



RBF 32/21

ROTATING BURNOUT FURNACE



OPERATIONS MANUAL

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1. INTRODUCTION

1-1. SAFETY PRECAUTIONS

Three safety precautions are described in this instruction manual to avoid risks on human body during operation. Be sure to read these precautions before using our products.

Each meaning as follows;

DANGER: Indicates a high-risk hazard. If this hazard is not avoided, it may result in severe injury or even death.

WARNING: Indicates a medium-risk hazard. If this hazard is not avoided, it may result in severe.

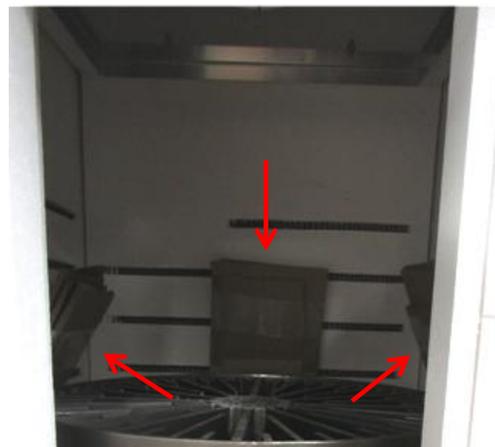
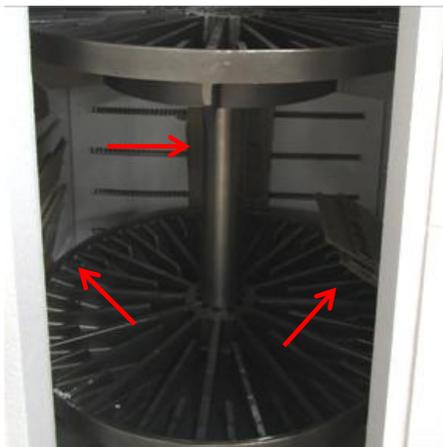
CAUTION: Indicates a low-risk hazard. If this hazard is not avoided, it may result in a minor or moderately severe injury. It also indicates a potentially hazardous situation. If it is not avoided, the product or items in its immediate environment may suffer.

1-2. SAFETY INFORMATION

CAUTION

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 search origin 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

DANGER

1. Since this product generates very high temperature (more than 900 degrees Celsius), always pay attention not to suffer burns. Do not allow unskilled or untrained person to operate this product.

Person who does not pay attention is highly possible to suffer serious burns.

2. This product is electric furnace designed for lost-wax casting. However, depending upon material, it may be possible to use this product for burning resins (such as material for Rapid Prototyping). If you need to use resins, examine properties of the resins beforehand thoroughly and carefully, and check for safety because various resin materials are distributed on the market. There are some resins which react aggressively being drained burning and splashing which may bring a fire.

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

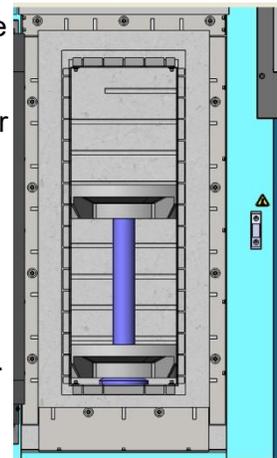
They may catch fire and spread.

4. When incomplete combustion gas of wax is generated, do not open the door. If you open the door at the time, the gas inside of furnace may catch fire and explode which can bring a fire.

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. Stay away from RBF unless you wear gloves, goggles and other

6. Before opening the door, ensure for safety that there is nothing in the door's way. Operator and third person may cause serious injury and burn.

7. Do not leave the door of the furnace open when this product is not used. may catch fire and explode which can bring a fire.



8. Always keep clean inside of the furnace. Investment residue or dusts on turntable or wax drain orifice etc. may cause clogging and prevent wax from draining out of furnace. As a result, a large amount of incomplete combustion gas is discharged. It may catch fire and spread.

9. 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. Rotation can be suspended by wax and rust sticking which lead over load at each driving part.
2. Do not try to cool inside of the furnace forcibly and very rapidly using a fan. Particularly, if forced at high temperature, the door frame material may be cracked or deformed. Heat insulation effect can be decreased. There is a serious risk of injury and burns on body by breaking and falling down of adiabatic blocks and panels.
3. When burning out a large number of flasks in one batch, take ample time for each step of burnout cycle. If not, too much harmful incomplete combustion gas can be generated and will be overflowed from afterburner. It also may affect burnout result.
4. Always use the wax collection container.
A deep container is recommended because drained wax will not splash around. Temperature of drained wax is very hot like over 200 degrees Celsius which may catch fire and spread.
5. Always be sure to check setting temperature of overheat protection function beforehand, and change LIMIT if necessary to proper value for the purpose.

1-3. PASSWORD

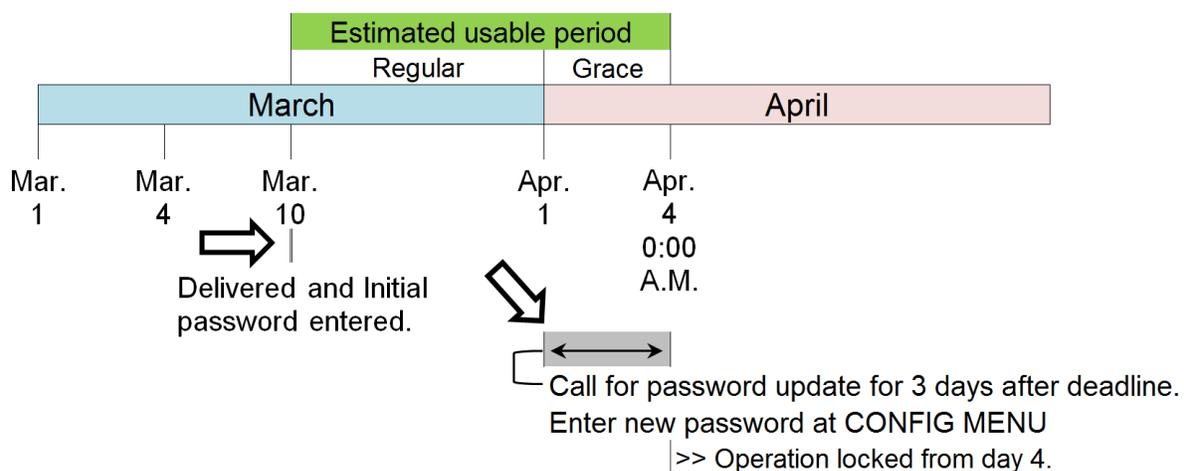
1-3-1. KIND OF PASSWORD

Three kinds of password are prepared for this product as follows.

1) Start password (at installation)

This password is necessary to release operation-lock of this product at the time of installation. 0:00 a.m. of 4th day of the next month (Japan time) is expiration date of this password. Unless final password is entered, new update password is necessary every month to use this product on and after this day. Operation will be locked from day 4.

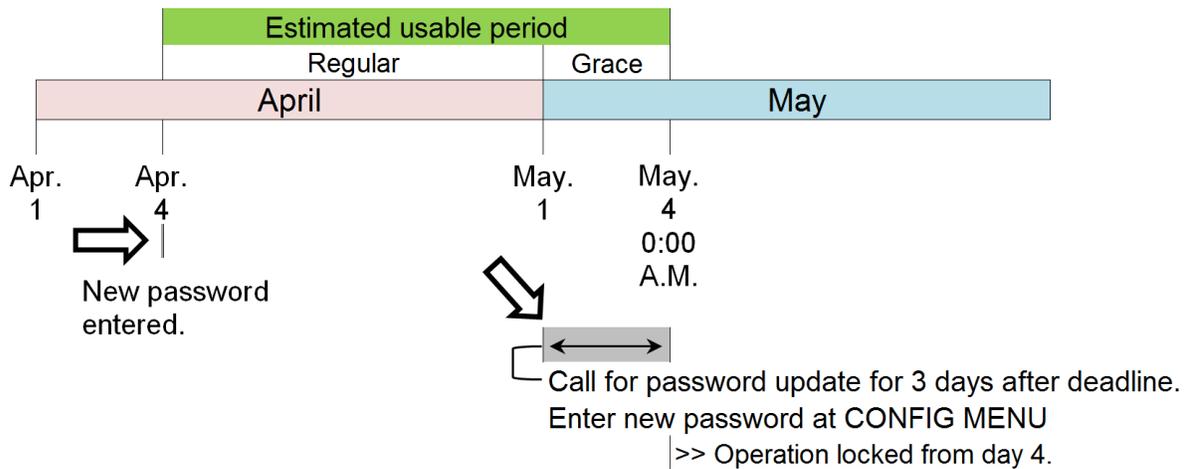
Example of Start password:



2) Monthly update password

In case this product is used by monthly use conditions, this password is necessary on or after the first day of the month to which the next monthly calculation starting time belongs.

Monthly calculation starting time is 0:00 a.m. of 4th day of every month by Japan Time.



* Some of products and models do not have 'Start password' but 1st password of Monthly update.



IMPORTANT

If you update before the first day of the month to which next monthly calculation starting time belongs, monthly update subtraction counter is decreased by extra one month. Update should be done on or after the first day of the month to which calculation starting day belongs.

3) Final password

When this password is entered and verified by this product normally, this product can be operated without time-limit.



IMPORTANT

Once this final password has been verified by this product, it cannot be reset to the monthly update password mode.

1-3-2. ISSUE OF PASSWORD

To issue next password in the case of use by monthly update password mode, the following information is necessary.

Model name: RBF32/21 Production Serial No. : xxx

Current monthly update history count: xx

1-4. SPECIFICATION LABEL

1) The principal specifications label of this product is affixed on the right side of RBF32/21. Apply power specified voltage printed on the label. Should any voltage exceed beyond the specified voltage, the manufacturer is not responsible to guarantee performance of RBF32/21.

2) When ordering spare parts, specify the production serial number that is printed on that label. Other information on the label should be recommended to take note.

The structure and parts installed are not always the same depending on serial no. and the performance will be maintained.

1-5. PURPOSE

This product is designed for one of lost wax casting process; burnout molds for precious metal and non-precious metal jewelry accessories.

Do not try for other purpose.

The manufacturer will not take any responsibility if not followed the purpose.

1-6. WORKING CONDITIONS

1) Use this product at temperatures ranging 0-40 degrees Celsius and humidity under 70%.

2) Apply power voltage 220VAC, 50/60 Hz, three phase only.

3) Do not use this product under atmosphere with too much dust or with harmful gas.

1-7. OTHERS

1) This product is controlled by genuine computer which needs longer time for starting up comparing with other electric equipment apparatus.

2) Please note that we have "half life period" on back up light for Liquid Crystal Display (LCD). Actual half life period of display is approx. 3 years when you use it with 100% brightness. This product is always shipped out with initial brightness setting 50% to save life time of back up light.

You can also control its life by using suspend function.

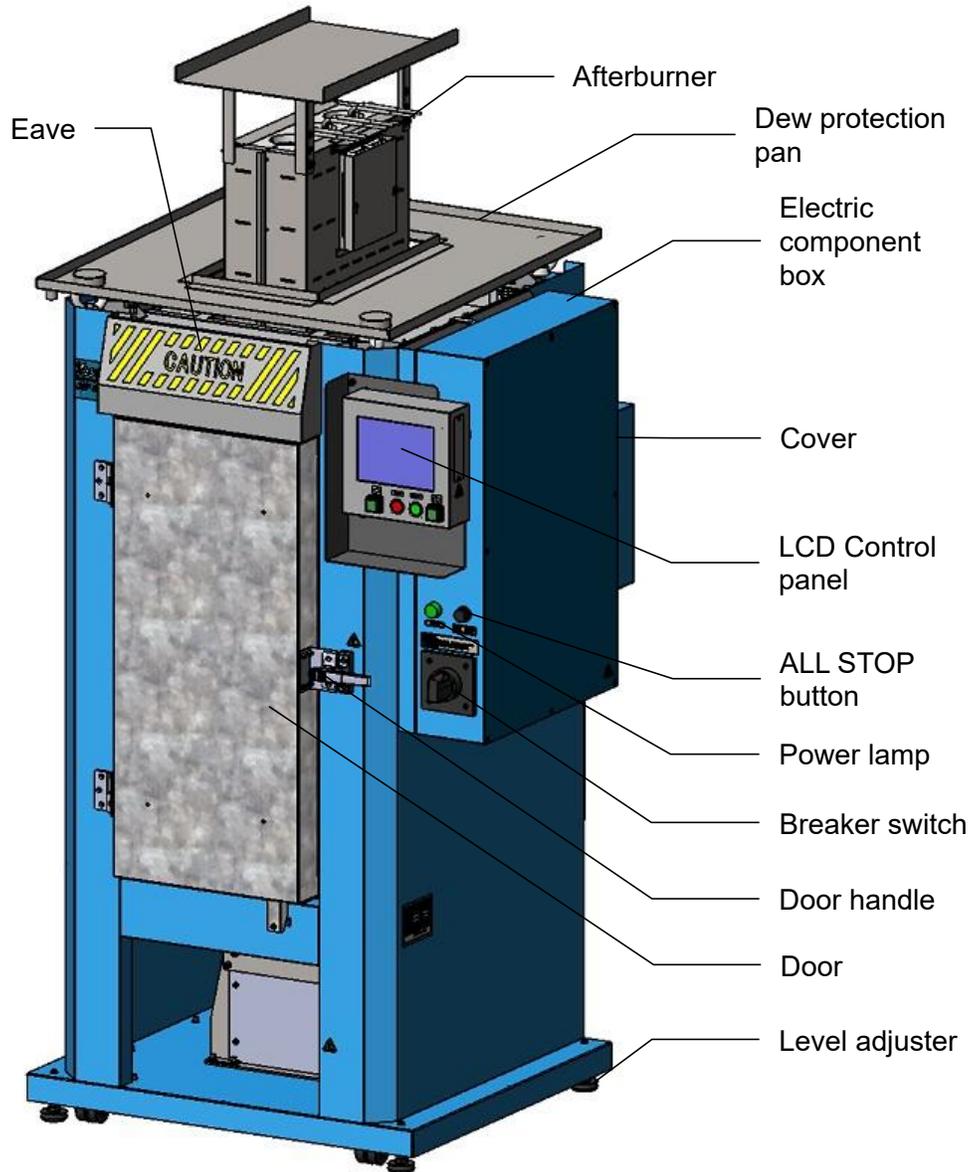


IMPORTANT

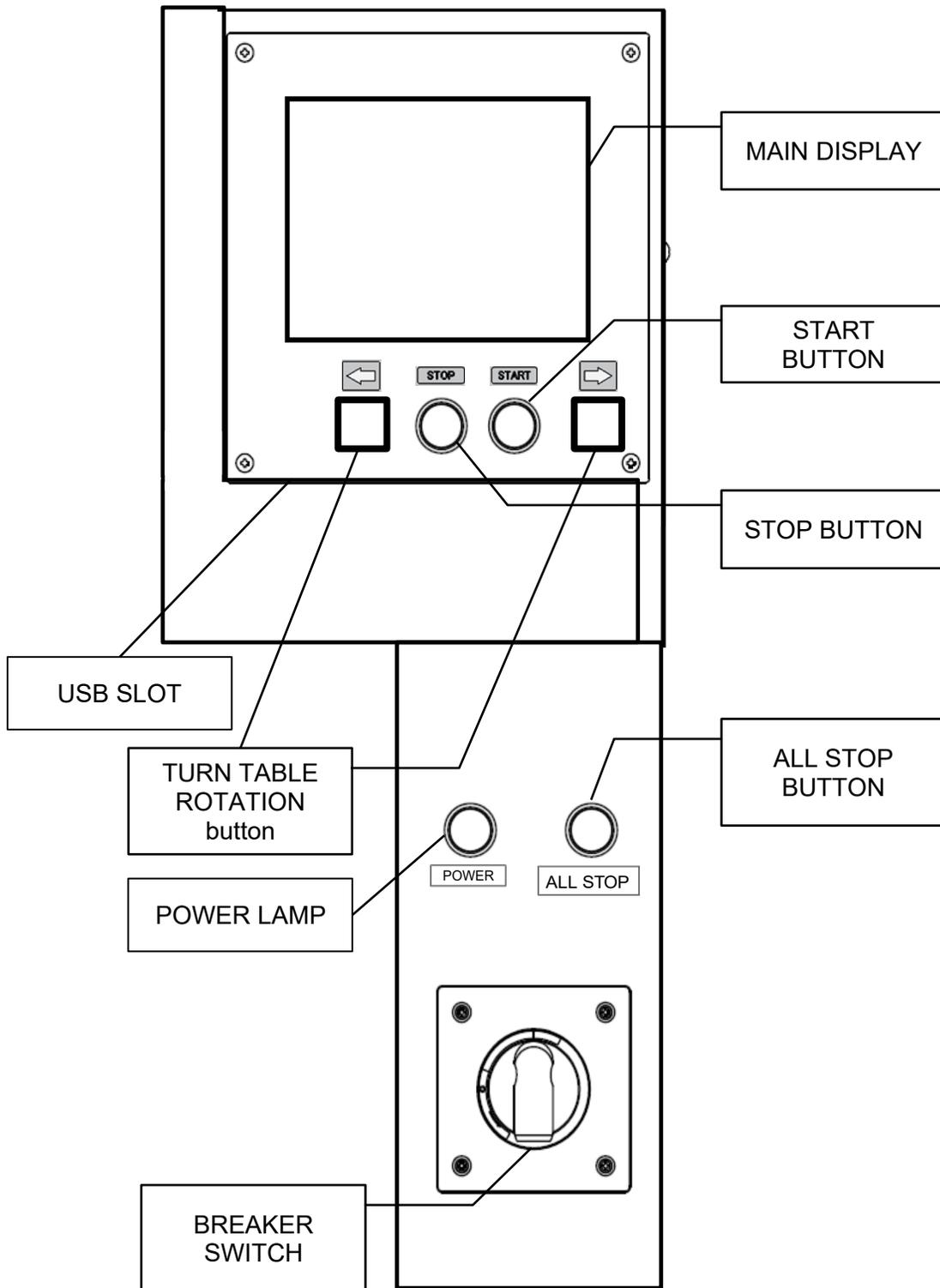
- The manufacturer shall in no event be liable for any damage resulting from improper use, negligence to follow the warnings and cautions in the instructions manual or the labels on this product, unskillfulness, use of non-original optional / consumable accessories / spare parts, non-authorized modification.
- 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



