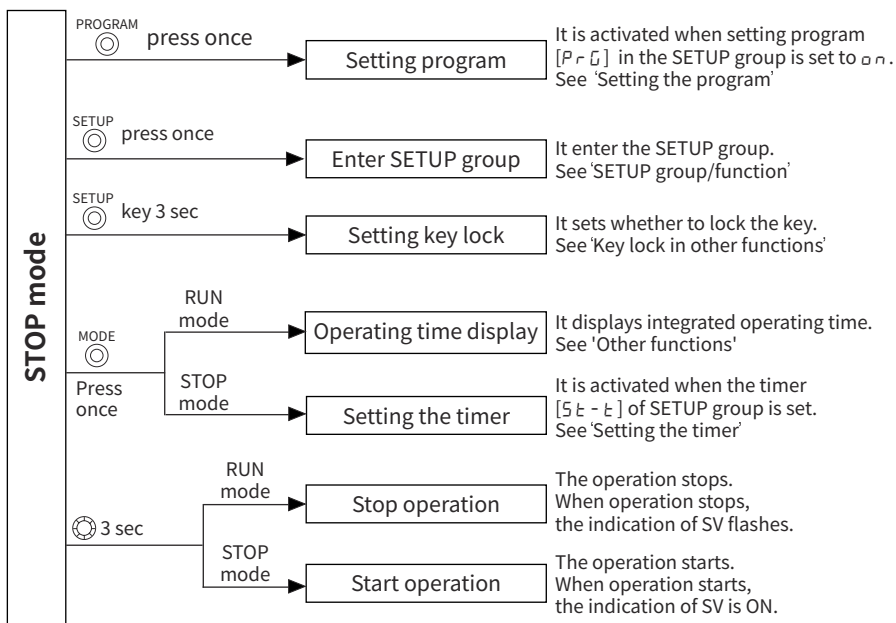
### Caution

Do not touch the heating part for a while after stop and during operation.

## ■ Operation during power outages

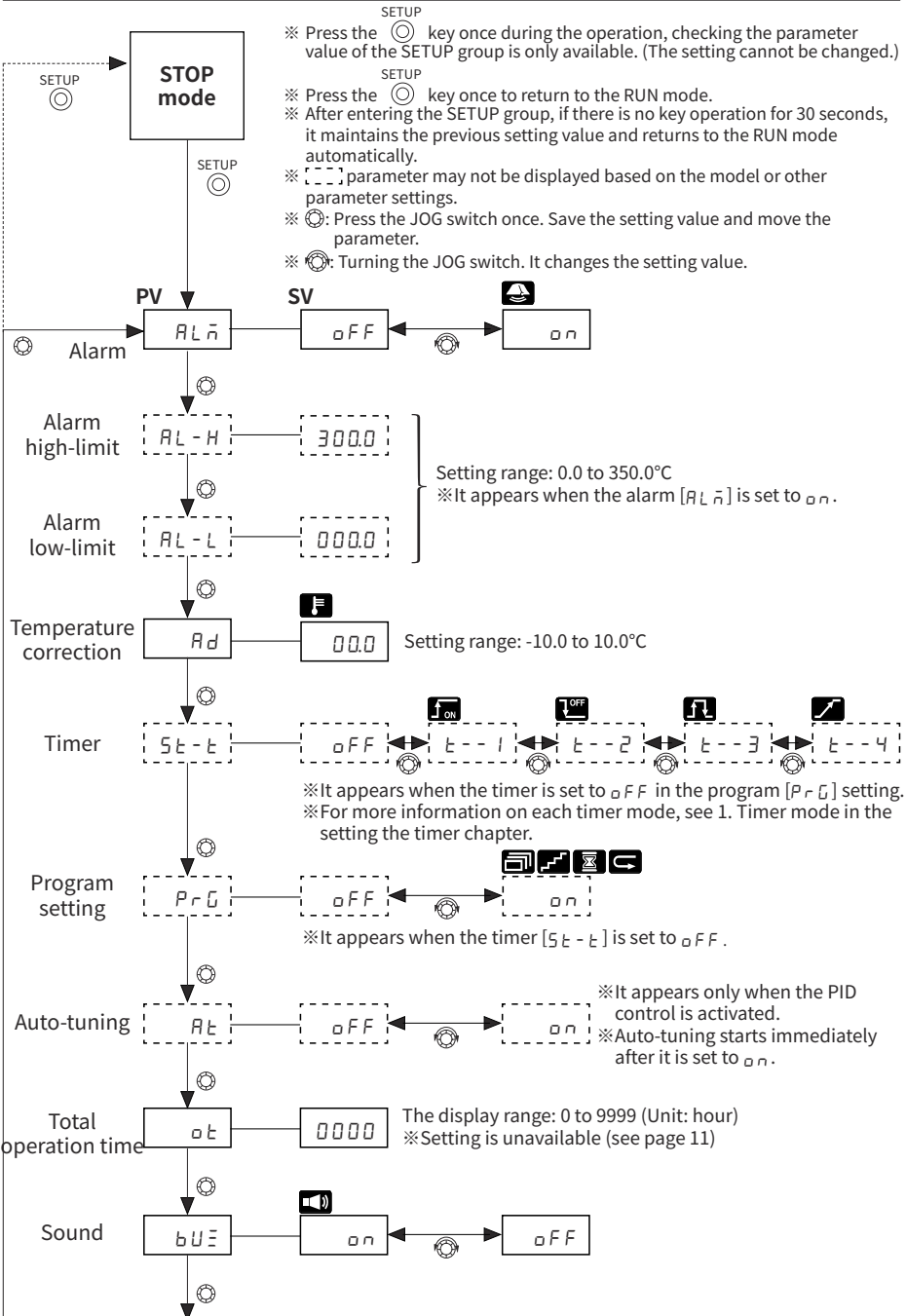
- If power is shut off temporarily and restored due to the unexpected blackout, the heater output will be stopped, and its operation will not be resumed automatically. Timer and program operation also will not operate automatically. Time is reset.

