ROMANOFF®
INTERNATIONAL SUPPLY CORPORATION

Yasui®
*The Gold Standard in fine casting.*

# *RBF13*

## ROTATING BURNOUT FURNACE


# *OPERATIONS MANUAL*

9 Deforest St. Amityville NY, 11701 | sales@romanoff.com | 1-631-842-2400 | romanoff.com

# CONTENTS

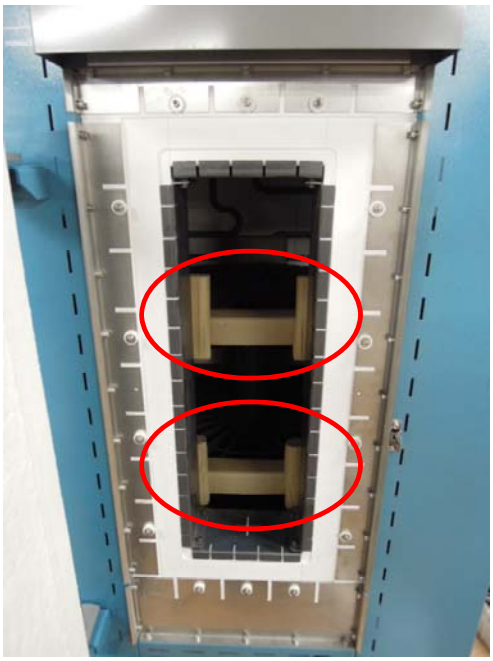
# 1. SAFETY INFORMATION

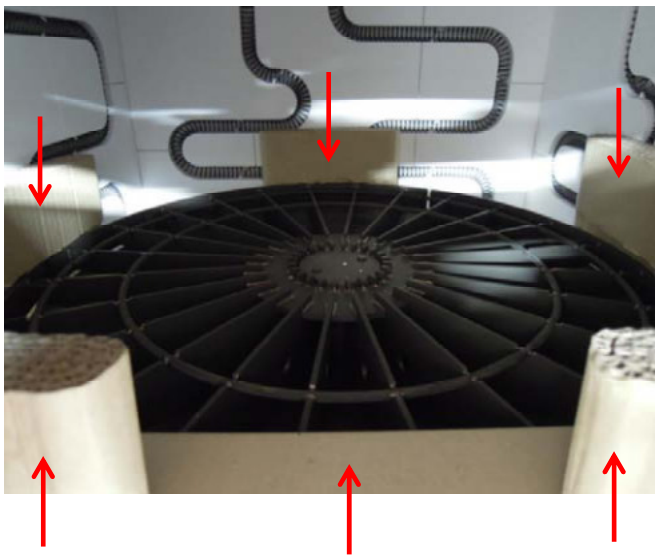
## WARNING

DO NOT TURN BREAKER SWITCH ON UNLESS YOU REMOVE PACKING MATERIALS FOR TRANSPORTATION INSIDE OF FURNACE BODY.

MOTOR UNIT WILL AUTOMATICALLY ROTATE FOR 1 MINUTE TO SERCH ORIGINAL POINT JUST AFTER TURNING BREAKER ON.

MOTOR WILL BE BROKEN IF YOU FORCE TO ROTATE WITHOUT PACKING MATERIAL REMOVED.





**REMOVE ALL OF CONTENTS INSIDE OF FURNACE AS ABOVE**

## WARNING

1. Since this machine produces very high temperature (more than 700 degrees Celsius), always pay attention not to suffer burns.
Do not allow unskilled or untrained person to operate this machine.

2. This machine is electric furnace designed for lost-wax casting. However, depending upon material, it may be possible to use the machine for burning plastics (such as material for Rapid Prototyping). If you need to use plastics, examine properties of the plastics beforehand thoroughly and carefully and check for safety because various plastic materials are distributed on the market.

3. Do not use or stock any inflammable gas, inflammable volatile liquid, or organic solvent near the machine or in the room where the machine is installed.

4. When incomplete combustion gas of wax is generated, do not open the door. If you open the door at this time, inside of the furnace may be combusted and flame may spread toward front through the gap between the door and the furnace body.

5. During or just after burnout, surrounding parts of the furnace opening are heated to very high temperature, so take utmost care not to burn your hands etc.

6. Do not leave the door of the furnace open when the machine is not used.

7. Always keep clean inside of the furnace. Investment residue or dusts on the turntable or the wax drain unit may cause clogging and prevent wax from draining out of the furnace.
As a result, a large amount of incomplete combustion gas is discharged.

8. Do not pile up flasks. If flasks fall down, the inner wall of the furnace may be damaged. Further, if they come into contact with the heater wires, an accident such as short-circuit may be caused.

## CAUTION

1. Periodically, check and clean the rotation driving parts. Remove wax on the bearing system.
2. Do not try to cool inside of the furnace forcibly and very rapidly using a fan. Particularly, if forced cooling is done when the machine is heated to high temperature, the door frame material may be cracked or deformed.
3. When burning out a large number of flasks in one batch, take ample time for each step of burnout cycle.
4. Always use the wax collection container.
A deep container is recommended because drained wax will not splash around.

- The manufacturer shall in no event be liable for any damage resulting from improper use, negligence to follow the warnings and cautions in the instructions manual or the labels on the machine, unskillfulness, use of non-original optional / consumable accessories / spare parts, non-authorized modification.
- The manufacturer shall in no event be liable for any consequential or indirect damages including, but not limited to, loss of production or loss of profit or damages due to machine downtime.
- Damages to the instrument and / or human bodies resulting from contacting with high temperature parts, and their consequential or indirect damages are not compensated by the manufacturer.
- Damages resulting from delay of reaction at emergency and mistaken operation are not compensated by the manufacturer.
- Damages from electrical noise, over voltage, or wiring error are not compensated by the manufacturer.
- Casting results (including burnout for normal precious metal casting, for stone-in-wax casting and etc.) by this manual are not compensated by the manufacturer.
- No part of this document may be copied or in any way reproduced without the expressed written consent of the manufacturer.

# 2. NOMENCLATURE

## 2-1. FRONT VIEW



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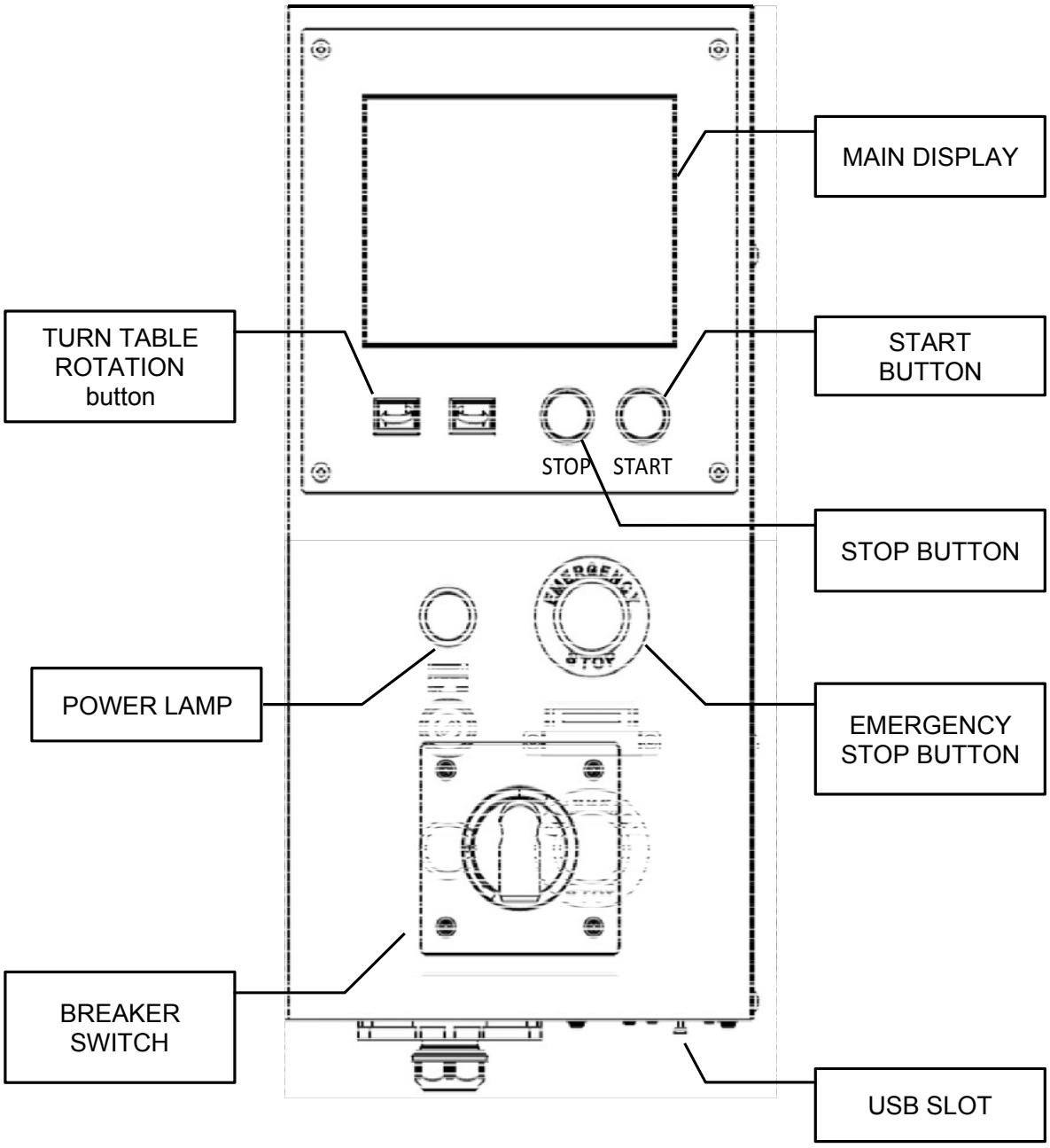
# 2-2. OPERATION PANEL



# 3. OPERATION

## 3-1. AUTOMATIC OPERATION

AUTOMATIC OPERATION can be processed as follows;

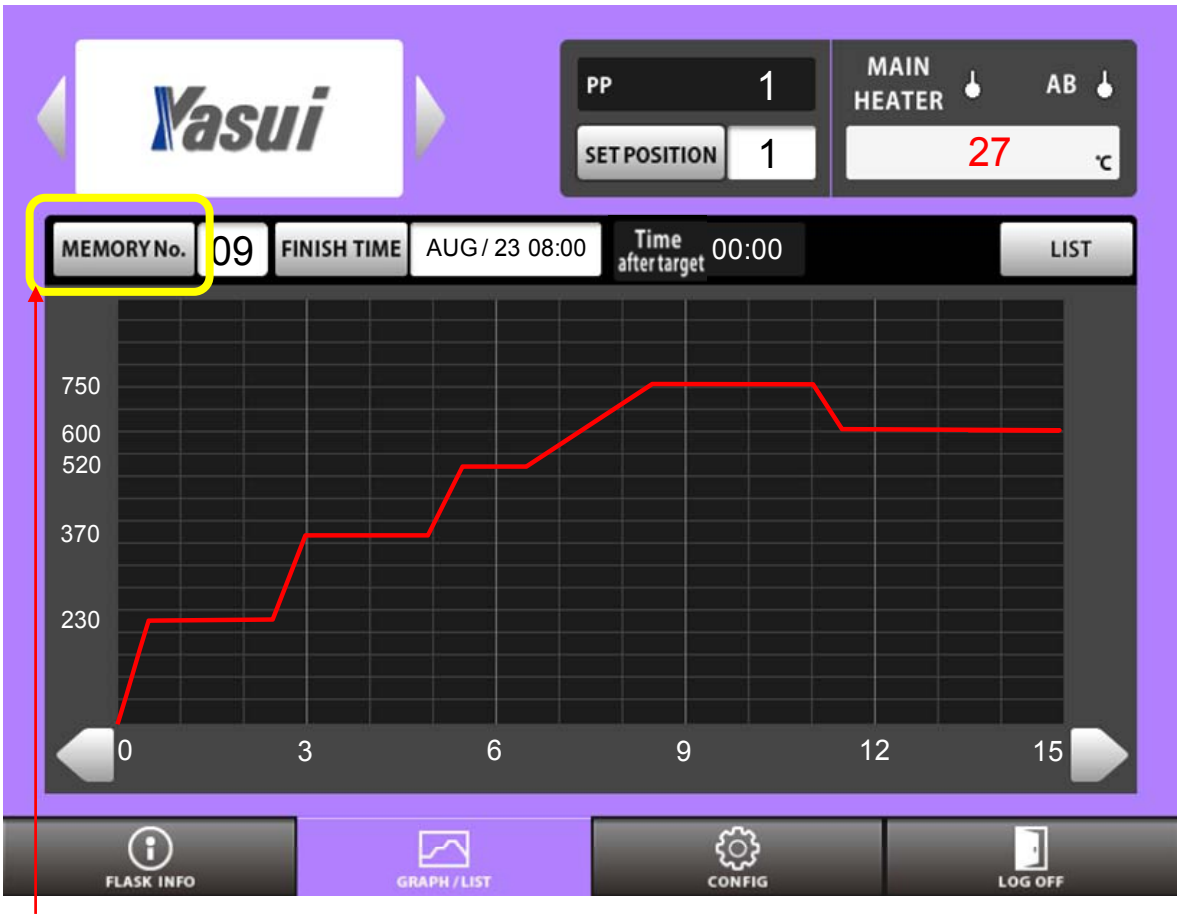
Turn breaker ON → choose Memory No. → Put flasks into furnace → Check Finish time → Push start button

**WARNING**

DO NOT TURN BREAKER SWITCH ON UNLESS YOU REMOVE PACKING MATERIALS FOR TRANSPORTATION INSIDE OF FURNACE BODY. CHECK AND CONFIRM IT AGAIN.

### 3-1-1. POWER ON AT BREAKER SWITCH

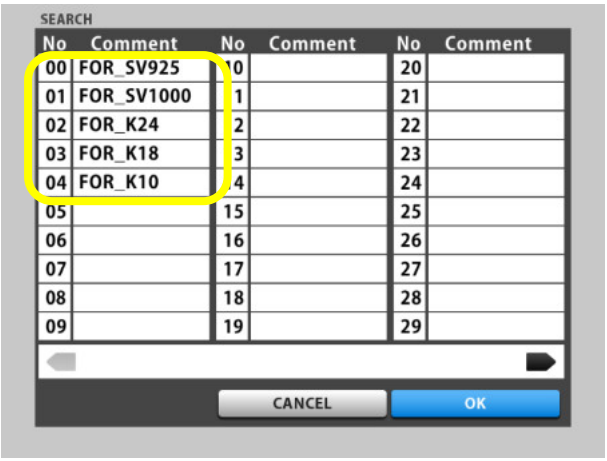
Please wait for the display shown.



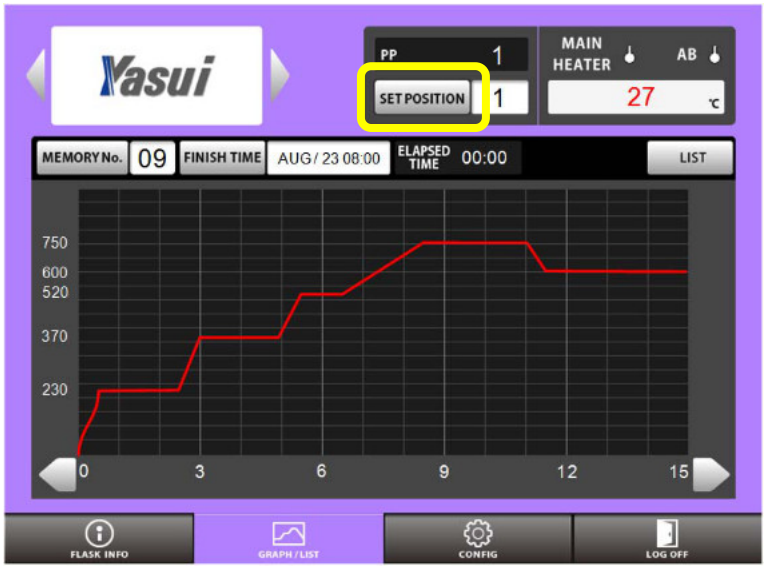

### 3-1-2. CHOOSE RECIPE

Tap MEMORY button to open SERCH window to choose recipe.

Tap one of recipes at this window and tap OK button.




## 3-1-3. PUT FLASKS INSIDE



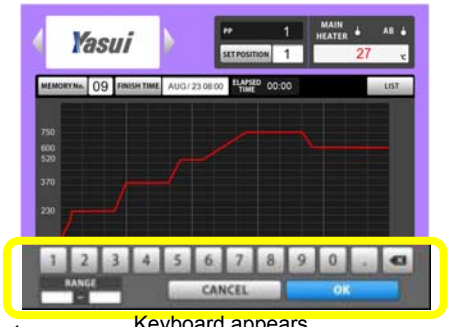

You can call any position you prefer automatically for each flask.

Tap 'SET POSITION' button to call keyboard, Enter any number you like.

Tap OK button to rotate turn table and stop at the position.

Then put flask inside of furnace.

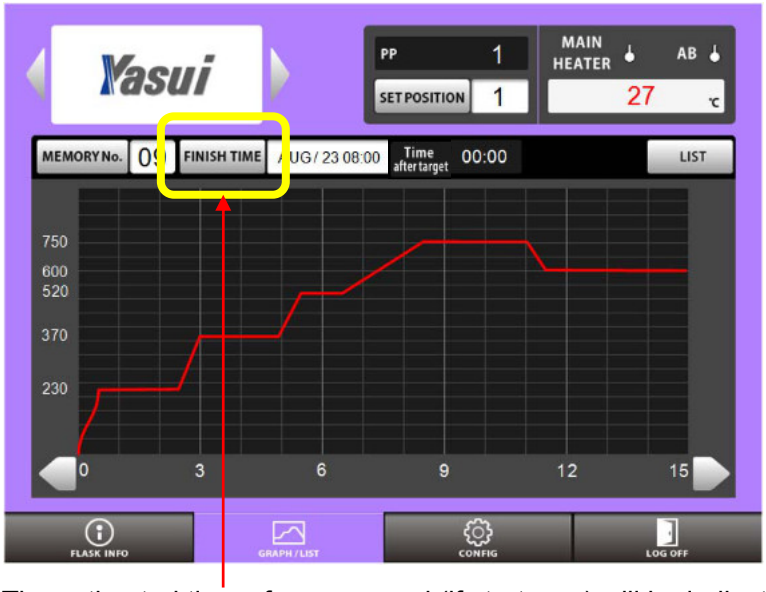
Take note number for each flask.