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 TOTAL TIME to

decide time to start → Push start button



IMPORTANT

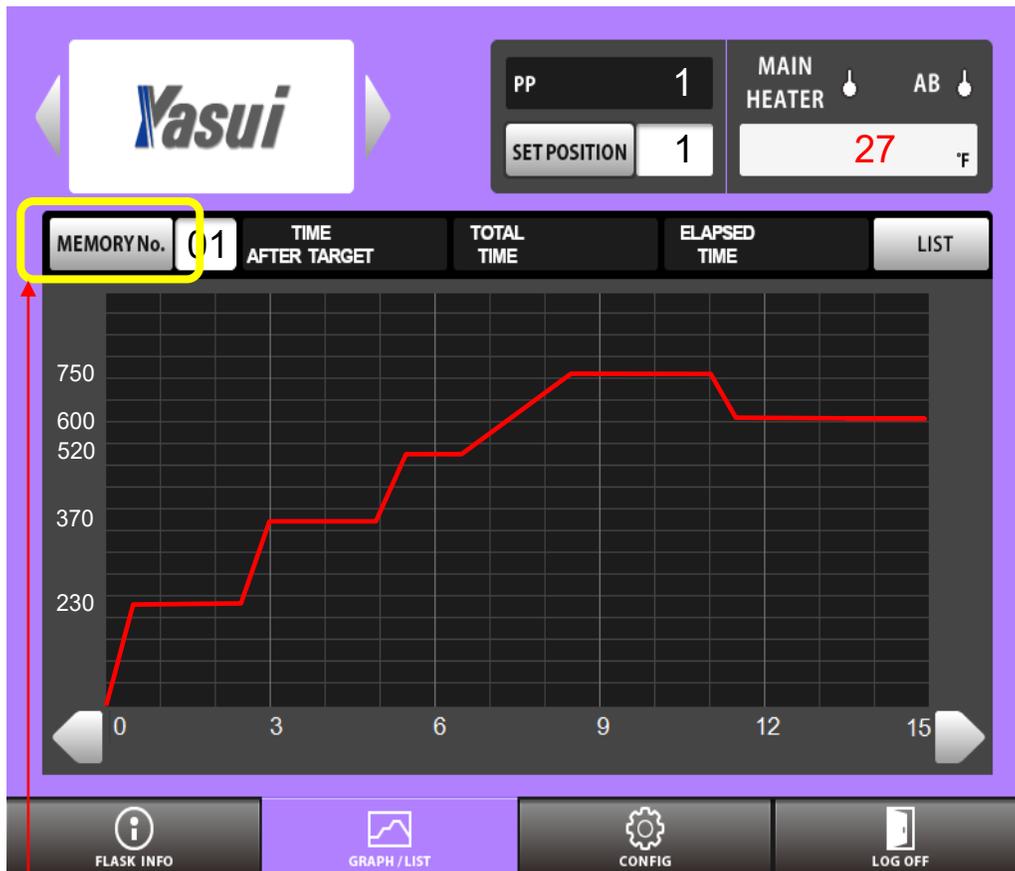
DO NOT TURN BREAKER SWITCH ON UNLESS YOU REMOVE PACKING MATERIALS

FOR TRANSPORTATION INSIDE OF FURNACE BODY. CHECK AND CONFIRM IT AGAIN.



3-1-1. POWER ON AT BREAKER SWITCH

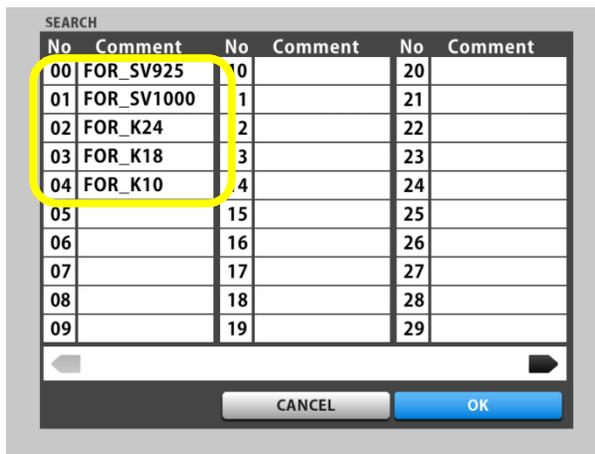
Please wait for the display shown.



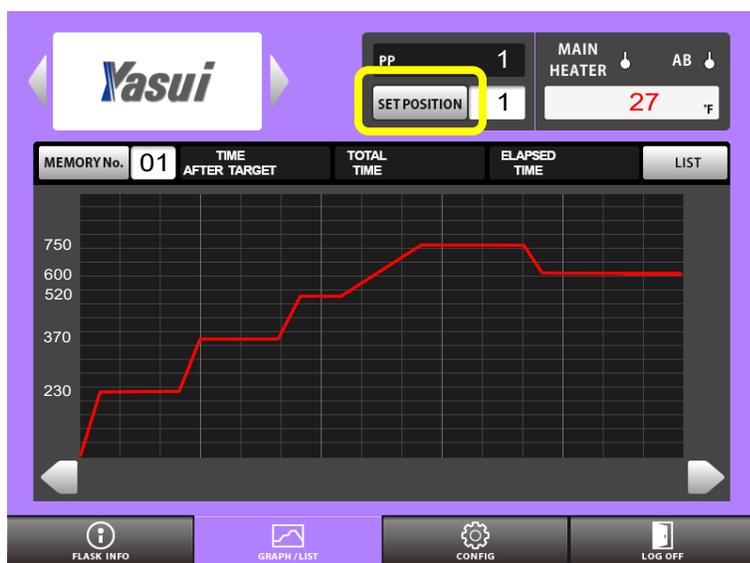
3-1-2. CHOOSE RECIPE

Tap MEMORY button to open SEARCH 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.

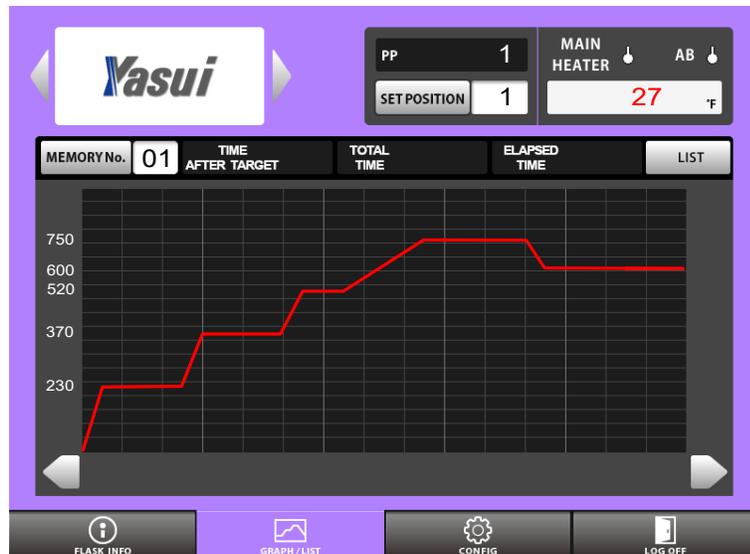
Then put flasks inside of furnace. Take note number for each flask.



Keyboard appears

3-1-4. START OPERATION

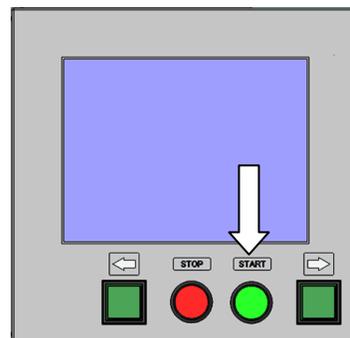
Confirm there is a line chart on the display before start burning out.



Back ground color changes



Confirm burnout cycle 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.

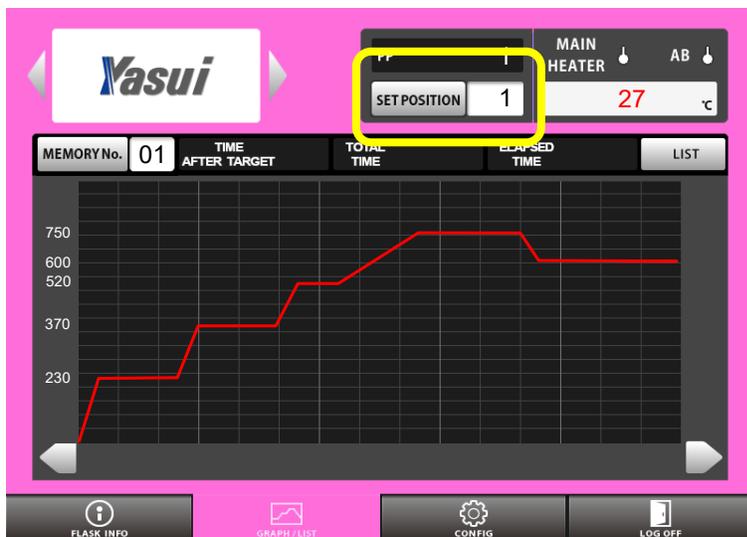


3-1-6. TAKE FLASK OUT FOR CASTING

1) Enter the number of position you want to stop here at SET POSITION window.

Tap this button to activate key board.

* This button is valid from the last step at automatic operation.

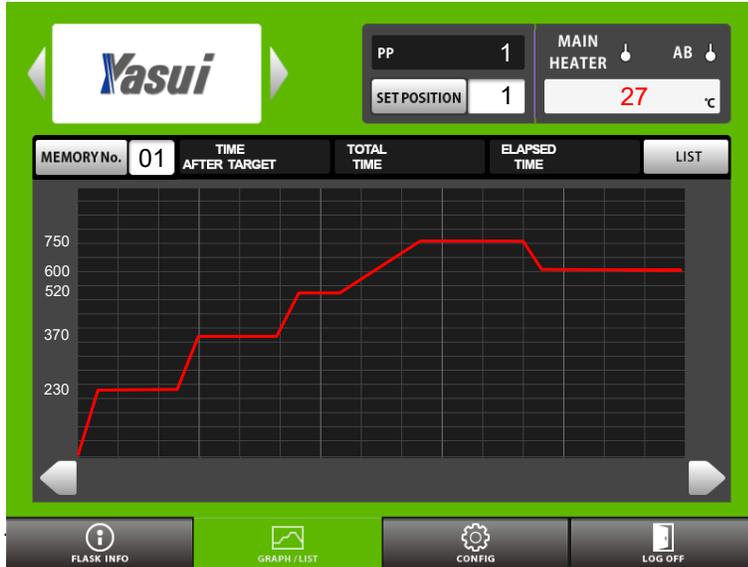


Keyboard appears

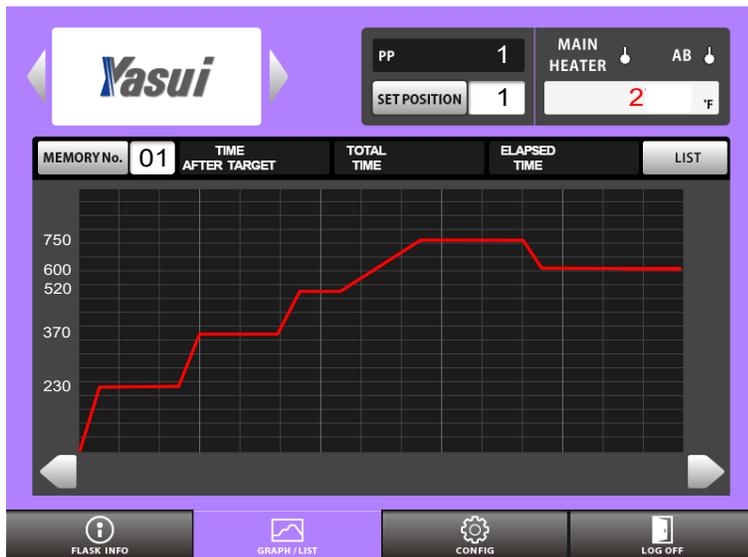
2) Rotation will stop at the point you've entered.

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 continue.

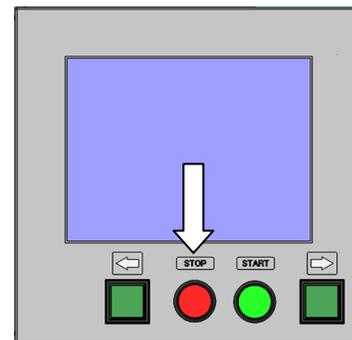


3-1-7. STOP OPERATION



Push STOP button after taking the last flask out.

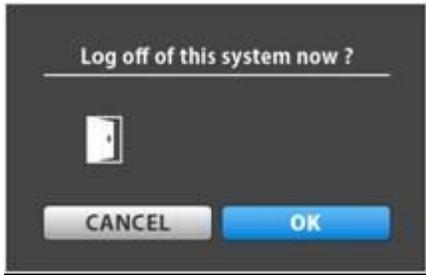
The back ground color will turn purple.



3-1-8. POWER OFF

1) Tap LOG OFF tab

2) Tap OK button



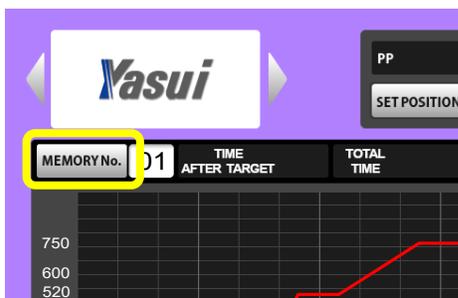
3) Turn breaker switch OFF when you see the pop up window.



3-2. HOW TO PROGRAM RECIPE MEMORIES

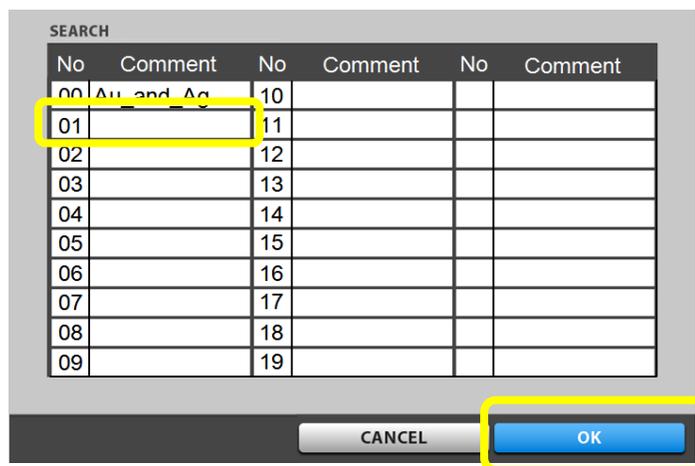
3-2-1. EDIT TEMPARATURE

1) Tap MEMORY No. button.

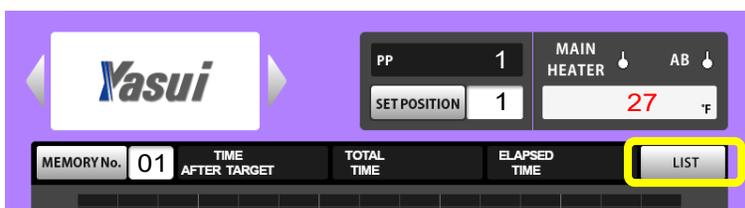


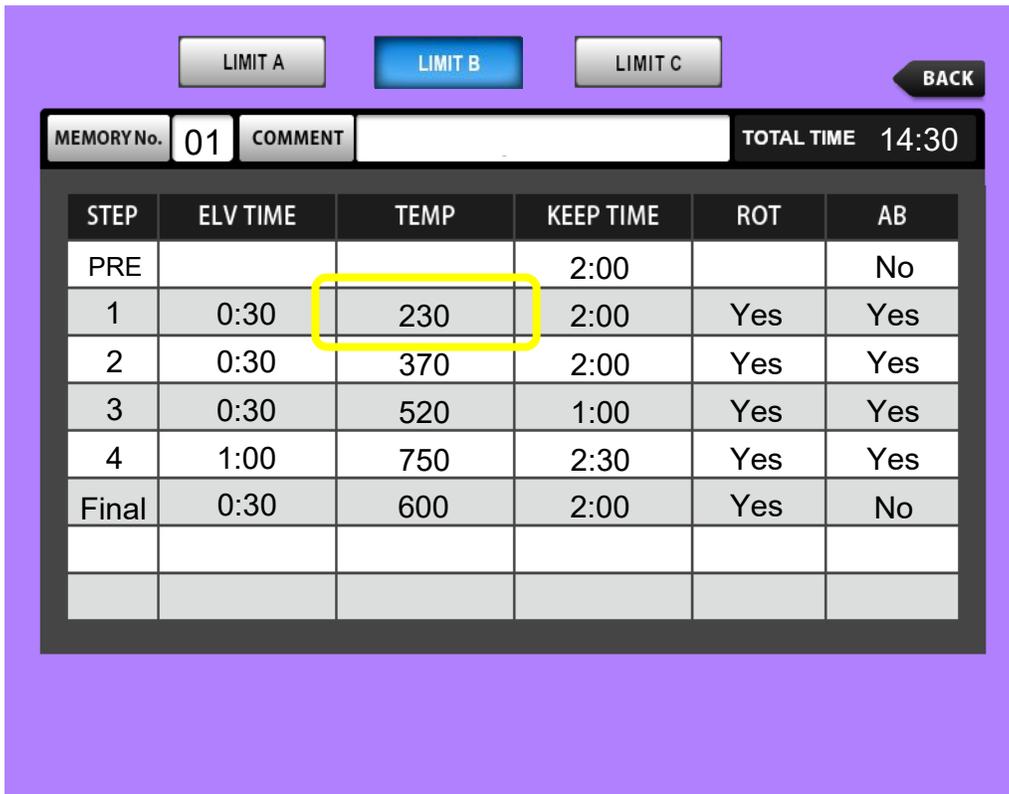
2) Tap MEMORY No.01 for instance.

