



# ***K2 NEXT***

## **VACUUM PRESSURE CASTING MACHINE**



# ***OPERATIONS MANUAL***

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# 1. INTRODUCTION

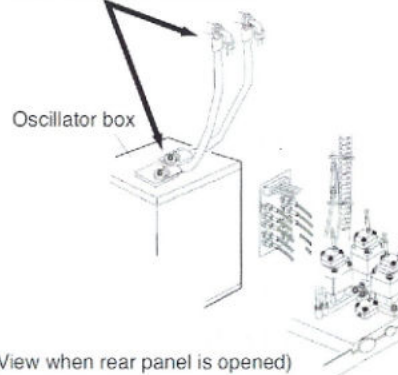
## 1-1. SAFETY INSTRUCTIONS



### DANGER

Do not open the panel unless instructed in this manual, because hazardous voltage is flowing inside the machine. When it is necessary to open the panel, always turn power off before opening the panel for safety, otherwise hazardous voltage can cause an electrical shock, burn or death.

HAZARDOUS VOLTAGE



(View when rear panel is opened)



### WARNING

Do not place fingers, hands, a part of body, or an article between the bottom of the lid and the top of the melting chamber or between the bottom of the melting chamber and the top of the mold chamber. When you press the START button, the lid will move downwards and the mold chamber will move upwards to close with pressure. As their pressing force to close is very strong, careless positioning of your fingers, hands, or any other part of body can cause severe injury.

Particular care should be taken so that any other person, standing close to you, should not place fingers, hands, any other part of body, or an article between the above-mentioned parts of chambers.

When you need to release the lid or the chambers, press the RESET button immediately.

If you release the START button while the lid is lowering, the lid moves upward to its original position.

If you release the START button in one second after the lid starts to close, the lid moves upward to its original position.



IMPORTANT:

The lid or the chamber does not open by pressing the EMERGENCY STOP button.







## WARNING

1. Do not place any material or tool on the operation panel or on the top cover of the machine. Particularly, never place anything on the operation panel because malfunction may be caused.
2. Electromagnetic waves from the machine may adversely influence medical equipment such as a pacemaker or an implantable cardioverter defibrillator (ICD). People wearing it should not be near the machine.



## CAUTION

1. Do not look into the molten metal continuously for a long time. Wear protection glasses.
2. Check that no crack or breakage is observed on the crucible, outer crucible, before their setting. Do not push the crucible body, or metal in the crucible, strongly. When the crucible has a crack, molten metal may leak through it, resulting damage of the machine.
3. Crucibles have their casting lives. Do not use a deteriorated crucible. Check condition of the crucible before use.
4. Do not leave the machine unattended, while it is turned on.



## DANGER

1. Use water to operate optional SHOT MAKER on K2 NEXT. Do not use other liquid.
  2. Molten metal is put into water, so misuse during handling may cause injury, machine damage or accident, resulting danger of human body.
- Take enough care and handle the machine correctly.



## CAUTION

1. Do not use any antioxidant like typically known 'borax', any metal which behave as same, fluxes, sodium bicarbonate, silicone and others. Most of them will create glassy contamination which clogs stopper holes. K2 NEXT will suffer serious problem by this.
2. Do not use too much material like zinc, nickel and others which create lots of fume when melting.



## WARNING

1. Never put anything on LID of melting chamber. Especially a part of human body or whole body shall not be put on it. A serious damage can be suffered on human body by strong energy.

Also the LID fixing shaft can be bent by the weight which makes operation not possible.

2. Never put any additives which are for antioxidant into metal going to be molten.

The most popular additive is borax will not be allowed to use.

Other additives like, sodium hydrogen carbonate (sodium bicarbonate), flux or any other things which can perform for the purpose as a result are also not allowed as well.

Those additives can affect serious damage on everything inside of melting chamber.

Silicone, any metals or alloys which generate a lot of fume when molten (like zinc, nickel...) are not allowed by same reason.

- 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 a crucible breakage or contacting with high temperature parts are not compensated by the manufacturer.
- Damages resulting from delay of reaction at emergency and mistaken operation are not compensated by the manufacturer.
- Damages by electrical noise, over voltage, or wiring error caused from an external vacuum pump are not compensated by the manufacturer.
- Shot results by the machine or 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.

## 1-2. PASSWORD

### 1-2-1. KIND OF PASSWORD

Three kinds of password are prepared for the machine as follows.

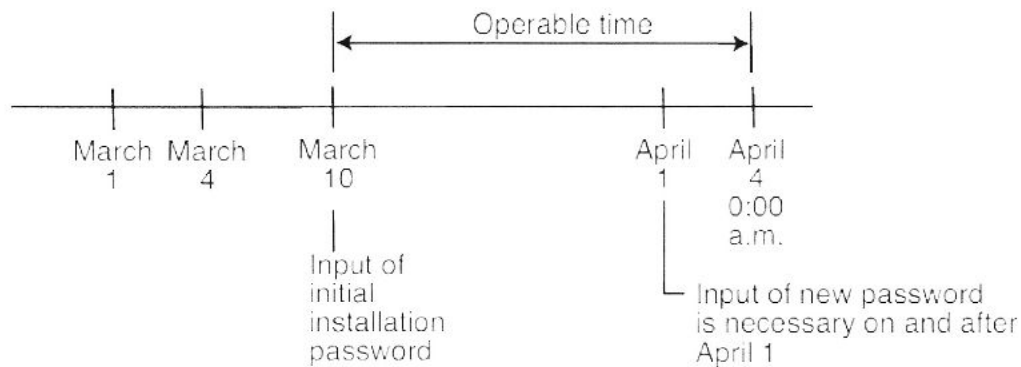
#### 1. Initial installation password

Initial installation password is necessary to release operation-lock of the machine at the time of installation of the machine.

0:00 a.m. of fourth day of the next month (Japan time) is expiration date of this password.

Unless final password is input, input of new update password is necessary monthly to use the machine on and after this day. Without the new password, operation becomes impossible.

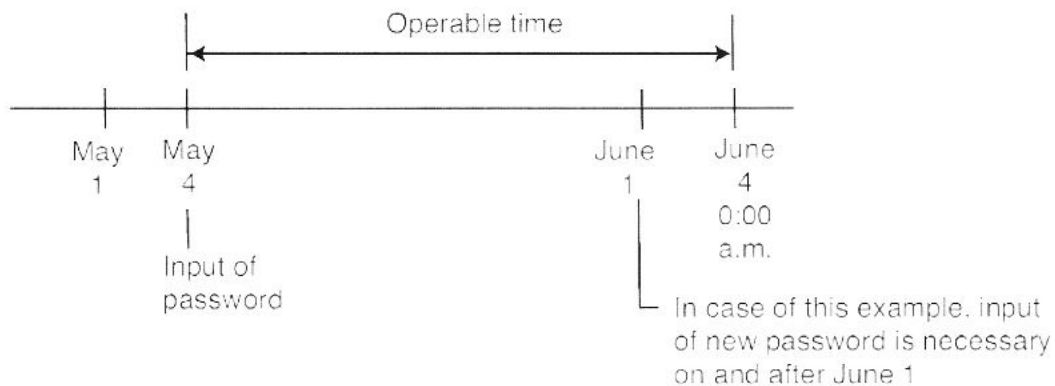
Example of initial installation password:



#### 2. Monthly update password

In case this machine is used by monthly use conditions, input of this kind of 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 the fourth day of every month by Japan Time.



**IMPORTANT :** If input is done 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.  
Input 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 input and is verified by the machine normally, the machine can be operated without time-limit.

IMPORTANT: Once this final password has been verified by the machine, the machine cannot be reset to the monthly update password mode.

### 1-2-2. ISSUE OF PASSWORD

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

Model name : K2 NEXT

Production Serial No. : xxx

Current monthly update history count : xx

### 1-3. SPECIFICATION LABEL

The principal specifications label of this machine is affixed on the panel on the back.

NOTE: When ordering spare parts, specify the production serial number that is printed on that label. 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 K2 NEXT.

### 1-4. WORKING CONDITIONS

- 1) Use the machine at temperatures ranging 0-40 degrees Celsius and humidity under 70%.
- 2) Apply power voltage 220 VAC, 50/60 Hz, 3 phase only.
- 3) Do not use the machine under atmosphere with too much dust or with harmful gas.

### 1-5. OTHERS

1) Please note that K2 NEXT is controlled by genuine computer which needs longer time for starting up comparing with other electric equipment apparatus.

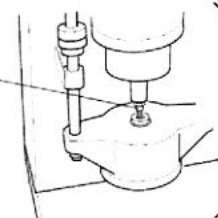
2) Please note that we have "half life period" on back up light for Liquid Crystal Display (LCD). Actual half life period on K2 NEXT's display is approx. 3 years when you use it with 100% brightness. K2 NEXT is always shipped out with initial brightness setting 50% to save life time of back up light. You can also control its life by using suspend function.

## 2. NOMENCLATURE

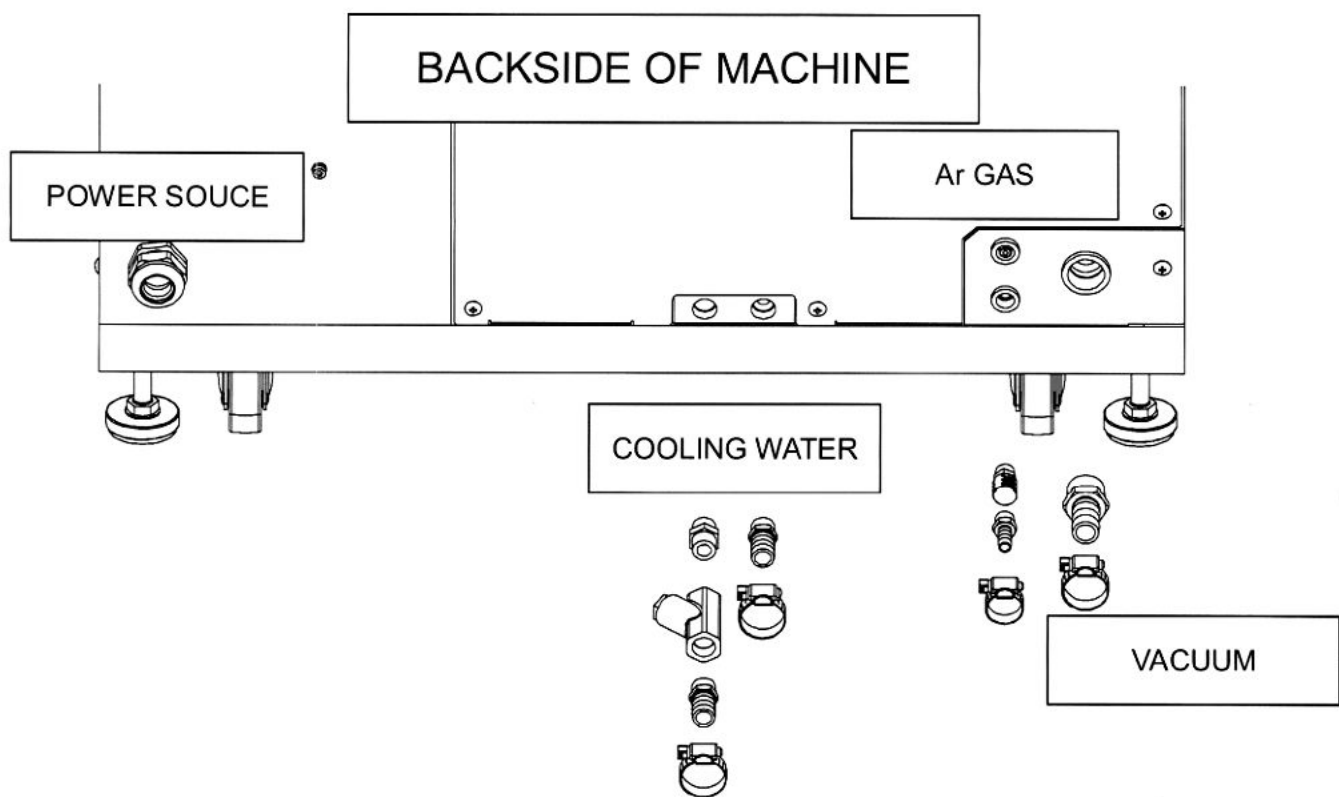
### 2-1. MAIN BODY



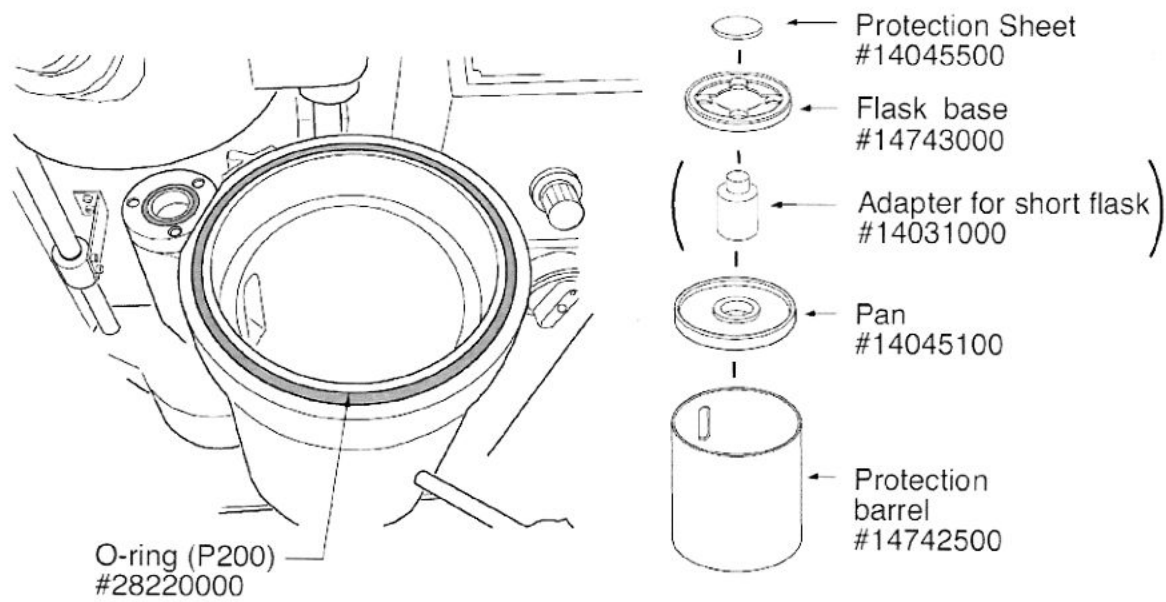
When installing the machine,  
1) remove the fixation bolt for transportation  
2) then, place the cover for cylinder rod.  
See page 82 for details.