Keyboard appears

## 3-1-4. START OPERATION

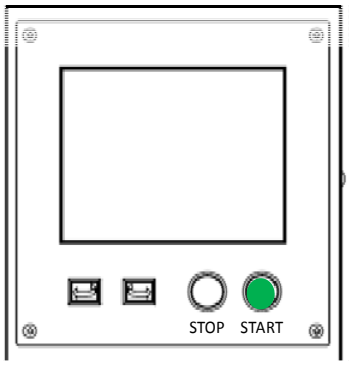
Confirm there is a line chart on the display before start burning out.




Back ground color changes

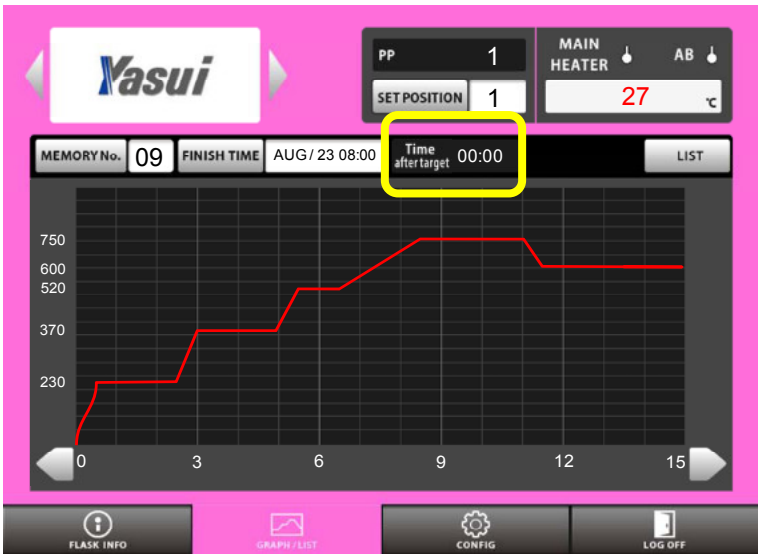
The estimated time of process end (if start now) will be indicated here.

Confirm FINISH TIME is what you expect and push start switch.
The present back ground color will turn pink.



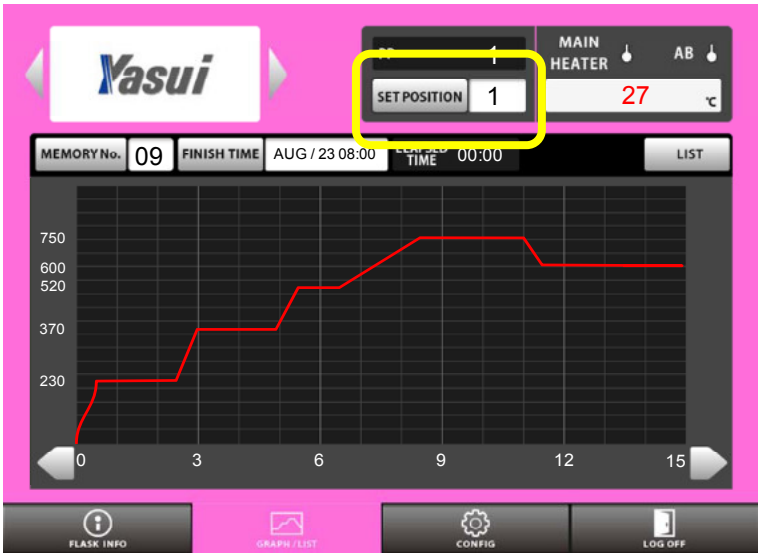

## 3-1-5. BURN OUT

Wait for burnout cycle finishes.
You can check how much time passed from temperature reach down to casting point here at this window.




## 3-1-6. TAKE FLASK OUT FOR CASTING

1) Enter the number of position you want to stop here at SET POSITION window.
Tap this button to activate key board.





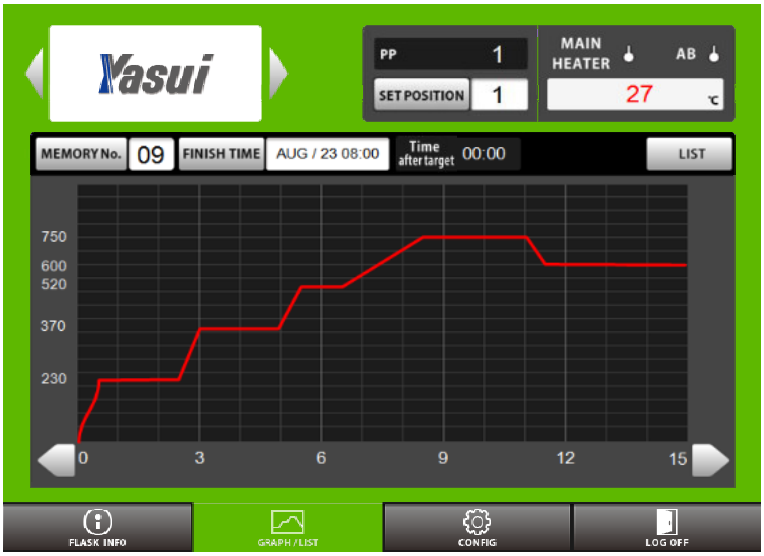
Keyboard appears

2) Rotation will stop at the point you've entered.

The present back ground color will turn green.

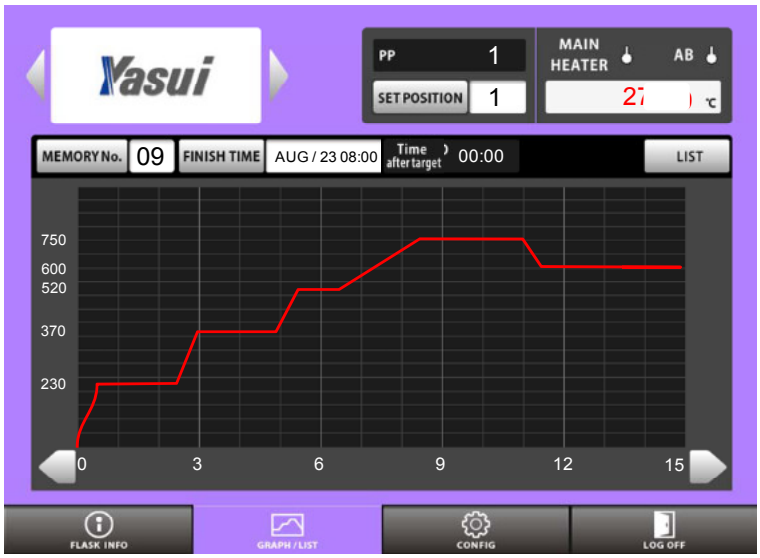
This is to prevent leaving rotation suspended.

Do not forget to push rotation button for 2 seconds after taking flask out of furnace to keep rotation.



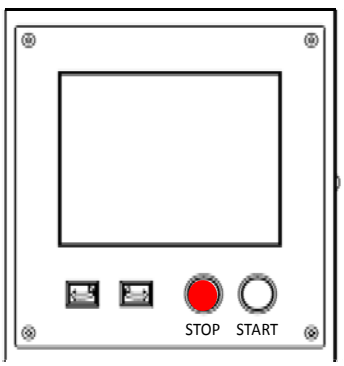

The back ground color will turn blue.

## 3-1-7. STOP OPERATION




Push STOP button after taking the last flask out.

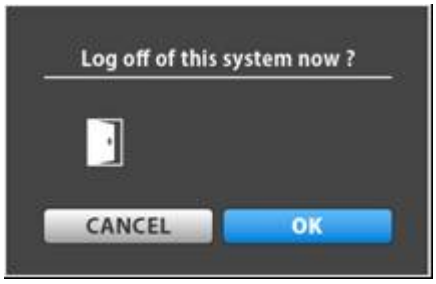
The back ground color will turn blue.




## 3-1-8. POWER OFF

1) Tap LOG OFF tab

2) Tap OK button

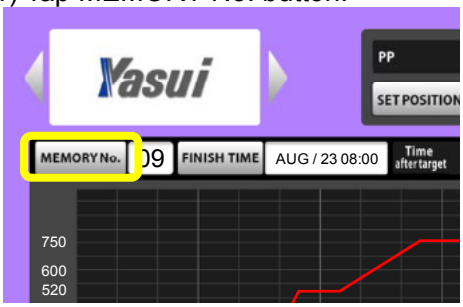



3) Turn breaker switch OFF when you see the pop up window.


# 3-2. HOW TO PROGRAM RECIPE MEMORIES

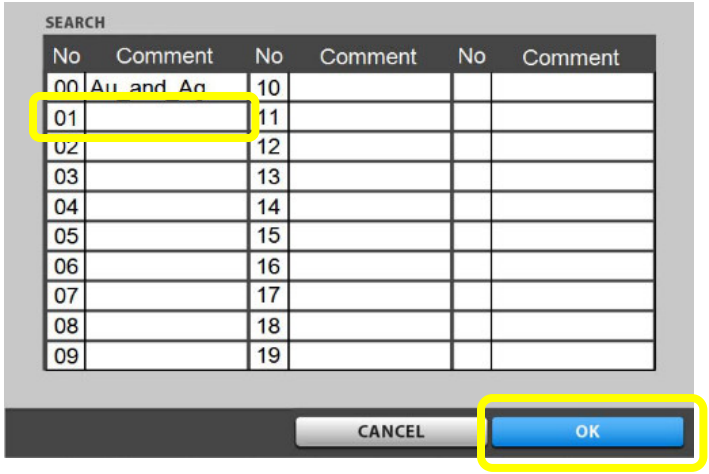
## 3-2-1. EDIT TEMPARATURE

1) Tap MEMORY No. button.

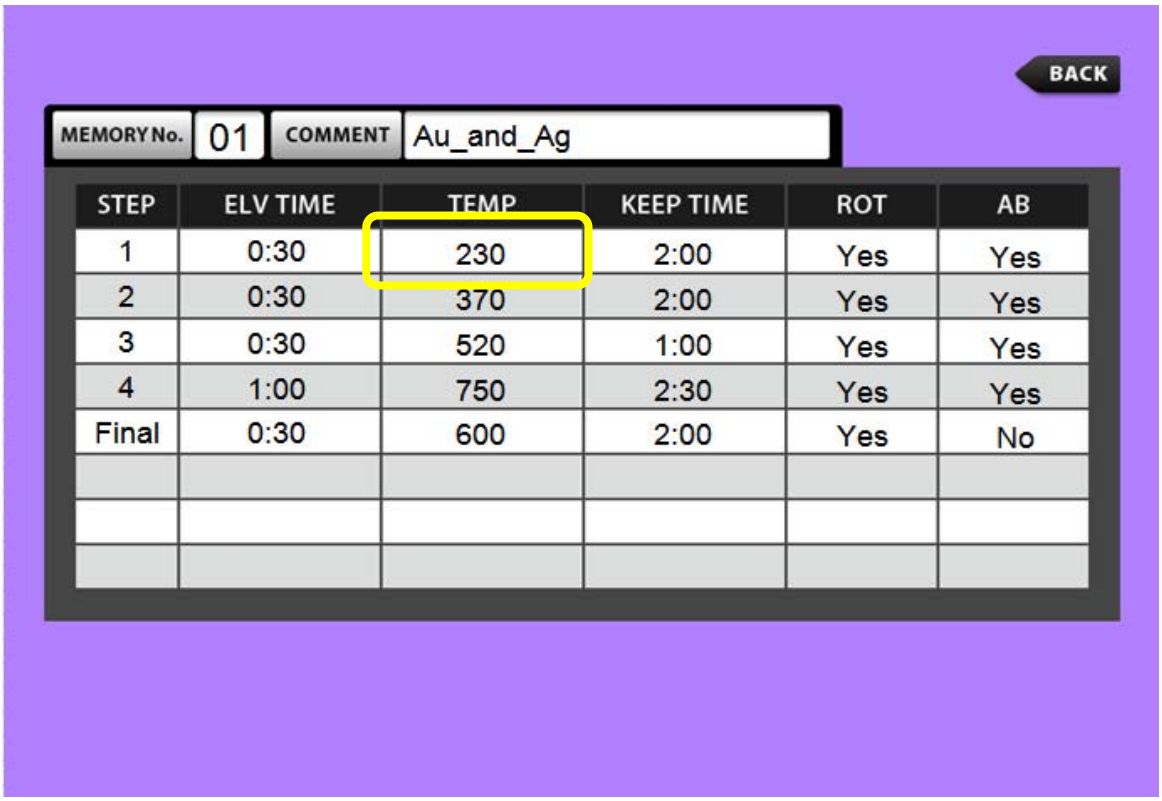



2) Tap MEMORY No.1 for instance.

3) Tap OK button after that.

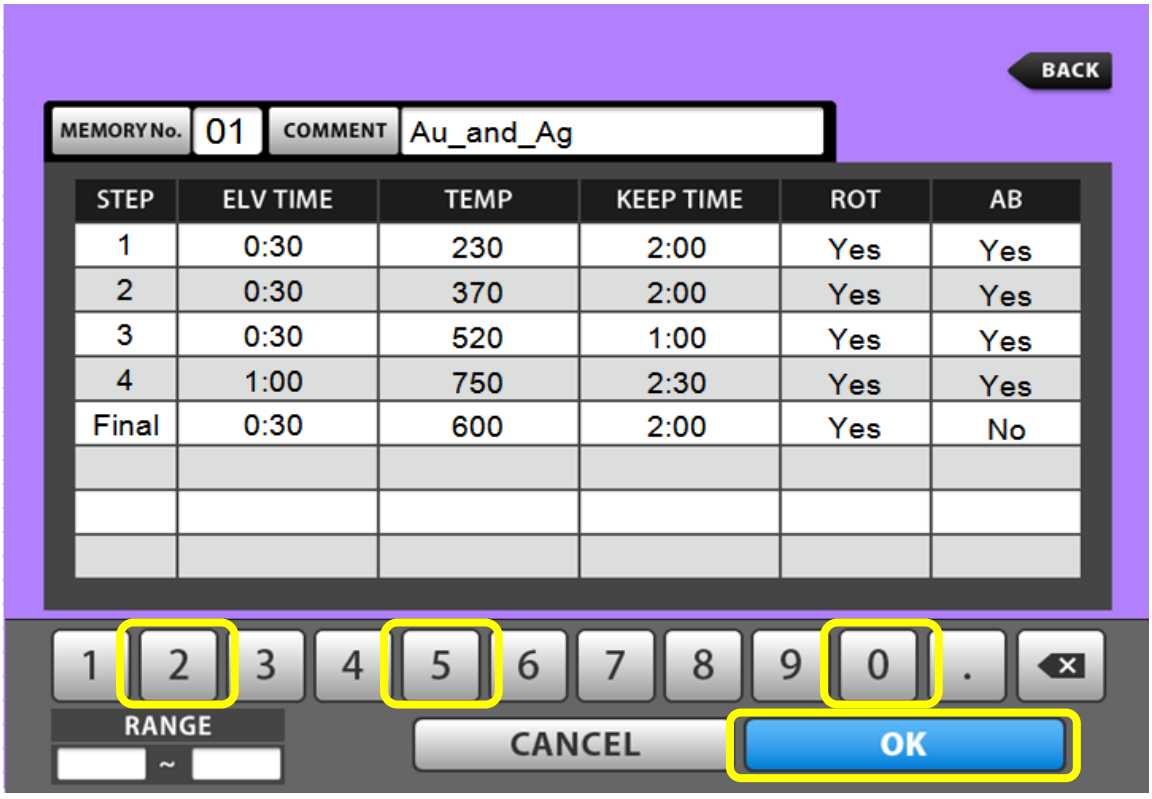



4) Tap LIST button.




5) If you want to change Temperature at STEP1, 230c to 250c, Tap the CELL marked as above.

6) You will see a keyboard activated.




7) Type 2, 5, 0 and tap OK button to confirm edit.

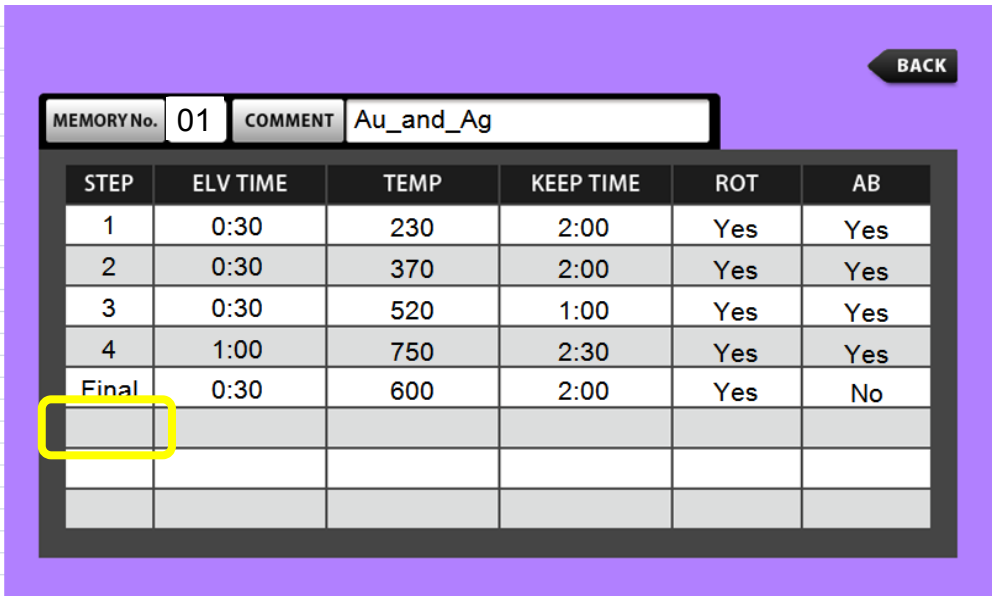
## 3-2-2. EDIT OTHER FACTORS

You can edit other factors like ELV TIME, KEEP TIME by the same manner as described already.