3) Tap OK button after that.



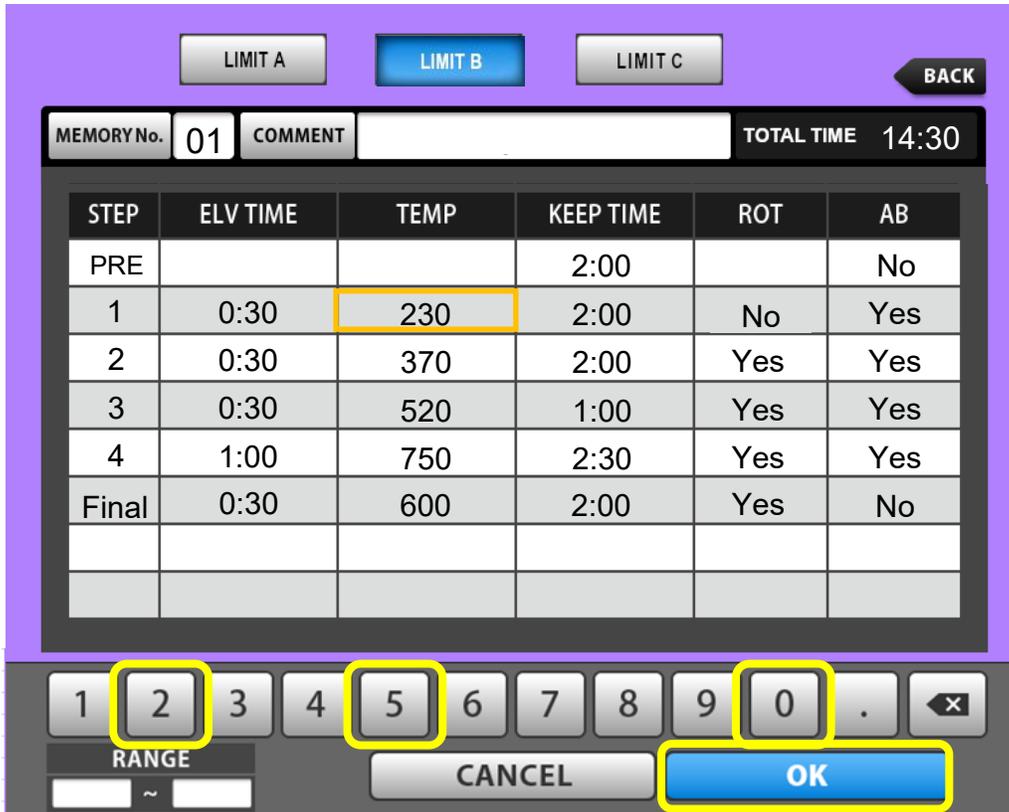
4) Tap LIST button.





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 determine edit.

3-2-2. EDIT OTHER FACTORS

You can edit other factors like ELV TIME, KEEP TIME by the same manner as described already.
(See page 29 for detail)

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

1) When you want to add one additional line (step). Tap blank cell next to Final cell marked as below.

STEP	ELV TIME	TEMP	KEEP TIME	ROT	AB
PRE			2:00		No
1	0:30	230	2:00	No	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

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)

STEP	ELV TIME	TEMP	KEEP TIME	ROT	AB
PRE			2:00		No
1	0:30	230	2:00	No	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

3-2-4. ROT, AB and COMMENT

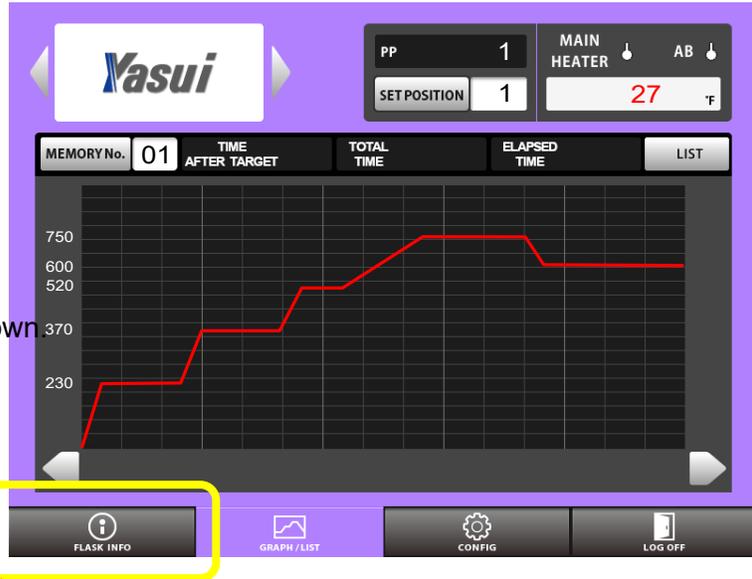
Will be described later. (See page 29, 30 for detail)

3-3. MANUAL OPERATION

3-3-1. POWER ON AT BREAKER SWITCH



Turn breaker switch ON. Wait for the GRAPH / LIST display shown



3-3-2. SWITCH MODE

Tap MANUAL button

Tap FLASK INFO button

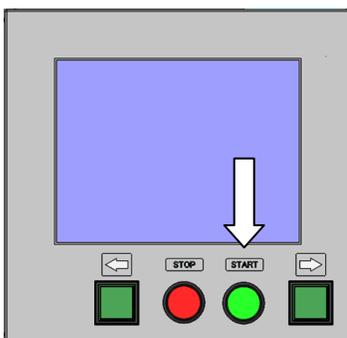


Tap PRESENTTEMP button to edit.



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.

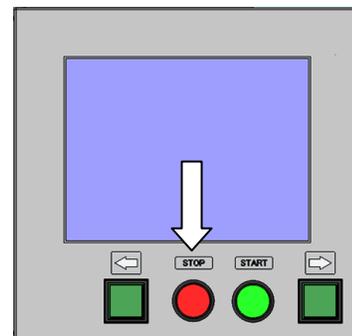


Push START button for 2 seconds



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



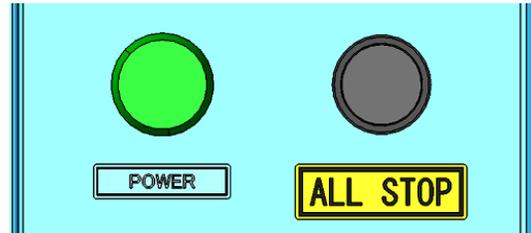
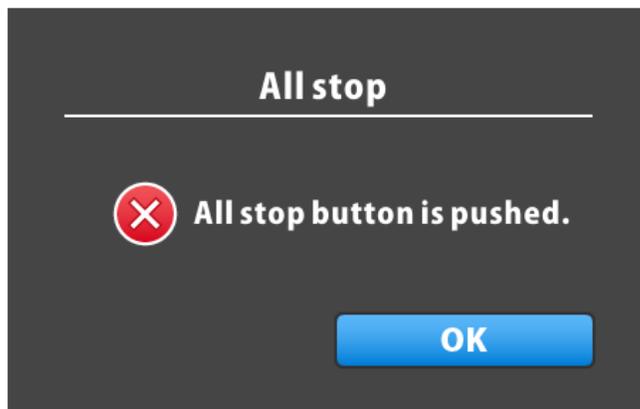
3) Turn breaker switch OFF when you see the pop up window



3-4. ALL STOP BUTTON

Push ALL STOP button in front of control box, when you want to suspend all of the function. Nothing can be operated on this condition.

Pop up window when button pushed.



IMPORTANT

Please confirm safety before reset emergency very carefully.

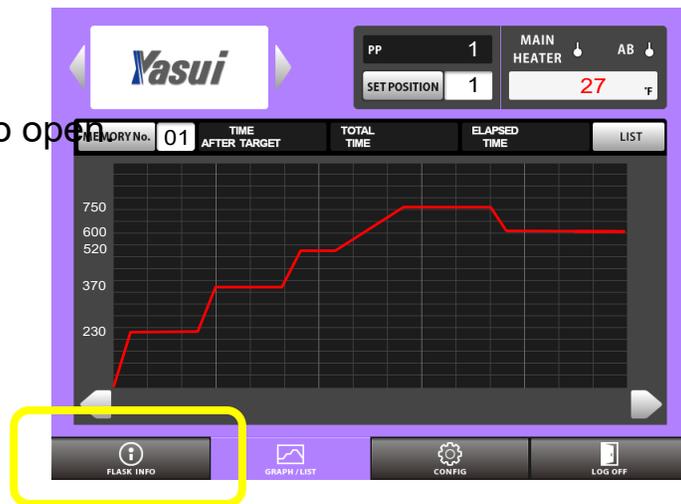
1. No flasks should be tilted on turn table or got stuck between turn table and heater panel.
2. No unusual smell should be from afterburner, furnace body and other areas.

You can release suspension by pushing ALL STOP button again.

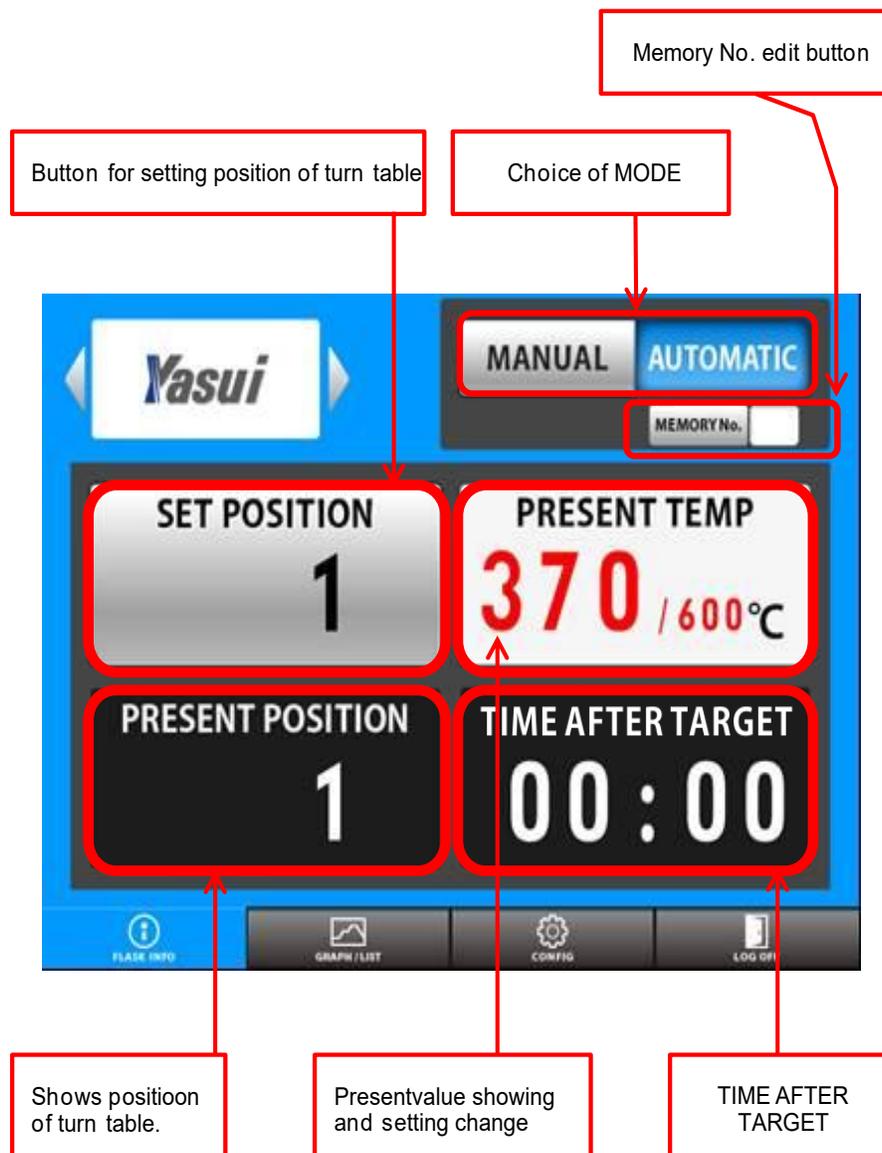
4. DESCRIPTION of EACH WINDOW

4-1. FLASK INFO window

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

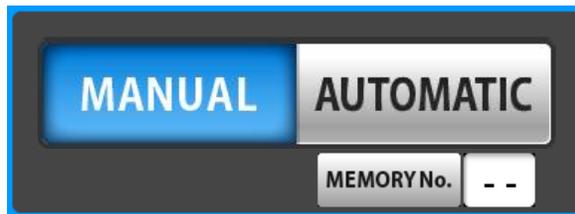


4-1-2. Details



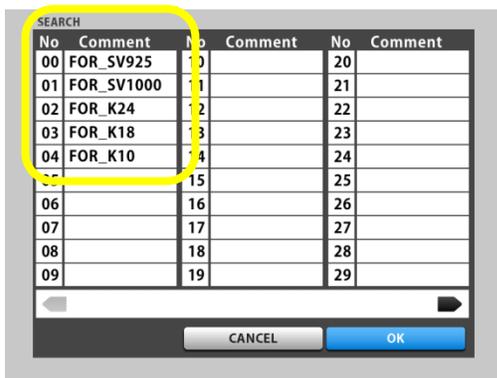
4-1-3. MANUAL / AUTOMATIC

- 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

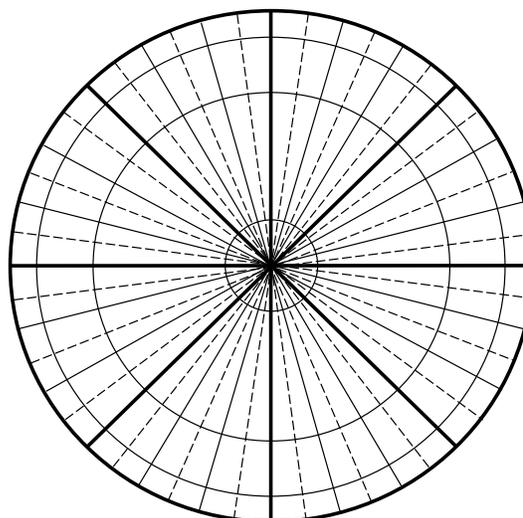
- 1) Tap memory No. button.



- 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 from 1 to 48.
Tap OK button to determine.
Rotation will stop at the position you've set.



** Turn table is divided into 48 areas

This is very useful not only when taking flask out but also when loading flasks before operation.

4-1-6. MANUAL ROTATION

You can also rotate and stop turn table by manual.

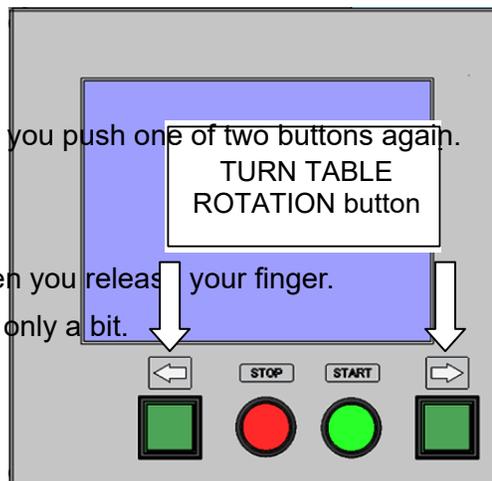
Push one of two buttons on control panel down for more than 2 seconds for continuous rotation.

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.



IMPORTANT

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.

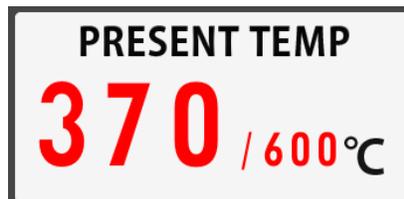


4-1-8. PRESENT TEMP

You can set any temperature you want by tapping this button at MANUAL mode.

Keyboard will be activated by tapping this button.