## 2-2. REAR PANEL

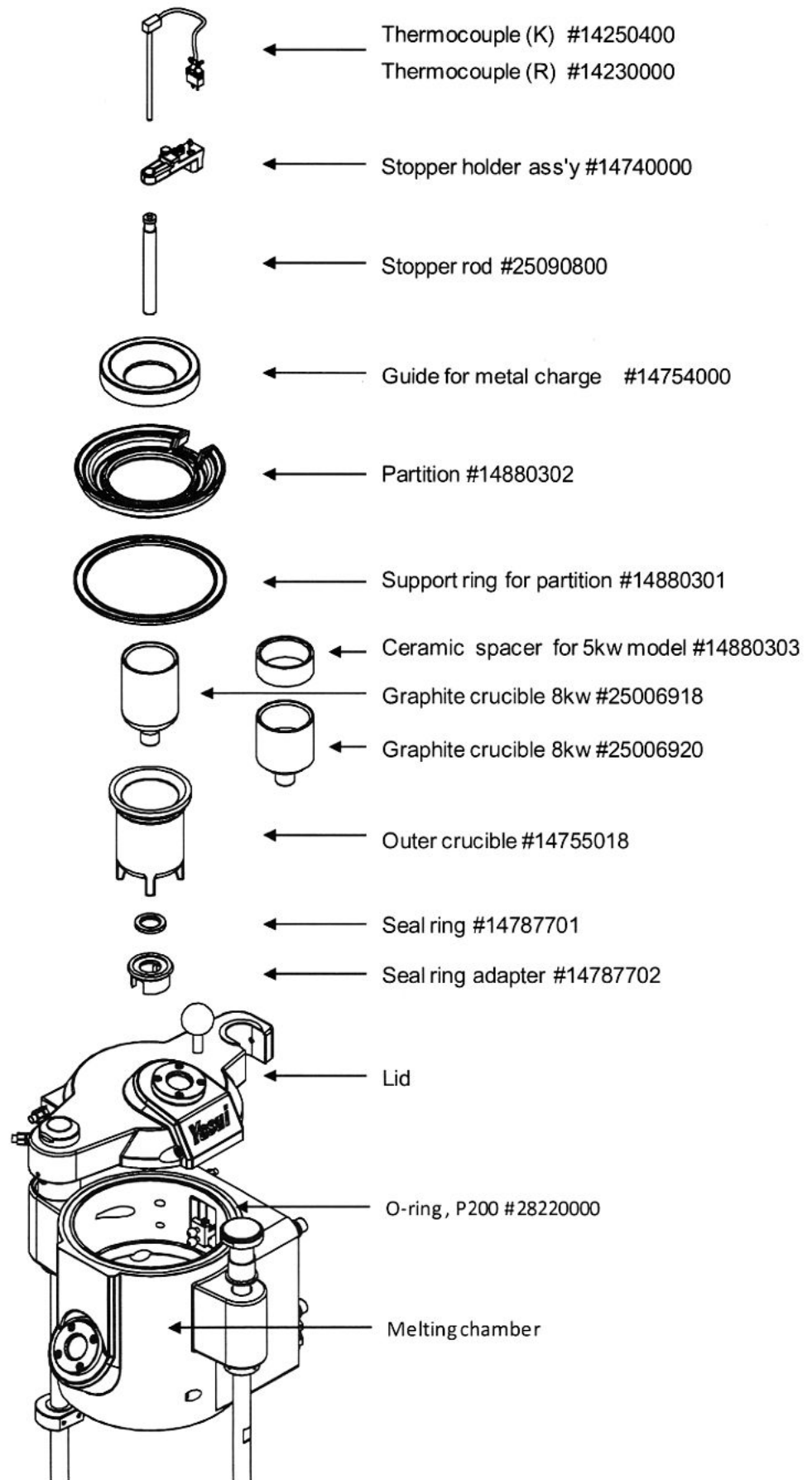


## 2-3. MOLD CHAMBER





## 2-4. MELTING CHAMBER



## 3. PREPARATION BEFORE CASTING

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### 3-1. CHECKING POINTS BEFORE POWER ON

Check the below points prior to power ON.

- 1) Connection of vacuum pump and its direction of rotation
- 2) Pressure of supply inert gas
- 3) Connection of hose to WATER IN
- 4) Connection of hose to WATER OUT



#### CAUTION

Make sure before starting heating the coil that the faucet of water is turned on and the tap water is running inside machine.

### 3-2. SETTING CRUCIBLE AND OTHER PARTS

Set up the below items.

Melting chamber

- 1) Outer crucible, crucible
- 2) Partition, Guide for metal charge
- 3) Stopper holder, stopper
- 4) Thermocouple

Below melting chamber

- 1) Metal sealing disk and O-ring

Mold chamber

- 1) Protection barrel, pan and flask base

Below mold chamber

- 1) Cover for cylinder rod



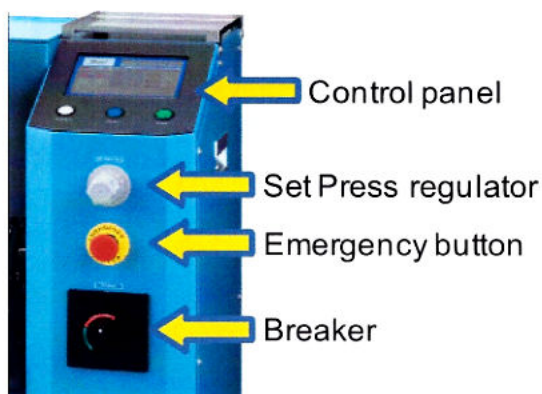
#### IMPORTANT

If the cylinder rod head cover is forgotten, the lid lock action cannot be performed properly.  
At the time of installing the machine, be sure to check it is set in place.

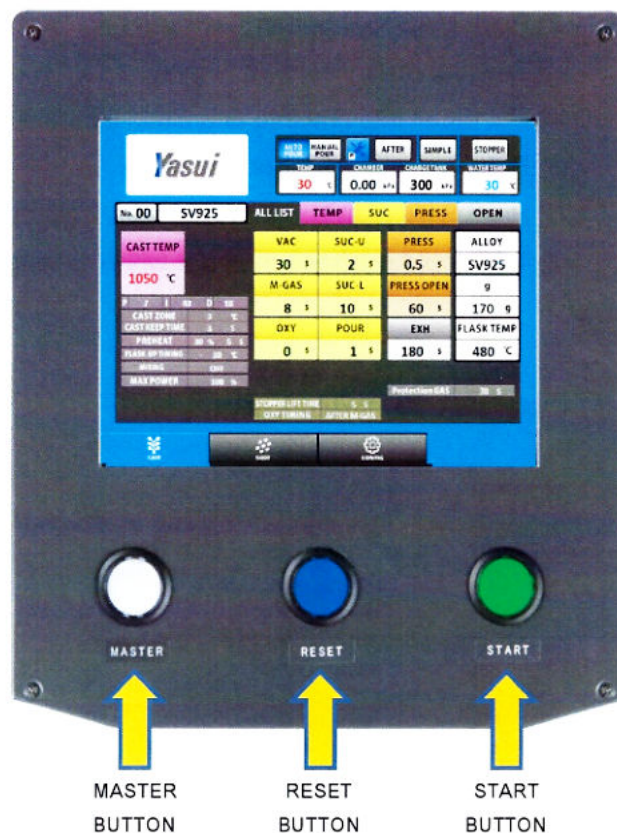


## 4. OPERATION

### 4-1. OPERATION PANEL AND OTHERS



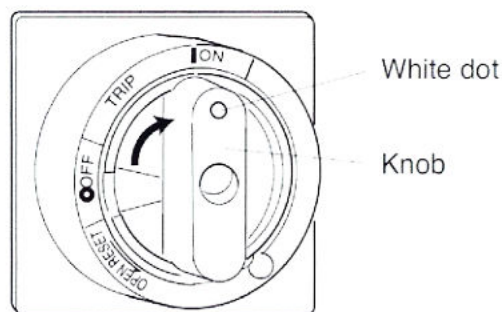
Major operation will be done around this area.



### 4-2. POWER ON

Turn the knob of the BREAKER switch until its white dot is set to ON position.

Power is supplied to all necessary parts.



**IMPORTANT:** Turn the knob securely until it clicks into place.

**IMPORTANT:** When the white dot of the BREAKER switch moved to TRIPPED position during use of the machine, over current has flown inside the machine (the machine became TRIPPED condition by over current). In this case, check the cause and take necessary action.

Then, turn the knob to RESET position. Next, turn the knob to ON.



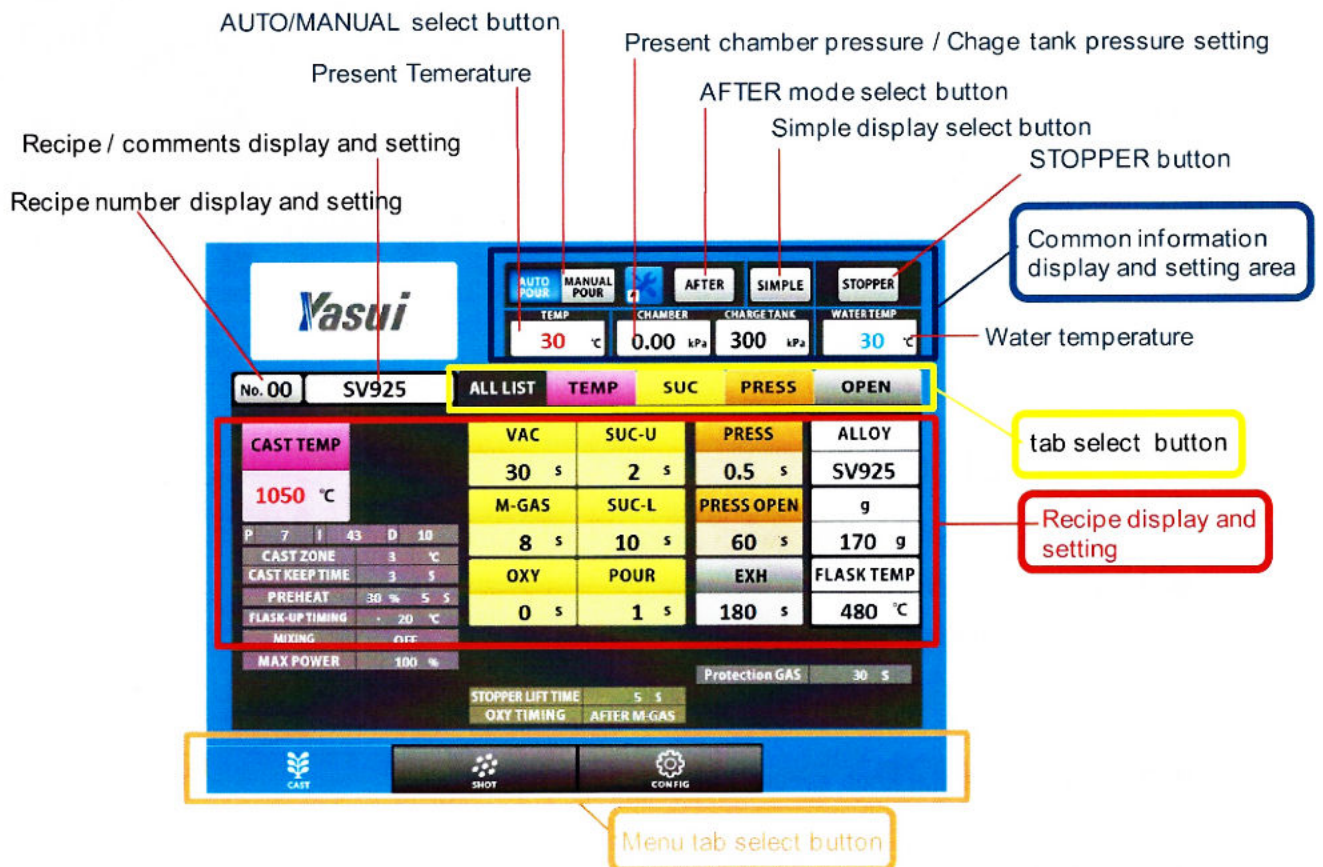
## 4-3. OPERATION

### AUTOMATIC OPERATION

- 1) Turn main breaker ON.
- 2) Push MASTER button.
- 3) Select memory at main display.
- 4) Put metal into crucible and close lid.
- 5) Put mold into chamber and close.
- 6) Push START button for more than 2 seconds.
- 7) Take mold out from chamber when casting process completed.



Details on the main display;



## 4-4. SET PRESS Regulator

Turn the SET PRESS regulator knob to set the final pressurization value of the internal charge tank. Set value is indicated on operation panel.

Maximum pressure value of this machine is 300 kPa.

When you finish turning the knob, push the knob in for locking.

## 4-5. EMERGENCY STOP button

In the case of emergency, press the EMERGENCY STOP button to stop all of the functions.

To recover, turn it clockwise and press the RESET button.

## 4-6. WINDOW AFTER START BUTTON

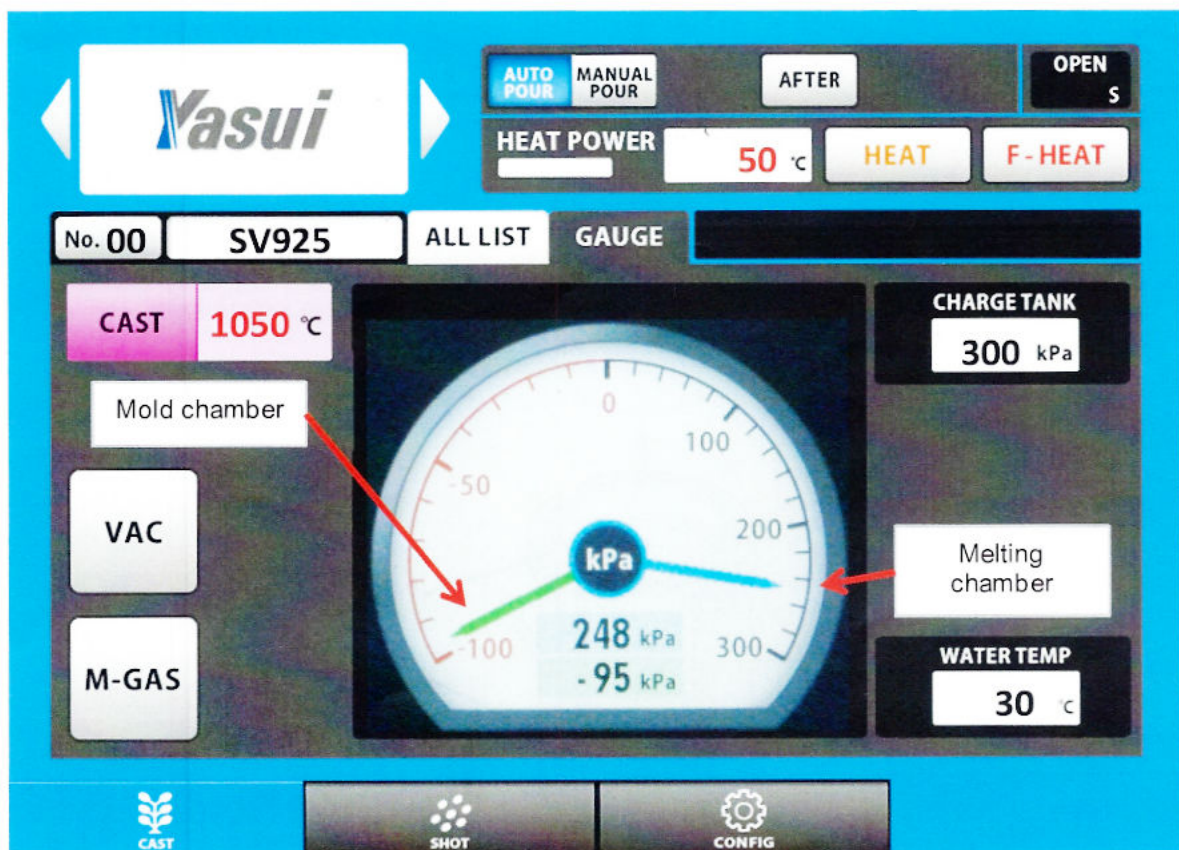
After pushing START button for actual casting, the window changes to GAUGE window.

Big bourdon tube style manometer enables you to feel pressure instinctively by needles.

While digital display in the gauge is very useful for reviewing casting result.

K2 NEXT shows not only pressure in melting chamber but also mold chamber pressure.