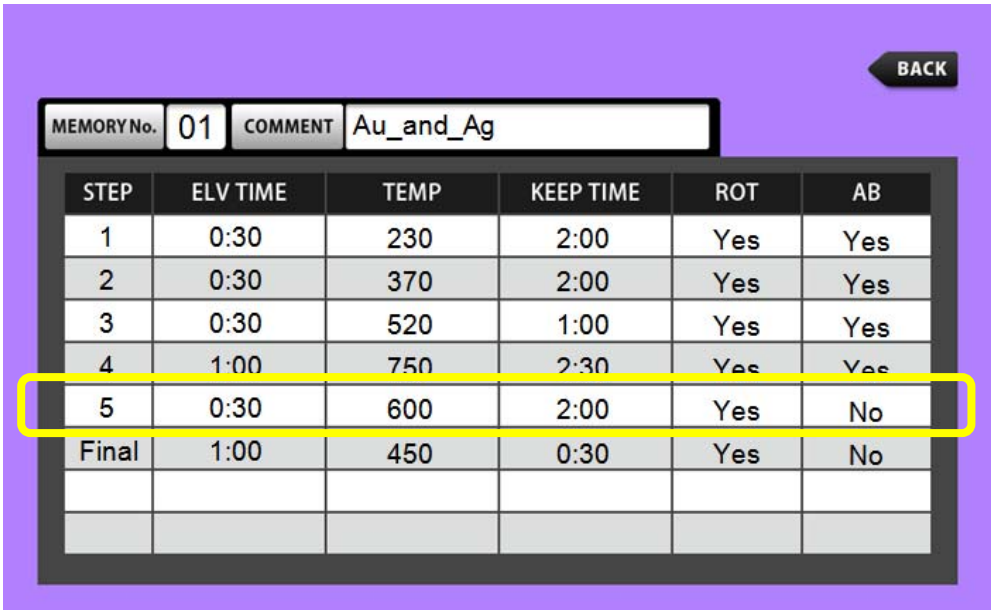
## 3-2-3. ADD and DELETE STEP(s)

1) When you want to add one additional step.

Tap blank cell next to Final cell marked as below.




You will see STEP5 has been added. Please edit STEP5 and Final step and go back to GRAPH window to check the line chart.




2) When you want to delete one step from the recipe.

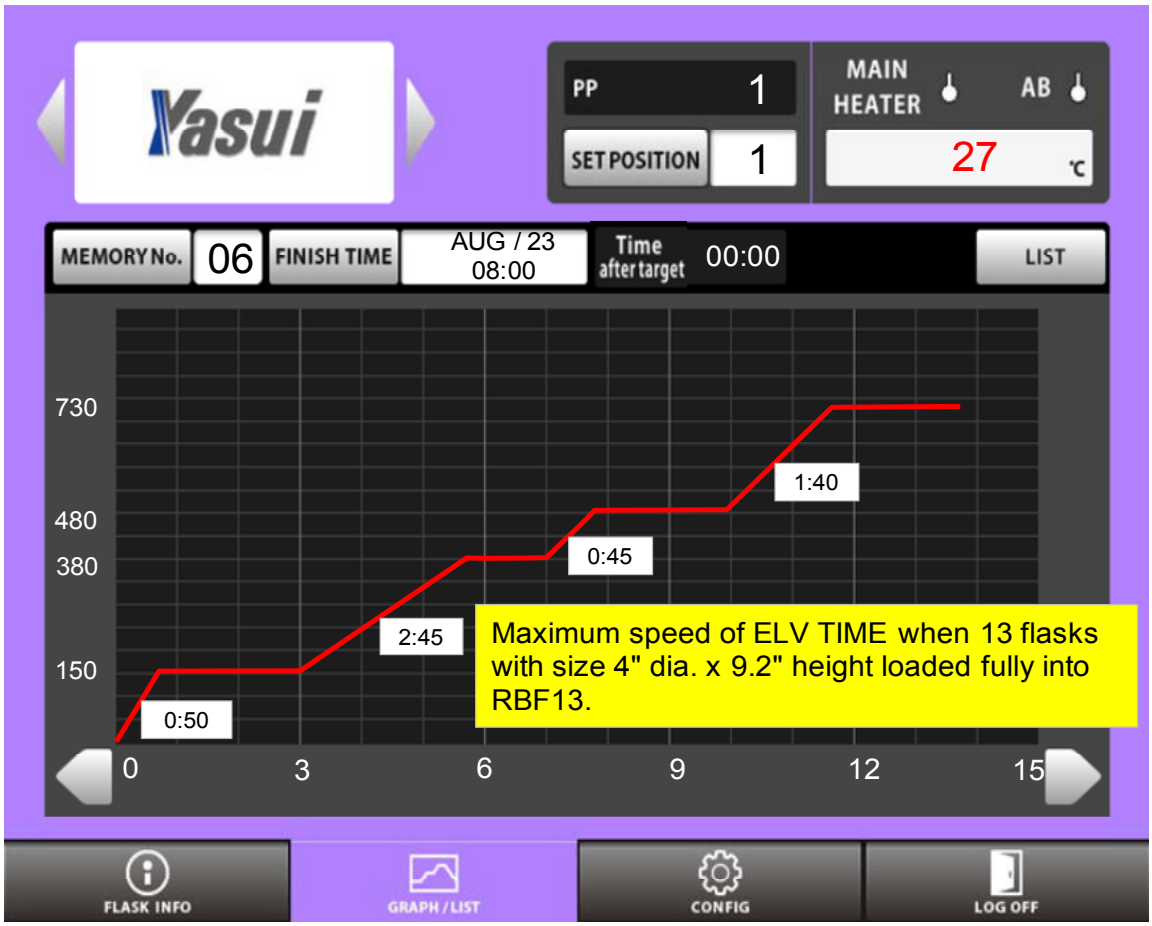
Tap previous step of Final step to delete the line.

You cannot delete all of STEPs. (Minimum recipe consists of 4 steps)

** This is for your reference when you program burnout recipe;

The chart is an actual temperature upward record at maximum load inside of RBBF13.

You can refer and program with correct time for ELV time by this.




This means you will not achieve your request even if you set 30 minutes for ELV TIME at step1 when you load max flasks inside. It takes at least 50 minutes to reach 150c and actual keep time will be shorter than you set.

Step 2 and 3 as well.

## 3-2-4. ROT, AB and COMMENT

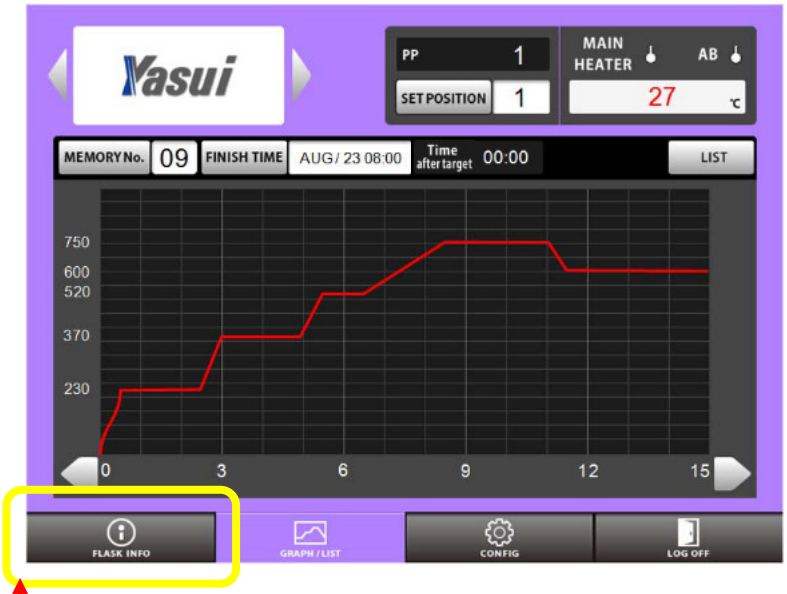
Will be described later.

# 3-3. MANUAL OPERATION

## 3-3-1. POWER ON AT BREAKER SWITCH

.

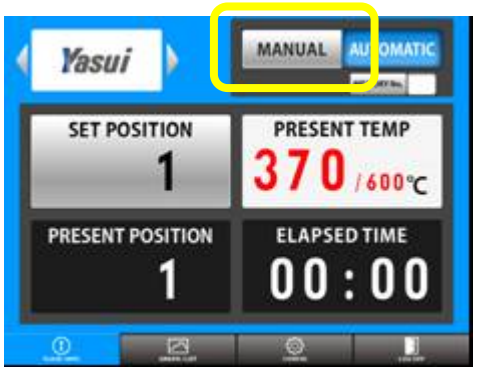
Please wait for the display shown



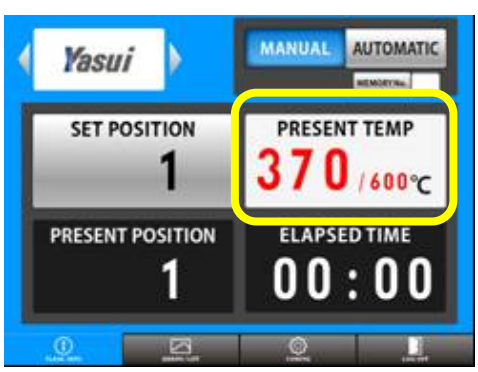

## 3-3-2. SWITCH MODE

Tap FLASK INFO button


Tap MANUAL button

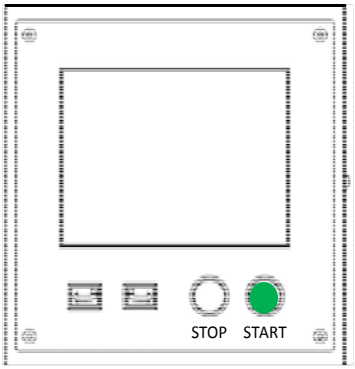



Tap PRESENT TEMP button to edit.



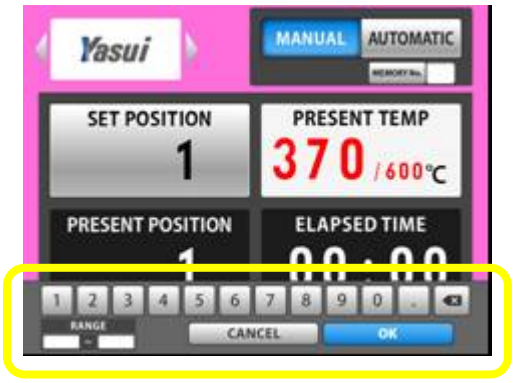

## 3-3-3. START HEATING

Push START button to heat. The back ground color will turn pink.




## 3-3-4. TAKE FLASK OUT FOR CASTING

1) Tap SET POSITION button to edit the value.

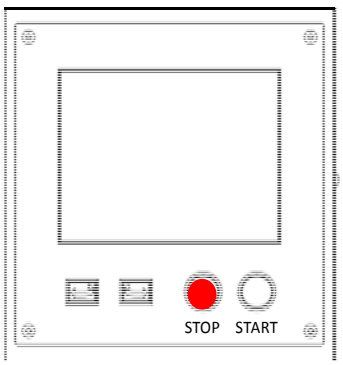




2) Rotation will stop at the point you've entered. The present back ground color will turn green.
This is to prevent leaving rotation suspended.
Do not forget to push rotation button for 2 seconds after taking flask out of furnace.


Push START button for 2 seconds


## 3-3-5. STOP OPERATION

Push stop button when you want to finish heating.
The background color will turn blue.

## 3-3-6. POWER OFF

1) Tap LOG OFF tab

2) Tap OK button


3) Turn breaker switch OFF when you see the pop up window.


## 3-4. EMERGENCY STOP BUTTON

Please push Emergency stop button in front of control box, when you want to suspend all of the function.

The button will be fixed unless you release it by manual.

Nothing can be operated on this condition.

Turn button clockwise to release lock.


Pop up window when button pushed.


### IMPORTANT

Please confirm safety before reset emergency very carefully.

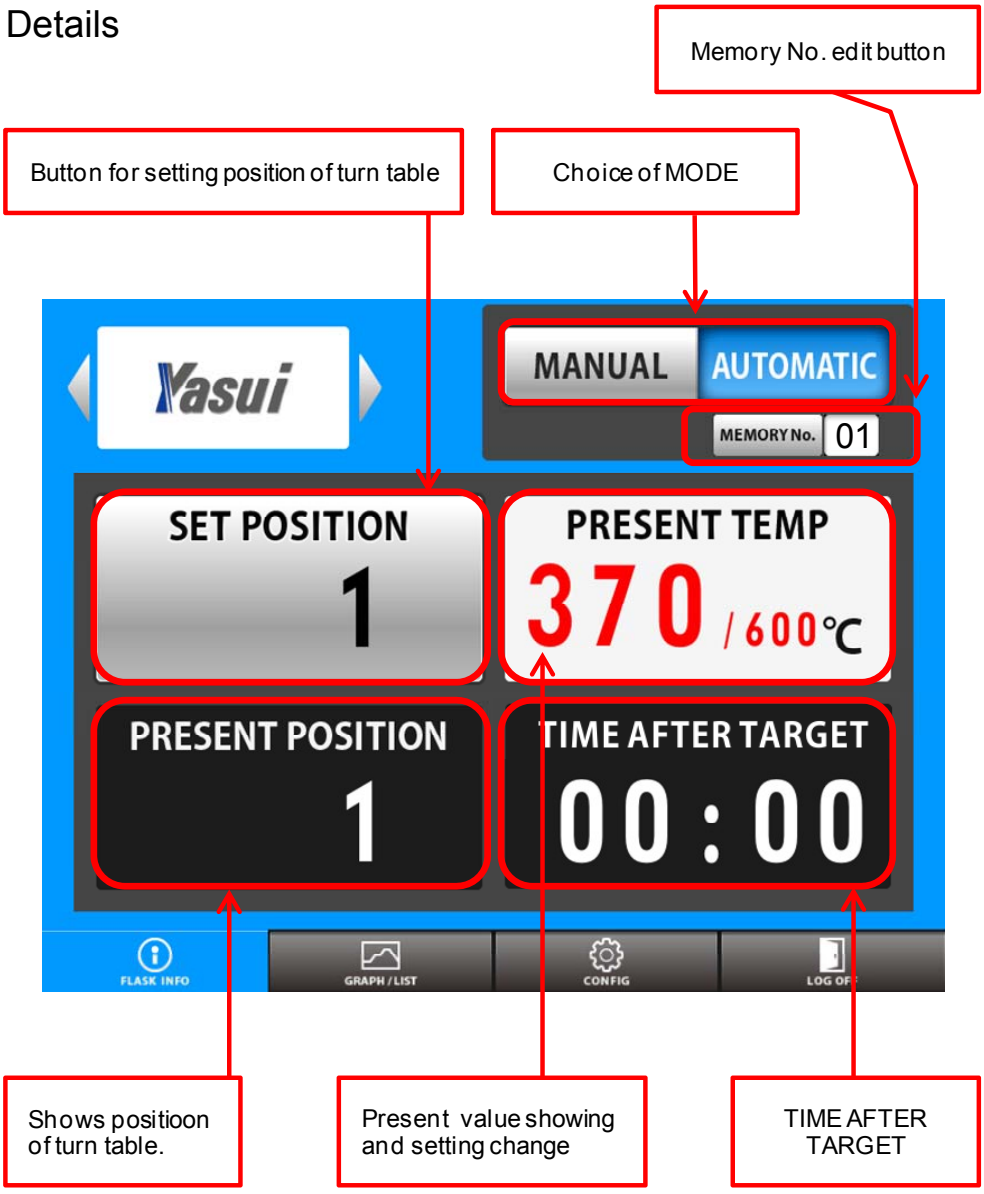
# 4. DESCRIPTION of EACH WINDOW

## 4-1. FLASK INFO window

### 4-1-1. Tap FLASK INFO tab to open.



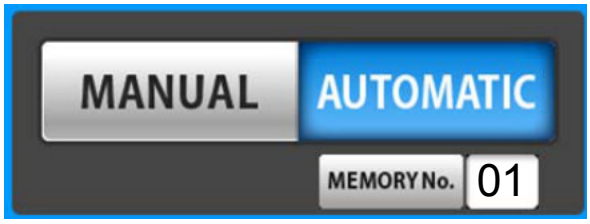
### 4-1-2. Details



## 4-1-3. MANUAL / AUTOMATIC

1) You can choose mode AUTOMATIC or MANUAL by tapping buttons directly.

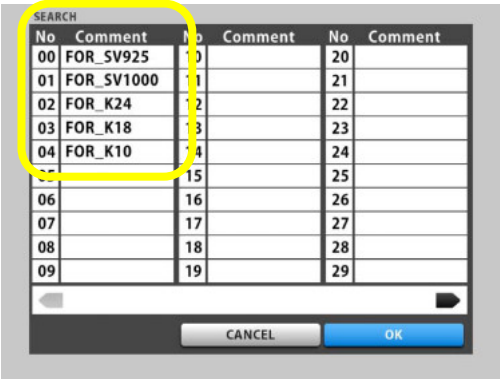
2) MEMORY No. will not be indicated when MANUAL mode is chosen.





## 4-1-4. Change memory number

1) Tap memory No. button.


2) choose memory from the list.

Tap OK button.

## 4-1-5. SET POSITION

You can stop rotation at your request.

Tap this button to activate keyboard,

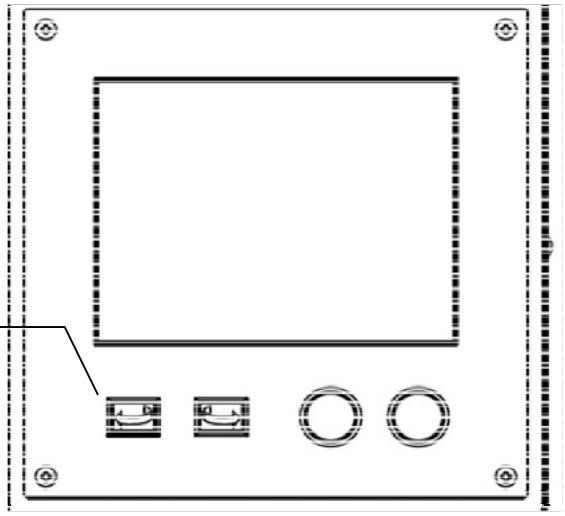
enter any position number you like from1 to 18.

Tap OK button to confirm.

Rotation will stop at the position you've set.

## 4-1-6. MANUAL ROTATION

You can also rotate and stop turn table by manual.
Push one of two buttons on control panel down for more than 2 seconds for continuous rotation.
Rotation starts and continues after finger released until you push one of two buttons again.




While pushing one of two buttons a short time for momentally rotation.
Rotation will not be continued when you release your finger.
This is very useful when you want to adjust the position only a bit.

### CAUTION

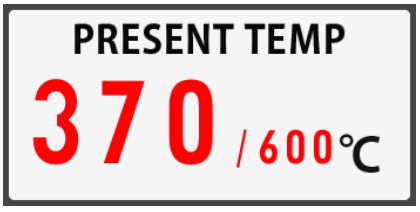
SET POSITION action will be canceled when you push manual rotation button when RBF is searching for target position.
You have to reset the position at SET POSITION button again if you want it to stop automatically.

## 4-1-7. PRESENT POSITION

You can check present position of turn table.
It is just for monitoring.


## 4-1-8. PRESENT TEMP

You can set any temperature you want by tapping this button at MANUAL mode.
Keyboard will be activated by tapping this button.
Enter temperature and tap OK button to confirm.