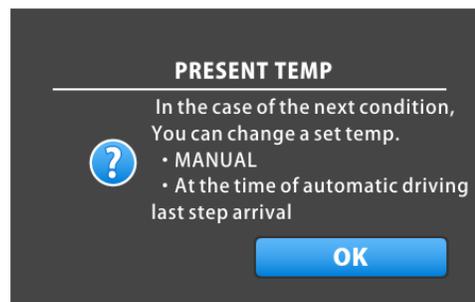
Enter temperature and tap OK button to determine.



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

This means;

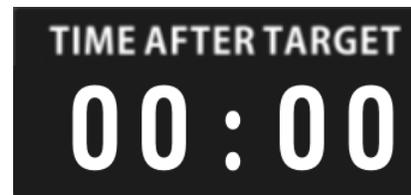
- 1) Temperature setting for MANUAL heating.
 - 2) Temperature edit for AUTOMATIC mode at only final step. (No need to cancel burnout cycle anymore)
- New switching function for another casting temperature.



4-1-9. TIME AFTER TARGET

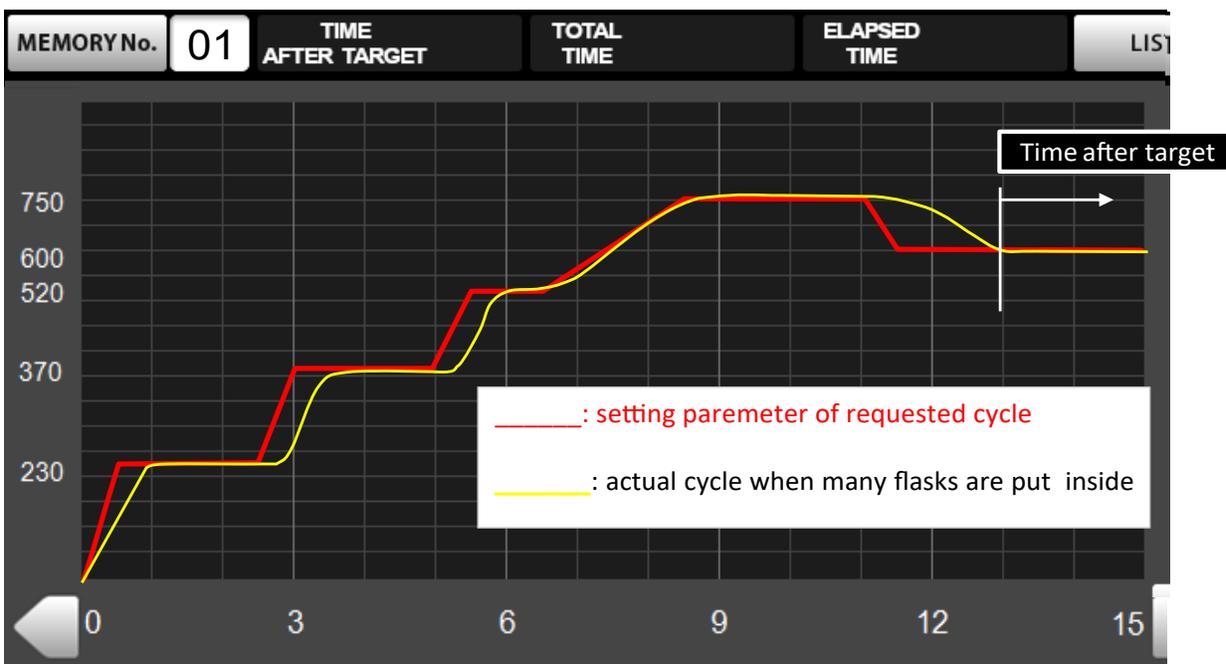
This informs you how long it passed from the point when temperature reaches final level.

The display shows set temperature curve in red, while actual curve is shown in yellow.



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

Actual kept time is visible now.

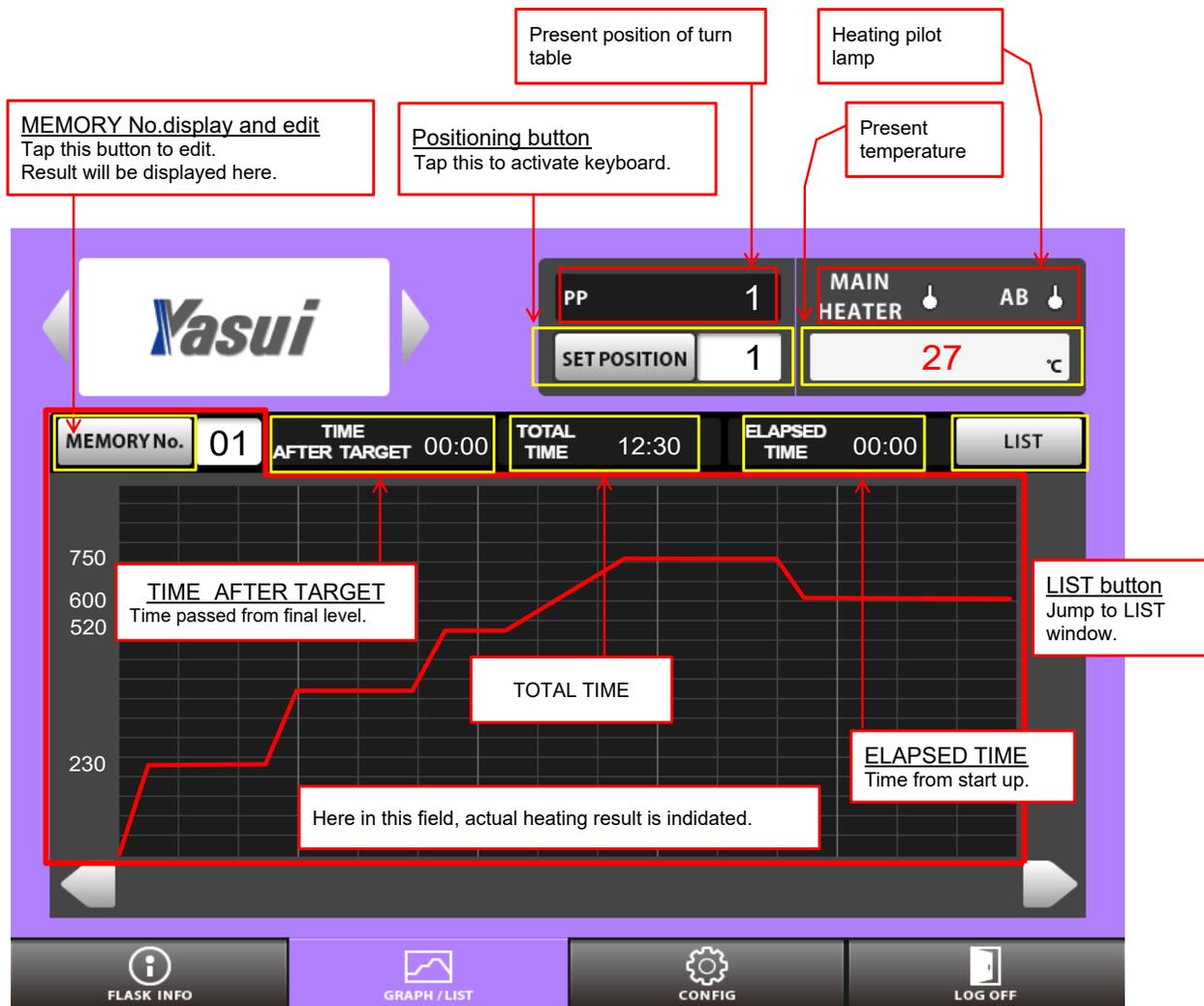


4-2. GRAPH window

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

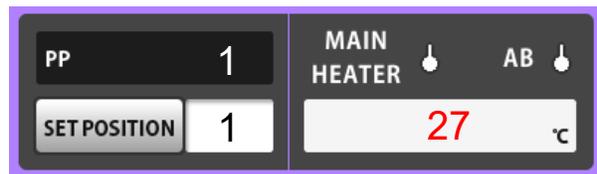


4-2-2. Details



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 (1-48) you request.

4-2-5. PILOT LAMP

Monitor lamp for MAIN heater and After burner.

4-2-6. PRESENT TEMPERATURE

Indicates present temperature



4-2-7. MEMORY No.



MEMORY Number is displayed here and can be edited.

4-2-8. TIME AFTER TARGET



Already described in previous page.

4-2-9. TOTAL TIME



TOTAL TIME of each parameter of MEMORY, ELV TIME + KEEP TIME, to calculate time of starting up.

4-2-10. ELAPSED TIME



Indicates time from starting up.

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.

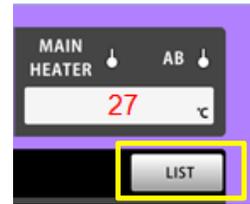
It is possible to lock selected recipe which will be described later.



STEP	ELV TIME	TEMP	KEEP TIME	ROT	AB
PRE			2:00	No	No
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

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

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



Memory No. edit button
Valid only at AUTO mode. The window will turn Memory search window when this button is tapped.

COMMENT edit button
Selected COMMENT is indicated here. Can be edited with keyboard by tapping this button.

After Burner setting
You can set after burner ON or OFF.

LIMIT A
LIMIT B
LIMIT C

BACK

MEMORY No. 01
COMMENT Au_and_Ag
TOTAL TIME 14:30

STEP	ELV TIME	TEMP	KEEP TIME	ROT	AB
PRE			2:00		No
1	0:30	230	2:00	No	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

Step number edit
Tapped cell will become the last step.

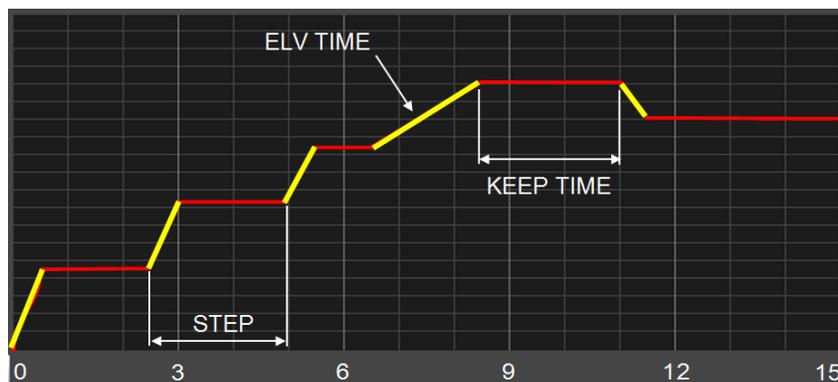
Temperature setting
You can edit TEMP here by tapping each cell.

Rotation select
You can set rotation ON or OFF. Tapped cell and later changes Yes.

ELV TIME setting
You can edit Elevation time (Ramp time) here by tapping each cell.

KEEP TIME setting
You can edit timer here with keyboard by tapping each cell.

This chart is for your understanding of major parameter.



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

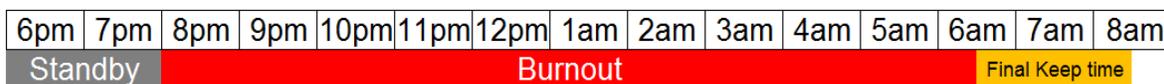
You can set Final step by tapping one of cells in this row. (Only 4th to 8th step)

This product has additional step which is 'PRE' step just before the 1st step.

You can activate afterburner before step 1 when you want to evacuate moisture inside of furnace using pull up effect by heat of afterburner.

You can use this step as a start timer if you choose 'NO' on afterburner.

Example image of time when you push START button at 6 pm with 2 hours on PRE step. (with the recipe on previous page)



4-3-4. ELV TIME

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

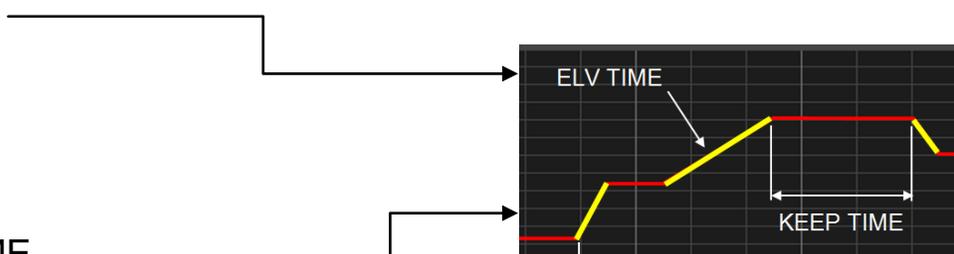
The part in yellow.

4-3-5. TEMP

Setting Temperature.

4-3-6. KEEP TIME

Holding time at each setting temperature.



4-3-7. ROT

You can choose rotation at required step. Tap each cell to choose Yes or No.

We usually recommend not rotating 1st step when drying flasks for platinum.

4-3-8. AB

You can choose activation of AFTERBURNER at required step.

Tap each cell to choose Yes or No.

4-4. CONFIG

Will be described later.



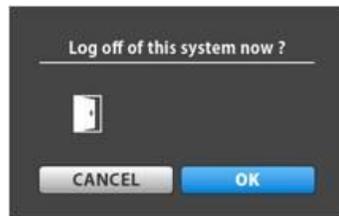
4-5. LOG OFF



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

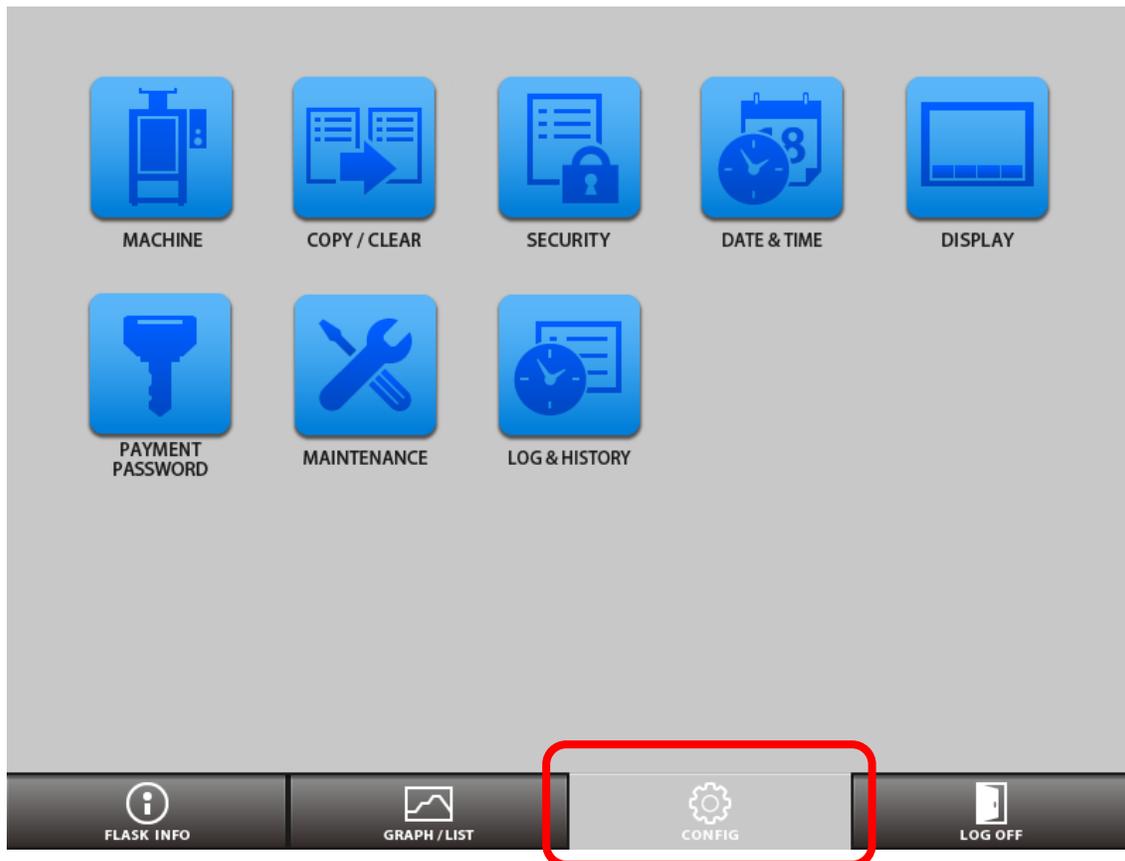


5. CONFIG MENU

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

MACHINE

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



COPY / CLEAR

COPY/CLEAR

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.



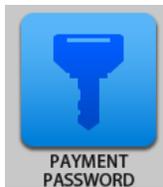
DATE & TIME

You can set calendar and clock at your region.



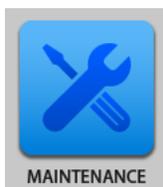
DISPLAY

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.