## 5. All parameters



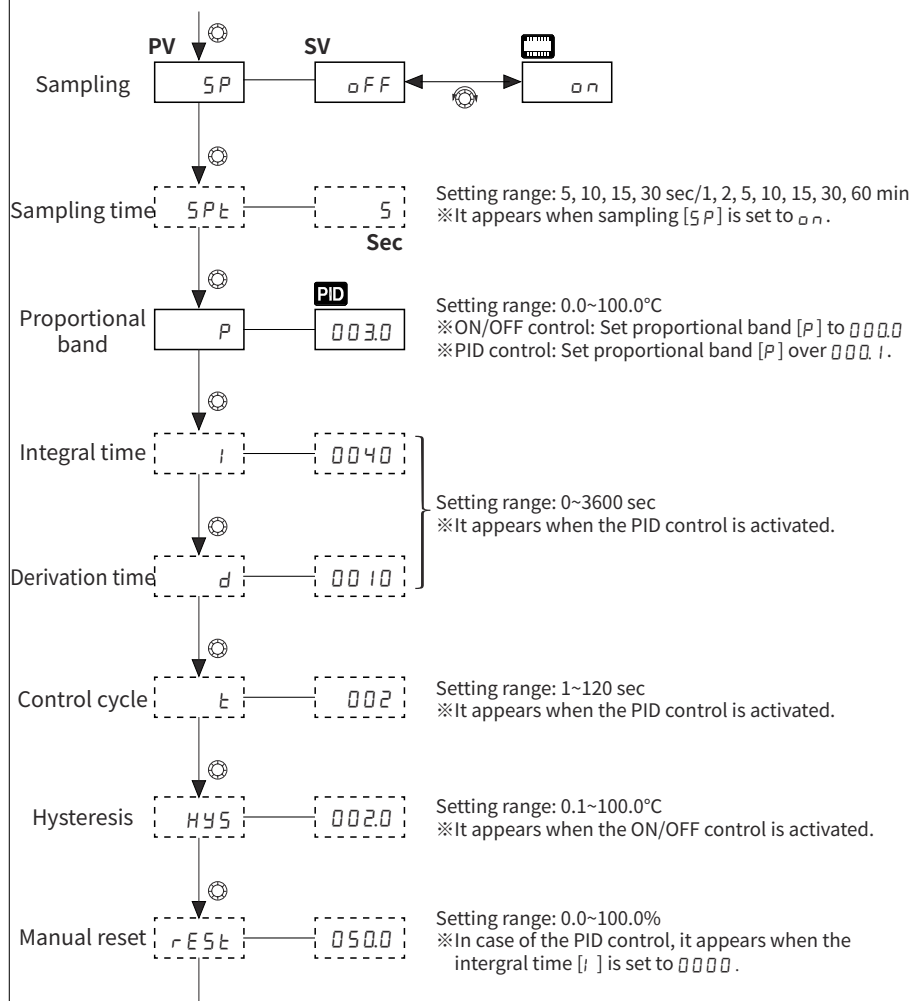


## SETUP group






## SETUP group



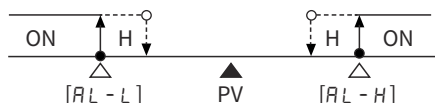


## SETUP group function

### 1. Alarm [ $R_L \bar{n}$ ]


You can use the alarm function. Alarm [ $R_L \bar{n}$ ] is set to  $\square n$  to use, and when the alarm is not used, set to  $\square FF$ . When set to  $\square n$ ,  appears on the icon display part.

Set alarm high-limit [ $R_L - H$ ] and low-limit [ $R_L - L$ ].



●: ON, ○: OFF


H: alarm hysteresis (2°C only)


In case of alarm operation, control output goes to OFF and alarm sound is generated regardless of operation sound [ $b U \Xi$ ] of SETUP group, and  flashes every 0.5 sec.

In case of alarm operation, alarm output (relay contacts) is ON with the above operation.

### 2. Temperature correction [ $R_d$ ]

It reduces the deviations caused by temperature sensors.



When the correction value is set,  appears in the icon display part. (When set to  $\square \square$ , it does not appear.)

 If you change the sensor input (external sensor  $\leftrightarrow$  internal sensor), the temperature correction value is maintained. Be sure to reset the correction value.

※ When the present temperature (PV) is out of the range of sensor display,  $HHHH$  or  $LLLL$  is displayed regardless of the temperature correction value.

### 3. Auto-tuning [ $R_E$ ]

It measures the thermal characteristics and response speed of various controlled subjects to calculate the PID time constants and set the value necessary for optimal control so that quick response time and high stability can be achieved.

When auto tuning [ $R_E$ ] is set to  $\square n$ ,  flashes every 0.5 sec. on the icon display part and performs the auto tuning. When auto tuning ends (normally or forcibly),  stops the flash and operation, and at the same time, the setting value of auto tuning [ $R_E$ ] is automatically changed to  $\square FF$ .