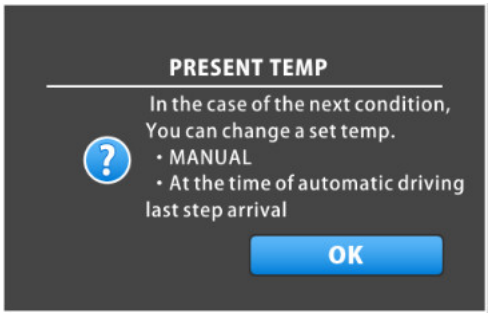
You will see this pop up window if you tap this button at AUTOMATIC mode.

This means;

1) Temperature setting for MANUAL heating.

2) Temperature edit for AUTOMATIC mode at only final step.(No need to cancel burnout cycle anymore)

New switching function for another casting temperature.

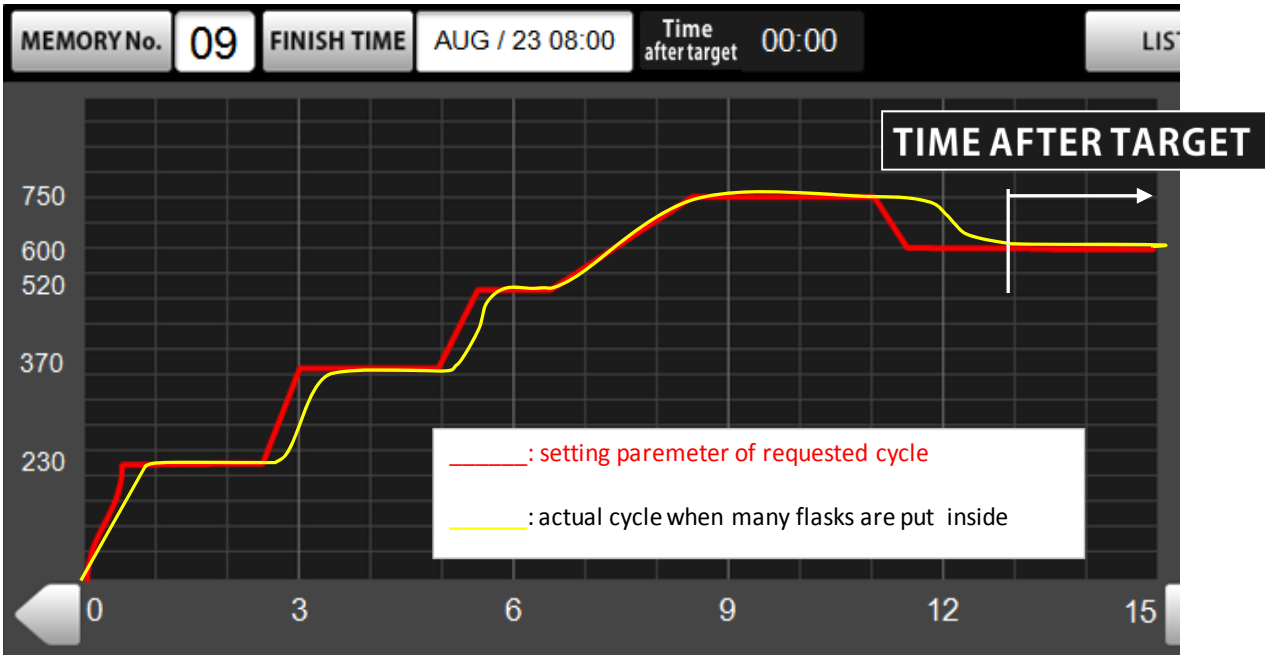



## 4-1-9. TIME AFTER TARGET

This informs you how long it passed from the point when temperature reaches final level.


You will know ideal time for final casting level by this.

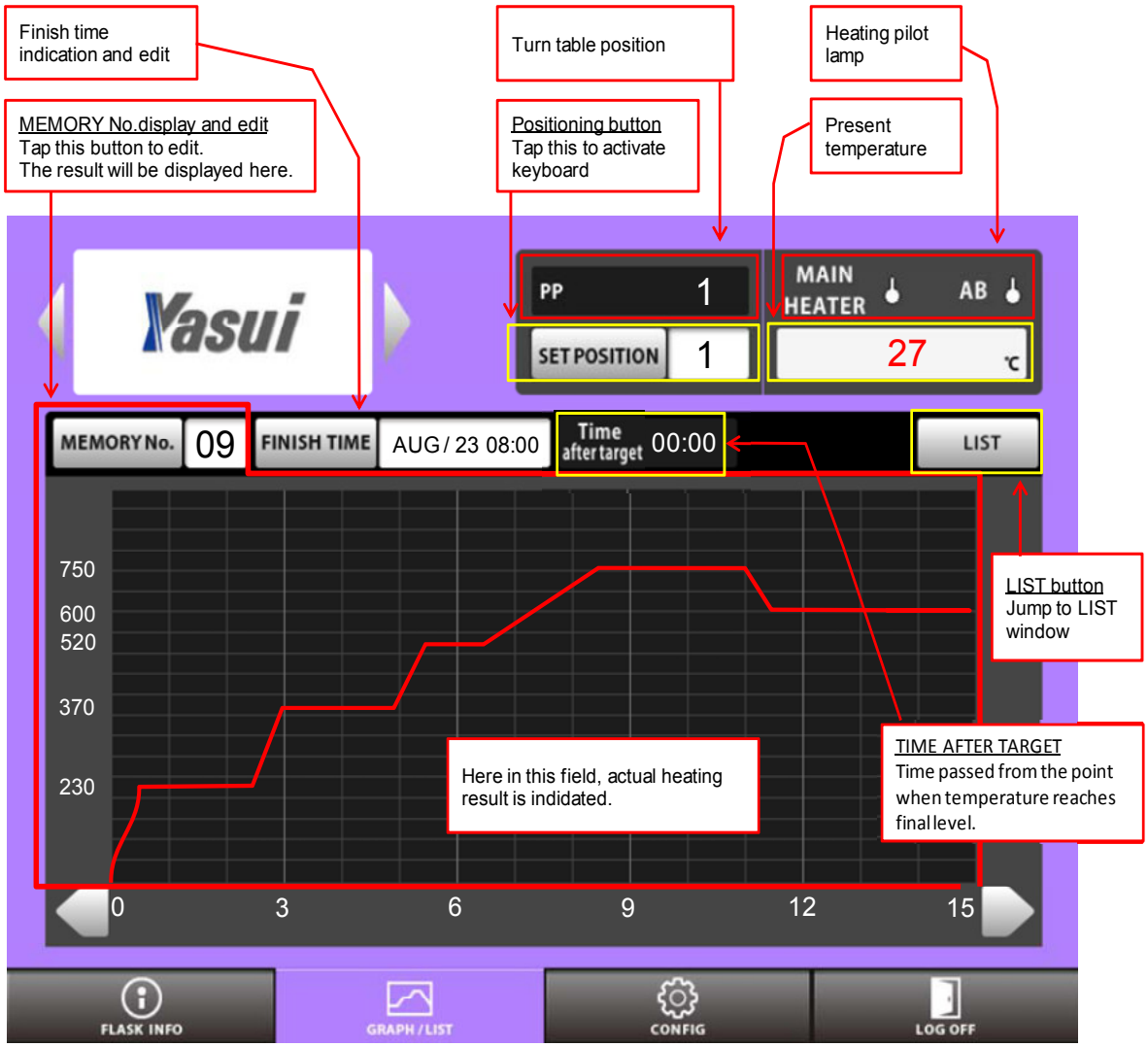
Actual kept time is visible now.



# 4-2. GRAPH window

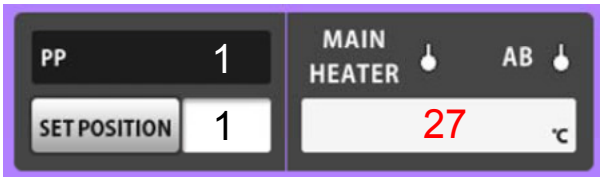
## 4-2-1. Tap GRAPH / LIST tab to open.


## 4-2-2. Details




## 4-2-3. PP window

Means Present Position of turn table.




## 4-2-4. SET POSITION

You can activate keyboard by tapping this button to stop table at the position you request.

## 4-2-5. PILOT LAMP

Monitor lamp for MAIN heater and After burner.

## 4-2-6. PRESENT TEMPERATURE

## 4-2-7. MEMORY No.


MEMORY Number is displayed here and can be edited.

## 4-2-8. FINISH TIME

＜When characters are indicated with black color＞

FINISH TIME is indicated here in case of starting now with chosen memory.

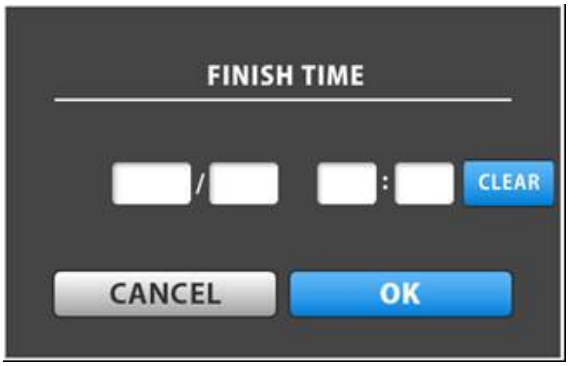
＜How to change FINISH TIME＞

1) Tap FINISH TIME button.

2) Enter delayed FINISH TIME you require.

3) The color of characters turns red which means ‘Standing by’.
RBF doesn’t start heating and waits for extra time for the target you’ve set after you tap START button.

4) Tap CLEAR button at 2) if you want to cancel it.



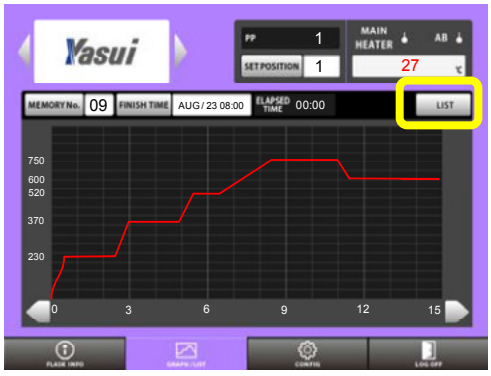

## 4-2-9. TIME AFTER TARGET

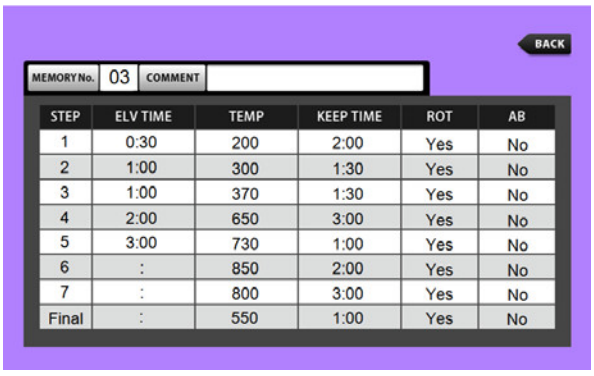
Already described in previous page.

## 4-2-10. LIST


You can open LIST window by tapping this button.

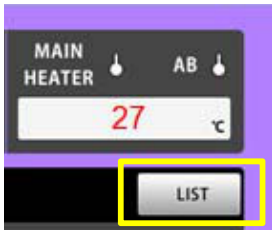
You can check and edit the recipe detail here in this window.

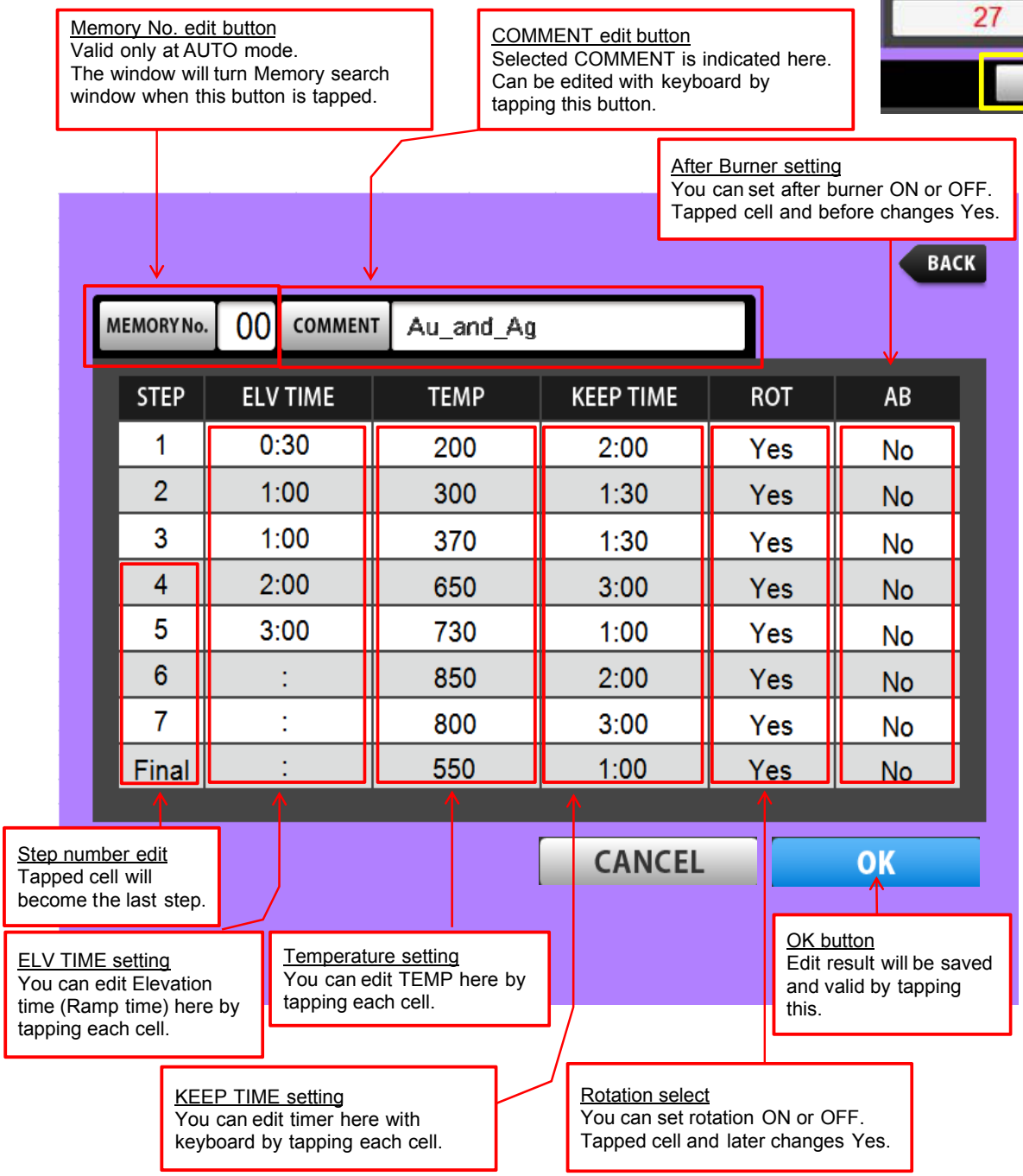



You can refer next page for detailed information of LIST window.

# 4-3. LIST window (tap LIST button to jump →)




## 4-3-1. MEMORY Number edit button

The window will turn Memory search window when this button is tapped (Only at AUTO mode)

## 4-3-2. COMMENT button

Selected COMMENT is indicated here.

You can register and edit comment here with keyboard by tapping this button.

## 4-3-3. STEP

You can set Final step by tapping one of cells in this row. (Only 4th to 8th step)

## 4-3-4. ELV TIME

Elevation Time, so called “ Rise Time “, “ Raise Time “, “ Ramp Time “ in other words.

The part in yellow (below)

## 4-3-5. TEMP

Setting Temperature

## 4-3-6. KEEP TIME

Holding time at each setting temperature.

## 4-3-7. ROT

You can cancel rotation at required step.

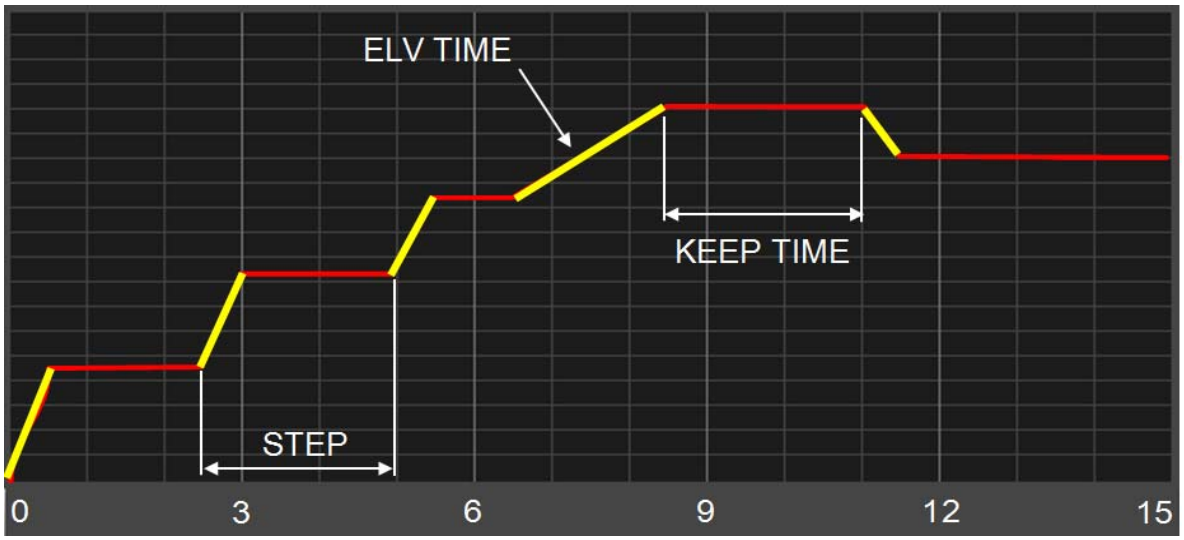
Tapped cell and before that changes to ‘NO’ and the last cell which is set ‘No’ can be switched ‘Yes’ by one tap.

We usually recommend not to rotate 1st step when drying platinum flaks.

## 4-3-8. AB

You can cancel After burner heating from required step.

Tapped cell and after that changes NO and first cell with No can be switched Yes by one tap.




RBF13 is shipped with 20 Memories already included with same recipe detail.