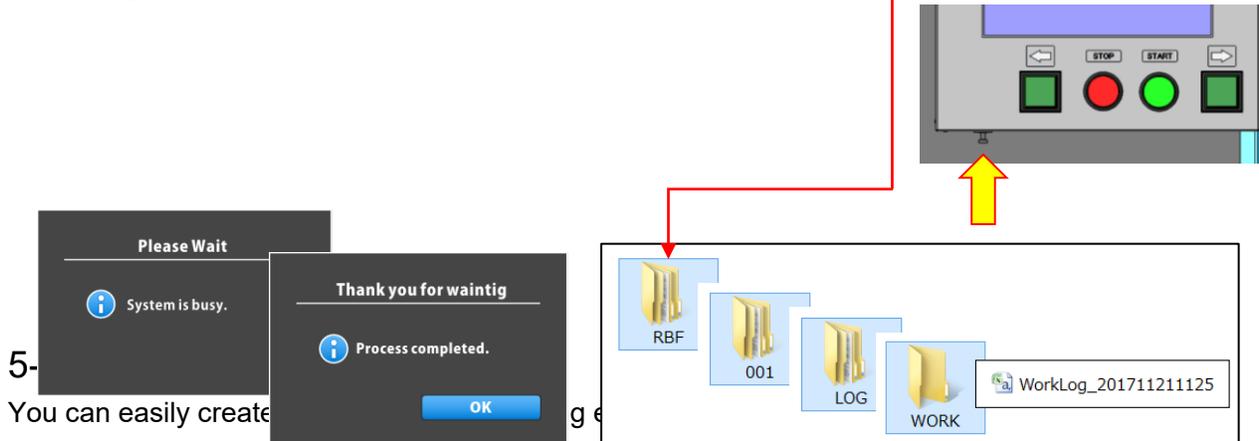
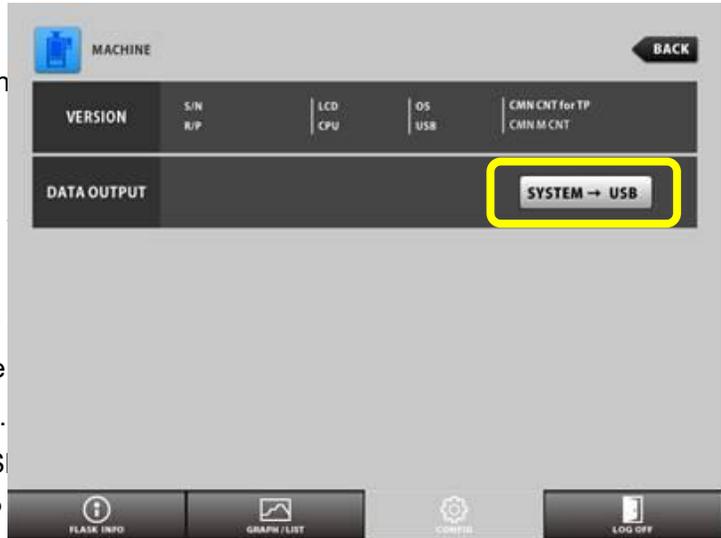
[VERSION]

You can check program version information

[DATA OUTPUT]

You can record temperature data into USB

- 1) Prepare blank USB flash drive SLC type
- 2) Plug it into USB slot on your pc to create
- 3) Re-name the folder with the name 'RBF'.
- 4) Plug it off from your pc and put it into US
- 5) Tap and open MACHINE window to TAP
- 6) Worklog file has been saved in ~~the USB flash drive.~~



5-
You can easily create
Sharing same recipes with other RBF is possible.

<How to open “COPY” window>

1) Tap CONFIG  tab to open CONFIG menu.



2) Tap COPY icon to open.



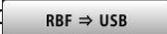
[COPY]

1) Multiple copy

- When you want to create many copies of

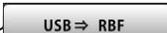
2) Single copy

- When you want to create just one copy.

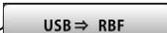
3)  button

- You can copy all of memories in the system

Put USB flash drive into the slot and tap this button (you've learnt already)

4)  button

- You can copy all of Memories in USB flash drive to the system.

Put  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;



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;



- You can choose and delete any recipe here.

Enter the recipe number 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'.

Tap OK button to determine.

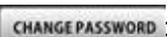


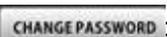
[ID REGISTER]

- You can edit password to protect RE

The default password is

'YASUI_RBF'

1) Tap  button.

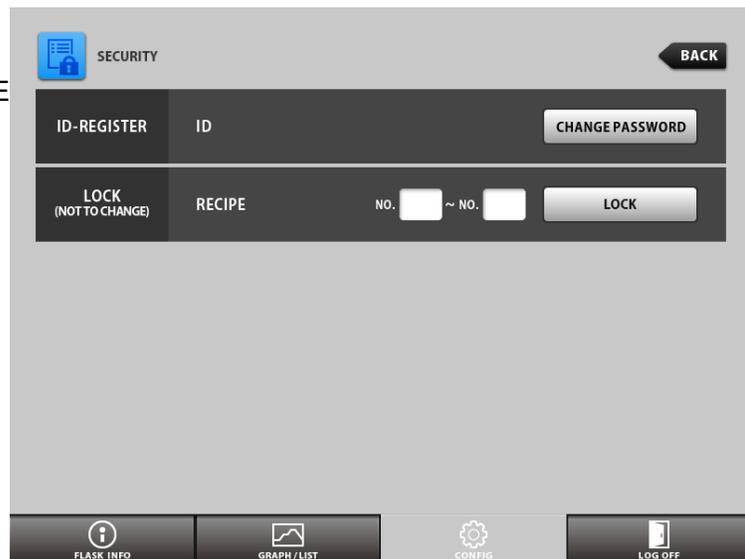
2) Enter  word you like.

3) Tap OK button.

4) Enter old password.

(In this case 'YASUI_RBF')

5) Tap OK button.



** Once you've changed password, don't forget to take note new password.

5-4. DATE & TIME

You can set date and time at your region here.

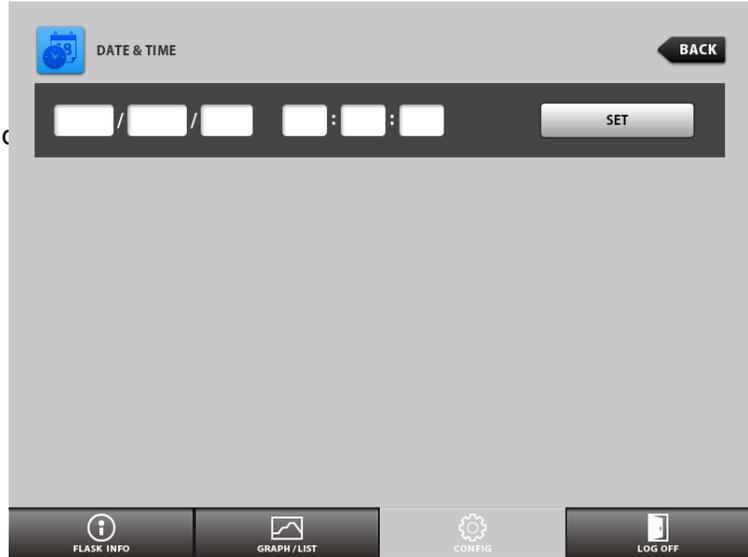
<How to open "DATE & TIME" window>

1) Tap CONFIG  tab to open CONFIG menu.

2) Tap DATE & TIME icon to open.



- Tap blank to open keyboard to enter
- 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. Choose ON for activate, timer can be s



4) BRIGHTNESS



You can adjust the brightness of 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.

** Every setting temperature will be converted to the value of chosen unit.

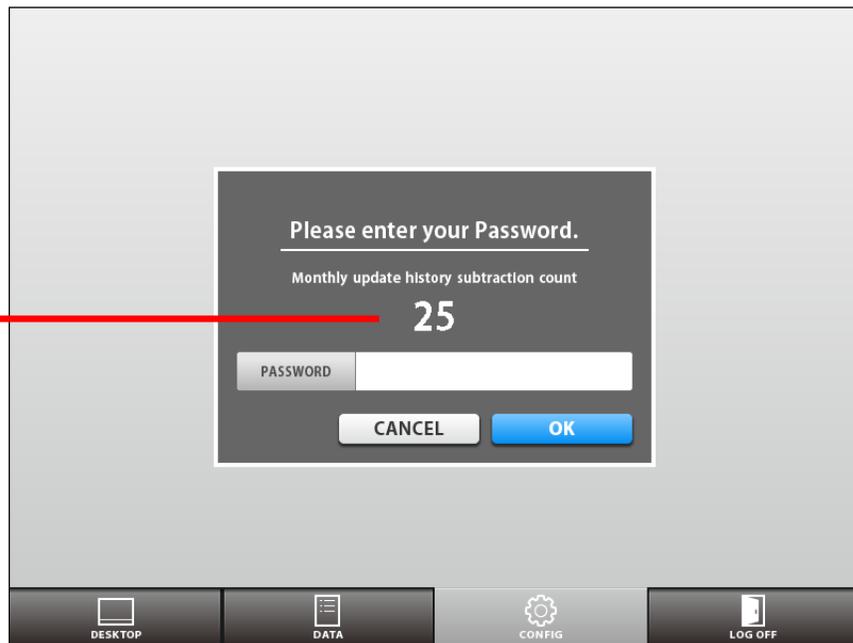
5-6. PAYMENT PASSWORD

<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.

✧ 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 RBF32/21 will be locked by system after payment deadline.

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

RBF32/21 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
DOOR		DOOR switch 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
DOOR		Auto DOOR ON/OFF switch (only for RBF37)

5-8. LOG & HISTORY

<How to open "LOG & HISTORY" window>

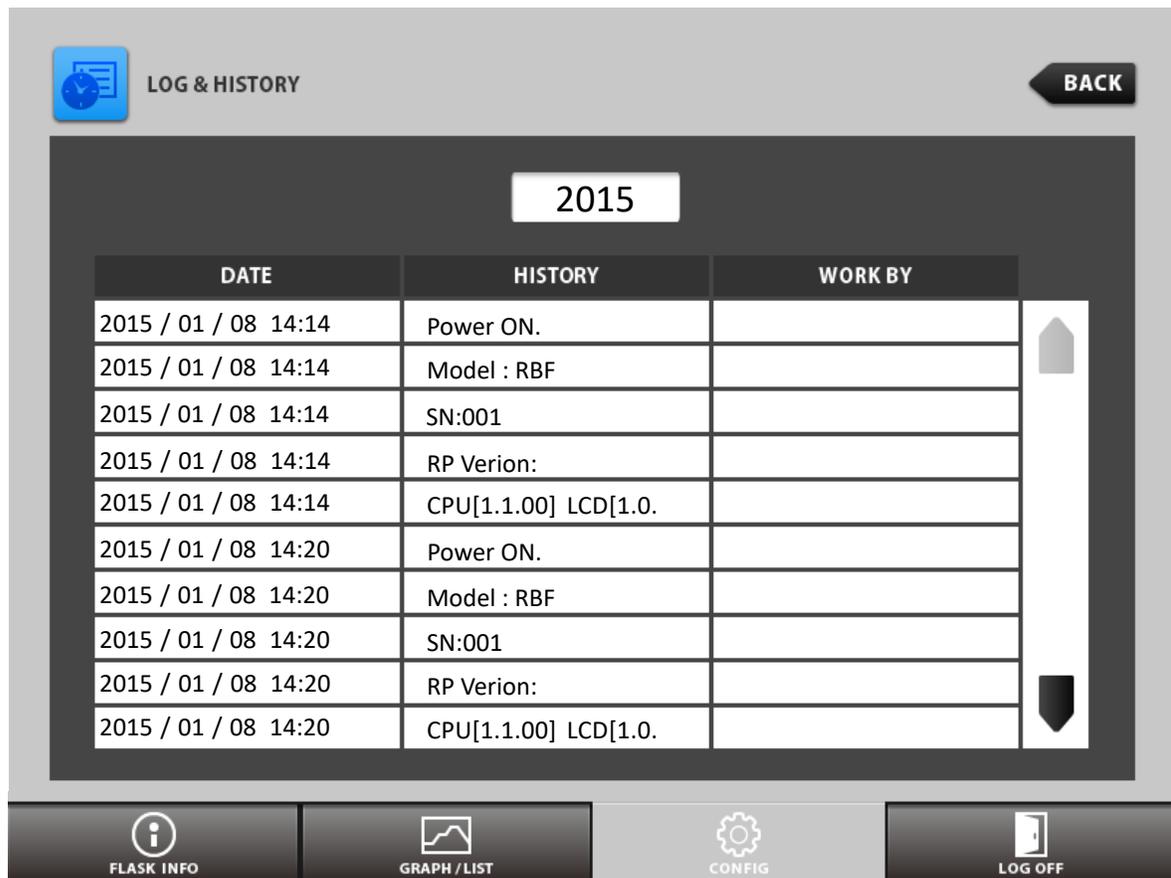
1) Tap CONFIG  tab to open CONFIG menu.

2) Tap LOG & HISTORY  button to open.

You can check machine log when problem happened.

It is very difficult to communicate about problems on this product. 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.

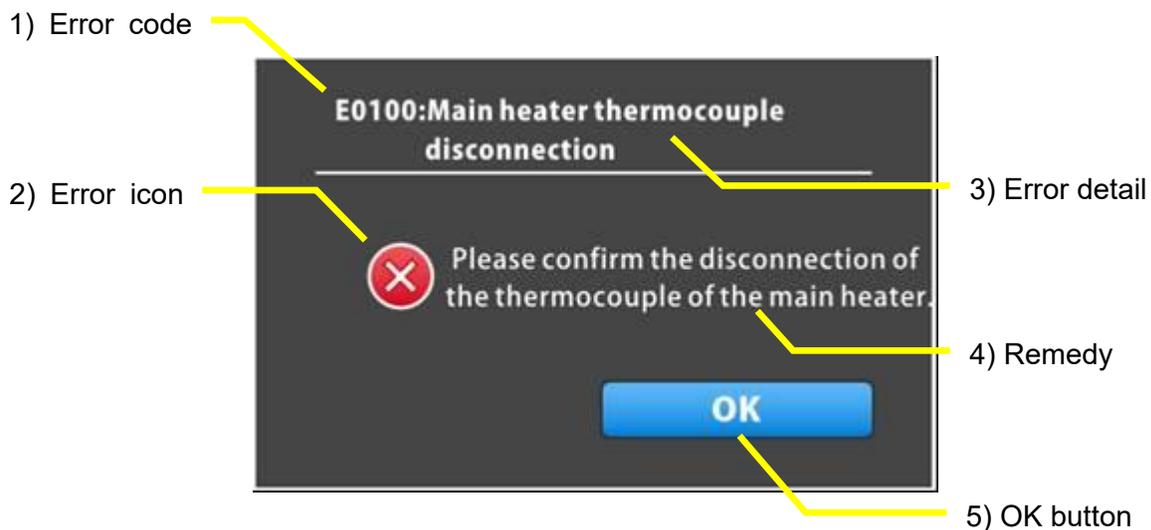


6. WHEN IRREGULARITY HAPPENED

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	How to recover
		Cause	Remarks
E0100	Error	Thermocouple of main heater defective.	Replace thermocouple.
E0101	Error	Main heater defective.	Replace heater coil.
E0102	Warning	Thermocouple of main heater incorrect connection.	Replace heater coil.
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. Electrical power supply was suspended for more than 5 minutes.	Check power supply. 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. Sensor of table original position not detected.	Check wiring on photo sensor PH1. Check sensor at Maintenance window.
E1604	Error	Main heater TEMP error. Present temp is out of range.	Replace heater or thermocouple, check control system.
E1605	Error	Overheat protection activated.	Check setting temperature and SSR.
E2010	Error	No reaction from temp control device for Overheat protection system.	Check communication cable and PCB. Replace PCB.
E2200	Warning	Voltage became caution level.	Check power supply.
E2300	Error	Voltage became abnormality level.	Check power supply.
E5200	Error	Control panel communication error.	Reboot system, Check communication program on control board and control panel.
E5203	Error	Control panel communication error.	Reboot system, Check communication program on control board and control panel.
E5300	Error	Flash programming error.	Reboot system, check control program.
E9000	Error	Machine parameter Sum-Check NG.	Initialize machine control parameter. Replace PCB.
E9010	Error	Internal clock error.	Battery exhausted, Enter Final-Password.
E9011	Warning	Internal clock warning.	Battery exhausted, Tap OK button to cancel.
E9031		USER USB flash write error.	Reboot system, Try another one if not recovered.
E9032	Error	Capacity error on USER USB flash drive.	Delete some files for more room and reboot.
E9034	Error	System USB file injustice.	Reboot system or replace system USB flash drive.

E9037	Error	I/O initialize error.	Reboot system or replace PCB.
E9055	Warning	SYSTEM USB flash drive 1 broken.	Replace System USB1.
E9056		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.
E9091		Consumption replace recommendation of motor for rotation.	Replace motor, Enter [change motor] at Maintenance window.
E9092	Warning	Consumption replace recommendation of main heater.	Replace motor, Enter [change main heater] at Maintenance window.
E9093		Consumption replace recommendation of after burner heating element.	Replace motor, Enter [change after burner] at Maintenance window.