※ The auto tuning [ $R_E$ ] does not appear during ON/OFF control.

※ The auto tuning [ $R_E$ ] can be executed ( $\square n$  setting) only when the operation stops.

※ Auto tuning continues to run even if the present temperature (PV) exceeds or less than the display range during the auto tuning is activating.

※ Other parameters except the auto tuning [ $R_E$ ] cannot be set during the auto tuning is activating.

※ When auto tuning ends forcibly, set auto tuning [ $R_E$ ] to  $\square FF$ .

It maintains [ $P, I, d$ ] setting values before auto tuning.

※ If the sensor break error [ $\square PE n$ ] occurs during auto tuning, auto tuning ends forcibly.

It maintains [ $P, I, d$ ] setting values before auto tuning.

※ When auto tuning is activating, the power of the body is turned off and then turned on, the auto tuning ends.

※ Each [ $P, I, d$ ] value calculated by auto tuning can be changed / set by the user after the auto tuning ends.

※ Please note that auto tuning may take a long time in case of difficult control conditions.


### 4. Indication of total operation time [ $\square t$ ]

This parameter displays the total operation time of the product by an hour.

The setting is unavailable, and the time during the operation stops is not added.

### 5. Operation sound [ $b U \Xi$ ]

It is available to use the sound. When the operation sound [ $b U \Xi$ ] is set to  $\square n$ ,

 appears on the icon display part.


The sound is generated in the following cases.

- When pressing the front key and JOG switch (except for the rotation of JOG switch)
- When completion of the operation of timer
- When completion of step progress time of program
- When the present temperature (PV) reaches the set temperature (SV)  $\pm 0.5^\circ\text{C}$  during operation.




## SETUP group function

### 6. Sampling [SP], Sampling time [SPt]

Save the present temperature (PV) at the internal memory in the sampling period you set. Sampling [SP] is set to  $\square\square$ ,  appears on the icon display part. Set the sampling time [SPt]. When the sampling time is set to 5 (Sec), the value of present temperature is saved at the internal memory once every 5 seconds. (Up to 7,700 values)

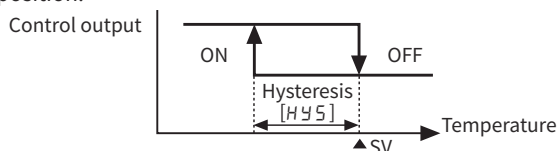
You can check the saved data using the comprehensive device management program (DAQMaster for AS ONE) by connecting the main unit and PC. For more information, see the DAQMaster for AS ONE user manual.

- ※ When sampling [SP] is set from  $\square FF$  to  $\square\square$ , all previously saved data will be deleted.
- ※ When the power is on again, the data is saved continuously.
- ※ When the storage space of internal memory is insufficient,  flashes every 0.5 seconds and data is not saved.

### 7. Hysteresis [HY5]

In ON / OFF control, Set ON and OFF intervals of control output.

- If the hysteresis is too narrow, it may cause hunting (oscillation, chattering) on the control output due to external noise.
- In ON / OFF control, hunting occurs at regular intervals even when the control is in stable. The causes of hunting are the setting value of the hysteresis [HY5], the response characteristics of the controlled subject, and the attachment of the sensor. In order to minimize this hunting width, set the hysteresis by considering proper hysteresis value [HY5], heater capacity and thermal characteristics, sensor's response time and position.

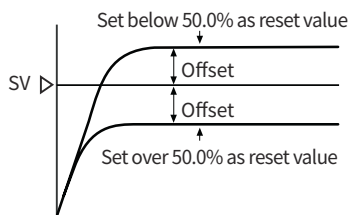


### 8. Manual reset [rE5t]

When selecting P/PD control mode, certain temperature difference exists because heater's rising and falling time is inconsistent due to thermal characteristics of controlled objects, such as heat capacity and heater capacity. This temperature difference is called offset, and manual reset [rE5t] is able to set or correct the offset.

- Setting method  
When PV and SV are equal, the reset value is 50.0%. After the control is in stable, if PV is lower than SV, set the reset value over 50.0%. On the contrary, if the PV is higher than SV, set the reset value below 50.0%.

- Manual reset [rE5t] by control result



- ※ The manual reset can be set in the proportional control (P/PD control).  
The manual reset [rE5t] appears when the reset time [t] is set to  $\square\square\square\square$ .



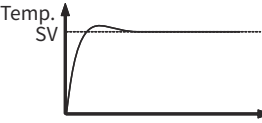

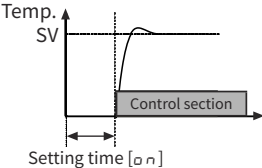

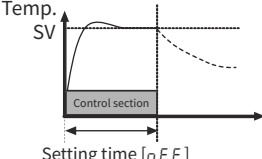

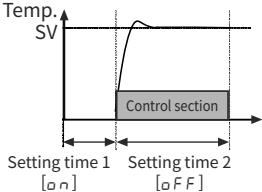

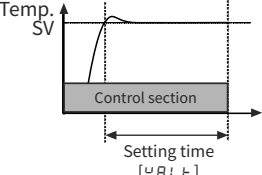
## Setting the timer

You can set the time for start, progress and end of control output.

Set the timer mode in timer [5 1 - 1] of the SETUP group.

when the operation stops, press the  to set the time in the timer mode.