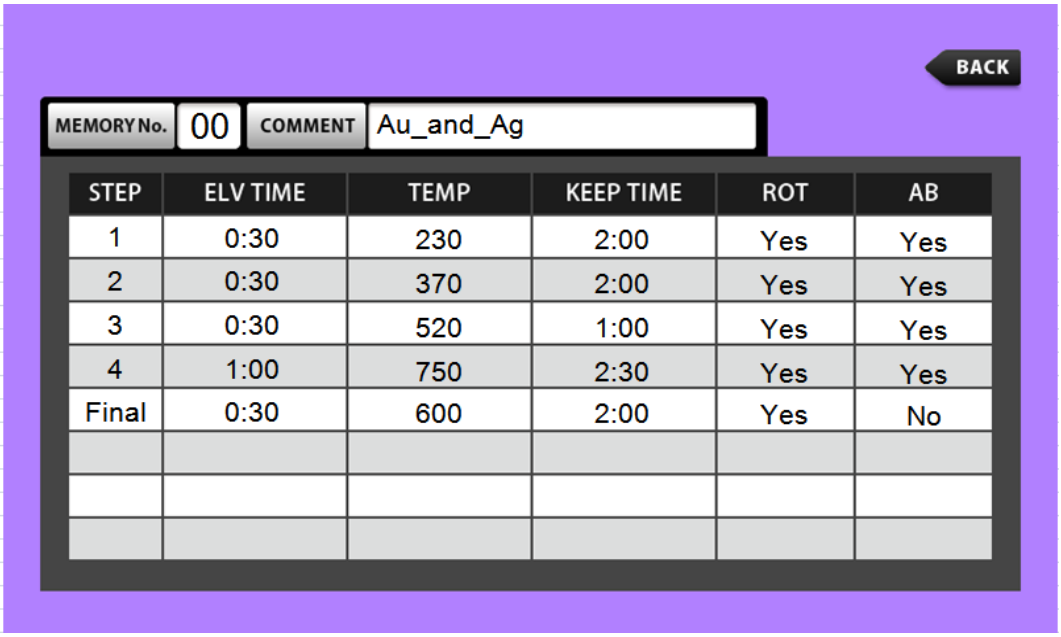
Comment [ Au_and_Ag] is registered to Memory number 00 only.

Other memories have no comment (01-19)

Please choose any Memory number to edit recipe and comment.

You don’t need to register new Memory from blank recipe.

Memory No.11 and later is the same.



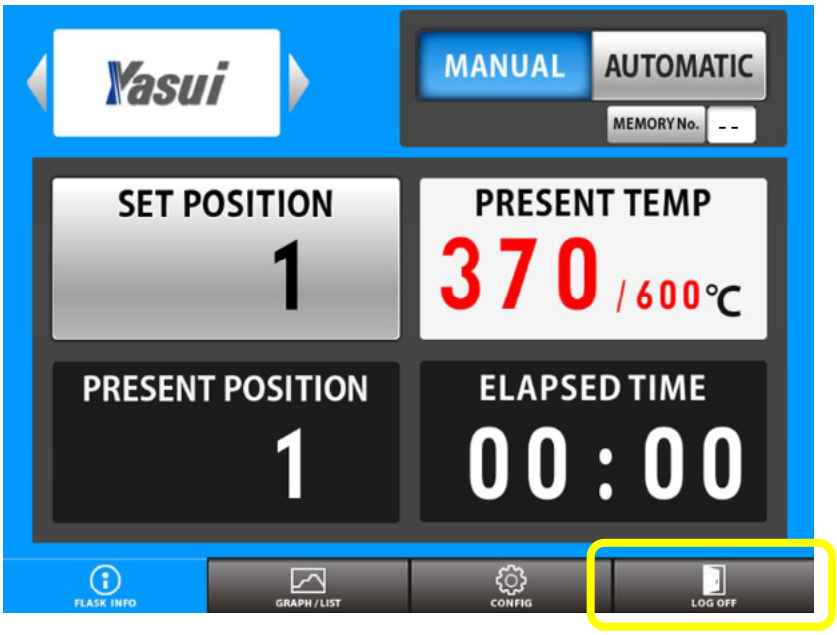

| STEP | ELV TIME | TEMP | KEEP TIME | ROT | AB |
|---|---|---|---|---|---|
| 1 | 0:30 | 230 | 2:00 | Yes | Yes |
| 2 | 0:30 | 370 | 2:00 | Yes | Yes |
| 3 | 0:30 | 520 | 1:00 | Yes | Yes |
| 4 | 1:00 | 750 | 2:30 | Yes | Yes |
| Final | 0:30 | 600 | 2:00 | Yes | No |
| | | | | | |
| | | | | | |
| | | | | | |

## 4-4. CONFIG

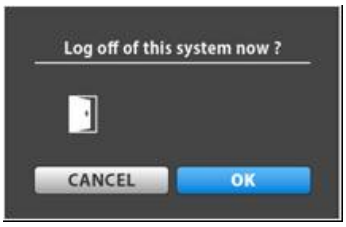
Will be described later.


## 4-5. LOG OFF


1) Tap LOG OFF tab before turning breaker OFF.



2) Tap OK button




3) Turn breaker switch OFF when you see this pop up window

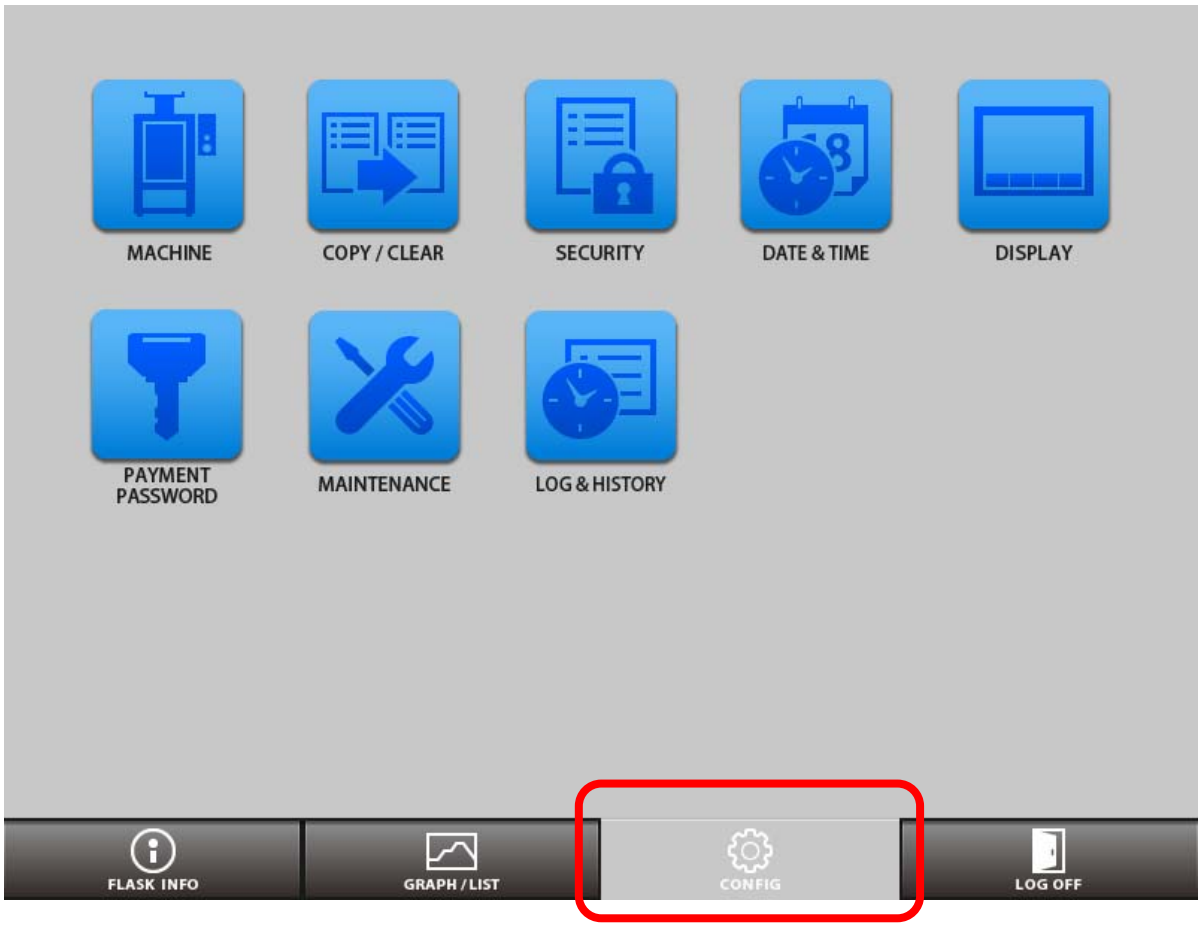
# 5. CONFIG MENU

You have several configuration menus in this page.

＜How to open CONFIG menu window＞

1) Tap CONFIG 

tab to open the window.




CONFIG window

＜About each icon＞


MACHINE

You can check machine information like its serial number and several program versions.


COPY

You can copy chosen recipe to minimize time for programming.


SECURITY

You can protect existing recipe details so that nobody can edit.

You can also change password for protection here.


DATE & TIME

You can set calendar and clock at your region.


DISPLAY

You can control display setting here.


PAYMENT PASSWORD

You can enter Passwords for Monthly payment here. Only for customers who use this system.


MAINTENANCE

You can check each single action, power source, sensor and others.

Some optional configurations for maintenance can be done here.


LOG & HISTORY

You can check machine log when problem happened.

## 5-1. MACHINE

You can check machine information like its serial number and several program versions.

＜How to open “MACHINE” window＞

1) Tap CONFIG 

tab to open CONFIG menu.

2) Tap MACHINE 

icon to open.

[ VERSION ]
You can check program version information here.

[ DATA OUTPUT ]
You can record temperature data into USB flash drive.
1) Put USB flash drive to the port.
2) Tap ‘SYSTEM→USB’ button.
3) Automatically completed
You will see a pop up window when finished.


## 5-2. COPY

You can easily create new memory by copying existing recipe.

＜How to open “COPY” window＞

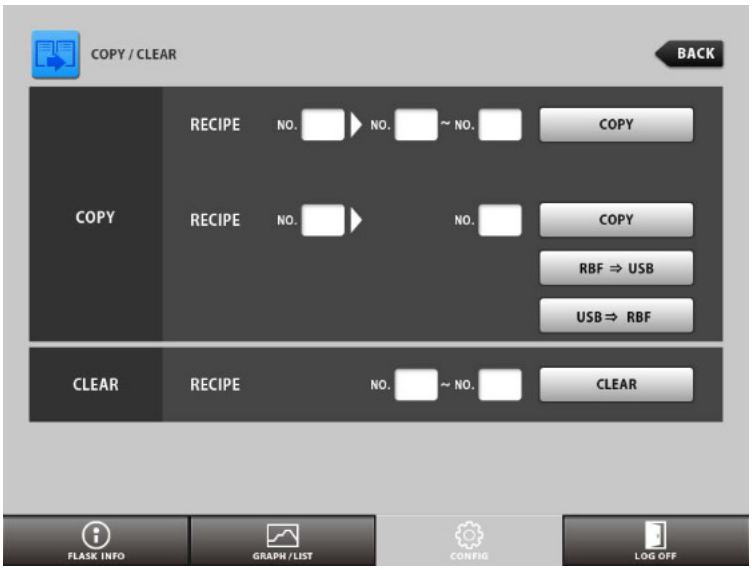
1) Tap CONFIG 

tab to open CONFIG menu.

2) Tap COPY 

icon to open.

[ COPY ]




1) Multiple copy
- When you want to create many copy of one specific recipe. (below)

2) Single copy
- When you want to create just a copy

3) RBF ⇒ USB button
- You can copy all of memories in the system to USB flash drive.
Put USB flash drive into the slot and tap this button.

4) USB⇒ RBF button
- You can copy all of Memories in USB flash drive to the system.
Put USB flash drive into the slot and tap this button.

* Multiple copy
When you want to copy the data of recipe 1 to memory 2-5(4 copies), Enter the value and tap COPY button as follows;


* Single copy
When you want to make a copy of recipe 1 to another memory 8, (1 copy), Enter the value and tap COPY button as follows;


[ CLEAR ]
- You can choose and delete any recipe here.

Enter the recipe number 1 when you want to erase recipe 1 as follows;

## 5-3. SECURITY

You can protect recipe data and edit password for recipe protection.

＜How to open “SECURITY” window＞

1) Tap CONFIG 

tab to open CONFIG menu.

2) Tap SECURITY 

icon to open.

[ LOCK ]

- You can lock the recipes you choose.

1) Enter recipe numbers which you want to protect to the blanks.
   Ex. 00-00 for single recipe, 00-03 for plural recipes protection.
2) Tap 

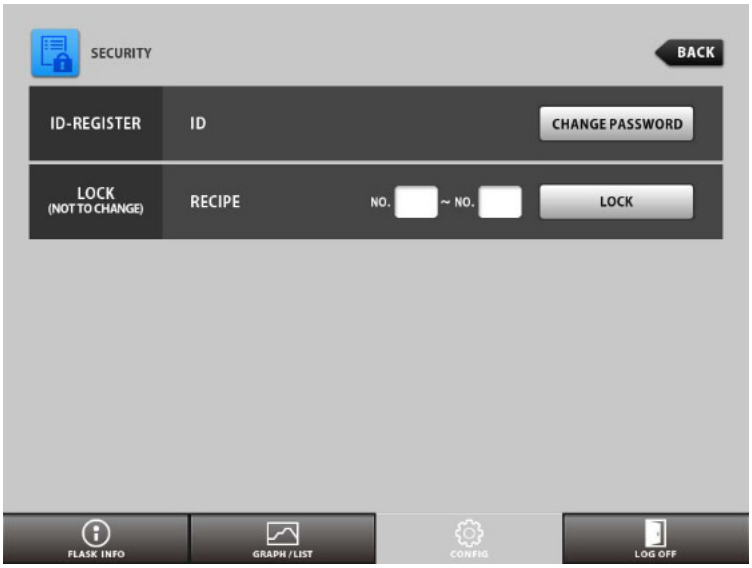
button.
3) Enter password ‘YASUI_RBF’.
4) You will see a pop up window ‘RECIPE LOCK’


[ ID REGISTER ]

- You can edit password to protect RECIPEs.
  The default password is ‘YASUI_RBF’

1) Tap 

button.
2) Enter new password you like.
3) Tap OK button.
4) Enter old password.
(In this case ‘YASUI_RBF’)
5) Tap OK button.




## 5-4. DATE & TIME

You can set date and time at your region here.

＜How to open “DATE & TIME” window＞

1) Tap CONFIG 

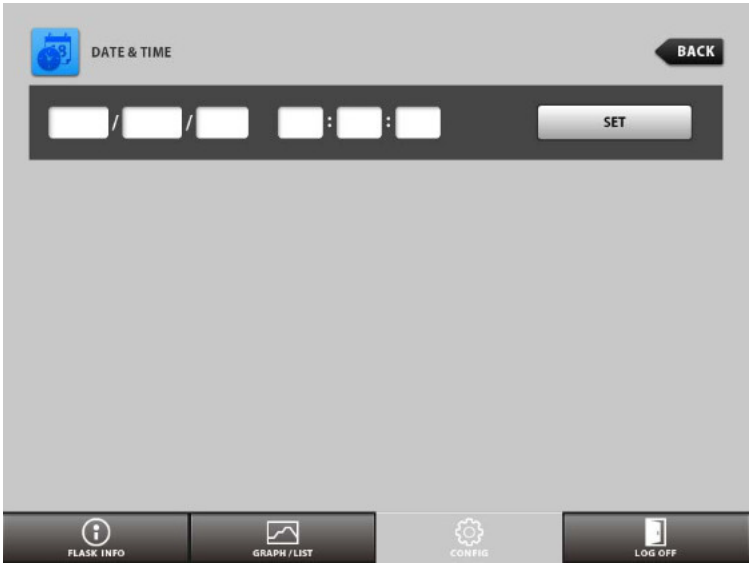
tab to open CONFIG menu.

2) Tap DATE & TIME 

icon to open.

- Tap blank to open keyboard to enter date and time.

- Tap SET button to finish.




## 5-5. DISPLAY

You can switch suspension power ON or OFF; adjust brightness.

＜How to open ”DISPLAY” window＞

1) Tap CONFIG 

tab to open CONFIG menu.

2) Tap DISPLAY 

button to open.

3) SUSPEND

You can activate Automatic power OFF function for display.

Choose ON for activate, timer can be set from 1-999 minutes.

4) BRIGHTNESS


You can adjust the brightness of the display.

Tap  button to decrease, tap  button to increase.

You can also long tap for continuous adjusting.

Direct entering value by keyboard can be also done. The range is 0 -100%

5) MEASUREMENT SYSTEM


You can change temperature measurement system here.

** You have to change setting at OVERHEAT PROTECTION DEVICE at the same time.

## 5-6. PAYMENT PASSWORD

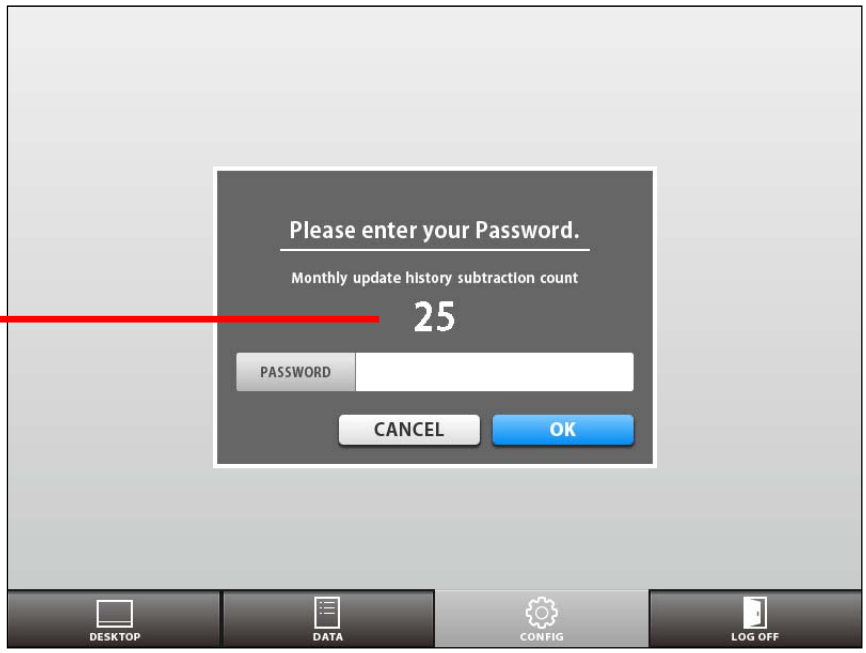
＜How to open ”PAYMENT PASSWORD” window＞

1) Tap CONFIG  tab to open CONFIG menu.



2) Tap PAYMENT PASSWORD  button to open.






The rest of months to be paid

3) PASSWORD


You can enter password.

### 5-6-1. WHAT IS MONTHLY PAYMENT?

Monthly payment system is a method to have you pay just like credit every month to distributor.

You need to pay credit every month to get password as RBF13 will be locked by system after payment deadline.

You can prevent password lock by entering password at CONFIG tab.

RBF13 accepts passwords anytime not only every month one by one.