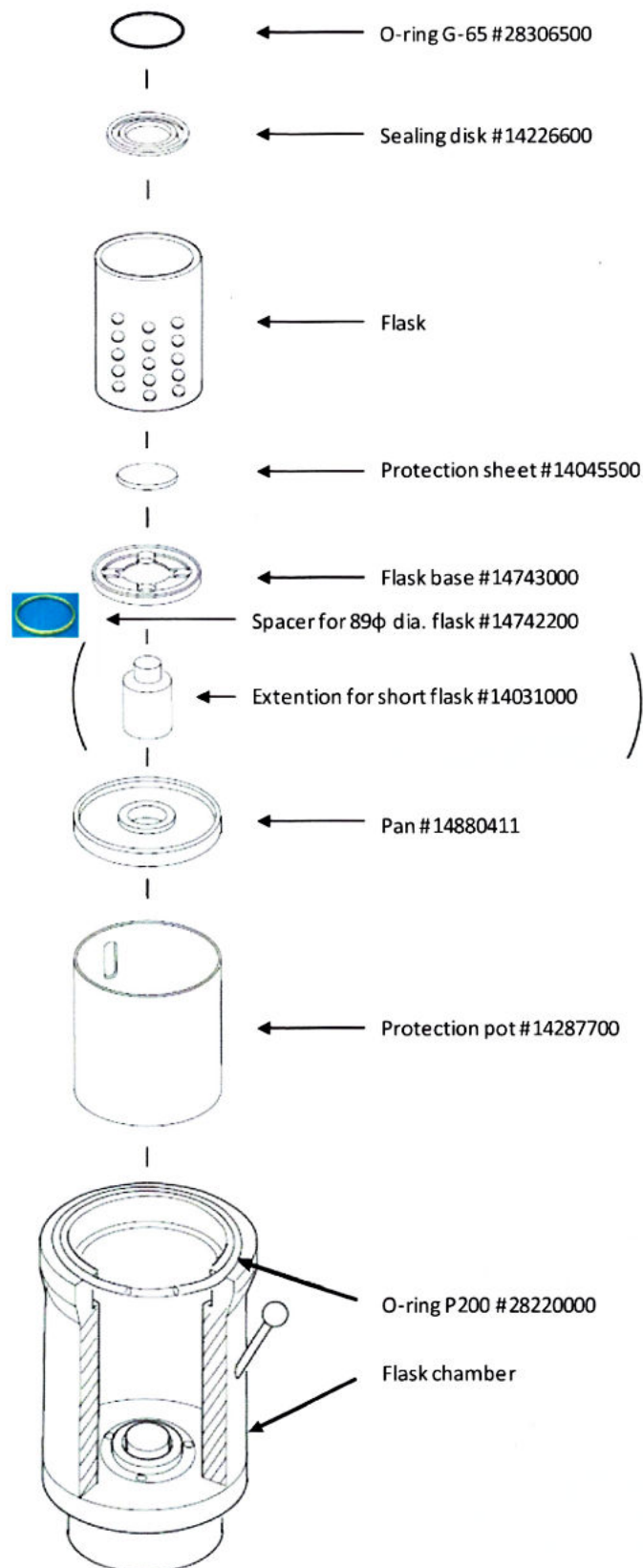
You will know the condition of sealing disk, investment quality, difference by control suction value and others to improve casting result.



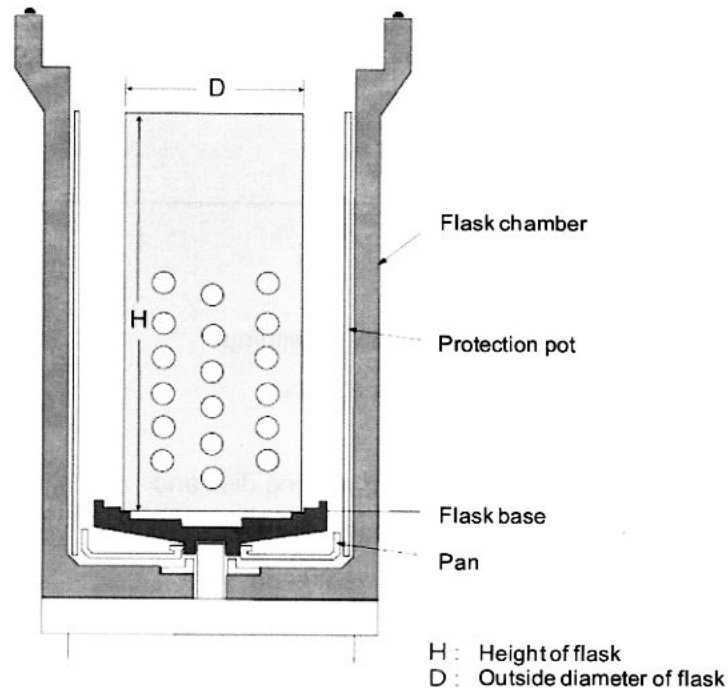
## 5. FLASK

### 5-1. FLASK COMBINATION





Use of a perforated flask is recommended.  
Position the flask and other accessories in order as the below figure.







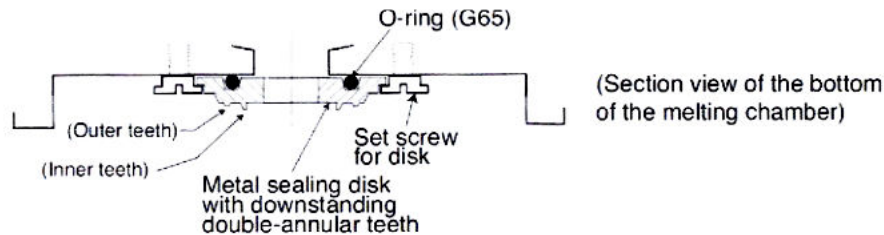
The below flasks can be used.

Flask base	Size of flask to be used	
	Height (H)	Outside diameter (D)
Flask base 	190 mm to 230 mm (7 1/2" to 9")	89 mm (3 1/2") to
Flask base  to be used together with the adapter for short flask (H=40 mm) 	150 mm to 190 mm (6" to 7 1/2")	125 mm (5") (when flask is not deformed) ( The positioning ring #14742200 is necessary for 89 mm flask  )

## 5-2. METAL SEALING DISK

Top of the flask is pressed against the bottom of the melting chamber. Then, pressurization and suction are actuated. Gas passes from the upper surface of the flask mold through inside the mold, then is disperses through side walls and bottom of the mold to outside. Use the metal sealing disk with down standing double-annular teeth to seal the upper surface of the flask mold.





## IMPORTANT

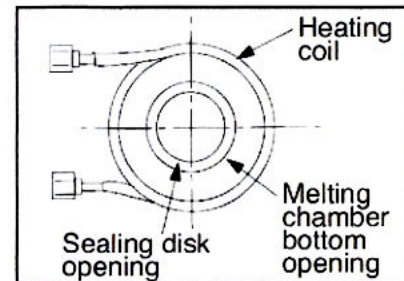
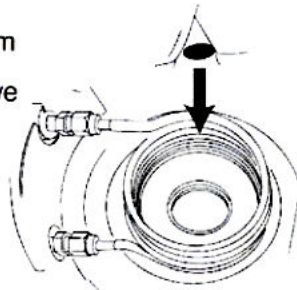
Wrong fixation of the metal sealing disk with down standing double-annular teeth may greatly affect casting results.

Check the below 1 to 4.

1. Check periodically the conditions of the metal sealing disk and the O-ring. The O-ring used for this sealing is consumable. So, replace into a new one before sealing effect is weakened.

2. Adjust the horizontal location so that the disk is exactly centered, and then tighten the three screws evenly. If the disk is not set properly, results of casting will be greatly affected.

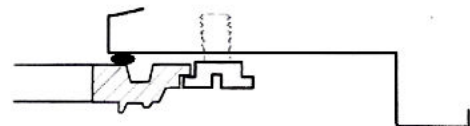
Look into the bottom opening of melting chamber from above



3. Take care that the O-ring will not go off the groove of the disk and will not be flattened.



O-ring location not good



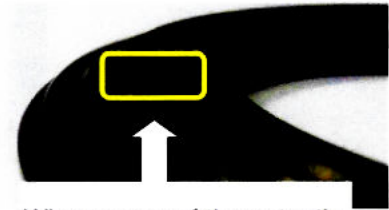
4. Wrong positioning of the set screw and the disk will disturb tightening of the screw to its end.



Disk location not good



Good



When a part of these teeth is broken, a good casting result may not be expected. Check them periodically.

## 5-3. O-RING CONDITIONS

As the O-ring is used for times, its sealing capability may be weakened which affects casting result. When deterioration of the O-ring is found, replace into a new one. (item #28306500 Oring, G-65)

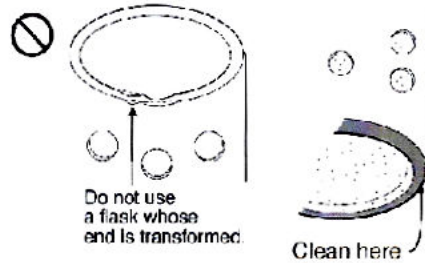
The O-ring has their lives. It is recommended to keep its spares in stock.

NOTE : In one of the below cases, it is possible that the investment may be cracked.

- 1) Pressure of melting chamber indicates rapid decrease suddenly.
- 2) Pressure increase is slower than usual at the time of pressurization.
- 3) Suction speed (after cast start) is slower than usual.

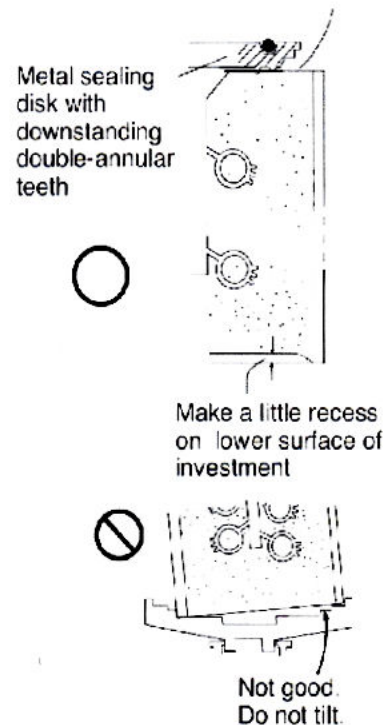
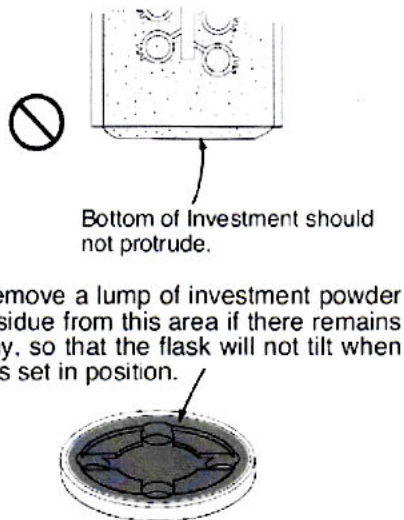
## 5-4. CORRECT PLACEMENT OF FLASK

1) Buildup of investment powder on either top edge or bottom edge of the flask may result in failure of casting. Before placing the flask into the burnout furnace, scrape spilled investment on both edges of the flask completely.



2) Check to see that investment surface is not protruding over the upper side edge or the lower side edge of the flask, so that sealing will be secured. (Check rubber base also) Make space as required referring to the below figure.

When you use the metal sealing disk with downstanding double-annular teeth, the upper surface of investment must be flat.

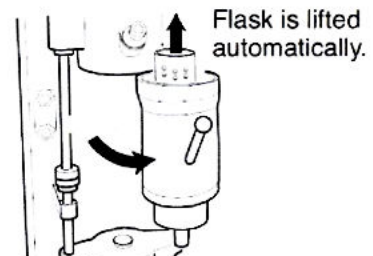
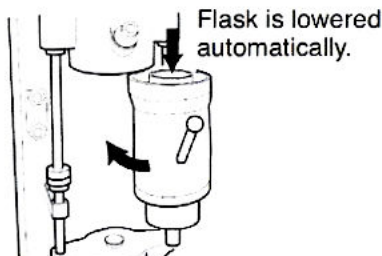


3) Slide the mold chamber in and out for trial to check that the flask automatically goes up and down.



### CAUTION

Do not slide the mold chamber toward the machine body too fast.



## 6. MAINTENANCE

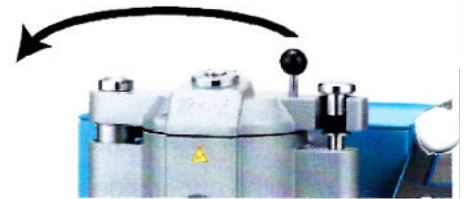


### WARNING

- 1) Be sure to turn BREAKER switch OFF before starting maintenance. Be careful with electric current in some part of the machine even when switch turned OFF, unless power supply cable is removed.
- 2) Care should be taken so that the skin is protected from direct contact with heated parts after heating is applied, because it requires some time for each part to cool down.

### 6-1. CLEANING OBSERVATION WINDOW

- 1) When observation window for melting became dirty, rotate lid to the left and clean the surface of the lens glass beneath.
- 2) When the observation window for casting is to be cleaned, Remove 4 screws and clean the internal glass.



### IMPORTANT

- 1) Tighten the casing of the lens securely after cleaning. When tightening is insufficient, vacuum leakage may be caused.
- 2) However, it might be better not to remove the lens from the casing except for replacement of lens.

### 6-2. GAS CYLINDER

Replace a gas cylinder early when remaining amount in the cylinder became small. Take enough care during replacement of gas cylinder, so that any dust will not enter the inside of gas tube.

### 6-3. CRUCIBLE AND STOPPER

- 1) After casting, slag sticks on the surface of crucible and stopper. Always clean it with a hard brass-wire brush or the like before next casting.



### CAUTION

When those parts are not cleaned, leakage of molten metal may be caused, resulting inferior casting. Further, a trouble which hinders normal operation of the machine may be caused, so take deliberate care about leakage of molten metal.

- 2) Shape of the crucible and the stopper will transform after long time use. That's why you need to check every time before casting to see whether the lower end of the stopper and the inside bottom opening of the crucible are securely fitted for perfect sealing.



## 6-4. FILTERS FOR CHAMBERS

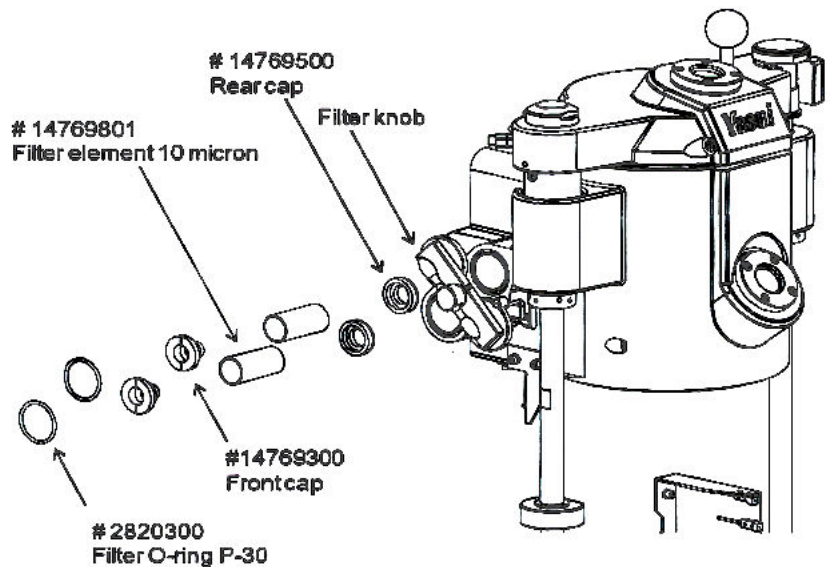
### 6-4-1. CLEANING

Condition of the filter is likely to affect casting results. Check the filters after every daily work and clean them as follows.

- Cleaning of the filter for melting chamber (upper side) depends on amount of zinc contained in the molten metal you use, however, it is better to clean the filter frequently.

- Clean the filter for mold chamber (lower side) after every daily work.

When clogging of the filter element cannot be improved after cleaning, replace the element with a new one (filter element 10 micron --- #14769801).



### 6-4-2. DISASSEMBLING FILTER UNIT

1) Rotate the knob for filter counterclockwise.

2) Remove knob with plate.

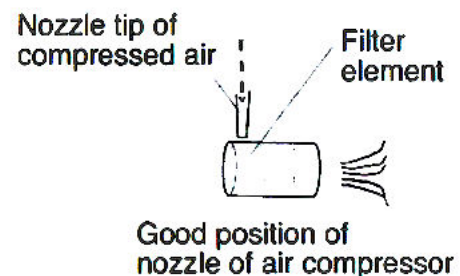
\* Note: parts inside can easily drop when open.