### 1. Timer mode

| Mode  | Operation   | Description   |
|---|---|---|
| Timer OFF<br>[0 F F]  |    | The drive and controls start at the same time and keeps this work until the power is OFF.   |
| Timer ON<br>[1 - 1]<br>     |    | It starts the drive and counts the setting time [0 n] at the same time.<br>The control output is OFF during the setting time [0 n].<br>The control output is ON after the setting time [0 n].   |
| Timer OFF<br>[1 - 2]<br>    |    | It starts the drive and counts the setting time [0 F F] at the same time.<br>The control output is ON during the setting time [0 F F].<br>The control output is OFF after the setting time [0 F F].   |
| Timer ON/OFF<br>[1 - 3]<br> |   | It starts the drive and counts the setting time 1 [0 n] at the same time, the control output is OFF during the setting time 1 [0 n].<br>After the setting time 1 [0 n], the setting time 2 [0 F F] starts and the control output is ON during the setting time 2 [0 F F].<br>After the setting time 2 [0 F F], the control output is OFF. |
| SV<br>[1 - 4]<br>         |  | The drive and controls start at the same time, if the PV is higher than SV, the control output is maintained during the setting time [0 A I 1] and then the output goes to OFF.   |

※ Setting range: 00:00 to 99:59 (hour:minute)

※ The icon of each timer mode flashes every 0.5 seconds during the setting time.

※ The set temperature (SV) cannot be set during the setting time. If you turn the JOG switch, the SV on the LCD indicator flashes for 2.5 seconds.

※ In case of the setting time is 00:00, ERR appears on the LCD indicator during the operation.

※ When the operation sound [b U 3] is set to 0 n, the sound is generated once when reaching the setting time.

※ After completing the setting time, press the  key for 3 seconds to stop the operation.


※ When timer mode is changed in timer [5 1 - 1] of SETUP group, the setting time (0 n, 0 F F, 0 A I 1) is initialized.

※ When using the timer, the program setting [P r 1] of SETUP group does not appear.

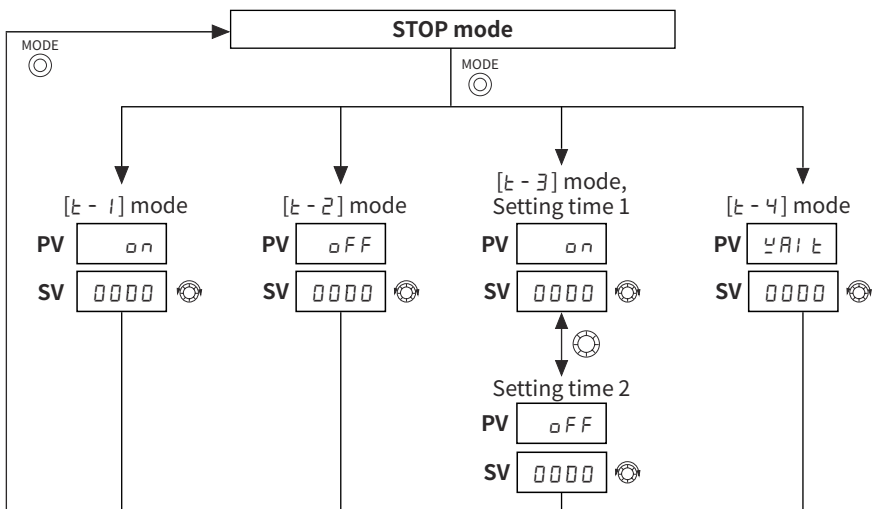


# Setting the timer


## 2. Setting the time mode


In the STOP mode, press the  key once, turning the JOG switch to set time of each timer mode in the timer [5 1 - 1] of SETUP group.

※The following functions are unavailable: The RUN mode; Timer [5 1 - 1] of SETUP group is set to 0FF; Setting the time of timer.



※: Turning the JOG switch. It changes the setting value.

※: Press the JOG switch once. Save the setting value and move the parameter.

※After setting the time, press the  key once to save the setting, and return to the STOP mode.



## Setting the program

You can set the conditions for temperature control as a program.

Select one program out of 9 programs. One program should consist of at least 2 to 8 steps.

Each step consists of the target value [5 0 □], run time [t 1 0 □], and wait time [0 0 0 □].

Temperature control is executed based on the target value, run time and wait time.

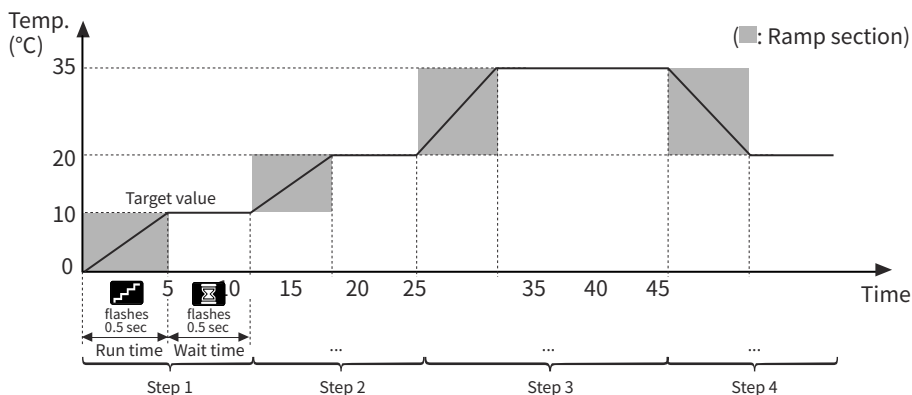
Set each step continuously. If the run time [t 1 0 □] is set to 00:00, the step cannot be proceeded. After that, the temperature control is not executed.