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

6-3. BLACKOUT

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

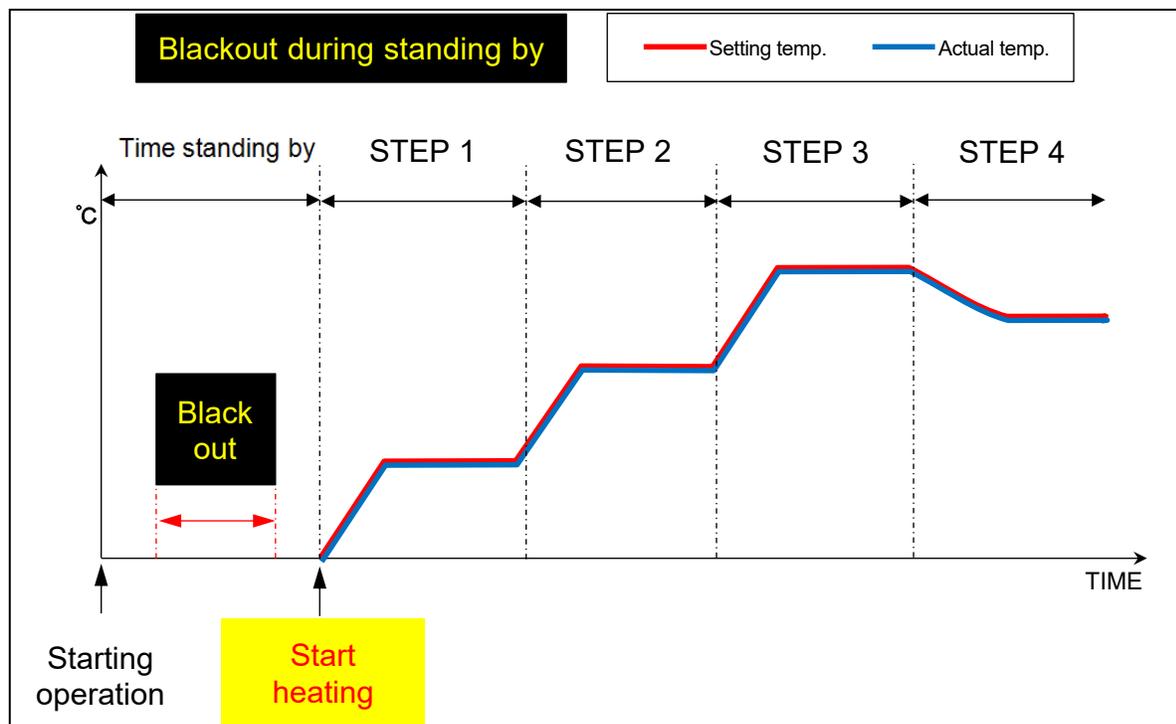
1) MANUAL BURNOUT MODE

When electric power supply is restored, this product does not resume heating automatically. Check setting value of temperature. Press START key, so that this product 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 start time of Step 1, this product 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.

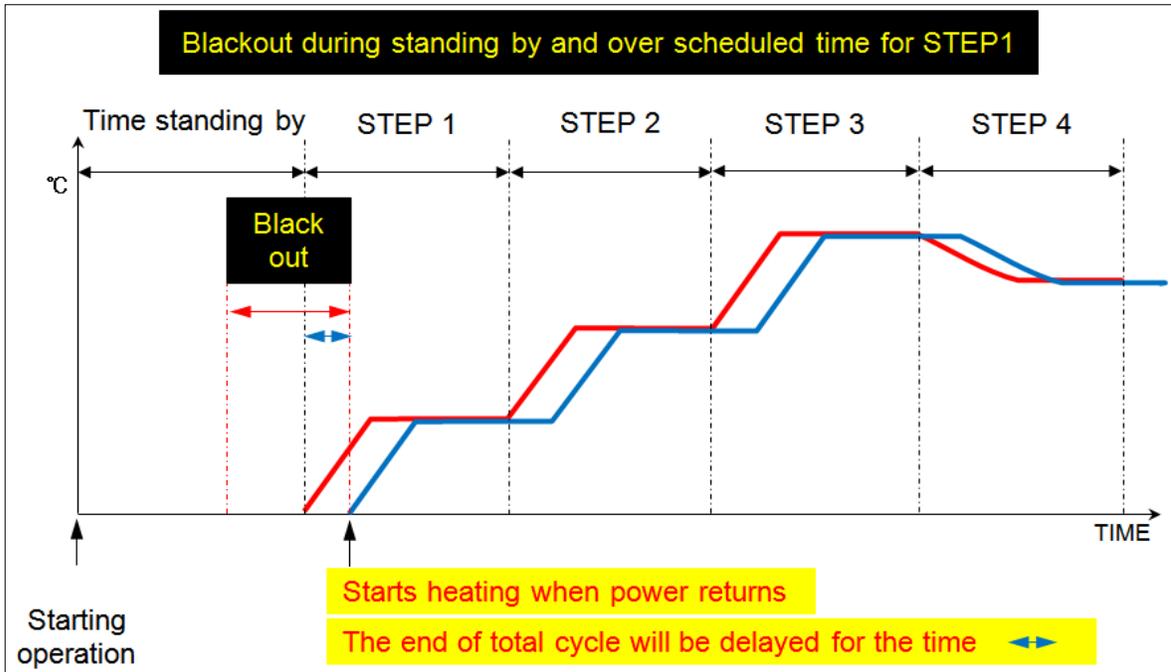


3) AUTOMATIC BURNOUT MODE (blackout before the set time of Step 1 and recovery after the time of Step 1)

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

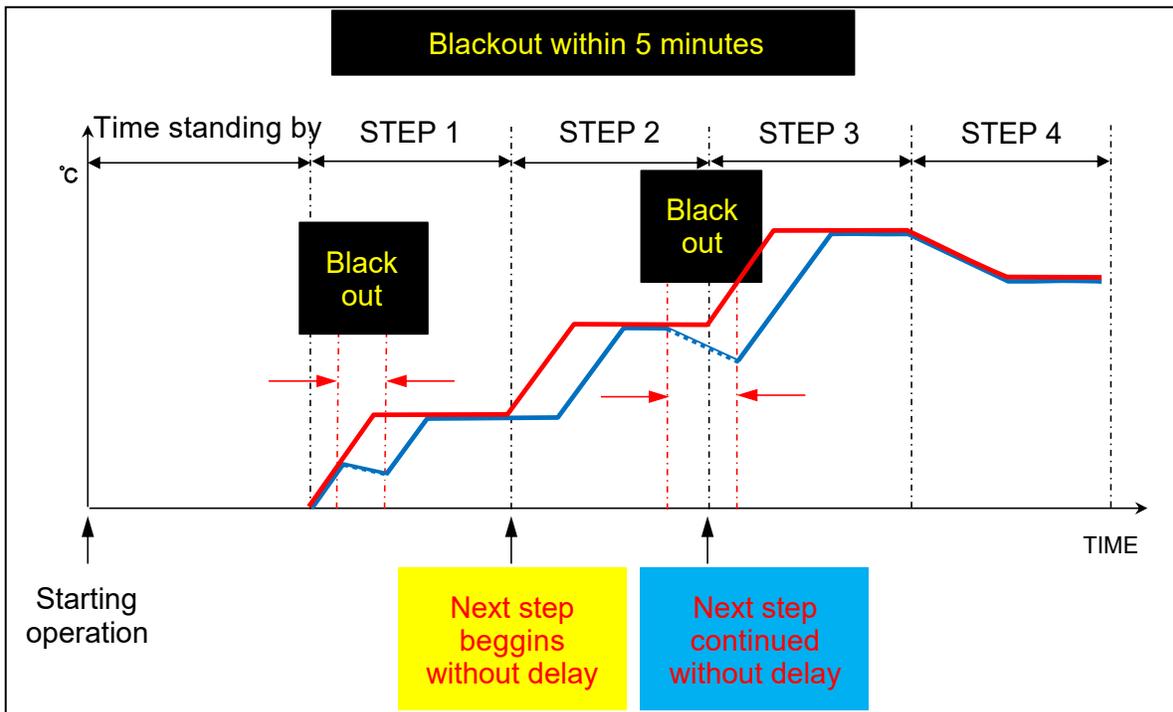
However, finish of total burnout cycle will be delayed for the time equal to blackout time period from start time of Step 1 to power recovery.

See the below figure.



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

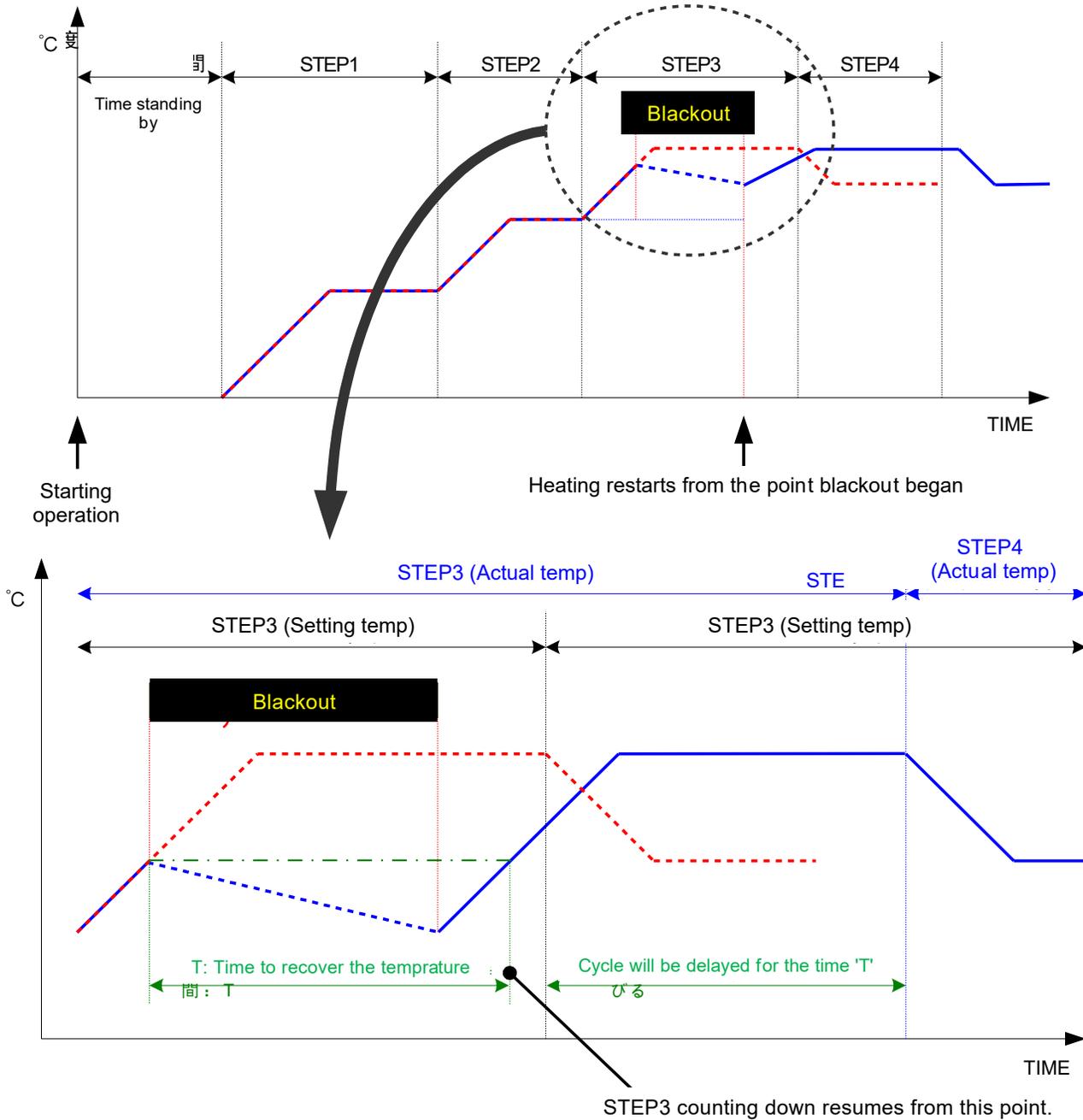
When electric power supply is restored, this product automatically resumes its running from the point where blackout occurred.



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

When electric power supply is restored, this product 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 FUNCTION

CAUTION

Overheating can break molds, stones in molds and even this product. Try to set temperature with utmost attention.

1. Be sure to check setting temperature of this function before startup. Change it if necessary.
2. Present temperature can overshoot against setting temperature by some conditions like number of molds, size of mold, recipe and others. Try to have margin as much as possible.
3. Overheat protection function was equipped as an optional operation on previous model of RBF. On this RBF the function is not option anymore and always protected.
4. Thermocouple for overheat protection function is consumable. If it is damaged by wire-breakage etc. because of deterioration, overheat protection function 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.

6-4-1. CHOICE OF SETTING

There are 3 pre-set values on this function.

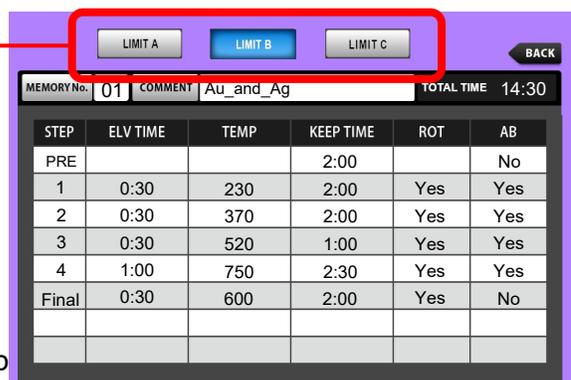
Choose one of them by tapping.



Color of the button will turn blue.

LIMIT A: Setting temperature is 620 c.

Default margin is 30 c. So actual shutting down will be



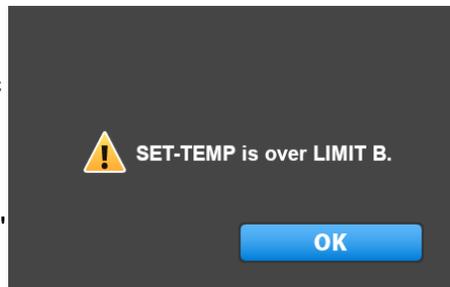
STEP	ELV TIME	TEMP	KEEP TIME	ROT	AB
PRE			2:00		No
1	0:30	230	2:00	Yes	Yes
2	0:30	370	2:00	Yes	Yes
3	0:30	520	1:00	Yes	Yes
4	1:00	750	2:30	Yes	Yes
Final	0:30	600	2:00	Yes	No

LIMIT B: Setting temperature is 750 c. Actual shutting down will be done at 780 c.

LIMIT C: Setting temperature is 950 c. Actual shutting down will be done at 980 c.

You will see a warning when you tap and choose LIMIT B, if higher temperature than 750c is included in the recipe. Tap OK button to erase the warning to edit recipe with lower 750c

* This limit memory  you can't



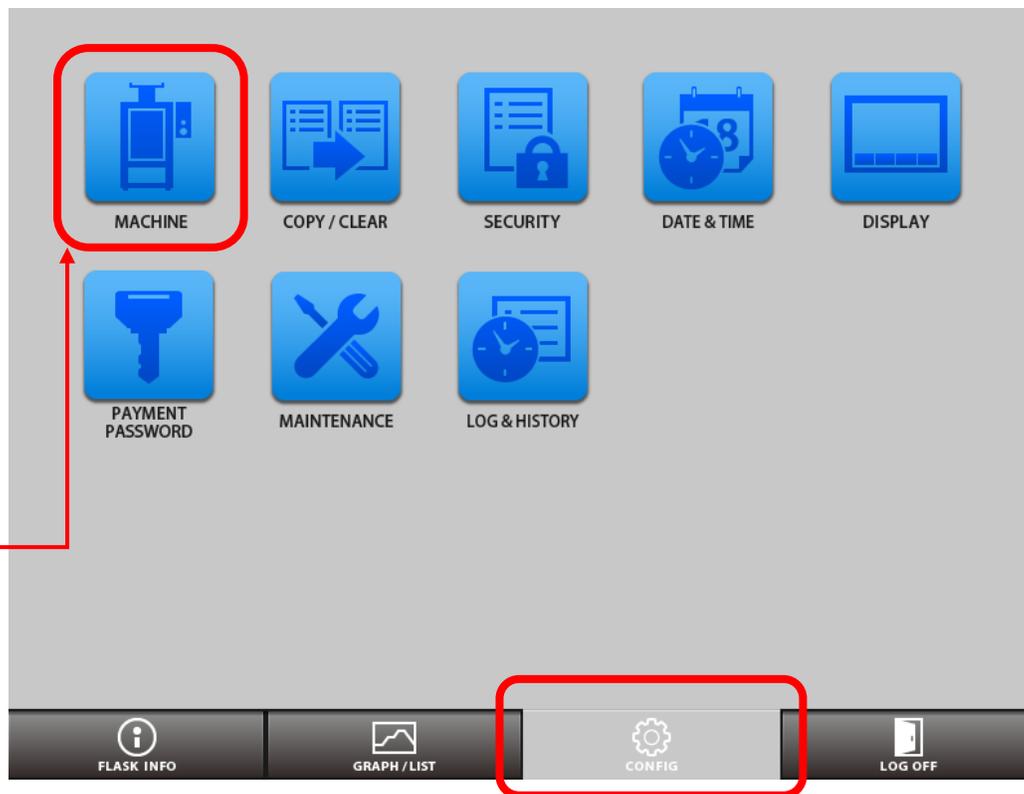
* The default setting is LIMIT C. You can change if necessary

* You will see an error message when startup if temperature is set in recipe higher than the LIMIT chosen. Change MEMORY, LIMIT, or Edit recipe to re-start.