## 5-7. MAINTENANCE

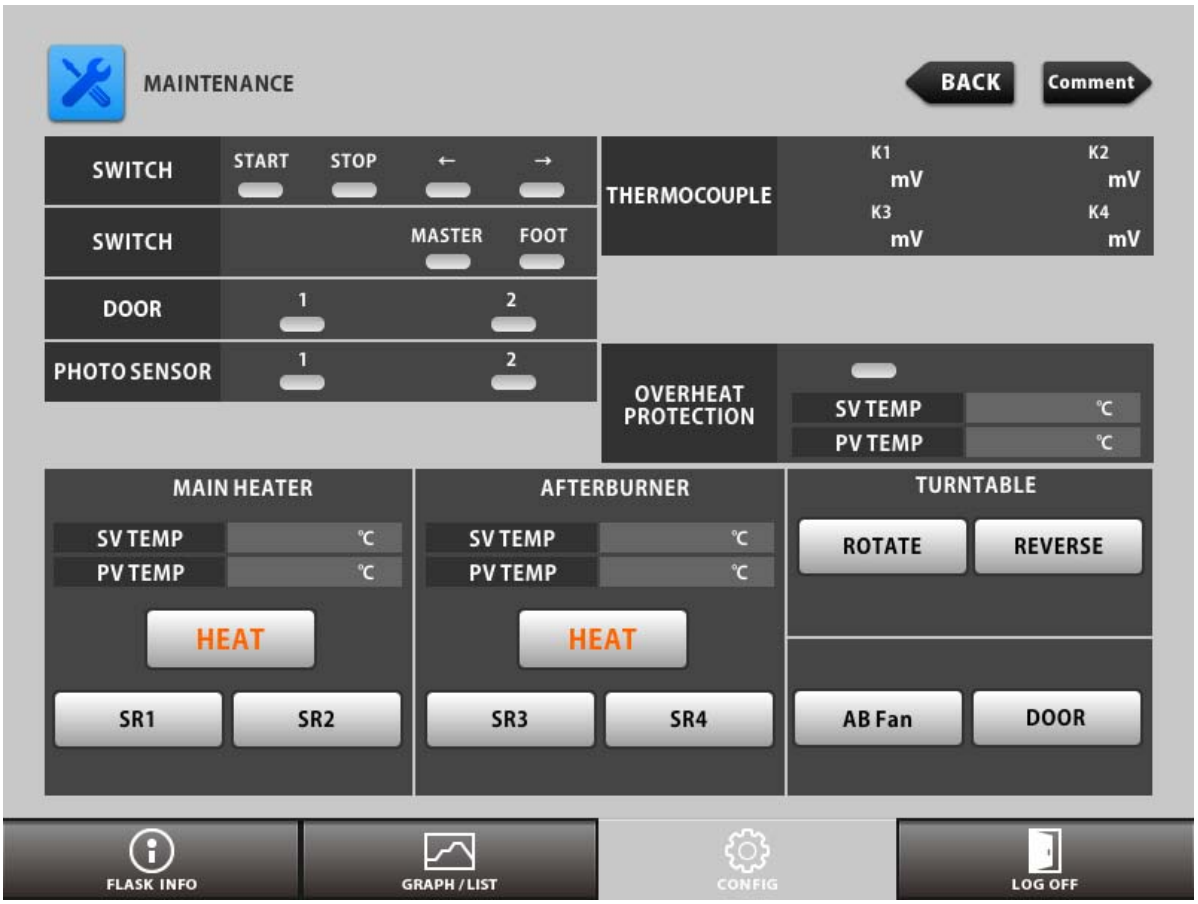
＜How to open ”MAINTENANCE” window＞

1) Tap CONFIG 

tab to open CONFIG menu.

2) Tap MAINTENANCE 

button to open.



Descriptions on MAINTENANCE window

| Category1 | Category2 | Description |
|---|---|---|
| SWITCH | START | START switch ON/OFF monitor |
| | STOP | STOP switch ON/OFF monitor |
| | ← | Rotation switch ON/OFF monitor |
| | → | Rotation switch ON/OFF monitor |
| | MASTER | MASTER switch ON/OFF monitor |
| | FOOT | FOOT switch ON/OFF monitor |
| DOOR | 1 | DOOR switch 1 ON/OFF monitor |
| | 2 | DOOR switch 2 ON/OFF monitor |
| PHOTO SENSOR | 1 | Original position of PHOTO SENSOR for rotation ON/OFF monitor |
| | 2 | Present position sensor ON/OFF monitor |
| THERMO COUPLE | | Input voltage through K type thermocouple |
| | K1 | Main heater |
| | K2 | Afterburner |
| | K3 | Spare |
| | K4 | Overheat protection |
| OVERHEAT PROTECTION | SV TEMP | Monitor of setting temperature |
| | PV TEMP | Monitor of present temperature |
| MAIN HEATER | SV TEMP | Tap and edit Setting Value here |
| | PV TEMP | Monitor of present temperature |
| | HEAT | Heat button for setting value |
| | SR1 | SSR1 (for main heater)ON/OFF switch |
| | SR2 | SSR2 (for main heater)ON/OFF switch |
| AFTERBURNER | SV TEMP | Tap and edit Setting Value here |
| | PV TEMP | Monitor of present temperature |
| | HEAT | Heat button for setting value |
| | SR3 | SSR3 (for Afterburner)ON/OFF switch |
| | SR4 | SSR4 (for Afterburner)ON/OFF switch |
| TURNTABLE | ROTATE | Normal rotation ON/OFF switch |
| | REVERSE | Reverse rotation ON/OFF switch |
| AB Fan | | Afterburner Fan ON/OFF switch |
| DOOR | | Auto DOOR ON/OFF switch (only for RBF37) |

## 5-8. LOG & HISTORY

＜How to open ”LOG & HISTORY” window＞

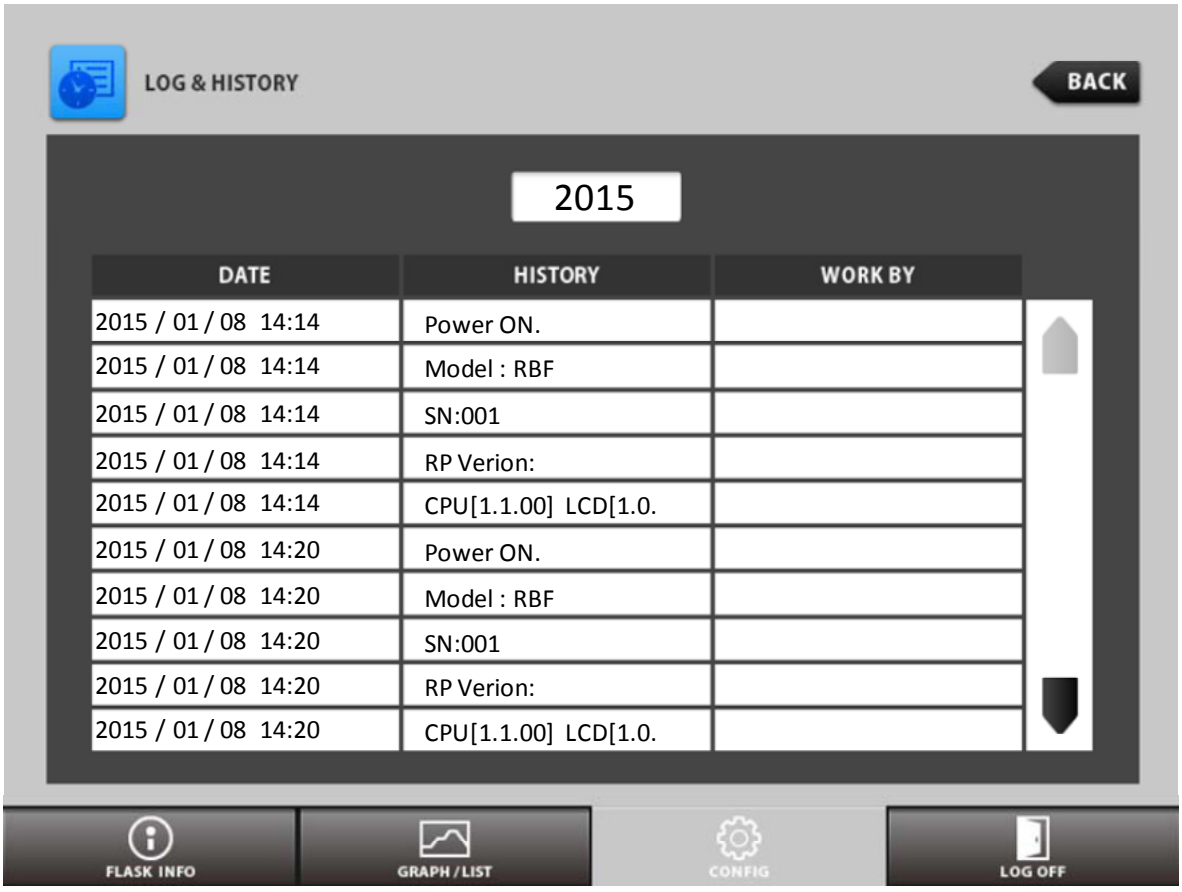
1) Tap CONFIG 

tab to open CONFIG menu.

2) Tap LOG & HISTORY 

button to open.

You can check machine log when problem happened.
It is very difficult to communicate about problems on machine. However you can easily report what is happening on it by taking picture and send us or our distributors this window.
It is very useful tool to diagnose.



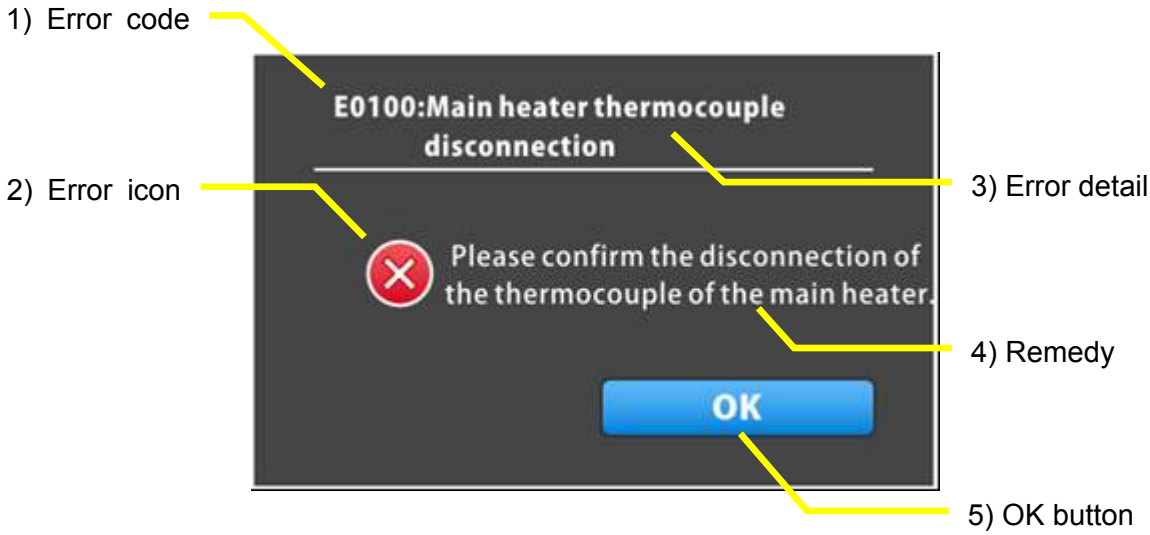
# 6. WHEN IRREGULARITY HAPPENED

## 6-1. ERROR MESSAGES

RBF shows messages when something irregularity happens.

You cannot operate RBF while Error message is displayed.

Example of error message




1) Error code

Code of error.

2) Error icon

3 kinds of icons will be shown  Error,  warning and  information.

3) Error detail

Detail of error.

4) Remedy

Countermeasures.

5) OK

Tap OK 

button to go back to previous page.

# 6-2. ERROR CODE LIST

| Error code | Level | Description<br>Cause | How to recover<br>Remarks |
|---|---|---|---|
| E0100 | Error | Thermocouple of main heater defective. | Replace thermocouple. |
| E0101 | Error | Main heater defective. | Replace heater coil. |
| E0102 | Error | Thermocouple of main heater not in correct position.(coming out) | Push it at the end. |
| E0200 | Warning | Thermocouple of afterburner defective. | Replace thermocouple. |
| E0400 | Warning | Afterburner defective. | Replace after burner heater, enter 'change after burner' at maintenance window. |
| E0800 | Warning | Door is opened for more than 2 minutes. | Warning. Close door. |
| E0801 | Error | Door is opened when starting up. | Close door. |
| E0900 | Error | Blackout. | Check power supply. |
| | | Electrical power supply was suspended for more than 5 minutes. | Heating re-starts from the beginning of the step at suspended. |
| E1300 | Warning | The turntable does not rotate. | Check motor, photo sensor and turntable. |
| E1301 | Warning | Disconnection of micro photo sensor. | Check wiring on photo sensor PH1. |
| | | | Check sensor at Maintenance window. |
| | | Sensor of table original position not detected. | |
| E1500 | Error | TEMP setting error. | Target must be in the range of 0-850c. |
| | | Target set over 1100c. | |
| E1604 | Error | Main heater TEMP error. | Replace heater or thermocouple, check control system. |
| | | Present temp is out of range. | |
| E1605 | Error | Overheat protection activated. | Check setting temperature and SSR. |
| E2000 | Error | Temp control device communication error. | Reboot. |
| | | No reaction from temp control device. | |
| E2010 | Error | No reaction from temp control device for Overheat protection system. | Reboot. |
| E2200 | Warning | Voltage became caution level. | Check power supply. |
| E2300 | Error | Voltage became abnormality level. | Check power supply. |
| E9002 | Error | Internal clock error. | Call distributor. |
| E9003 | Error | Fatal error. | Call distributor. |
| E9054 | Error | Data copy to another drive will begin as SYSTEM USB flash drive broken. | Wait for copy finishing and normal reboot (takes long time) and replace broken drive after that. |
| E9055 | Warning | SYSTEM USB flash drive 1 broken. | Replace System USB1. |
| E9056 | Warning | SYSTEM USB flash drive 2 broken. | Replace System USB2. |
| E9057 | Warning | Data copy to replaced new drive will begin. | Wait for copy finishing and normal reboot (takes long |

| | | | |
|---|---|---|---|
| | | | time) and replace broken drive after that. |
| E9058 | Warning | Data copy failed. | Reboot. Replace System USB flash drive if not recovered |
| E9059 | Error | Injustice position of SYSTEM USB flash drive. | Replace one of USB flash drives. |
| E9060 | Error | Starting failure. | Remove User USB flash drive and reboot. |
| E9091 | Error | Consumption replace recommendation. | Replace motor, enter 'change motor' at maintenance window. |
| E9092 | Warning | Consumption replace recommendation. | Replace heater, enter 'change main heater' at maintenance window. |
| E9093 | Warning | Consumption replace recommendation. | Replace after burner heater, enter 'change after burner' at maintenance window. |

** Contact distributor about errors not mentioned above or not solved by this.

# 6-3. BLACKOUT

If electric power supply failed, control system reacts as follows;

1) MANUAL BURNOUT MODE

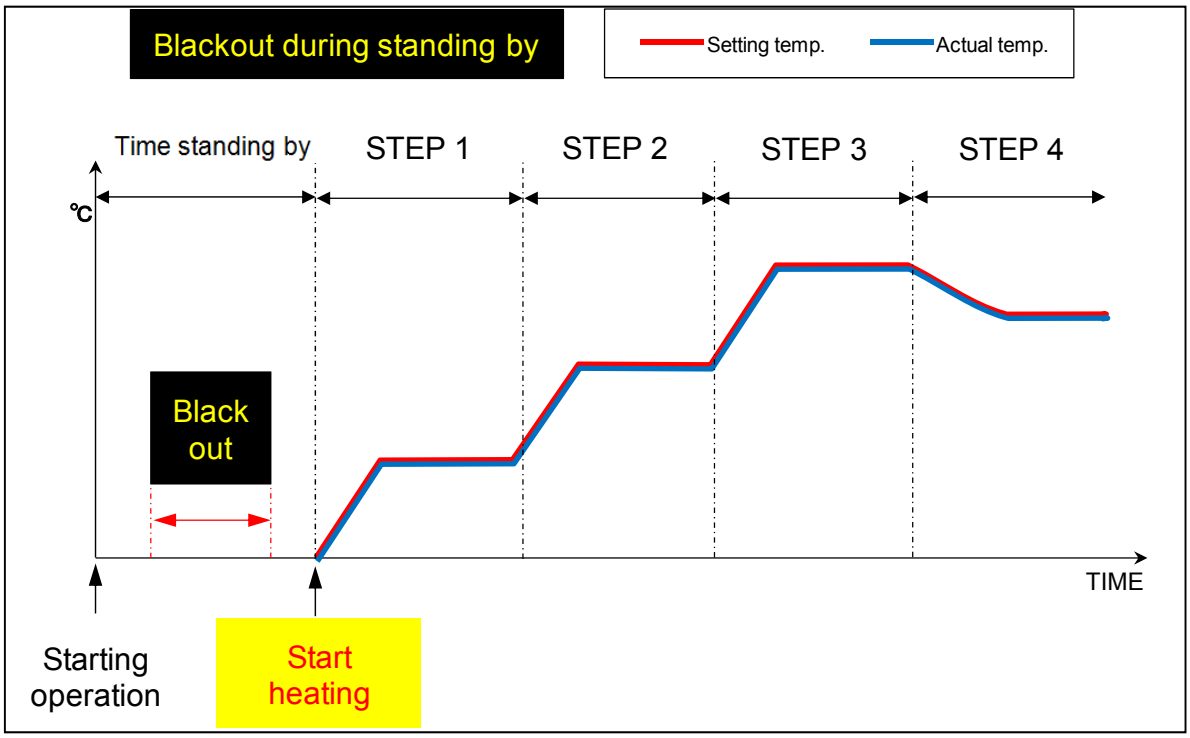
When electric power supply is restored, the machine does not resume heating automatically.

Check setting value of temperature. Press START key, so that the machine will resume its running.

2) AUTOMATIC BURNOUT MODE (blackout and recovery before the set time of Step 1)

In case blackout happened during standing by and restored before the set start time of Step 1, the machine resumes its running when power supply is restored.

In this case, finish of total burnout cycle will not be delayed. See the figure as follows.