### 1. Program operation

Example: Program 1 [P 1 0 1] consists of 4 steps


| Program 1 [P 1 0 1]  | Step 1 [5 1 0 1] | Step 2 [5 1 0 2] | Step 3 [5 1 0 3] | Step 4 [5 1 0 4] |
|----------------------|------------------|------------------|------------------|------------------|
| Target value [5 0 □] | 10               | 20               | 35               | 20               |
| Run time [t 1 0 □]   | 5                | 5                | 5                | 5                |
| Wait time [0 0 0 □]  | 5                | 5                | 10               | 5                |

Initial SV: 0°C



Setting range of the target value [5 0 □]: 0.0 to 350.0°C




Setting range of the run time [t 1 0 □], wait time [0 0 0 □]: 00:00 to 99:59 (hour:minute)

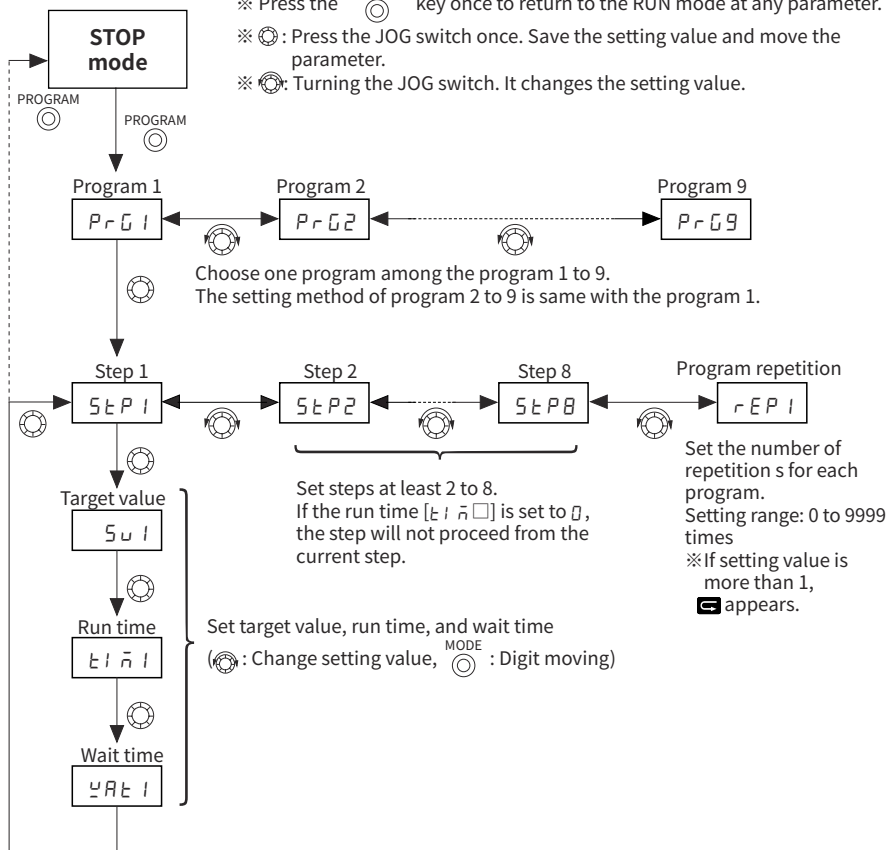
- ※ The temperature of step 1 starts based on the set temperature (SV). Pay attention to set SV. When the program is repeated, one cycle is completed and then next cycle operates based on the target value [5 0 □] of the last step of the program in step 1.
- ※ For example, if the present temperature (PV) is higher than the SV of the next step, the run time and wait time are not skipped.
- ※ During program operation, LCD indicator displays the present temperature (PV) and the target value of the step (SV). The icon for each section flashes every 0.5 seconds.
- ※ If you turn the JOG switch during program operation, the current step number flashes for 2.5 seconds on the SV indication part.
- ※ In case of the sound [b 0 0] of SETUP group is set to ON, the sound operates one time when completing the run time of each step. (The sound does not occur in the step where the wait time [0 0 0 □] is 00:00.) When the program operation ends, the sound is generated 5 times.
- ※ After completing the program control, press the  key for 3 seconds to stop operation.
- ※ When the program control ends normally, the target value (SV) of the last step is displayed, but subsequent temperature control is not executed.
- ※ When using program setting function, the timer [5 1 - 1] of SETUP group does not appear.



## Setting the program

### 2. Program setting

- ※ Program setting [P r G] of SETUP group is set to 0 n to set a program.
- ※ The program setting is unavailable in the RUN mode.
- ※ Press the  key once to return to the RUN mode at any parameter.
- ※ : Press the JOG switch once. Save the setting value and move the parameter.
- ※ : Turning the JOG switch. It changes the setting value.







## Other functions

### 1. Key lock ( key 3 sec.)

Lock the front keys and JOG switch, preventing unintentional changes of setting value.



In the stop mode, press the  key for more than 3 seconds to set / release the key lock.

$\square \square \square$  setting: The front keys and JOG switch cannot be used.

(Except stop / operation (press 3 sec.) via  key and JOG switch.)

$F r E E$  setting: The front keys and JOG switch can be used.