3) Withdraw the filter parts.



### 6-4-3. CLEANING FILTER

Press the tip of the air compressor nozzle on the outer surface of the filter. If you place the tip of nozzle of a vacuum cleaner (available in the market) inside the filter, cleaning will be more effective. When it is difficult to remove clogged dusts, use an ultrasonic cleaner available in the market for cleaning.





#### 6-4-4. REASSEMBLING

- 1) Take care at the time of reassembling the filter element that dust or investment particles shall not enter inside.
- 2) Clean the front and rear caps beforehand. Check that the O-ring is put back in place at the time of reassembling. Apply a light coating of grease to the surface of the O-ring for better sealing.



#### IMPORTANT

- 1) Use only grease made for exclusive use for vacuum sealing. Do not use grease which is available for general mechanical use etc.
- 2) If direction of the filter element is reverse at reassembling, it will not be possible to lock the cover.

#### 6-4-5. HIGH-DENSITY FILTER ELEMENT 5 micron (option)

Filter element 10 micron (#14769801) for mold and melting is installed at shipment.

Use of high-density filter element 5 micron (#14769802, optional accessory) may be more effective to prevent intrusion of investment particles inside the pipe system. Size of high-density filter element 5 micron is same to filter element 10 micron, so it can be set to the machine just in the same manner as filter element 10 micron.

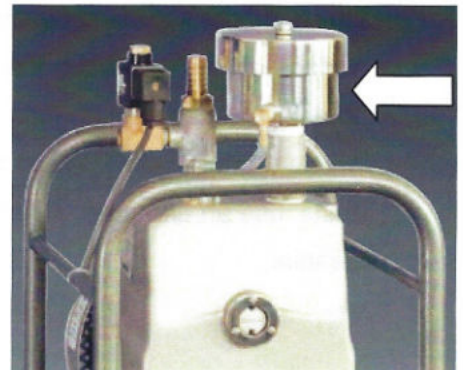


#### IMPORTANT

1. If filter element 5 micron is installed, vacuum load is increased, and as a result vacuum speed becomes slower and it takes longer time to finish evacuation. If vacuum speed equivalent to filter element 10 micron is required, you need to replace the external vacuum pump with a stronger one.
2. Clogging degree of filter element depends on mold condition after burnout and suction timing. Further, the filter element cannot catch all particles perfectly (Some of particles pass through the filter )

\*\* We strongly recommend you to check oil mist trap element on vacuum pump as well as filters in casting machine.

Many castors don't notice about this and have vacuum problem.



## 7. ADVANCED OPERATION

### 7-1. WINDOWS

There are 5 tabs on main window for CAST;  
ALL LIST, TEMP, SUC, PRESS, OPEN as you  
see on the right.

The initial tab after turning power ON is ALL  
LIST tab.

Each tab description as follows;



#### 7-1-1. ALL LIST tab

Principal casting parameter can be seen and edited here at this window.

Detailed settings which are registered at other tabs can be monitored at lower part of this window with  
smaller letters in white color.

• CAST TEMP :  You can check  
and edit casting temperature here in this box.



Tap this button to activate keyboard at lower part on the window to edit.

• VAC (To set vacuum keep time)

Time period of evacuation of the melting chamber and the mold chamber after pressing the START  
button is set. When the timer of this key is in action, timer display is counted down.

• M-GAS (To set inert gas charging time)

Time period of gas charge into the melting and mold chambers after VAC.

When inside pressure of the chamber reached 100 kPa, M-GAS is stopped.

VAC	SUC-U
30 s	2 s
M-GAS	SUC-L
8 s	10 s
OXY	POUR
0 s	1 s

• OXY (To set air introduction time)

Time period of opening the exhaust valve to introduce air into the melting and mold chambers.

You have 2 choices when introduce OXY at SUC tab.

• SUC-U (To set time of communication between two chambers)

Suction of the melting chamber is carried out during this time.

Time period of action of the communication valve between the suction line of melting chamber and  
the suction line of the mold chamber.



When process temperature reaches Set Value and CAST START is activated, action set by this key starts, and after elapse of setting time it is turned off.

•SUC-L (To set time of communication between two chambers)

Suction of the melting chamber is carried out during this time.

Time period of action of the communication valve between the suction line of melting chamber and the suction line of the mold chamber.

When process temperature reaches Set Value and CAST START is activated, action set by this key starts, and after elapse of setting time it is turned off.

•POUR (To set waiting time for start of pouring by lifting of stopper)

Time period from expiration of the time preset by "SUC-U" to lifting of the stopper rod.

When the timer is in action, it is counted down.

•PRESS (To set waiting time for starting pressurization)

Waiting time from start of POUR to action start of PRESS.

•PRESS OPEN (Pressure valve open time)

This is for time to open pressure valve between melting chamber and charge tank.

PRESS	ALLOY
0.5 s	SV925
PRESS OPEN	g
60 s	170 g
EXH	FLASK TEMP
180 s	480 °C

•EXH (To set time to exhaust finish)

Time period from pouring start to finishing exhaust of gas in the chamber is set.

To avoid wearing of the crucible by oxidation, it is recommended to set a longer time.

During action, this setting time is displayed in the parameter display by countdown.

•ALLOY : You can take note alloy used as your reference for better quality.

•g : You can take note amount alloy used.

•FLASK TEMP : You can take note flask temperature.

## 7-1-2. TEMP tab

This window is for setting parameters to control casting temperature.

•FLASK-UP TIMING : Temperature to determine when jack up flask.



•CAST ZONE : Casting is started at this area.

•CAST KEEP TIME : Holding time at CAST temperature ZONE

CAST starts automatically by combination of TIME and ZONE. (Details described later).

•POWER : Heating power after POUR.

•KEEP TIME : Time of heating after POUR.

\* Heating after POUR is to maintain metal temperature when it takes long to go out of crucible.

This function can be used when you cast with big amount of metal.

•PID : Setting for each value of PID control. (P: Proportional, I: Integral, D: Differential)

PID control is a kind of feedback control system using 3 parameters.

PI control is for reaching CAST temperature very promptly with big heating power but tries not to overshoot setting value controlling power before target

After reaching target D controls heating power to maintain the temperature until CAST starts.

•% CONTROL : In addition of PID control, you can control maximum heating power at 3 ranges up to target for more sensitive heating.

For instance zinc rich gold can easily vapor when melting.

You can reduce it by heating lower power at first step of 3 ranges.

% CONTROL			
TEMP RANGE		MAX POWER	
1	800 ~	2	80 %
2	300 ~ 800	3	100 %
~ 4	300	4	70 %

•MAX POWER : Maximum heating power can be controlled in whole range to target.

You can combine this function with PID control for much sensitive heating.

% CONTROL	
MAX POWER	
100 %	

•MIXING : Choose MIXING function

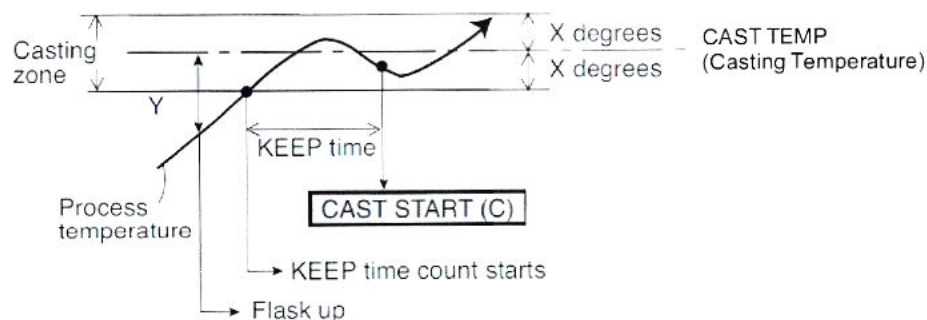
\* Additional information about CAST ZONE and TIME

When temperature enters into the Casting Zone by heating, casting is started on specified conditions.

" Casting Zone =

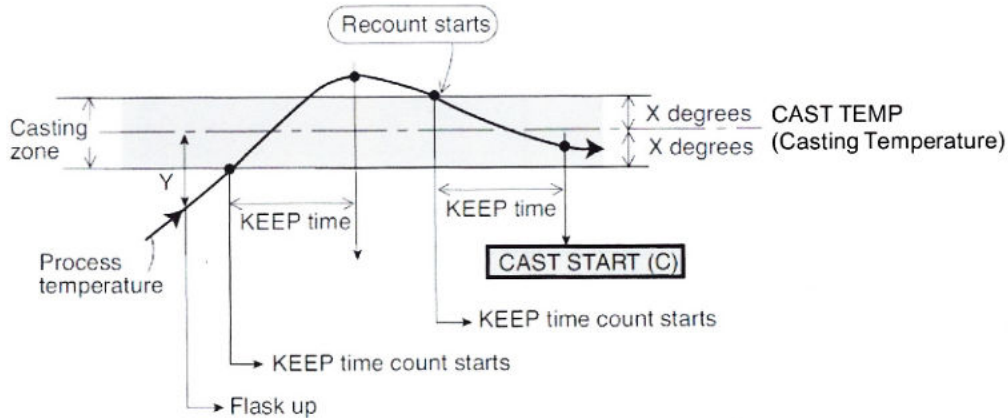
Temperature SV of the TEMP. CONTROLLER +/- X degrees centigrade"

(Standard of X : 3 degrees centigrade)





- Y degrees centigrade for activating flask up is set with key (Standard: set temperature (SV) -20 degrees centigrade).



When measured present temperature goes out of the Casting Zone during the KEEP time, counting of time starts again when temperature again enters into the CAST ZONE.

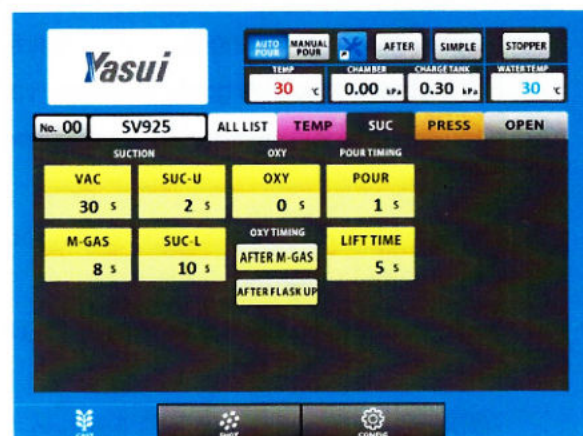
### 7-1-3. SUC tab

This window is mostly for setting VAC level control

•VAC, M-GAS, SUC-U, SUC-L, OXY, POUR are already described.

•OXY : You have 2 choices when introduce OXY here in this window.  
AFTER GAS is to introduce OXY after M-GAS finished.  
AFTER FLASK UP is when flask jack up finished.

•LIFT TIME : This is for time lifting stopper rod up.



### 7-1-4. PRESS tab

This window is for setting pressure control

•PRESS and PRESS OPEN are already described;

PRESS for waiting time of pressurization.

PRESS OPEN is for opening valve for pressure.



•De-Gas : Activate De-Gas function by this button.

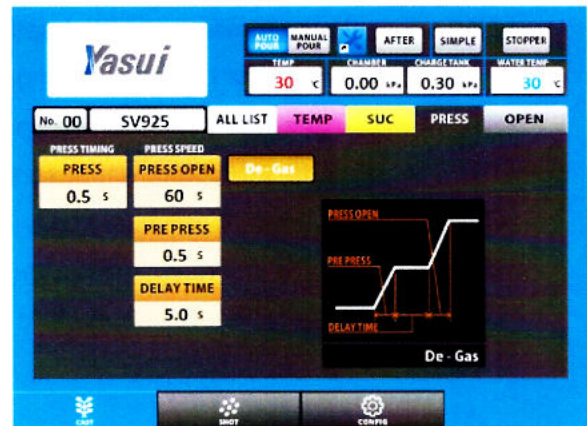
\* The window changes when you choose De-Gas.

This is a new function for K2 NEXT.

"DeGas " mode: The machine waits for exhaust of gas that has been generated at the time of metal charge into the mold.

After then, pressurization will be started.

(Patent pending)



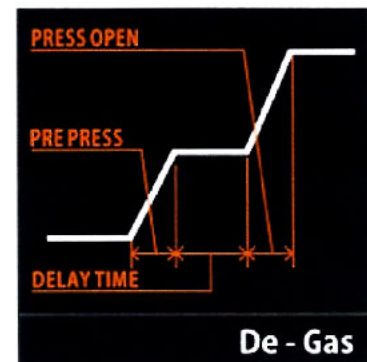
•PRESS : Press timing as already mentioned.

•PRESS OPEN : Press open time as already mentioned.

•PRE PRESS : Time for supplying pressure for De-gas.

•DELAY TIME : Time to keep PRE PRESS.

PRESS will be done after this timer.



## 7-1-5. OPEN tab

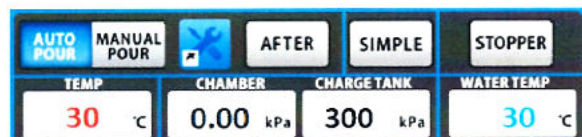
•EXH : Time to maintain pressure as already mentioned.

•Protection Gas : Time for Protection gas when casting with AFTER MODE chosen.



## 7-1-6. UPPER PART on CAST window

Some selections here in this area.



•AUTO/MANU POUR : Choice of Auto pour or Manual pour. Manual pour is called Semi Auto in previous machine. The button turns its color blue when chosen.

•  : Short cut button to MAINTENANCE window. No need to go through CONFIG window.



- AFTER : Choice of AFTER mode. Button will turn blue when chosen.
- SIMPLE : You can erase detailed setting information which is shown lower part of CAST window in white color except for principal casting parameters. Button will turn blue when chosen.
- STOPPER : Manual stopper lifting up and down for cleaning or checking contact to crucible.
- TEMP : Present temperature measured by thermocouple is indicated here.
- CHAMBER : Present pressure inside of melting chamber is indicated here.
- CHAMBER TANK : Present pressure of charge tank is indicated here.
- WATER TEMP : Present temperature of drain water is indicated here.

## AFTER MODE

1) It is possible to melt metal temporarily before loading flask.

This is effective to protect flasks from metal leaking during melting caused by bad contact of stopper and crucible. It is very effective at stone set casting as well as normal casting which requires stable flask temperature to prevent cooling down by this for better filling up.

Previous model also has this function but metal is oxidized by air when lid and flask chamber lock released.

K2 NEXT has protection gas system when loading flask.

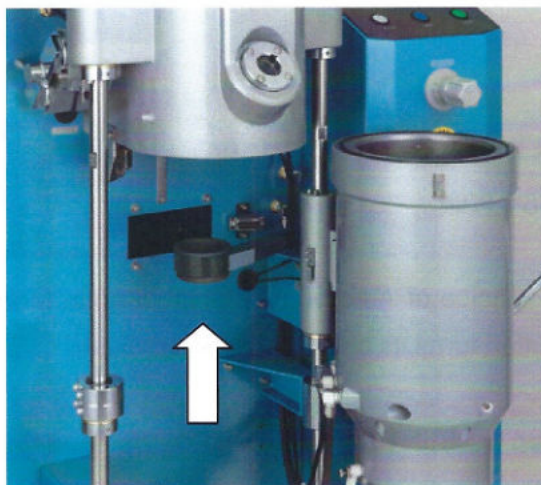
2) Flask chamber is released when temperature reaches target. You can open it to load flask.

3) LID lock is not released to maintain inert gas and furthermore protection gas is provided to melting chamber to minimize atmosphere comes up.