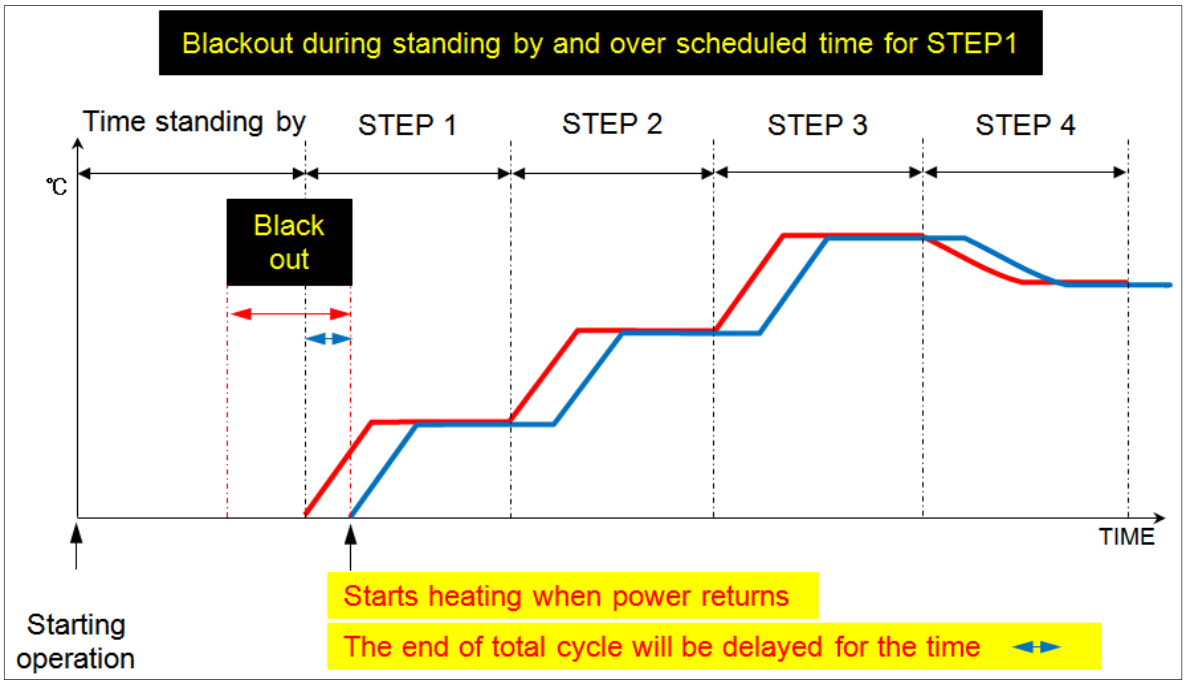



3) AUTOMATIC BURNOUT MODE (blackout before the set time of Step 1 and recovery after the set time of Step 1.

In case blackout happened during standing by restored after the set time of Step 1, the machine will be activated automatically again at the time when power supply returns.

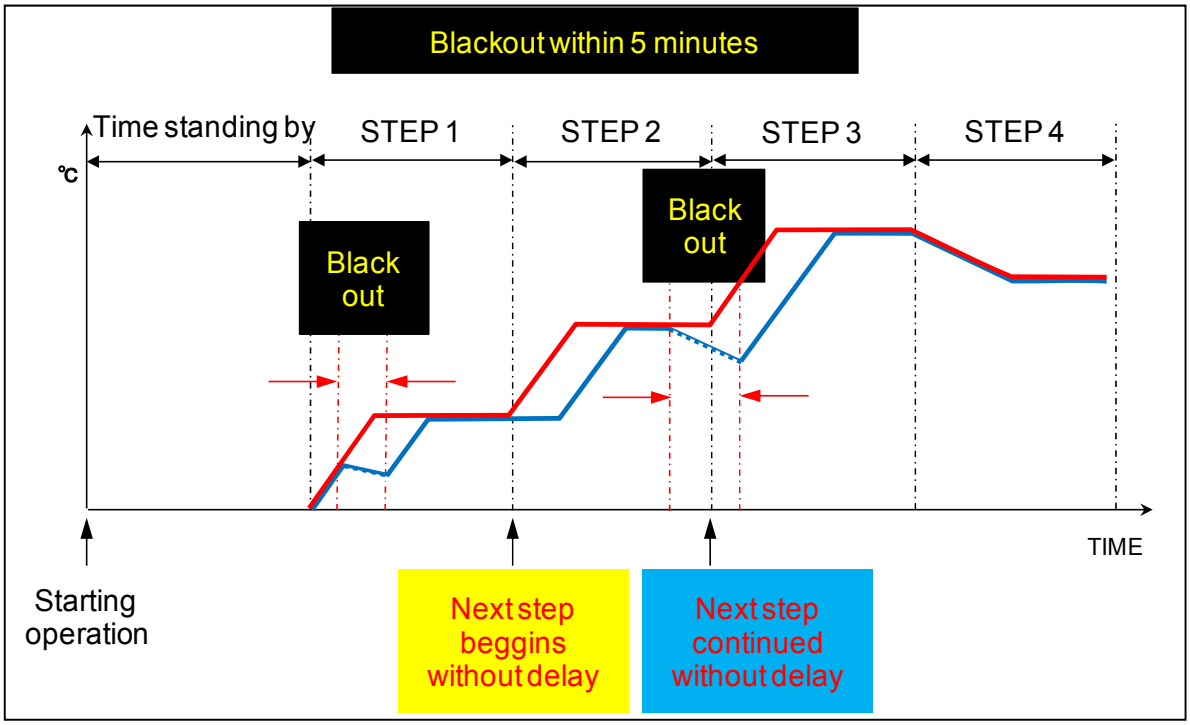
However, finish of total burnout cycle will be delayed for the time equal to blackout time period from the set start time of Step 1 to power recovery.

See the below figure.




4) AUTOMATIC BURNOUT MODE (during burnout cycle time within 5 minutes)

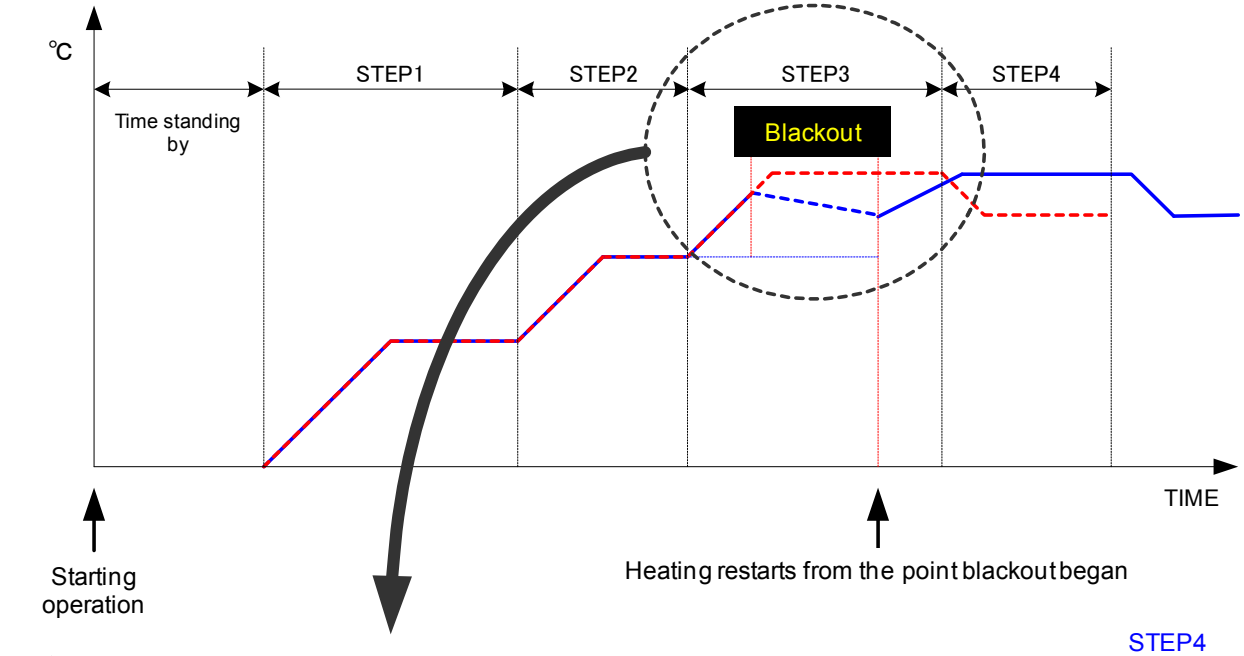
When electric power supply is restored, the machine automatically resumes its running from the point where blackout occurred.

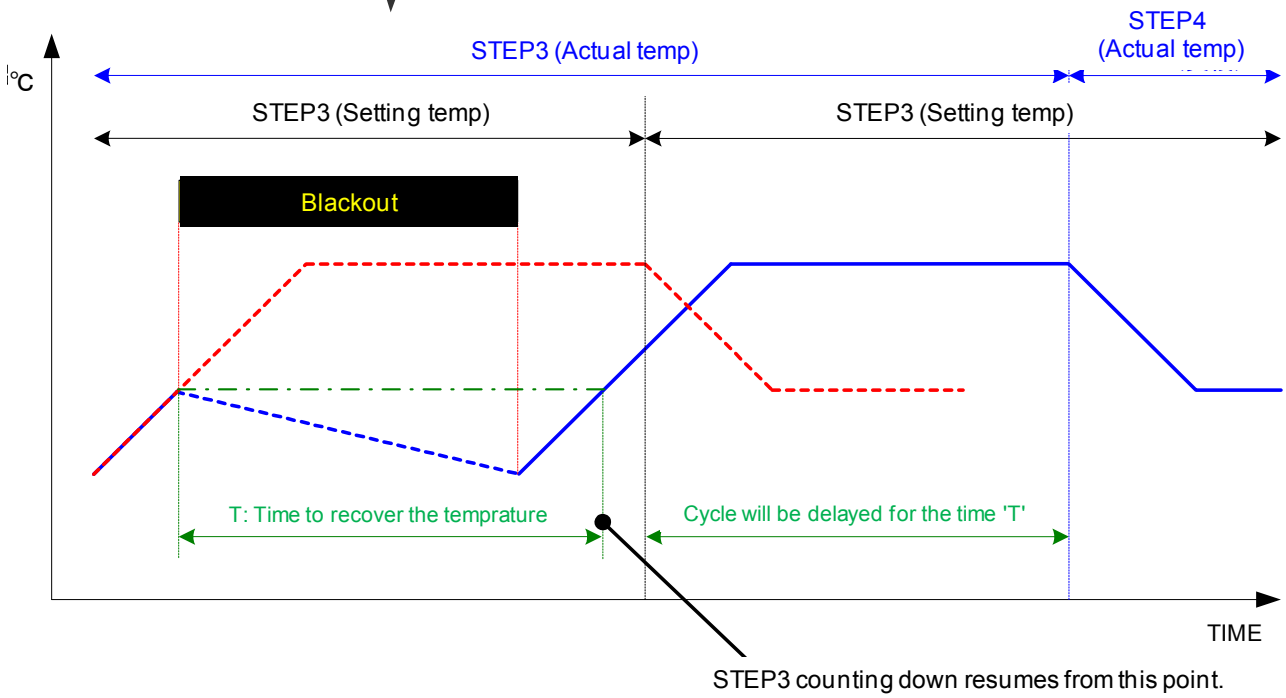


5) AUTOMATIC BURNOUT MODE (during burnout cycle time for over 5 minutes)

When electric power supply is restored, the machine automatically resumes its running from the point where blackout occurred.

The time lost will be resumed and burnout cycle will be delayed for the time equal to blackout time period.



# 6-4. OVERHEAT PROTECTION DEVICE

## CAUTION

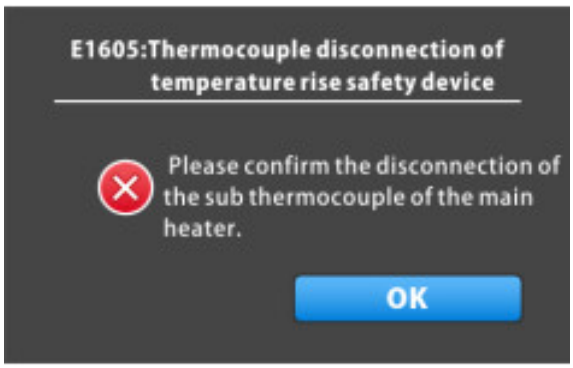
1. When changing the set value, consider that actual temperature may overshoot the set value of overheat protection device depending upon capacity of flask etc.
2. Thermocouple for overheat protection device is consumable. If it is damaged by wire-breakage etc. because of deterioration, overheat protection device cannot work. So, always keep a spare thermocouple (available as a spare part) in your stock and replace deteriorated thermocouple with a new one as far in advance as possible.

1) Overheat protection device automatically shuts down heating when present temperature exceeds peak of setting value in the burnout cycle.
The point shutting down is +20 degrees Celsius.

2) Check and remove the cause of overheat and reboot RBF.

The manufacturer shall in no event be liable for any consequential or indirect damages including, but not limited to, loss of production or loss of profit (including burnout for normal precious metal casting, for stone-in-wax casting and etc.) or damages due to machine downtime.
Casting results (including burnout for normal precious metal casting, for stone-in-wax casting and etc.) by the machine or by this manual are not compensated by the manufacturer.

** A message E1605 will be on display when thermocouple for the device is defective,
.



# 7. INSTALLING

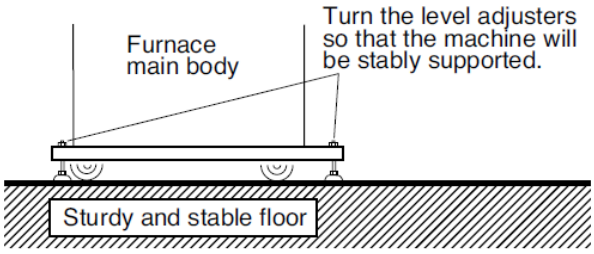
## 7-1. UNPACKING

Open the door, and remove cushioning material between the turntable and the heater panel.
(Do not give unnecessary strong force at this part; otherwise the heater surface may be damaged.)

## 7-2. MAIN UNIT

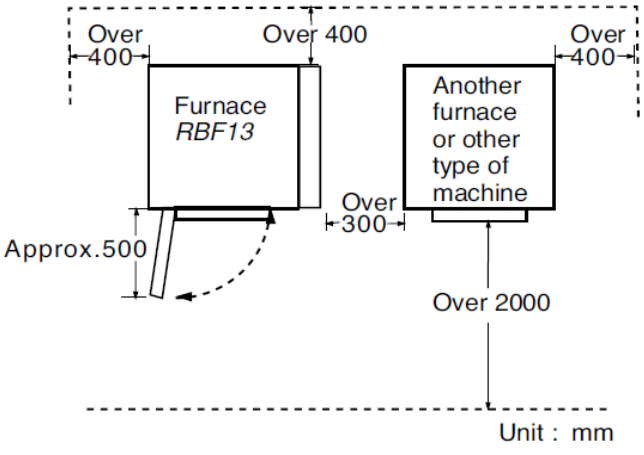
**IMPORTANT**: Great attention should be given to ambient temperature at installation of the machine. In case two or more machines are arranged side by side, allow enough spacing.
Do not use the machine in a closed room. Provide adequate ventilation of air for the machine.

1) When doorways are not wide enough, the power control box can be separated from the furnace body temporarily.
Contact distributor at your place.




2) Mount the machine on a sturdy place endurable to weight. (Weight of the machine may be more than 230 Kgs when flasks are contained.)

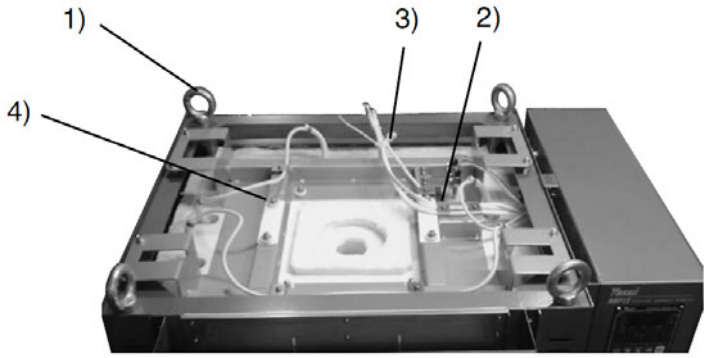
3) After placement of machine, turn the level adjusters so that the machine will be stably supported by the level adjusters.



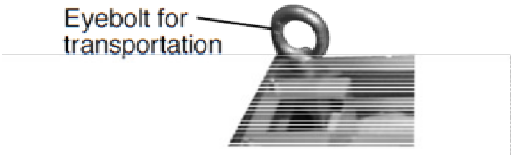

4) Sufficient clear space should be left around the machine so that daily operation and maintenance will not be obstructed.
Especially, if another furnace is placed next, there should be at least 300 mm clearance between the machines.


9 Deforest St. Amityville NY, 11701 | sales@romanoff.com | 1-631-842-2400 | romanoff.com

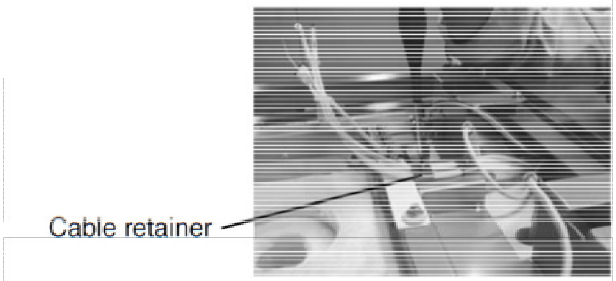
# 7-3. AFTERBURNER



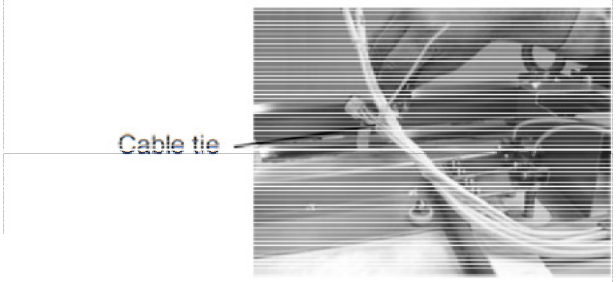

1) Remove eyebolts for transportation (4 pieces) by rotating counterclockwise.



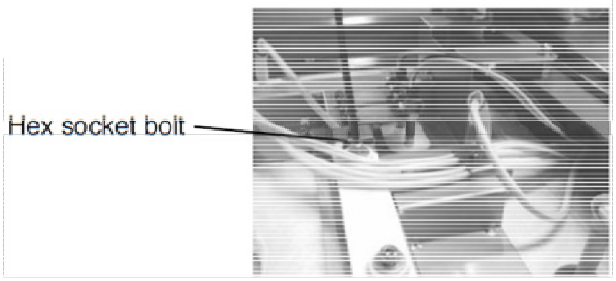

2) By unscrewing fixation bolt, remove cable retainer.