### 2. Indication of operation time

If press the  key once in the run mode,  flashes every 0.5 sec. on the icon indication part and the total operation time is displayed for 3 seconds.

Only the driving time is added and the time of stop mode is not.

When the power is on again, reset the total operating time.

During the timer operation, only the operating time of the control section is added.

The time from the start to end (including repetition) of the program is added in the program control.

Display range: 00:00 to 99:59 (hour:minute) (Display only 99:59 after exceeding the display range)

### 3. Sound when reaching the SV

If the operation sound [  $b u \Xi$  ] of SETUP group is set to  $\square n$ , the sound is generated once when the PV reaches the SV  $\pm 0.5^{\circ}\text{C}$ .









Only it works during normal control and timer operation. (Except program control)

The sound is applied again when restarting the operation or setting SV again.

### 4. LED bar indication

There is an LED bar on the front of the product.

LED is displayed based on the temperature of the top plate in case of the operation status (normal / error) and when the operation stops.

| Operation |                                      | LED bar |  | Red  | Green  |
|-----------|--------------------------------------|---------|--|--|--|
| Run       | Normal                               |         |  |   |   |
|           | Error                                |         |  |   |   |
| Stop      | Top plate temperature: 60 °C or less |         |  |   |   |
|           | Top plate temperature: 60 °C or more |         |  |  |  |

(: ON, : Flash, : OFF)

### 5. Multi inputs

External sensors can be connected.

When the external sensor (K(CA)) is connected correctly, the temperature is controlled based on the temperature of the external sensor.

※External temperature sensor (thermocouple: K(CA), sold separately)

- Do not bend the protective tube.
- Do not put liquid into the lead wire.
- Do not use it out of the range of the rated temperature.
- Be sure not to deviate from the measurement object.

### 6. Loop break alarm (LBA)

It checks control loop and outputs LBA error message [  $L b R$  ] by temperature change of the subject. When the operation (100% output), if the PV does not increase or decrease above the LBA detection band (2 °C) during the LBA monitoring time (900 seconds), it is determined that there is an error in the loop.

LBA error message [  $L b R$  ] is displayed on the front indication part every 0.5 seconds and an alarm sounds. (It is not related to the operation sound [  $b u \Xi$  ] of the SETUP group.)

When the operation stops, the LBA error message [  $L b R$  ] and the alarm are unavailable.

Be sure to check the connection of the product again.

※LBA monitoring does not operate in error condition (  $H H H H / L L L L / \square P E n$  ).



## Error display

If an error occurs, a corresponding message and alarm are generated.  
(It is not related to the operation sound [b U ɜ̃] of the SETUP group.)

| Display | Description  |
|---------|--|
| H H H H | If the PV is higher than the display range, it flashes every 0.5 seconds on the PV indication part.<br>→ Automatically released when the PV is within the display range.   |
| L L L L | If the PV is lower than display range, it flashes every 0.5 seconds on the PV indication part.<br>→ Automatically released when the PV is within the display range.  |
| o P E n | If input sensor line is broken or sensor is not connected, it flashes every 0.5 seconds on the PV indication part.<br>→ Contact your purchasing place for repair.  |
| L b A   | When the operation (100% output), if the PV does not increase or decrease above the LBA detection band (2 °C) during the LBA monitoring time (900 sec), it flashes every 0.5 seconds on the PV indication part.<br>→ Check the connection of temperature sensor and SV in the stop mode.<br>If the message continuously appears, check the product.<br>Please contact your purchasing place. |
| ɛ A L   | A problem has occurred inside the product. Normal operation is impossible.<br>→ It is necessary to inspect the product. Please contact your purchasing place.  |
| E r r   | If the setting time is 00:00 in the timer mode, it flashes every 0.5 seconds on the PV indication part.<br>→ Set the time higher than 00:00.   |

## When operating safety devices

### 1. Operate bimetal switch

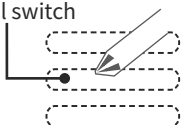
If the main body is not cooled enough, the bimetal switch only cut off the for heater circuit.  
(The indication of the operating state is normal.)

Turn off the main power, unplug it, and check if the cooling is complete, then turn the main unit upside down and push the bimetal switch from the bottom with a thin rod-shaped object (such as a Phillips screwdriver) to reset.

However, in order to use this product safely, it is important to remove the cause of the bimetal switch activation. If the bimetal switch act again during operation even though after resetting it, please request repair or inspection.

You can see the drawing on the next page for the bimetal switch position of each model.

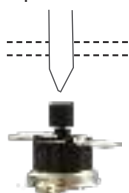
Push point of  
bimetal switch



There is a bimetal switch operation button under the ventilation opening on the bottom of the product. If the position is difficult to understand, please check the position by illuminating it with a penlight, etc.



Image of  
the switch pushed

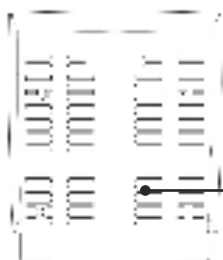


When the bimetal switch is activated, the metal plate inside flips and produces a click feeling when pressed. Release is complete when the click is no longer felt.