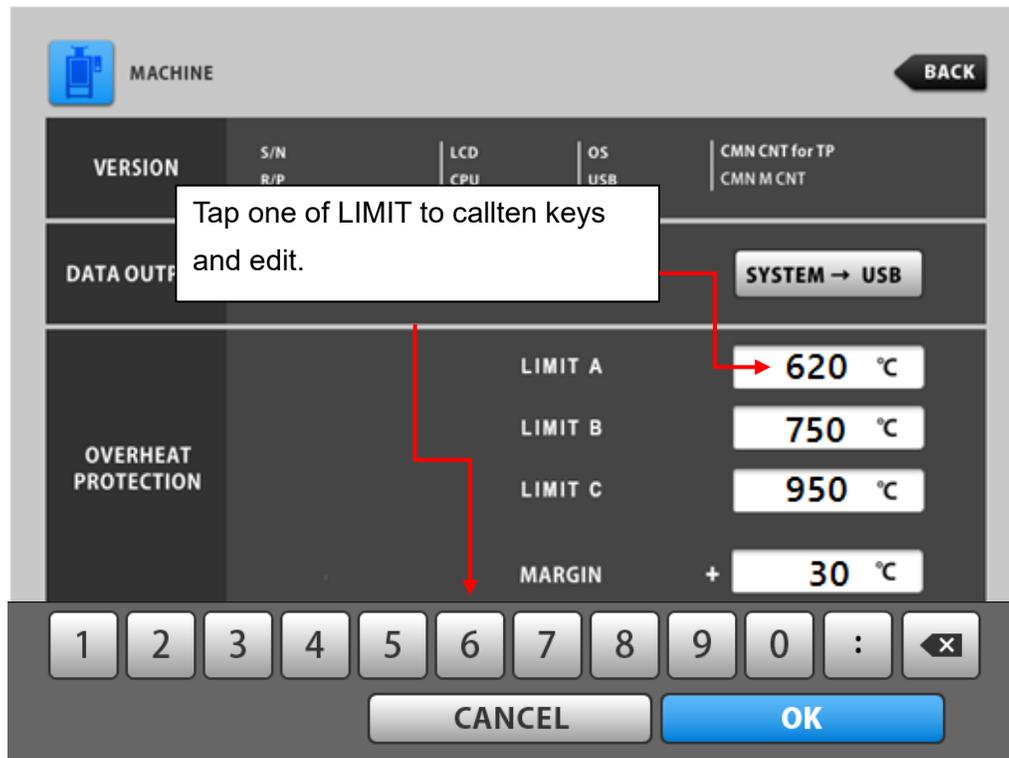


6-4-2. EDIT OF SETTING TEMP

You can edit LIMIT setting values and margin.



- 1) Tap CONFIG tab.
- 2) Tap MACHINE button.



Tap OK button to enter.

We strongly recommend you to maintain default value for MARGIN.



IMPORTANT

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.

7. INSTALLATION

7-1. UNPACKING

Open the door, and remove cushioning material between turntable and heater panel.

(Do not give unnecessary strong force at this part, otherwise heater surface may be damaged.)

7-2. MAIN UNIT



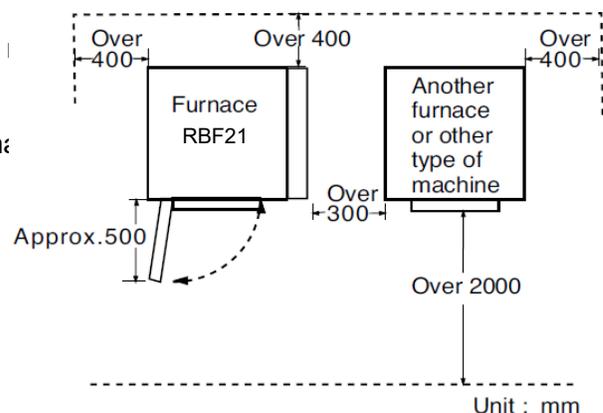
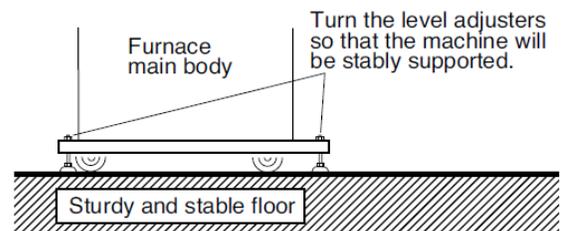
CAUTION

1. Great attention should be given to ambient temperature at installation of this product. There may be some troubles on control system by higher ambient temperature as specified.
2. In case two or more machines are arranged side by side, allow enough spacing. Surroundings will be full of heat which brings same problem as 1.
3. Do not use machine in a closed room. Provide adequate ventilation of air for machine. Room temperature will be more than specified temperature which brings same problem as 1. When incomplete combustion gas is blowing out from afterburner by some reason, there may be a problem of unusual smell and defectives on every part of RBF by corrosion. The gas exhausted is extremely stimulating which never allows your eyes keep opened. It will attack your breathing apparatus, too.

1) Mount this product on a sturdy place
endurable to weight. (Weight of this product may be n

2) After placement of this product, turn the level
adjusters so that this product will be stably and horiz

3) Sufficient clear space should be left around this
product so that daily operation and maintenance will
Especially, if another furnace is placed next, there
should be at least 300 mm clearance between the m



7-3. AFTERBURNER

WARNING

1. Be sure to turn power off before installation. There might be an electric shock by high-voltage current.
2. Wiring should be made by a qualified technician under correct method. There might be electric contacts molten down or a fire caused by it.
3. Take care not to drop a screw or the like in main body of furnace. If you happen to drop it, be sure to pick it up, otherwise it might cause short-circuit. Defectives on control system or a fire can be caused by it.
4. Do not move the position of thermocouple. Incorrect position can bring over heat problem.

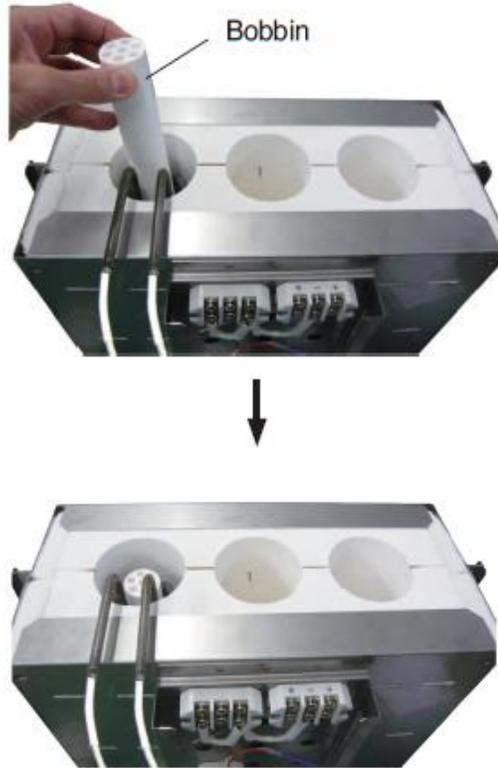
- 1) Place sheath heating element deliberately into the hole of afterburner unit. (Remove terminal block cover beforehand)



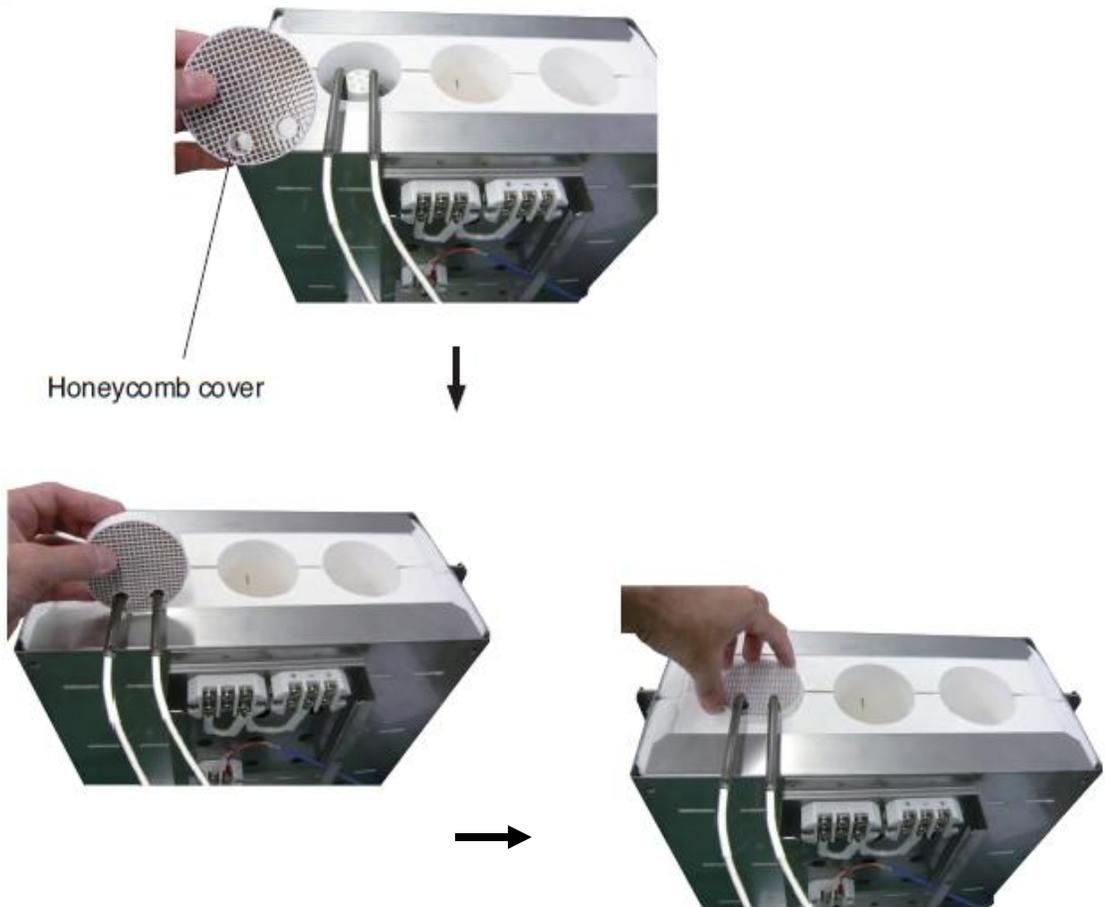
- 2) Place the afterburner bobbin deliberately.

CAUTION

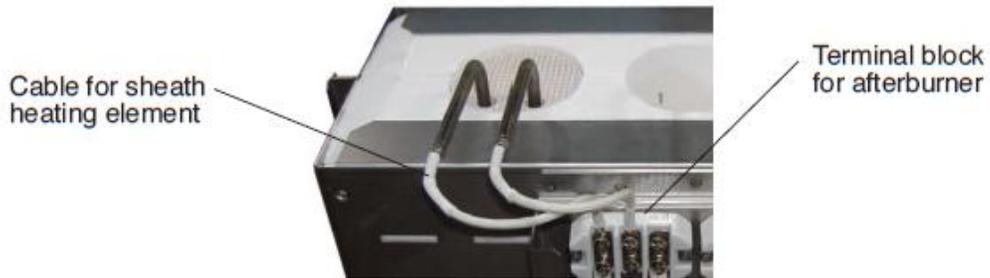
Take care not to drop the sheath heating element and bobbin, because the parts of machine may be damaged.



3) Place honeycomb cover in position passing cables through its holes as below figures.



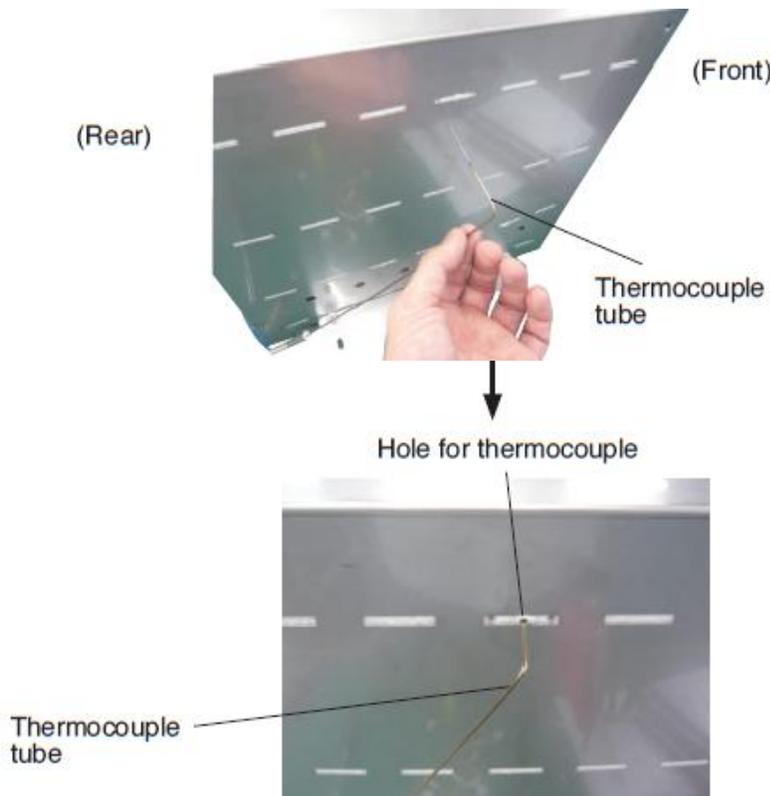
4) Connect the cable for sheath heating element to terminal block for afterburner.



5) Repeat the above 1) to 4) for other two afterburner sheath heating elements.

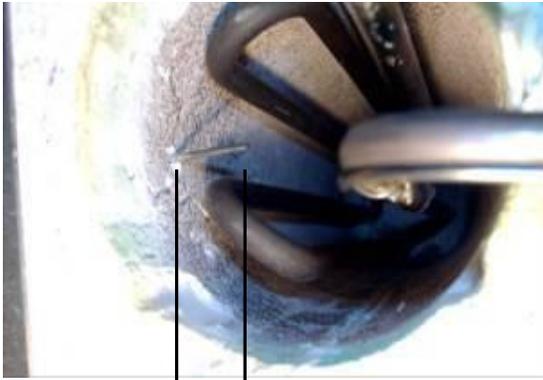


6) Insert the tip of thermocouple tube into the hole for thermocouple as below figures.



7) Fix 2 parts with included saddles like this.





Protruding length should be adjusted to approx. 10mm.

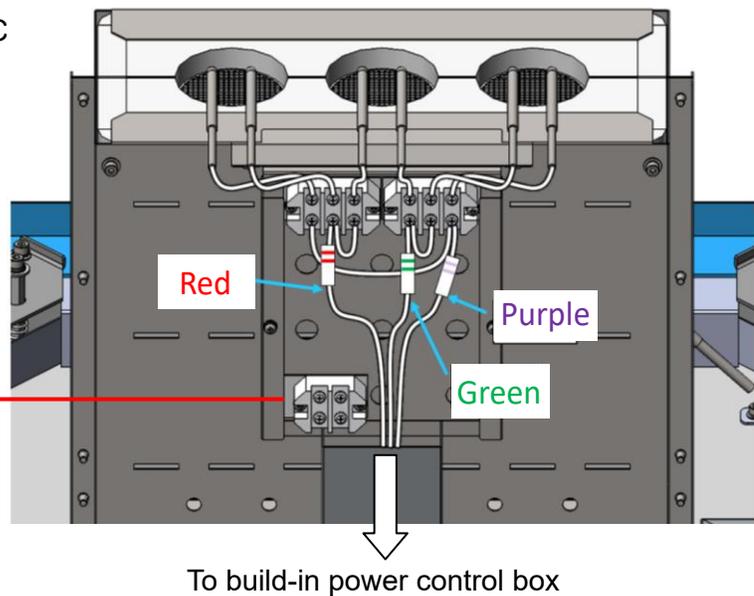


IMPORTANT

The position of thermocouple is important to avoid short life of thermocouple and heater or poor effect of burning smoke.

8) Place afterburner onto the top of RBF32/21 main body.
Connect cables for afterburner from built-in power control box of RBF32/21 main body as the figures below and in the next page.

Wiring at terminal block for afterburner. C



Each connection should be done as picture on the left.

◆ Yellow cable from control box

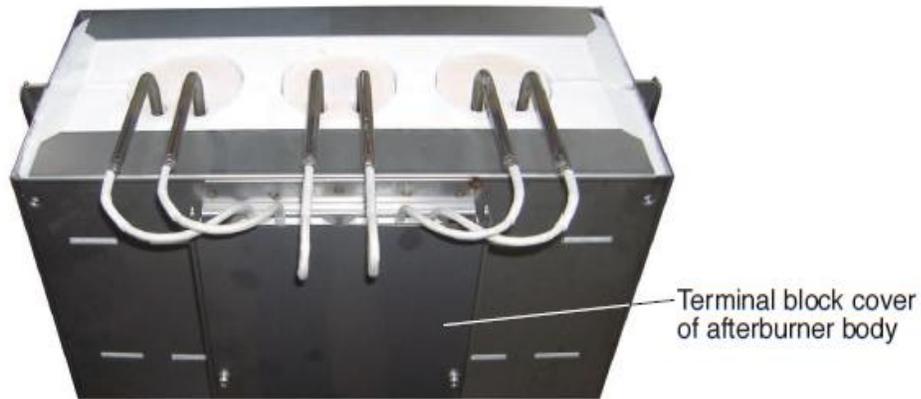
Label 'TMP2+(R)' on lower left terminal : Red cable from thermocouple on upper left terminal.

◆ Red cable from control box

Label 'TMP2+(W)' on lower right terminal : White cable from thermocouple on upper right terminal.