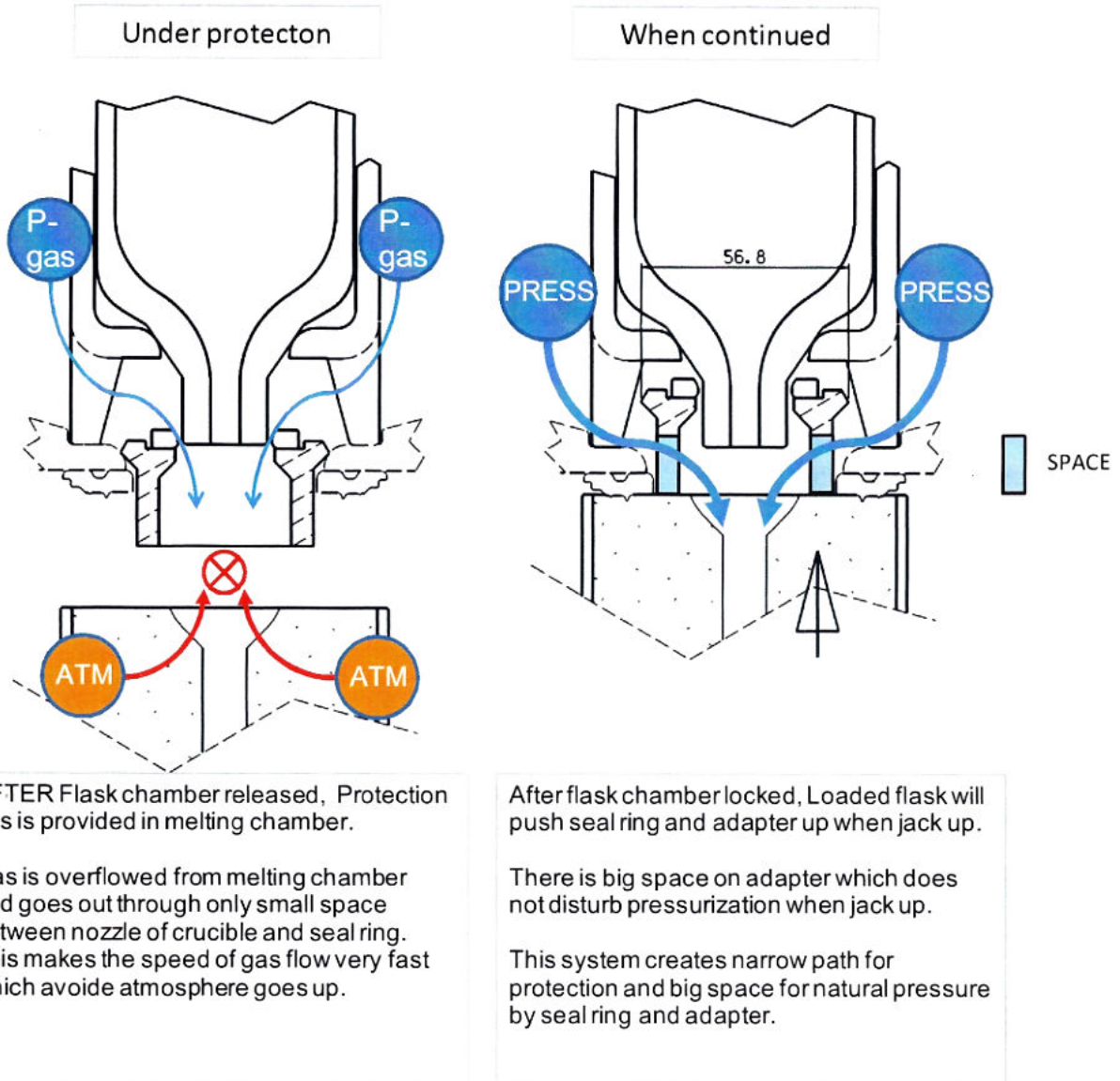
\* Timer for Protection gas should be set in advance at OPEN tab.

4) Close flask chamber and push START button to continue AUTO casting.

5) K2 NEXT has a protection pot which receives metal fall down by leakage which can be happens by shock chamber open and closing. (Can be stored inside of body by magnet if not used)



6) You must use seal ring and seal ring adapter when casting by this mode.



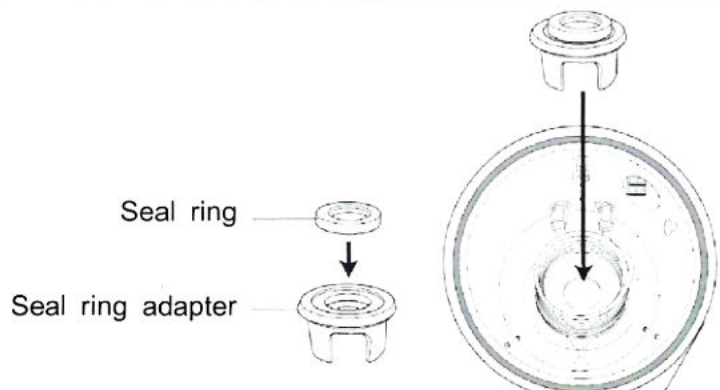
#### 7) Seal ring / Seal ring adapter



### IMPORTANT

When using AFTER mode, always set seal ring and seal ring adapter on bottom of the melting chamber.

- 1) Place the seal ring on the seal adapter.
- 2) Place seal ring and seal ring adapter from above to fit with the central opening at the bottom of melting chamber.

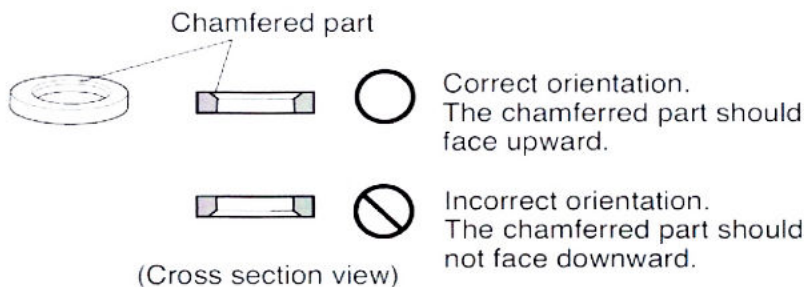






## IMPORTANT

Be sure that the chamfered part of seal ring should face upward, so that the bottom of edge of crucible can be smoothly set to the central opening of the seal ring.



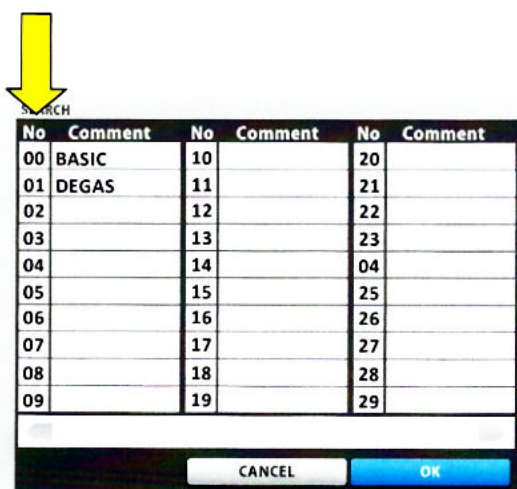
The seal ring and seal ring adapter are used for the purpose of preventing leakage of protection gas in the melting chamber. So, when the seal ring or seal ring adapter is damaged (crack or tipping etc.), be sure to replace into a new one before operation.

It is recommended to keep stock of those consumable parts.

## 7-1-7. MEMORY REGISTRATION

You can register your own recipe with number and name.

1) As already described, Tap memory number.

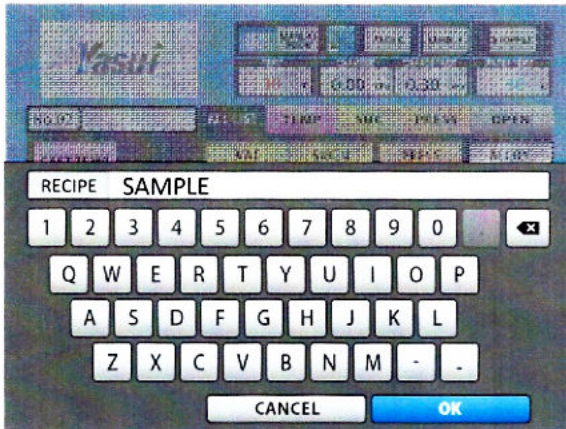


2) Choose any number you like

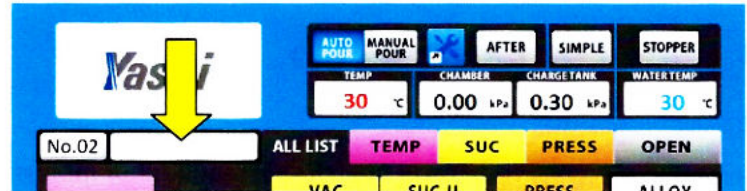
3) Window goes back with number chosen.



4) Tap blank box to put name or comment.



6) Tap OK button to close



5) Keyboard opens, type any name you like.

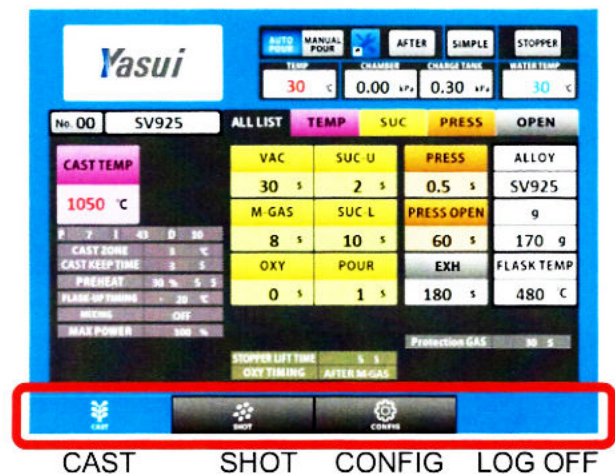


## OTHER tabs

There are 5 tabs on CAST window as already described.

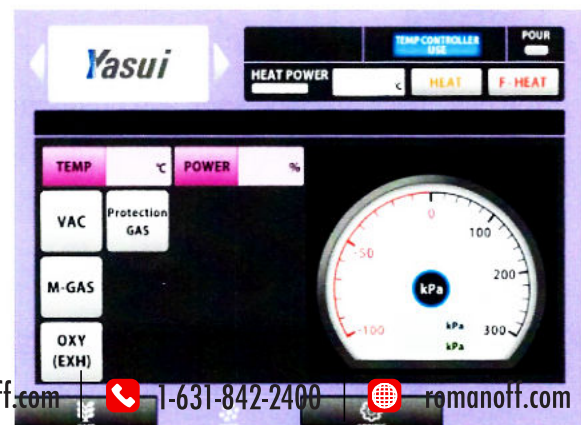
Besides CAST window is one of other kinds of tabs on the display.

Other tabs are ; SHOT, CONFIG, LOG OFF tabs



## 7-2. SHOT tab

This is an operation window for shot making.  
Please refer instruction of SHOT MAKER.



## 7-3. CONFIG tab

You have several configuration and other menus in this window.

<How to open CONFIG menu window>

Tap  CONFIG tab to open the window.



<About each icon>



MACHINE

You can check machine spec and program software version, calibration here.



COPY/CLEAR

You can copy or delete registered recipes.





## COUNTER

You can check how many shots done by AUTO in the past



## LANGUAGE

You can select language here.



## SECURITY

You can edit password and lock recipes.



## PAYMENT PASSWORD

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



## DISPLAY

Suspend timer, Brightness, and unit of measure.



## MAINTENACE

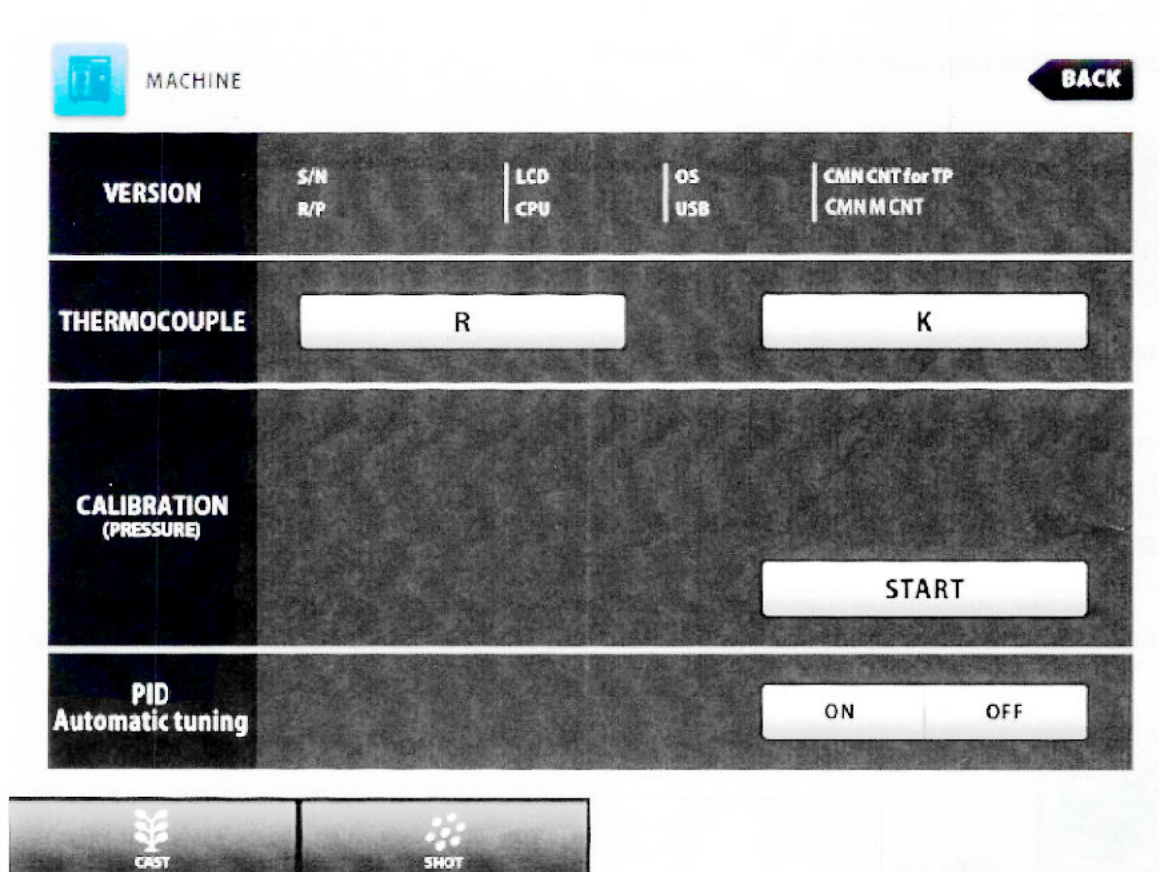
You can check status of machine, try single action of each function for maintenance

## 7-3-1. MACHINE

<How to open MACHINE display>

1) Tap  CONFIG tab to open CONFIG menu.

2) Tap MACHINE  icon to open MACHINE display



- 1) VERSION: Serial number of the machine, Firmware version and other information are indicated here.
- 2) THERMOCOUPLE: You can choose type of thermocouple R or K here.
- 3) CALIBRATION (PRESSURE): This function is used at installation or when location is changed.
- 4) PID Automatic tuning: You can get suitable PID settings automatically when you turn it ON.