## When operating safety devices

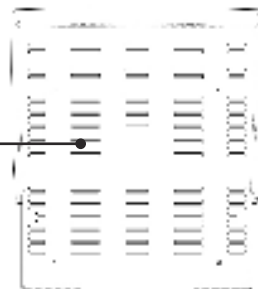
[Bimetal switch position of each model]

NDK-1A-F/I



2nd row from  
right  
5th row from  
the bottom

NDK-2A-F/I



4th row from  
right  
12th row from  
the bottom



### Warning

1. Do not operate the bimetal switch while the main unit is hot.  
Be sure to allow the main unit to cool before operating as it may cause burns.
2. For safety, remove the power plug from the outlet and shut off the power to prevent electric shock.



## 2. Fuse disconnection

The overcurrent disconnects fuse, which cuts the power supply to the main body. Although the customer can exchange, we recommend that you request a repair or inspection because it is difficult to identify the cause.



## Factory defaults

| Parameter   | Initial value | Parameter  | Initial value | Parameter   | Initial value |
|-------------|---------------|------------|---------------|-------------|---------------|
| <i>Su</i>   | 0.0           | <i>PrG</i> | oFF           | <i>l</i>    | 0040          |
| <i>ALn</i>  | oFF           | <i>Alt</i> | oFF           | <i>d</i>    | 0010          |
| <i>AL-H</i> | 300.0         | <i>bUz</i> | on            | <i>t</i>    | 002           |
| <i>AL-L</i> | 000.0         | <i>SP</i>  | oFF           | <i>HYS</i>  | 002.0         |
| <i>Ad</i>   | 00.0          | <i>SPt</i> | 5             | <i>rest</i> | 050.0         |
| <i>St-t</i> | oFF           | <i>P</i>   | 003.0         |             |               |

## About the maintenance

Please unplug first for maintenance and repair.

### ◆ Daily maintenance

- Please clean the alien material on the body with soft and dry towel.
- Please wipe the dirty part which is hard to remove with small amount of neutral detergent.
- Do not use solvents such as benzene and detergents, cleaner, and hot water. (It may cause discoloration or damage on the surface. And it may cause the discoloration and deterioration of rubber or plastic parts.)
- If you use the neutral detergent, please clean with a dry towel.
- Always keep the product in dry state.
- Do not pour water on the body. (Particularly if water is poured to the front part, it may cause performance damage.)
- Incorrect maintenance may cause product damage but also cause a malfunction.
- Please unplug the power from the outlet in case the product is not used for a long time, and package and keep the product in a dry place.
- The heater is a consumable item and may need to be replaced. This includes the case that the temperature does not rise due to heater disconnection. To replace the heater, please contact the AS ONE dealer.



**Warning**



**Do not disassemble, repair or modify the product.**

**\*It may cause personal injury, electric shock and fire because of the malfunction.**



## Trouble shooting





■ When it is regarded as a malfunction,  
check the below before requesting the repair.

| Problem                                      | Check and measures   |
|--|--|
| Power supply dose not working.               | <ul style="list-style-type: none"> <li>• Check the blackout, breaker, etc. and whether the electricity is coming to the power outlet.</li> <li>• Check the power plug is put into the outlet firmly.</li> <li>• Check the power switch of the body is ON.</li> <li>• Check the fuse in the fuse holder. If the fuse is blown, please replace it.</li> </ul>  |
| The setting of temperature does not working. | <ul style="list-style-type: none"> <li>• Check the key is locked. (see page 17)</li> <li>• Check the timer or program function is activating. (see page from 13 to 16)</li> <li>• The setting of temperature is unavailable while the auto tuning is activating. Check whether the auto tuning is ON. (see page 11)</li> </ul>   |
| The temperature control does not working.    | <ul style="list-style-type: none"> <li>• Press JOG switch over 3 seconds to activate run mode.</li> <li>• When the external sensor (Thermocouple K (CA)) is used, check the sensor position is set properly.</li> <li>• Check the problem with error code in case there is an error code on LCD indication part. (see page 18)</li> <li>• Check that whether each setting value is proper.</li> <li>• Check there is machinery generates high frequency noise around the product.</li> <li>• The factory default of temperature control is PID control.<br/>([P]=3.0, [I]=40, [d]=10)<br/>Set suitable PID values for operational condition or use auto-tuning function.</li> <li>• Check the environmental condition is proper.<br/>(e.g. A severe difference is in temperature.)</li> <li>• If the safety device (bimetal switch) is activated, the temperature control does not return automatically. Please reset manually. (See page 19)<br/>If it works several times, it needs repair. Ask your purchasing place for repair.</li> </ul> |
| It cannot drive the timer.                   | <ul style="list-style-type: none"> <li>• Check the timer [5 t - t] of SETUP group is set properly.<br/>(The timer function does not work when the program setting [P r G] is on.)</li> <li>• Check the auto tuning is ON.</li> <li>• Check the setting time is proper. (Minimum setting value: 1 min)</li> </ul>   |
| It cannot drive the program.                 | <ul style="list-style-type: none"> <li>• Check the program function [P r G] of SETUP group is set properly.<br/>(The program function does not work when the timer [5 t - t] is t - - □)</li> <li>• Check the auto tuning is ON.</li> <li>• Check each setting value of program is set properly.</li> </ul>  |
| It cannot operate the auto tuning.           | <ul style="list-style-type: none"> <li>• When using the ON/OFF control, the auto tuning function is deactivated.</li> <li>• Check the auto tuning [R t] of SETUP group is on.</li> <li>• Check the characteristics of the controlled subjects based on this product's performance.</li> </ul>  |
| It cannot be communicated well.              | <ul style="list-style-type: none"> <li>• See [DAQMaster for AS ONE user manual].</li> </ul>  |

If it cannot be repaired with the guides above, please stop the using, unplug the power, and contact the purchasing place.