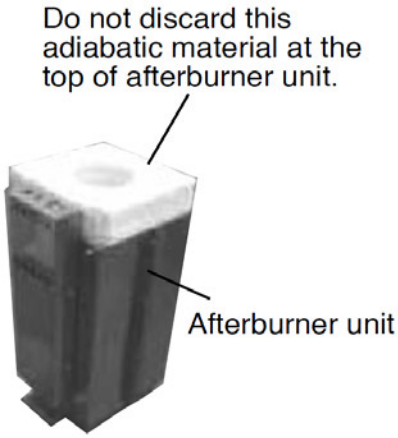

3) Cut cable tie with a nipper.

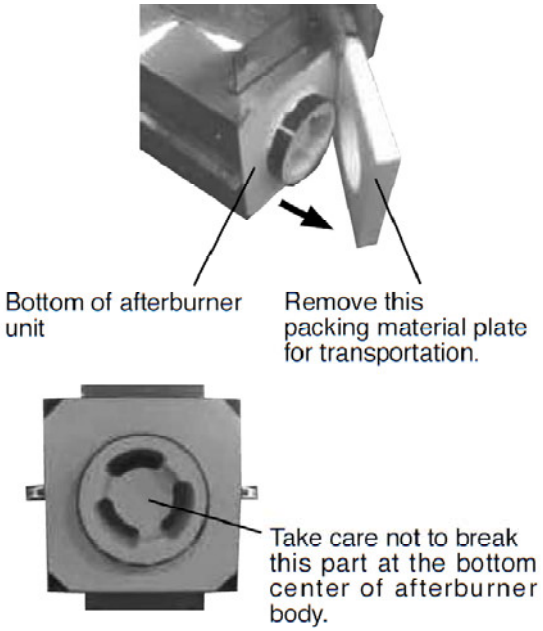



4) Remove hex socket bolts (4 pieces) for Afterburner fixation with a hex key.



5) Remove packing material plate for transportation at the bottom of afterburner unit. (Do not discard the white adiabatic material on top of afterburner unit.)

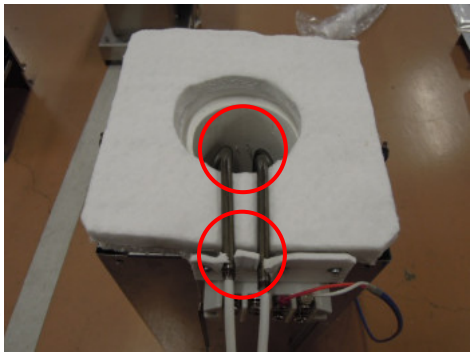



6) Install thermocouple

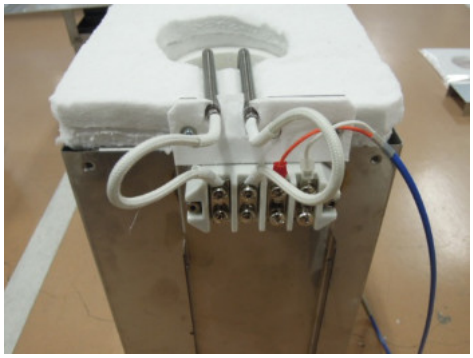
Iinsert thermocouple in place.
Fix it by metal plate and screw bolts.

7) Place afterburner unit to fit at central hole on top of furnace, and fix it with four bolts removed by the former procedure 4).



8) Remove white adiabatic material on top.
Place sheath heater into the part marked by red circle.
Its cables have to be wired in parallel.
At this time, position the bobbin at center of sheath heater.
Be sure to place white adiabatic material back on top as before.

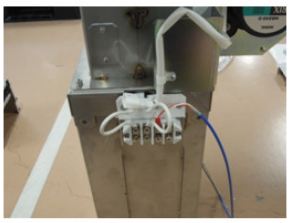
9) Remove cable cover with screwdriver.



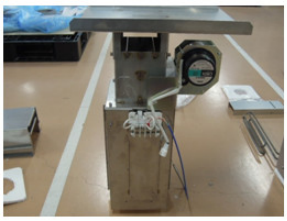
10) Connect cables of sheath heater and thermocouple to terminal block marked by red circle.
At this time, wire the cable of the sheath heater so that the cable is bent in a large circle shape at upper area of the terminal block.
(Do not bend the cable by force.)

11) Install Afterburner and Fan

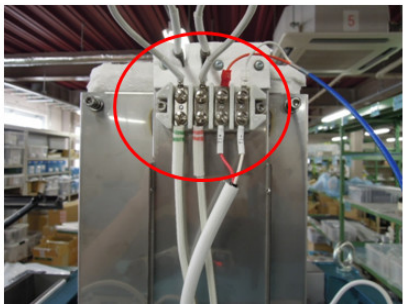
Place the adiabatic bracket for fan on the area marked by red circle and install the fan.



12) Install Afterburner on RBF

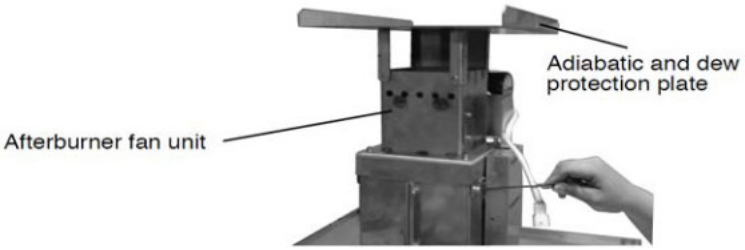


Connect the cables for sheath heater and thermocouple to the area marked by red circle. At this time, take care that the polarities of the thermocouple must match.

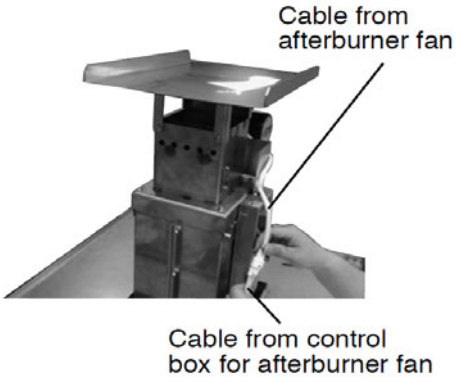


13) Place dew protection pan, so that weep hole should be positioned at the front left.


14) Place afterburner fan unit with adiabatic and dew protection plate on Afterburner body, and fix it by bolts using a hex key.




15) Connect cables for afterburner fan by pushing connectors together.



# 7-4. CONNECTING POWER SUPPLY

Connect machine to power source AC 220V, single phase.

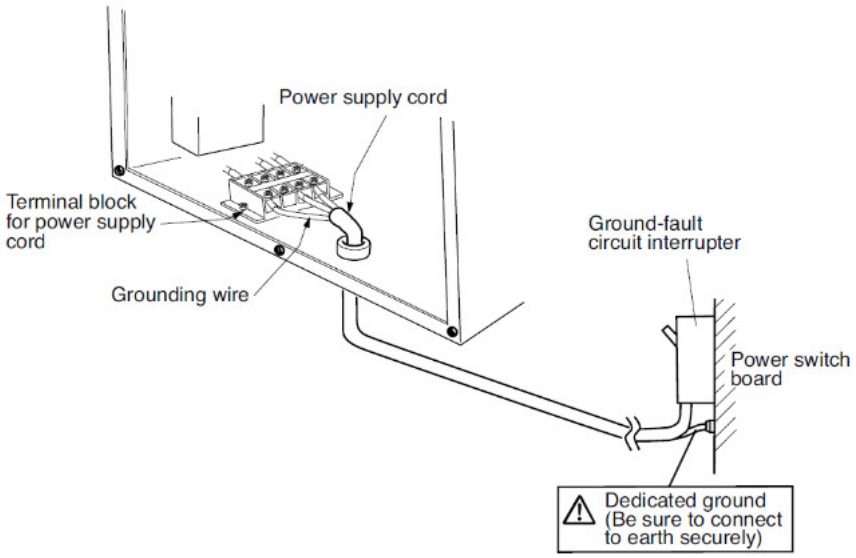
**WARNING**

1. Connect to specified power supply only.
2. Be sure to connect ground wire to avoid electrical shock hazards.
3. This machine is not equipped with a ground-fault circuit interrupter. Connect to ground-fault circuit interrupter on power switch board in your factory. If ground wire is not earthed correctly, ground-fault circuit interrupter may not work normally. Connect the ground wire correctly.
4. Wiring should be made by a qualified electrician.

1) Loosen fixation screws of cover for control box and remove cover.

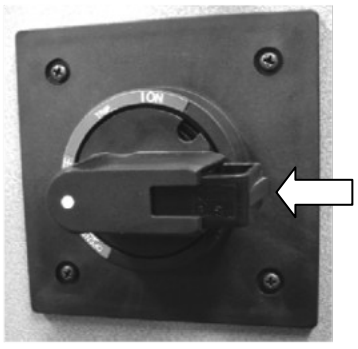
2) Connect the power supply cord to terminal block inside.
Connect the ground wire for protection from electric hazard.

3) Close cover.




# 7-5. BREAKER SWITCH

Release and remove padlock. Push down lock button to release lock.

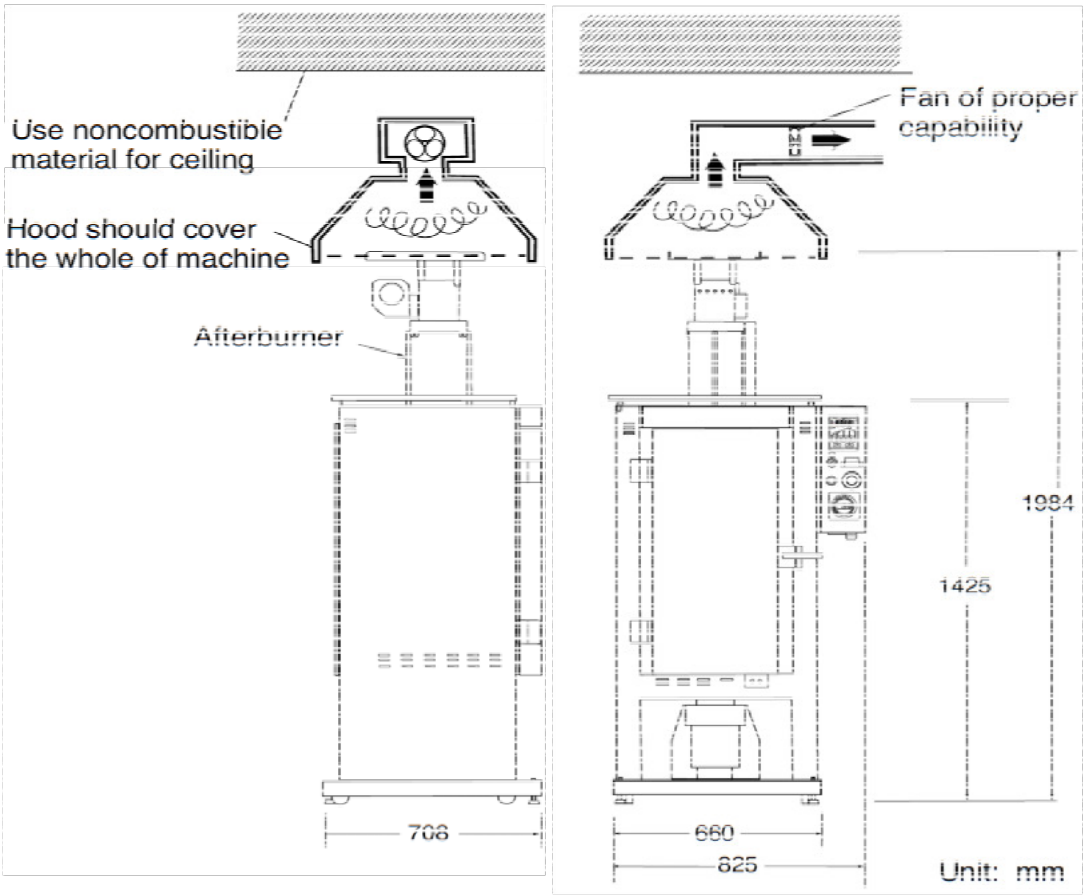




# 7-6. EXHAUST SYSTEM

Install equipment for exhaustion such as exhaust duct (not provided from manufacturer).

**WARNING**

1. Building of exhaust system should be done by a qualified technician.
2. Use noncombustible material.
3. Install high power fan suitable for exhaust of fumes.
4. Dew drops should not fall directly onto the machine body.
5. Make exhaust system earthquake-resistant.
6. Check the exit of exhaust device periodically to see that it is not obstructed by birds' nest or by other causes and that the exhaust fan works normally.




# 7-7. WAX DRAINAGE

Always place a wax collection container (not provided from manufacturer).

Deep container is recommended because drained wax will not splash around.

# 8. MAINTENANCE

Check operating conditions periodically, so that machine can always be used in good condition. Especially, perform the following maintenance work periodically.

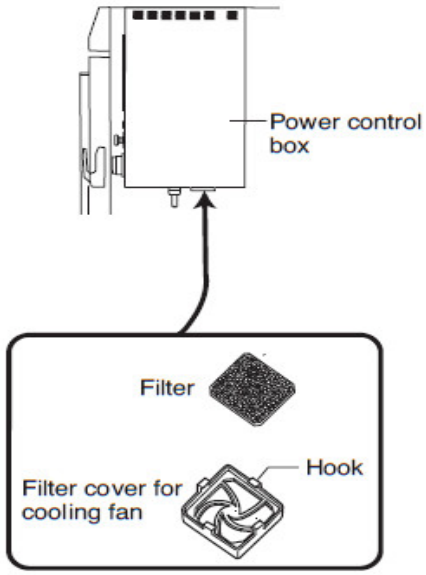
## 8-1. CLEANING FILTER FOR COOLING FAN

**CAUTION**

It is recommended to clean filter every work day, although cleaning cycle depends on frequency of use and work environment.

If cleaning is neglected, dusts may accumulate to more than a few millimeters thickness on the filter. Dusts accumulation or clogging of filter may cause trouble of the machine (flow of cooling air is shut off ---> cooling does not work ---> temperature of internal electric circuit rises ---> malfunction).

1) Move the filter cover downward to remove.
2) The filter can be removed together with the filter cover.
3) Clean the filter.
4) Assemble the filter and the filter cover again, so that each hook of the filter cover will be caught by each groove.




13051710
Fan, Filter, FL9
Consisting of Filter, filter cover and groove

## 8-2. CLEANING FURNACE AND ROTATING UNIT

1) When waste has accumulated, collect it by sucking with a vacuum cleaner available on the market.
2) If clogging happened in the wax collecting hole, push it through with a screwdriver or the like.
3) To collect waste in the deep bottom area of the furnace and the wax receiver, use a crevice tool nozzle of vacuum cleaner. In the case a vacuum cleaner available on the market is used, use it with a crevice tool nozzle.

**CAUTION**

If wax is not drained smoothly (a large amount of wax remains inside the furnace) because of clogging etc., a large amount of gas over combustion capability of the afterburner may be generated, and incomplete combustion gas (black gas) may blow out from exit of the afterburner.

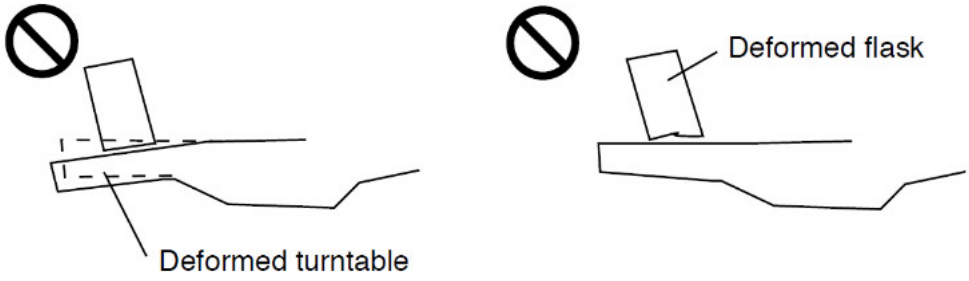
## 8-3. CHECKING CRACK OF ADIABATIC MATERIAL

Cracks in the door frame should be repaired with adhesive at its early stage.

## 8-4. CHECKING DEFORMATION OF TURNTABLE

If the turntable is deformed by deterioration, the flask may tilt, resulting an accident such as short-circuit or damage of the heater etc. If deformation has become so large that the flask may tilt, replacement of the turntable is necessary. From the same reason, a deformed flask should not be used.

When you set flasks in the furnace, repeat rotation and stop of turntables for several times to make sure that the flasks will not tilt. Then, start automatic burnout operation.




(The turntables are used in high temperature environments, so their deterioration speed depends on individual using frequency and conditions.)

# 9. SPARE PARTS LIST

* 13201010 Heater coil A

For heater panel right and left side.

* 13201020 Heater coil B

For heater panel on the back.

* 13201011 Heater coil kit A

Consists of; Heater coil A, 2pcs. Crimp terminal, 2sets screw bolt and nut, 4pcs. flat washer, spring washer, cement.

* 13201021 Heater coil kit B

Consists of; Heater coil B, 2pcs. Crimp terminal, 2sets screw bolt and nut, 4pcs. flat washer, spring washer, cement.

* 13101052 Coil holder

* 13050720 Thermocouple

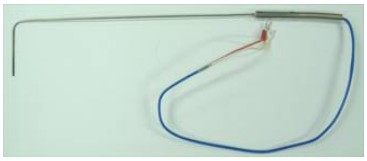
Thermocouple for RBF13 main heater / overheat protection device.

* 13160017

Sheath heater for afterburner.

* 13160003

Thermocouple for afterburner.



* ADHESIVE

(1) 13073600 Inorganic adhesive 150g ARONCERAMIC

for repairing crack f.frame/slab.


(2) 13074100 Coating cement QF-180 500ml

for slab/frame/felt/blanket.


* 13051710 Fan, Filter, FL9

Consisting of 3 items. (P.54)

# 10. SPECIFICATIONS

Power source: AC 220 V +/-10 %, 50/60 Hz, single phase
Power consumption: 6 KVA

Setting range of temperature: 0 to 950 deg.C (32 to 1742 deg.F)

Minimum display unit of temperature: 1 deg.C (2 deg.F)

Temperature control of main furnace accuracy: within set temperature +/- 2 deg.C (at stable condition in the range of 100 to 950 deg.C)
Thermo sensor display accuracy: within +/-5 deg.C for 0 to 1000 deg.C
Turntable position display: 1 to 18
Step numbers: 8 steps
Memory numbers: 20 memories
Power failure detecting time: over 5 minutes (shorter time than this will be handled as 'short break')

Max. height of acceptable flask: 230 (H) mm
Furnace capacity for flask: 13 flasks (101 mm diameter)
15 flasks (89 mm diameter)
19 flasks (76 mm diameter)

Dimensions: 915 (W) x 710 (D) x 2001 (H) mm (including afterburner)
Net weight: Approx. 210 Kg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