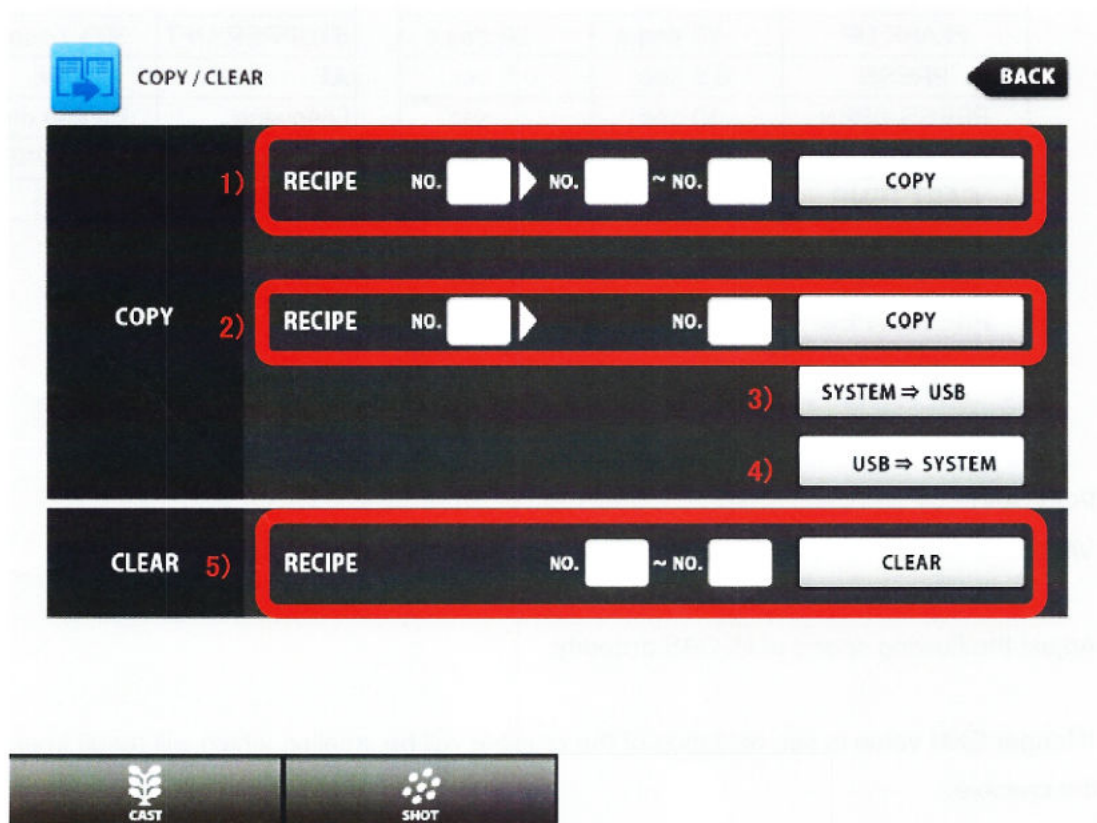
## 7-3-2. COPY/CLEAR

You can copy and delete registered recipes here in this page.

< How to open COPY/CLEAR window >

1) Tap CONFIG  tab to open CONFIG menu.

2) Tap COPY/CLEAR  icon to open COPY/CLEAR window.



<How to copy and delete>

- 1) Several copy : Copy one recipe to several recipe numbers.
- 2) Single copy : Copy one recipe to another recipe number.
- 3) K2 NEXT to USB : Copy all of recipes in K2 to USB flash drive.
- 4) USB to K2 : Copy all of recipes in USB flash drive to K2.
- 5) Delete recipe : Delete recipe chosen from No. XX to No. YY.

\* The default recipe is already preset at factory.

You can edit these recipes to create your original recipe.



## Parameters of K2 NEXT Preset at Factory

MEMORY NO.	00	01	Other parameters	
VAC	30 sec.	60 sec.	PID	7 : 43 : 10
M-GAS	8 sec.	8 sec.	CAST TEMP	1000 °C
* (after M-GAS)	(-0) kPa	(-0) kPa	TANK PRESS	200 KPa
OXY	0 sec.	0 sec.	CAST ZONE	±3 °C
SUC-U	2 sec.	2 sec.	KEEP TIME	3 sec
SUC-L	10 sec.	10 sec.	MIX	OFF
POUR	1 sec.	1 sec.	% Control	OFF
FLASK UP	-20 deg.c.	-20 deg.c.	STOPPER LIFT	30% / 5sec.
PRESS	0.5 sec.	0.5 sec.	AT	OFF
PRESS OPEN	10 sec.	- sec.	Language	English only
EXH	180 sec.	180 sec.	Security pass	YASUI_K2NEXT
CAST TEMP	1000 deg.c.	1000 deg.c.	Brightness	50%
PRE PRESS	- -	0.5 sec.		
DELAY TIME	- -	5.0 sec.		
PRESS OPEN	- -	60 sec.		
ALLOY	General casting	DEGAS MODE		

### IMPORTANT

- 1) VAC parameter is for use of vacuum pump with capability about 300 liters per minute.
- 2) Adjust the flowing speed of M-GAS properly.
- 3) If longer EXH value is set, oxidation of the crucible will be smaller, which will result in extended life of the crucible.
- 4) Adjust the HEAT parameter depending upon metal.
- 5) Set the pressure of the internal pressure tank by adjusting the SET PRESS regulator so that pressure inside the melting chamber after metal pouring will be within from 100 to 200 kPa.
- 6) When using metal containing large amounts of high evaporation rate materials such as zinc etc. and pouring it in high vacuum condition, vapor of zinc etc. is easily generated.  
As a result, dust of zinc etc. will be accumulated inside the chamber and further dust of zinc etc. will flow in and affect pipe components inside the machine.  
When using such metal, be sure to have atmospheric pressure after M-GAS as mentioned in the chart above. 8 second is only an example in certain tubing to achieve 0 kPa.  
Time will be different at each factory.

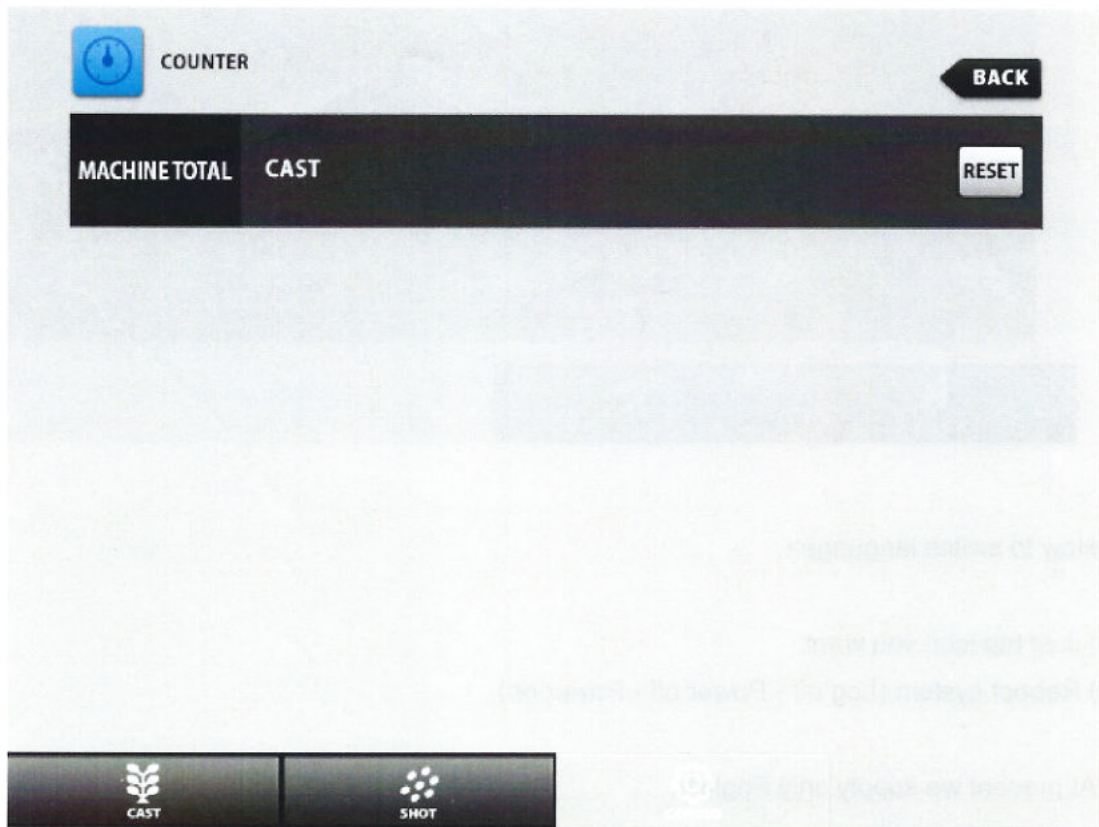
### 7-3-3. COUNTER

\* It is not possible to edit counter.

<How to open COUNTER window>

1) Tap CONFIG  tab to open CONFIG menu.

2) Tap COUNTER  icon to open COUNTER window.



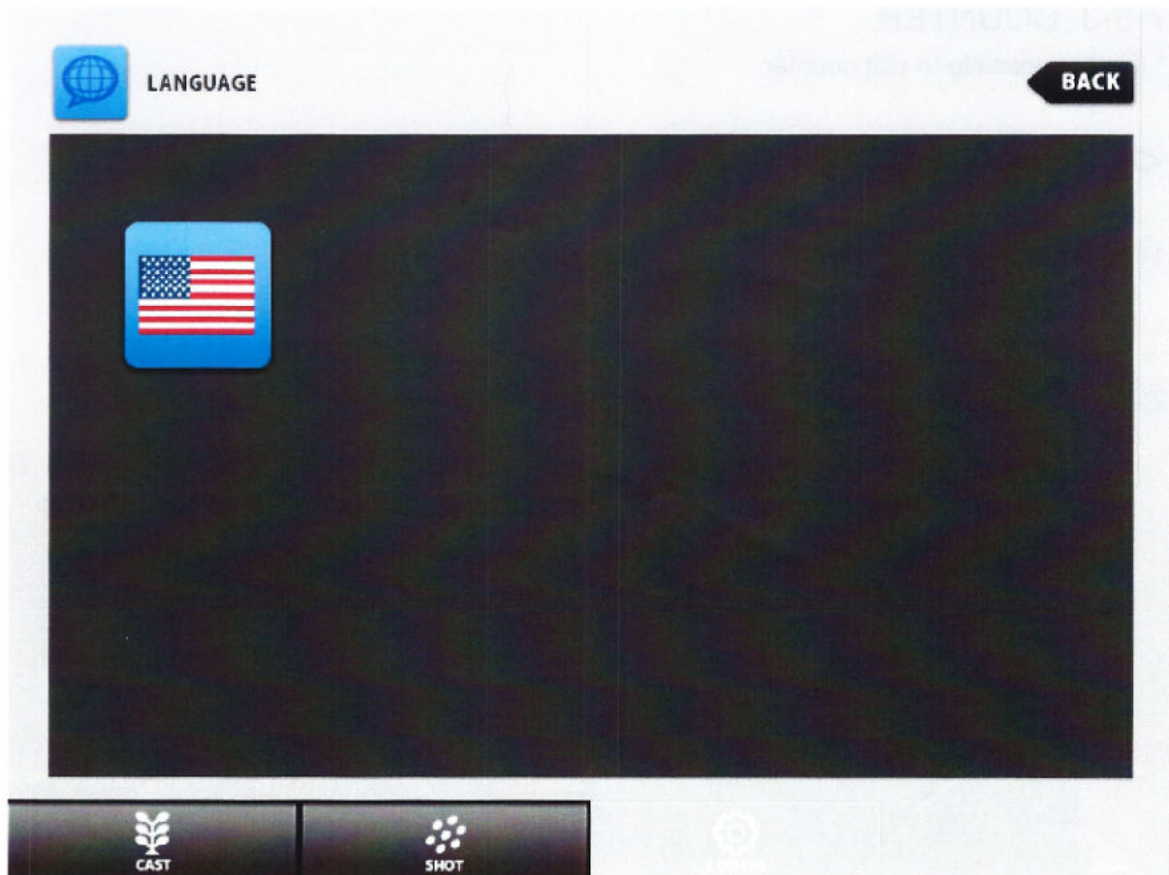
### 7-3-4. LANGUAGE

You can choose language

<LANGUAGE window>

1) Tap CONFIG  tab to open CONFIG menu.

2) Tap LANGUAGE  button to open.



<How to switch language>


- 1) Just tap icon you want.
- 2) Reboot system (Log off - Power off - Power on)

\* At present we supply only English.

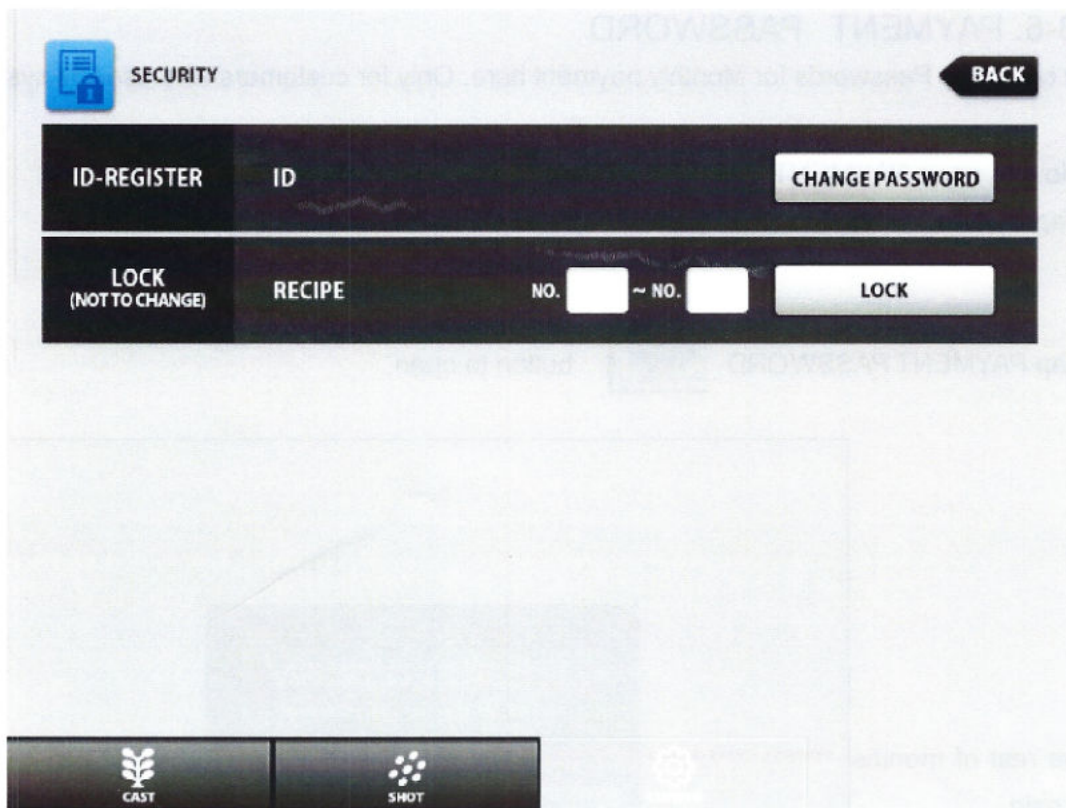
## 7-3-5. SECURITY

You can change your ID and protect recipes already registered here in this page.

- 1) Tap CONFIG  tab to open CONFIG menu.

- 2) Tap SECURITY  button to open.



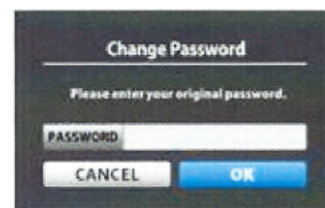


#### <ID-REGISTER>

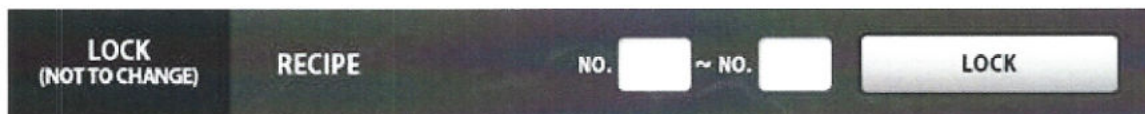
1) Tap CHANGE PASSWORD  button.

2) Tap blank cell to open keyboard and  
Enter new password you want to register

3) Tap present password (before change).  
Default password is "YASUI\_K2NEXT"



#### <RECIPE LOCK>



- 1) Enter any number you want to lock.
- 2) Tap LOCK button to open keyboard.
- 3) Enter password.
- 4) Lock button turns blue.