## Specifications

| Model                       |                               | NDK-1A-I   | NDK-1A-F  | NDK-2A-I   | NDK-2A-F  |
|-----------------------------|-------------------------------|--|---|--|---|
| Power supply                |                               | 220VAC 50/60Hz   |   |  |   |
| Current consumption         |                               | 3.1A   |   | 4.6A   |   |
| Heater capacity             |                               | 680W   |   | 1000W  |   |
| The appearance size (W×L×H) |                               | 240×280×90mm   |   | 320×360×90mm   |   |
| The top plate size (W×L)    |                               | 170×170mm  |   | 250×250mm  |   |
| Material of the top plate   |                               | Aluminum (ceramic coating)   |   |  |   |
| Display method              |                               | LCD Display  |   |  |   |
| Setting method              |                               | Setting by keys and JOG switch at the front body.  |   |  |   |
| Input specifications        | Inner sensor                  | Thermocouple: K(CA)  |   |  |   |
|                             | External sensor <sup>※1</sup> | Thermocouple: K(CA)  |   |  |   |
| Setting range               |                               | 0.0 to 350.0℃  |   |  |   |
| Display range               |                               | -20.0 to 370.0℃  |   |  |   |
| Display accuracy            |                               | F.S.±1%  |   |  |   |
| Sampling period             |                               | 100ms  |   |  |   |
| Control output              |                               | TRIAC output   |   |  |   |
| Alarm output                |                               | Relay contacts output (max. 12VDC, 50mA)   |   |  |   |
| Communication output        |                               | USB communication output   |   |  |   |
| Control method              |                               | ON/OFF control, P, PI, PD, PID control   |   |  |   |
| Hysteresis (ON/OFF)         |                               | 0.1 to 100.0℃  |   |  |   |
| Proportional band width (P) |                               | 0.0 to 100.0℃  |   |  |   |
| Integral time (I)           |                               | 0 to 3600 sec  |   |  |   |
| Derivative time (D)         |                               | 0 to 3600 sec  |   |  |   |
| Control period (T)          |                               | 1 to 120 sec   |   |  |   |
| Environment                 | Ambient temp.                 | 5 to 35℃, storage: -10 to 50℃  |   |  |   |
|                             | Ambient humi.                 | 35 to 85%RH, storage: 35 to 85%RH  |   |  |   |
| Safety device               |                               | Fuse <sup>※2</sup> , bimetal switch  |   |  |   |
| Power cable length          |                               | Approx. 1.8m   |   |  |   |
| Power plug                  |                               | IEC type I  | CEE 7/7 <sup>※3</sup>  | IEC type I  | CEE 7/7 <sup>※3</sup>  |
| Approval                    |                               | CE   |   |  |   |
| Weight <sup>※4</sup>        |                               | Approx. 4.0kg  |   | Approx. 6.5kg  |   |

※ The above product specifications are subject to change without notice for improvement. Please kindly understand that.

※ Environment resistance is rated at no freezing or condensation.

※ This product uses Refractory Ceramic Fiber (RCF) as insulation.

It should be done away regarded as industrial waste.

※ 1. When using an external sensor, a temperature deviation may occur due to the thermocouple's resistance value. If a temperature deviation occurs, use the temperature correction [Rd] function to enter the correction value.

Thermocouple K(CA), external sensor, is sold separately. (Model: 1-4601-11)

※ 2. For fuse specifications, see 'product overview' (page 5).

※ 3. CEE 7/7 plug is compatible with IEC type E and type F.

※ 4. The weight excludes packaging.



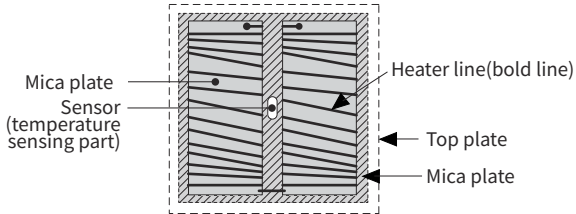
## FAQs

Q. I want to set the temperature faster. Is it just a way to turn the JOG switch?

A. You can move the set value via the MODE key.

Q. Please release the drawings of the heater.

A. Sorry. It cannot be released.



Q. There is dust in the gap between the top plate, is there any problem?

A. Heater and insulation are installed under the top plate.

It does not matter that small dust falls.

Also, white and cloth-like insulation may be seen, but there is no problem in use.

Q. Is it possible to turn on the power (or heater output) with an external input?

A. It is impossible, even in the state of communication with PC.

Q. Is it an explosion-proof product?

A. It is not an explosion-proof specification.

Q. Please release the CAD drawings.

A. Sorry. It cannot be released.



## Contact information

Department in charge:

AS ONE Corporation Overseas Sales Department

Address: 2-1-27, Edobori, Nishi-ku, Osaka, 550-8527, Japan

TEL: 81-6-6447-8905

FAX: 81-6-6447-8681

E-mail: [asoneint@so.as-1.co.jp](mailto:asoneint@so.as-1.co.jp)

## <Product Information>

Please use the QR code of the following representative model number.



NDK-1A-F  
(1-4601-31-90)

QR code is a registered trademark of DENSO WAVE INCORPORATED.



### ■ ABOUT REPAIR

For repair inquiries, please contact the distributor  
where you purchased the product.

※The specification and dimensions can be changed without notice in order to improve the product.