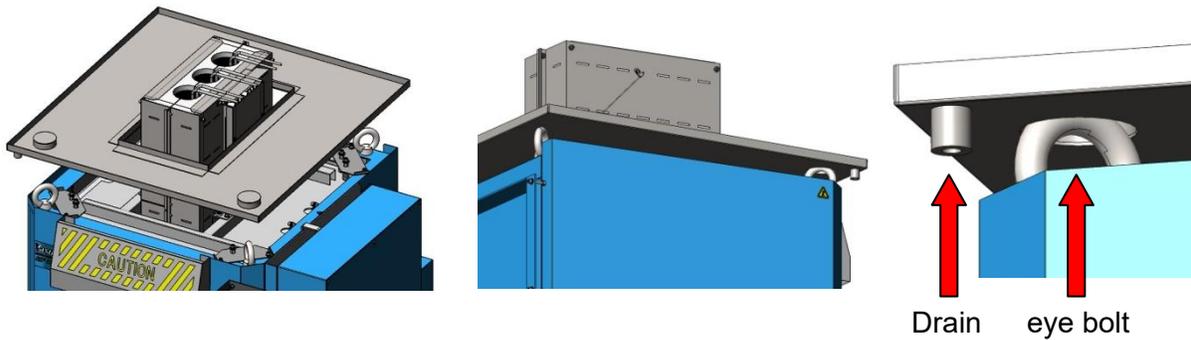
9) Fix afterburner body with fixation plates and bolts.

10) Attach terminal block cover of afterburner body.

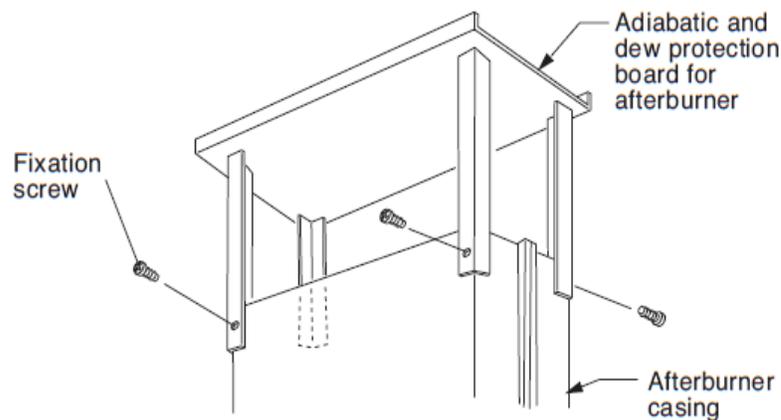


11) Place dew protection pan, so that weep hole should be positioned at the front left.

Let each gap fit on eye bolts. Attach hose onto weep hole (hose is not included).



12) Be sure to assemble adiabatic and dew protection board for afterburner as the figure.



7-4. CONNECTING POWER SUPPLY

Connect this product to power source AC 220V, three phase.



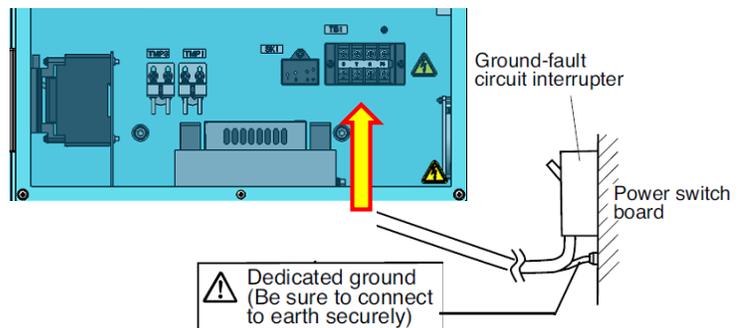
WARNING

1. Connect to specified power supply only.
2. Be sure to connect ground wire to avoid electrical shock hazards.
3. This product 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.

Loosen fixation screws of cover on electric component box and remove cover.

- 1) Connect power supply cable to terminal block inside.
Connect ground wire for protection from electric hazard.

- 2) Close cover.

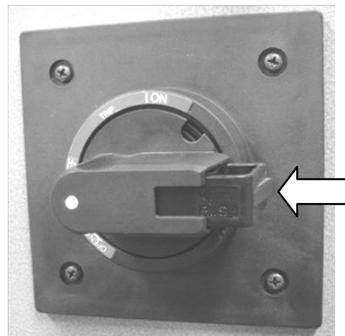


7-5. BREAKER SWITCH

Release and remove padlock.

Push down lock button

to release lock.



7-6. EXHAUST SYSTEM

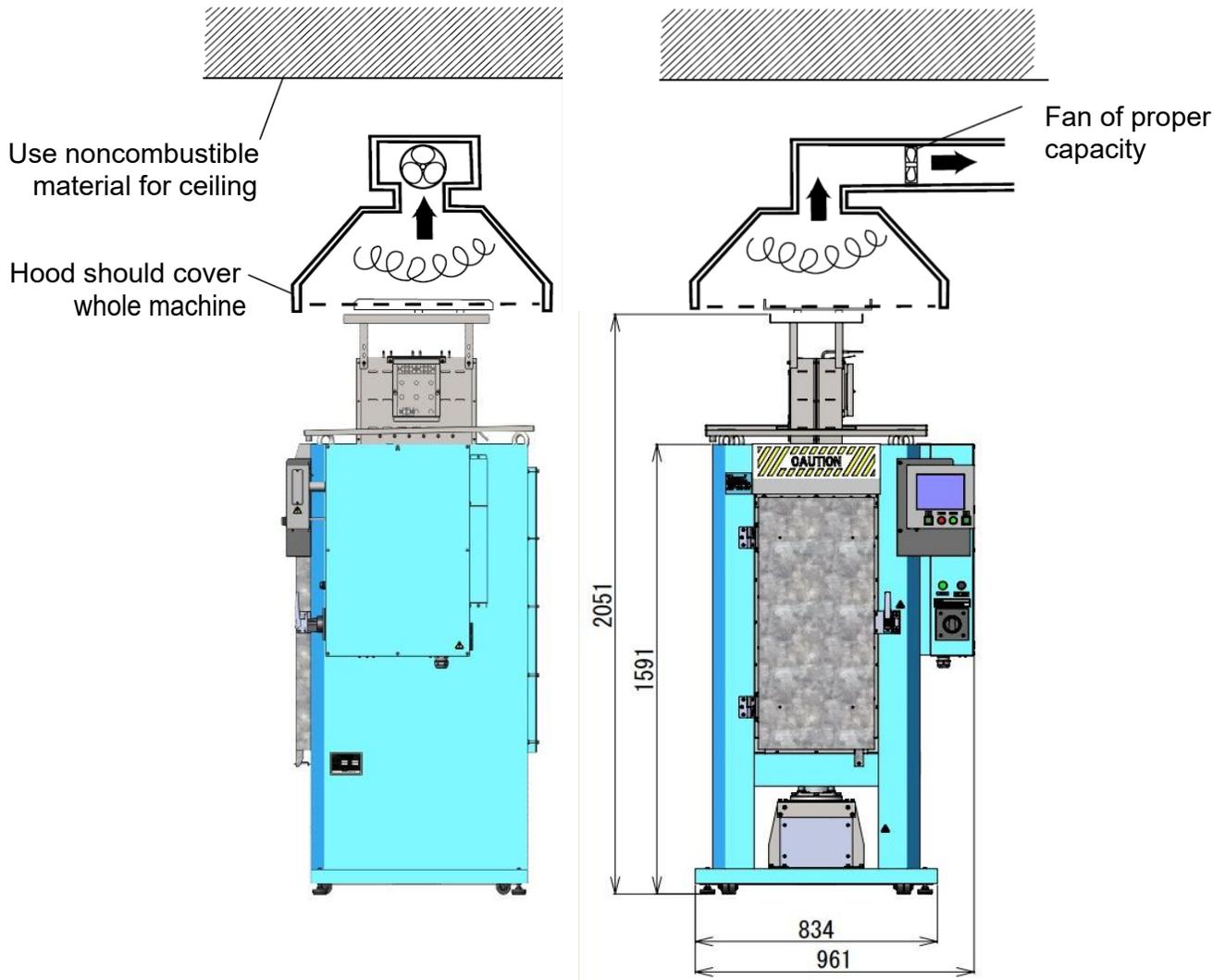
Install equipment for exhaustion such as exhaust duct (not provided from manufacturer).



CAUTION

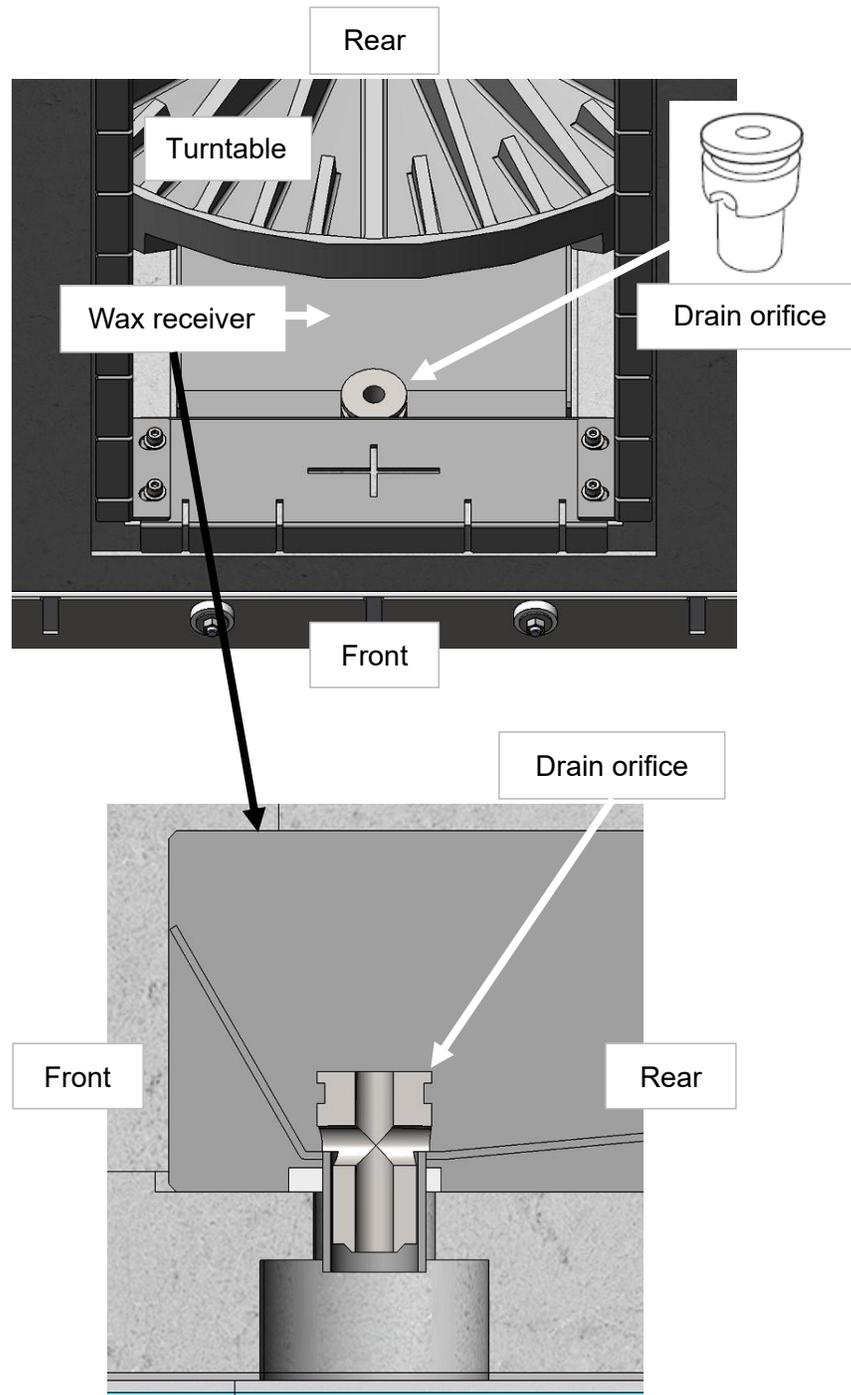
1. Building of exhaust system should be done by a qualified technician.
2. Use noncombustible material.
3. Install high power fan suitable for exhaust of fumes.
4. Dew drops should not fall directly onto the machine body.
5. Make exhaust system earthquake-resistant.
6. Check exit of exhaust device periodically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

Room temperature will be more than specified temperature and there may be troubles on control system by higher ambient temperature as specified. Also, when incomplete combustion gas is blowing out from afterburner by some reason, there may be a problem of unusual smell and defectives on every part of RBF by corrosion. The gas exhausted is extremely stimulating which never allows your eyes keep opened. It will attack your breathing apparatus, too.



7-7. DRAIN ORIFICE

The drain orifice is used for limiting the amount of air which flows inside the furnace.
Remove and clean the drain orifice every day.



IMPORTANT

Always place a container below the drain orifice for collecting wax.
Choose it as big as possible, deep as well.

8. MAINTENANCE

Check operating conditions periodically, so that this product 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.

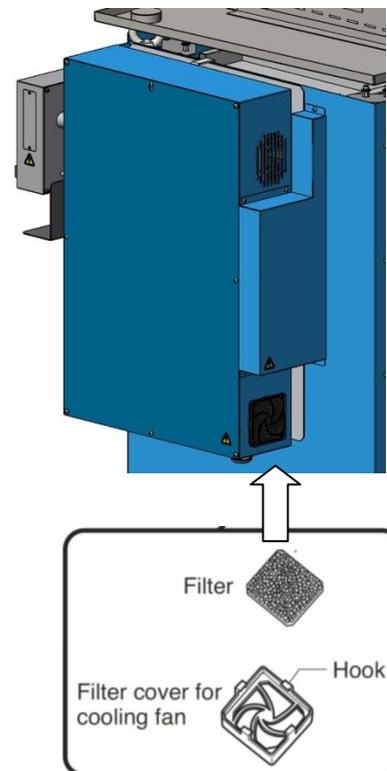
If cleaning is neglected, dusts may accumulate to more than a few millimeters thickness on the filter. Dusts accumulation or clogging of filter may cause trouble of this product (flow of cooling air is shut off ---> cooling does not work ---> temperature of internal electric circuit rises ---> malfunction).

- 1) Move 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 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 deep bottom area of furnace and 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 afterburner may be generated, and incomplete combustion gas (black gas) may blow out from exit of afterburner.

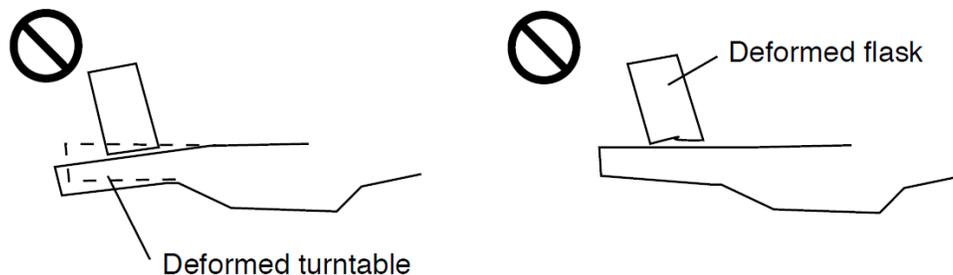
8-3. CHECKING CRACK OF ADIABATIC MATERIAL

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

8-4. CHECKING DEFORMATION OF TURNTABLE

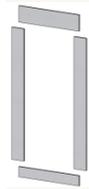
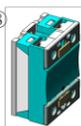
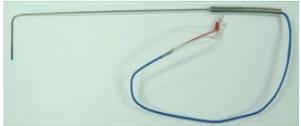
If turntable is deformed by deterioration, flasks may tilt, resulting an accident such as short-circuit or damage of heater etc. If deformation has become so large that flasks may tilt, replacement of turntable is necessary. From the same reason, a deformed flask should not be used.

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



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

9. SPARE PARTS LIST

	Name of part	Item number	
1	Heater panel, rear	13310207	
2	Heater panel, left and right	13310210	
3	Upper heat insulator board on bottom, rear	13310208	
4	Upper heat insulator board on bottom, left and right	13310211	
5	Door blanket upper Door blanket lower Door blanket sides	13310320 13310321 13310322	
6	Thermocouple	13050700	
7	Micro photo sensor	13075900	
8	SSR for main heater	13250800	
9	SSR for afterburner	13155100	
10	Cooling fan	13051500	
11	Sheath heater for afterburner.	13160017	
12	Thermocouple for afterburner.	13160003	

13	ADHESIVE (1) Inorganic adhesive 150g ARONCERAMIC for repairing crack f. frame/slab.	13073600	(1) (2)
14	ADHESIVE (2) Coating cement QF-180 500ml for blanket.	13074100	

10. SPECIFICATIONS

Power source	AC 220 V±10%, 50/60 Hz, three phase
Power consumption	16.2 kVA (including afterburner)
Setting range of temperature	0 - 950 degrees Celsius
Indication range of temperature	0 - 1000 degrees Celsius
Minimum display unit of temperature	1 degree Celsius
Temperature control of main furnace accuracy:	Within±3 degrees Celsius (at stable condition in the range of 100 - 950 degrees Celsius)
Temperature control of Afterburner accuracy	Within±3 degrees Celsius (at stable condition of setting temp.650c)
Thermo sensor display accuracy	Within±5 degrees Celsius in the range of 100 - 950 degrees Celsius
Turntable position display	1 - 48
Step numbers	8 steps (S1 - S8)
Memory numbers	20 (MEMORY No. 00 - 19)
Power failure detecting time	Over 5 minutes (shorter time than this will be handled as a 'short break')
Max. height of acceptable flask	300 mm (Upper table) / 230 mm (Lower table)
Furnace capacity for flask	21 flasks (100 mmφ) 32 flasks (89 mmφ) 41 flasks (76 mmφ)
Dimensions	960 (W) x 872 (D) x 2048 (H) mm (including afterburner)
Net weight	Approx. 310 kg



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