#### <Unlock RECIPE>

- 1) Tap LOCK button to open keyboard
- 2) Enter password
- 3) Lock button turns white

## 7-3-6. PAYMENT PASSWORD

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

<How to open PAYMENT PASSWORD window>

1) Tap CONFIG



tab to open CONFIG menu.

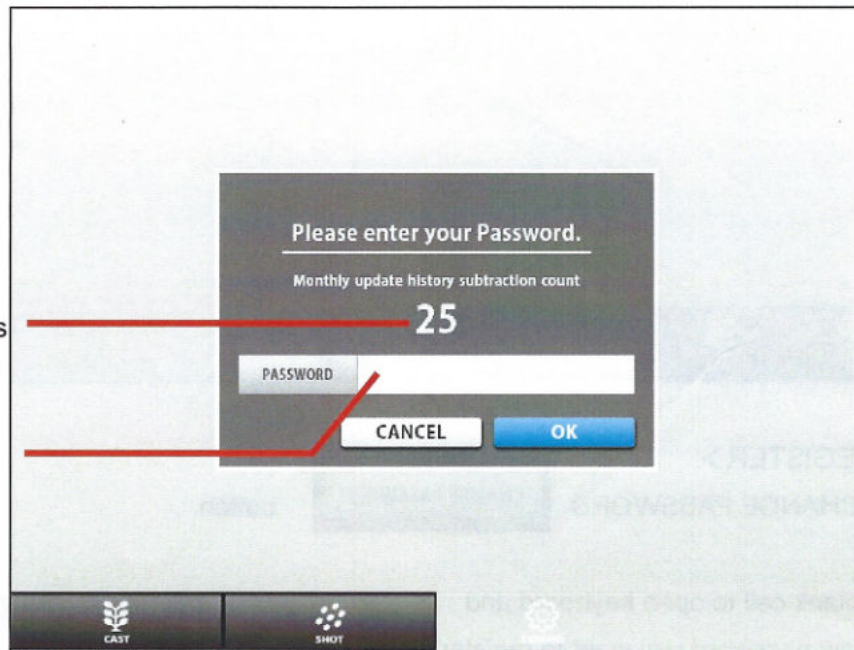
2) Tap PAYMENT PASSWORD



button to open.

2) The rest of months  
to be paid

1) Password box



1) PASSWORD



You can enter password.

2) Monthly update history subtraction count

The rest of months of payment.

## 7-3-7. DISPLAY

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

<How to open DISPLAY window>

1) Tap CONFIG

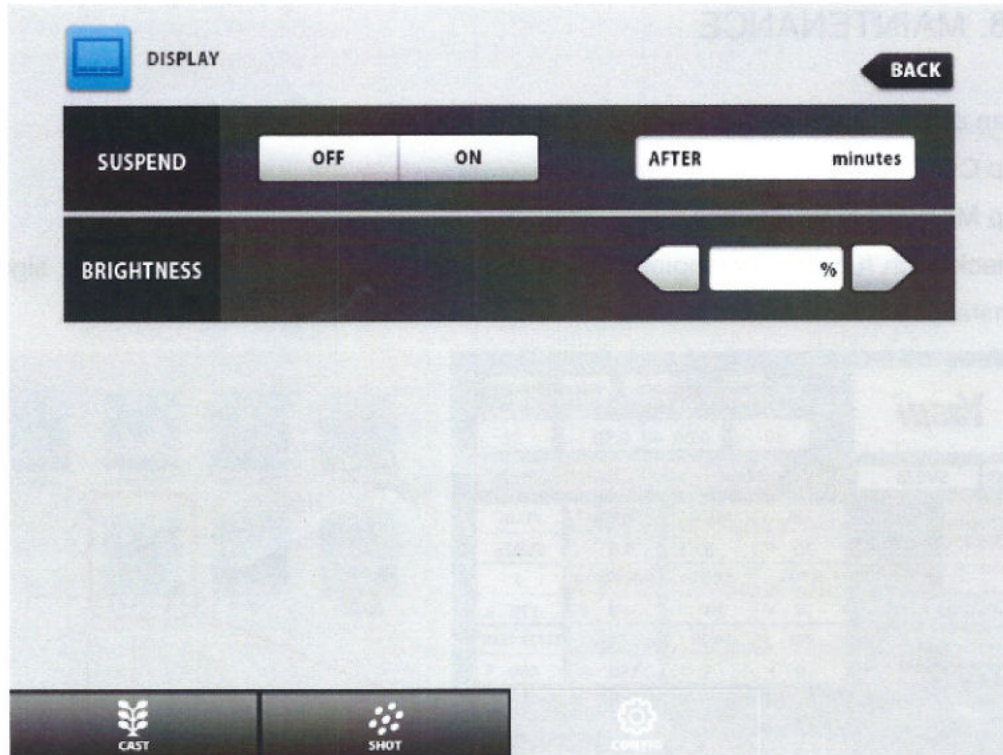


tab to open CONFIG menu.

2) Tap DISPLAY



button to open.

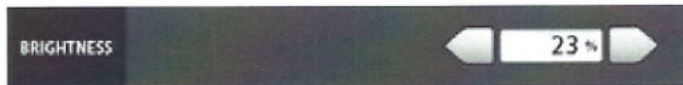




### 1) SUSPEND



You can activate Automatic power OFF function of the display.  
Select ON for activate, timer can be set from 1-999 minutes.

### 2) BRIGHTNESS



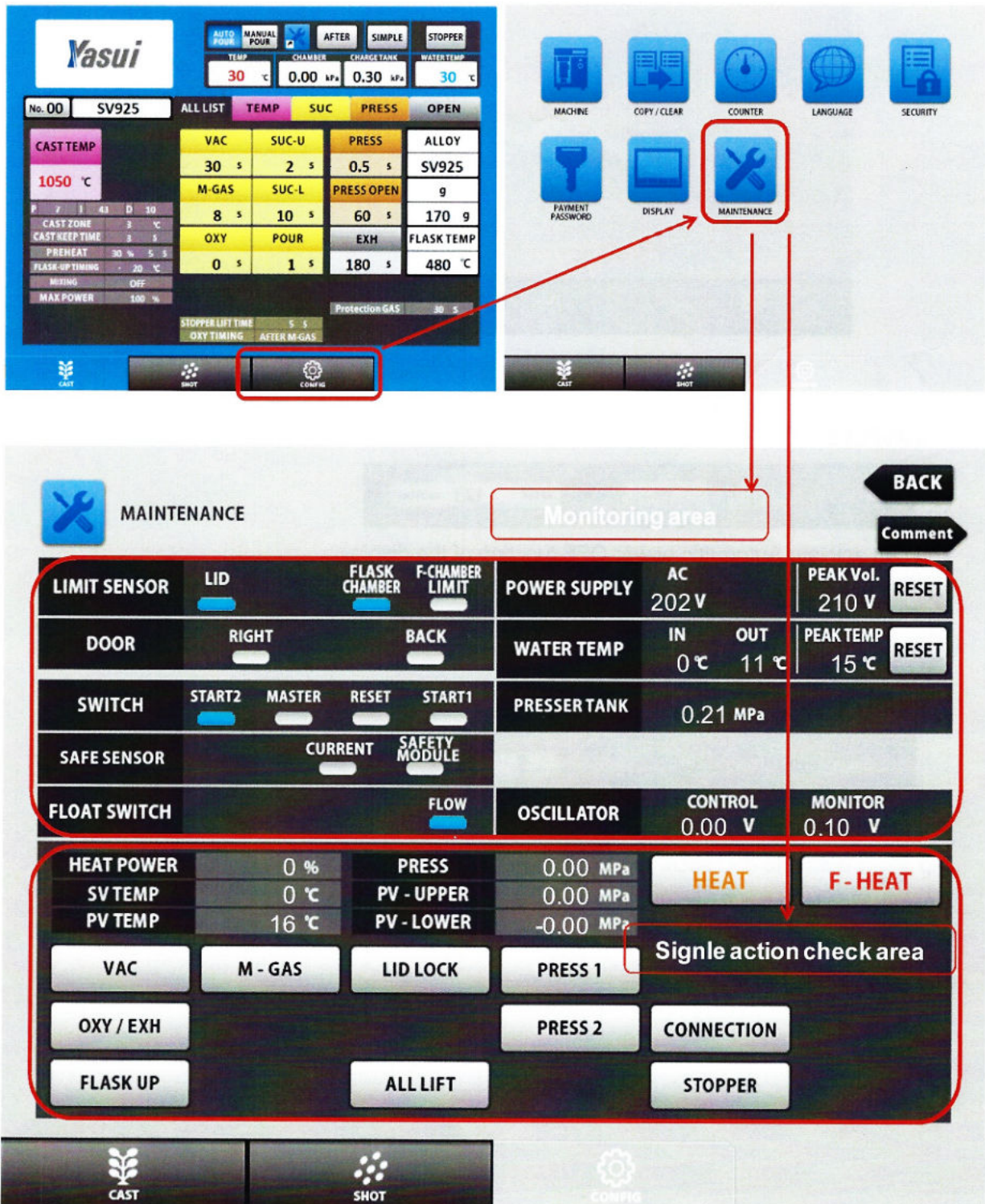
You can adjust the brightness of the display.  
Tap  button to decrease, tap  button to increase.  
You can also long tap for continuous adjusting.  
You can also tap number and open keyboard to set directly.  
The range is 0 - 100%



## 7-3-8. MAINTENANCE

You can activate each single action of K2 next for maintenance and other purpose.

- 1) Tap CONFIG tab at CAST window.
- 2) Tap MAINTENANCE button.
- 3) Check each function by tapping buttons. You can also monitor electric power, signals and other circumstances.



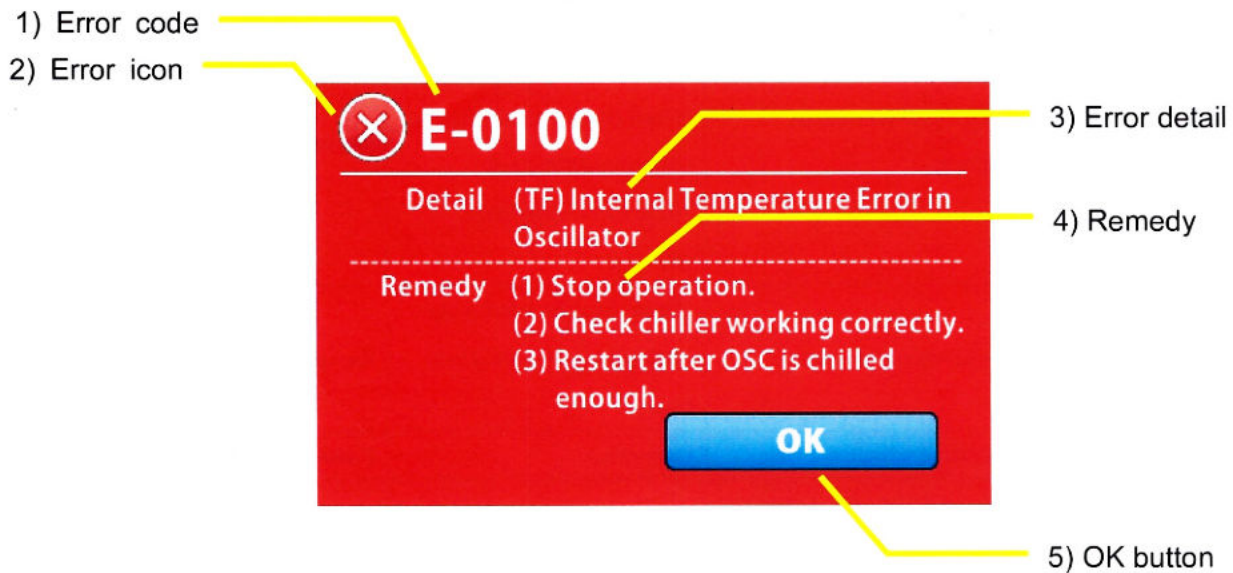
## 8. TROUBLE SHOOTINGS

### 8-1. ERROR MESSAGES

K2 NEXT shows messages when accidents happen.

You cannot operate K2 NEXT while 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,  information.

3) Error detail: Detail of error.

4) Remedy: Countermeasures.

5) OK: Tap OK  button to go back to previous page.



## 8-2. ERROR CODE

Error code	Level	Description	Cause	Remedy
E00	00	Error	EMERGENCY STOP button is ON	Solve problem and release button
E01	00	Error	(TF) Temp anomaly inside of oscillator	Temp exceeds over 55c Check cooling water supply temp
	01	Error	(AC) Over current input oscillator	• Short circuit on heating coil • Defective on oscillator Replace defective part
	02	Error	(NQ) Resonance circuit anomaly	• Rapid fuse open • Short circuit on heating coil • Open circuit between heating coil and matching coil • Defective on oscillation elements Replace defective part
	03	Error	(HF) Over current output	• Short circuit on heating coil • Defective on matching coil, others Replace defective part
	04	Error	(VL) Input voltage anomaly	Low voltage Ensure required power
E03	01	Error	Safety relay module activated	
E04	00	Error	Cooling water failure	Cooling water flow and pressure not enough (flow 3L/min, Pressure 1.5kg/cm2 required) • Check water tap • Check water pressure, amount • Check strainer filter
E05	00	Error	Over heat on heating coil cooling water supply	Cooling water supply temperature exceeds 35c Reduce temp
	01	Error	Over heat on heating coil cooling water drain	• Drain water temp too high • Water supply not enough • Check water temp • Check water flow
E06	00	Error	No response	No response of temperature controller • Check cable
	01	Error	Function code injustice	Need inspection
	02	Error	Address injustice	Need inspection
	03	Error	Number of readout register anomaly	Need inspection
	04	Error	Self-diagnostic error	Self-diagnostic error on temp. controller Replace temp controller
	05	Error	CRC error	Need inspection
	06	Error	Communication error	Check noise
	07	Error	Hardware error	Replace temp controller



E07	00	Error	Temp anomaly	Present temp too low	• Check setting of thermocouple type and K2
	01	Error	Over heat on melting chamber		• Check thermocouple
	02	Error	Thermocouple and oscillator defective	Temperature does not go up after heating start	Replace defective part
E08	00	Error	Right side panel open		• Close panel • Check sensor
	02	Error	Back side panel open		• Close panel • Check sensor
E12	00	Warning	Cycle time over	One of process time exceeds 20 min.	Check leakage
E13	00	Error	Exhaust failure	Exhaust not completed	Clean exhaust valve and pipes
E14	00	Warning	Voltage warning	Power out of range 195V-245V	Ensure required power
E15	00	Error	Voltage anomaly	Power out of range 180V-260V operation suspended	Ensure required power Check parts inside
E17	00	Error	Melting chamber pressure sensor anomaly	Pressure sensor detected pressure out of range	• Clean pipes • Check pressure sensor
	01	Error	Flask chamber pressure sensor anomaly	Pressure sensor detected pressure out of range	• Clean pipes • Check pressure sensor
	02	Error	Source pressure sensor anomaly	Pressure sensor output exceeds capacity range	• Clean pipes • Check pressure sensor
	03	Error	Surge tank pressure sensor anomaly	Sensor output exceeds capacity range	• Clean pipes • Check pressure sensor
E18	02	Error	Vacuum error	Pressure does not go down over certain value in certain time after vacuum starting up	Check vacuum valve and pressure sensor
E19	00	Warning	Recipe injustice	Recipe exceeds capacity range when start casting	Correct recipe
E20	00	Error	Operation panel switches contacts failure	Contacts on operation panel are closed when turning power ON	Replace defective part
E24	00	Error	Over current for ground	Too much current for ground	Remove short circuit between heating coil and melting chamber
E26	00	Warning	Lid open	Lid is open when operation starts	• Close lid • Check lid sensor
E27	01	Warning	Flask chamber open	Flask chamber is open when operation starts	• Close flask chamber • Check flask sensor
E28	00	Warning	Slow heating speed		Check thermocouple and PID

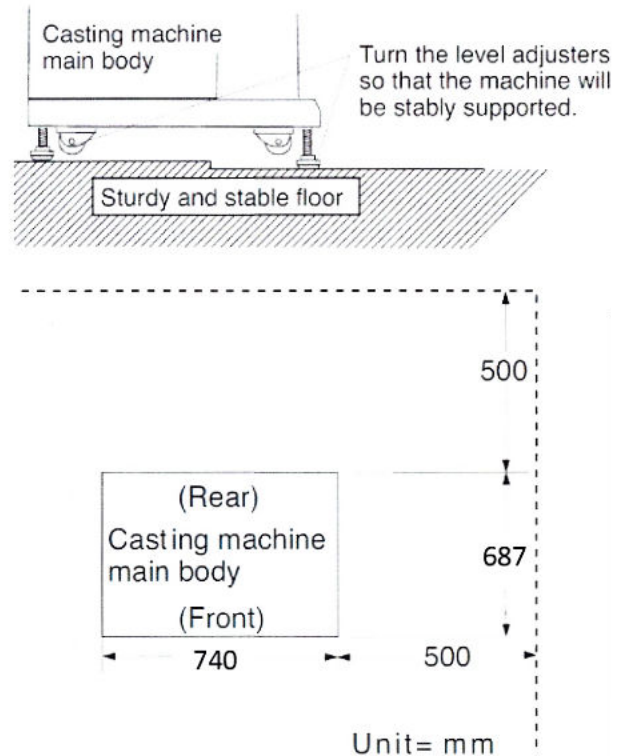
					setting
E29	00	Error	Slow pressure speed	No arrival target	Check solenoid valve and pipes
E50	00	Error	Sum-Check error of machine control parameter		Reboot
	01	Error	Setting-Range error of machine control parameter		Reboot
	03	Error	Failure of zero reset for pressure sensor on melting chamber		• Check solenoid valve
	04	Error	Failure of zero reset for pressure sensor on flask chamber		• Check pressure sensor
E52	00	Error	Command Format injustice		Need inspection
	01	Error	Undefined command receiving error		Need inspection
	02	Error	Command parameter injustice		Need inspection
	03	Error	BCC error		Need inspection
	04	Error	Communication error		Need inspection
	05	Error	Mode is not correct		Need inspection
E53	00	Error	Delete module transfer error		Need inspection
	01	Error	Writing module transfer error		Need inspection
	02	Error	Error at delete flash ROM		Need inspection
	03	Error	Error at writing flash ROM		Need inspection
E54	00	Warning	MASTER switch not turned ON	Start button pushed before MASTER button	Push MASTER button

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

## 9. INSTALLATION

### 9-1.PLACE

- 1) Floor must be sturdy and stable. The machine must be free from vibrations.
- 2) The machine must be levelled. (When the floor is not flat, adjust the level adjuster, so that the machine should be levelled.)
- 3) Do not install the machine at the place where material such as gas, that may affect casting and operation of the machine, is produced.
- 4) The machine must be installed at a dustless place.
- 5) Electrical noise should not be produced nearby.
- 6) Proper power supply is necessary.
- 7) Save enough space around the machine for daily maintenance.



### 9-2. POWER SOURCE

Use the power source of AC 220 V +/- 10%, three phase, 30 A, Approx. 9.5 KVA(8 KW model) or 6.5 KVA (5 KW model), 50/60 Hz, only for the machine.



#### WARNING

- 1) The machine must be earthed effectively.
- 2) This machine is not equipped with a ground-fault circuit interrupter. Connect to the ground-fault circuit interrupter on the power switch board in your factory. If the grounding wire is not earthed correctly, the ground-fault circuit interrupter may not work normally. Connect the grounding wire correctly.
- 3) Connection of the power supply cable should be made by a specialized electric technician only.
- 4) Do not connect the vacuum pump to the K2 NEXT machine body. Use another exclusive power supply line for the vacuum pump.

- 1) Open the right-side cover.
- 2) The terminal block for power source is located at the bottom.  
Connect the power cable for the machine to the terminal block.

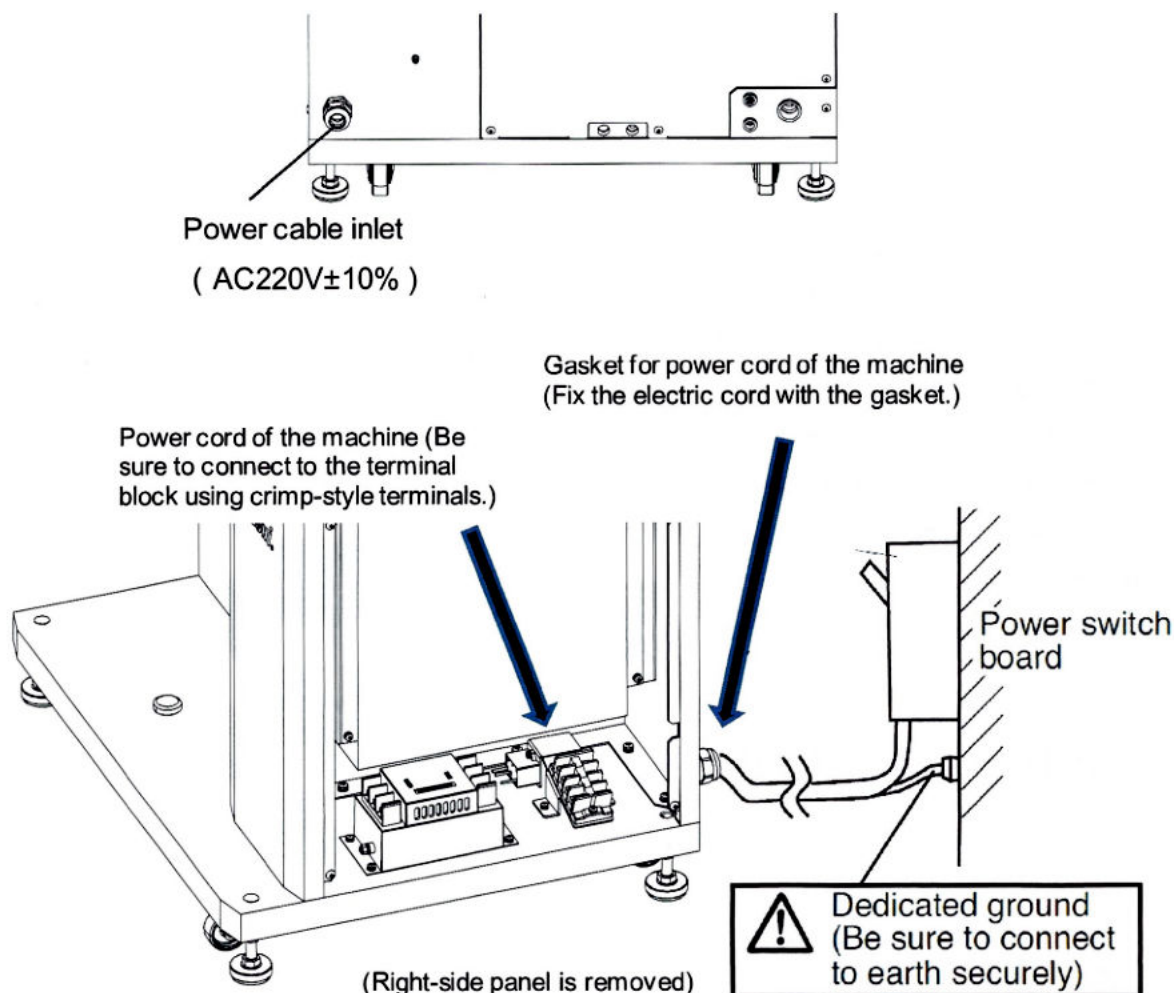




## IMPORTANT

Three-phase current is used for power supply in this machine.

Therefore, correct connection of the power cable for the machine body is important.



## 9-3. CONNECTING WATER HOSE

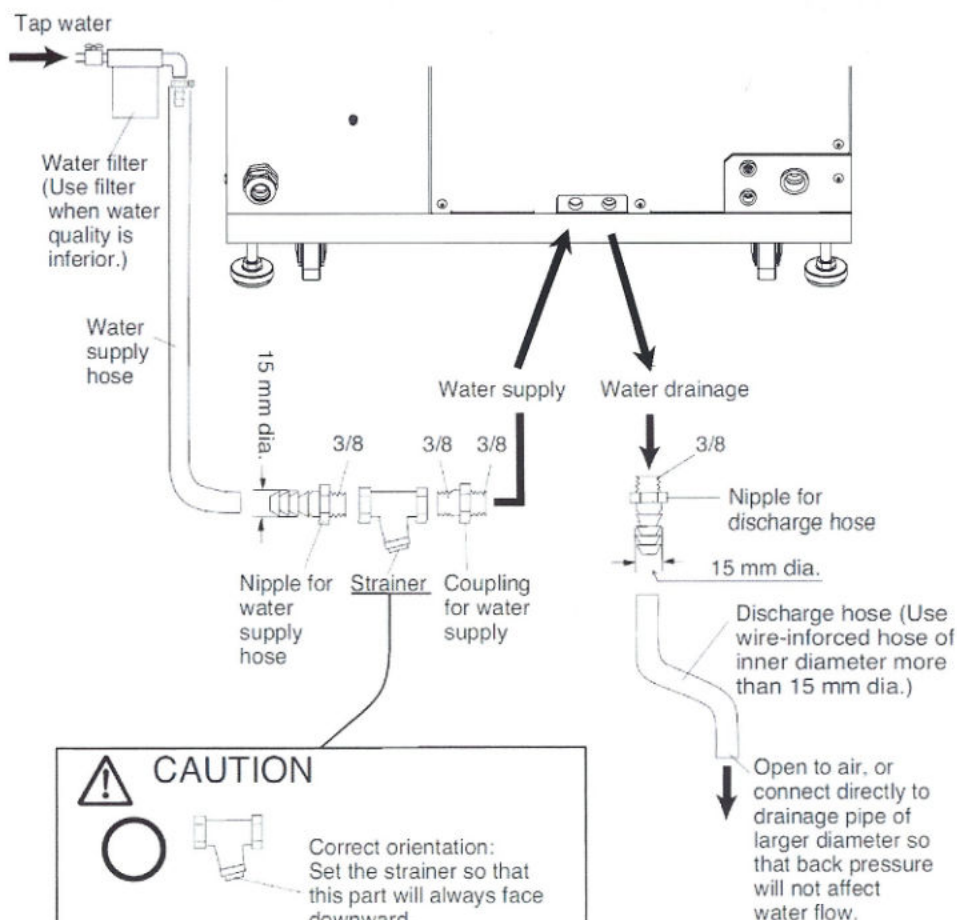
This machine needs internal circulation of tap water for cooling. Connect to water supply of sufficient water pressure (water supply pressure: over 0.15 MPa in average, and water supply flow rate: more than 3 liters per minute).



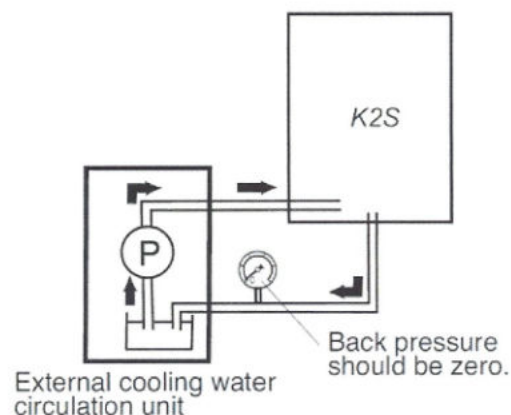
## CAUTION

- 1) In case water from the tap is not clean, water should be supplied through water filter available in the market. (Water filter and hose are not provided with the K2 NEXT.) Select water filter of adequate size so that water flow should not be decreased.
- 2) Be sure to complete water supply correctly before start heating.

Connect a water supply hose and a water discharge hose as below figure.



When using external cooling water circulation unit available in the market, arrange it so that back pressure should 0 (zero). (External cooling water circulation unit is not provided with the K2 NEXT.)



## IMPORTANT

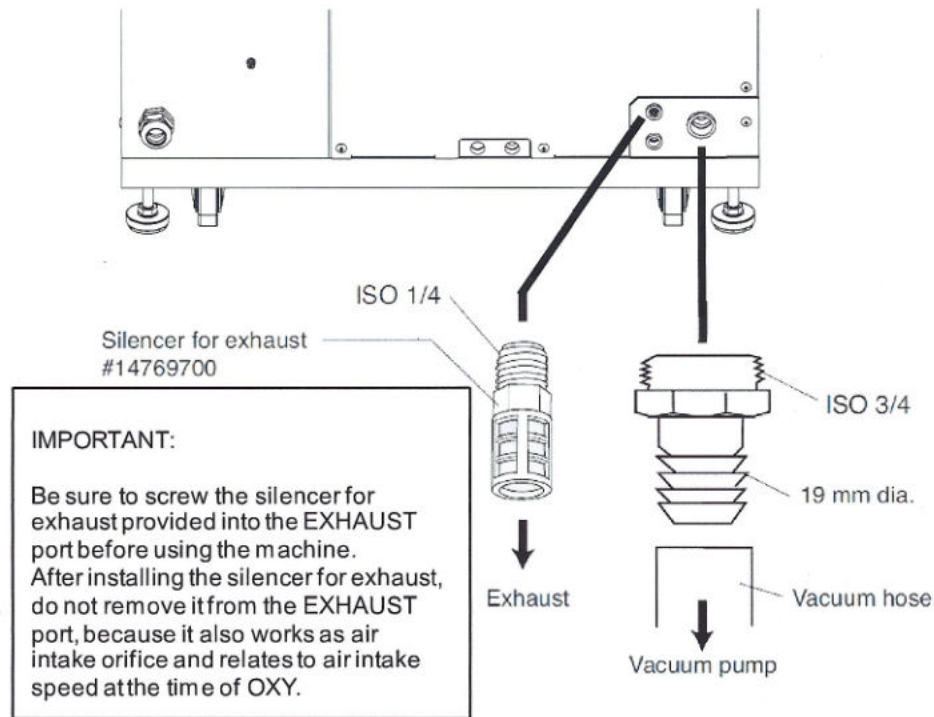
- 1) Boost pressure of its pump should be high enough.
- 2) Consult with a qualified technician for arrangement of circulation unit.

The manufacturer shall in no event be liable for any damage resulting from use of external cooling water circulation unit.

## 9-4. CONNECTING VACUUM PUMP

Connect the vacuum pump specified by the manufacturer to the machine as follows.

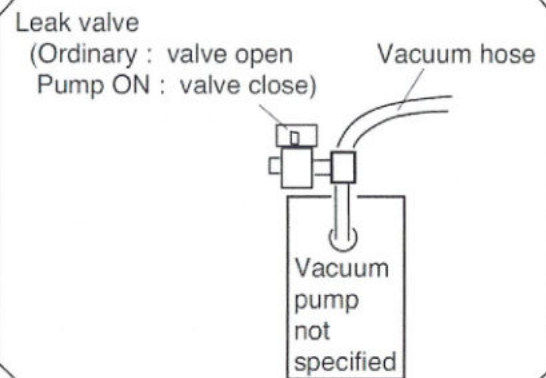
(Vacuum pump is not included in the K2 NEXT.)



### CAUTION

- 1) Use a pump of more than 300 liters per minute.
- 2) Connect the power cable of the vacuum pump to wall power outlet separately from the casting machine, so that the pump will operate alone independently. Be sure to set a 'leak valve' to the vacuum pump so that the inside of the hose will become exhaust condition at the moment when the pump is turned OFF. That leak valve should synchronize with power ON-OFF in such a manner that when the pump is ON, the leak valve should be OFF and when the pump is OFF, the leak valve should be ON.

- 3) After checking of cable connection, check also that rotating direction of the motor of vacuum pump is correct. Particular care should be taken at cable connection to avoid reverse rotation by phase difference.





## 9-5. SUPPLY OF INERT GAS



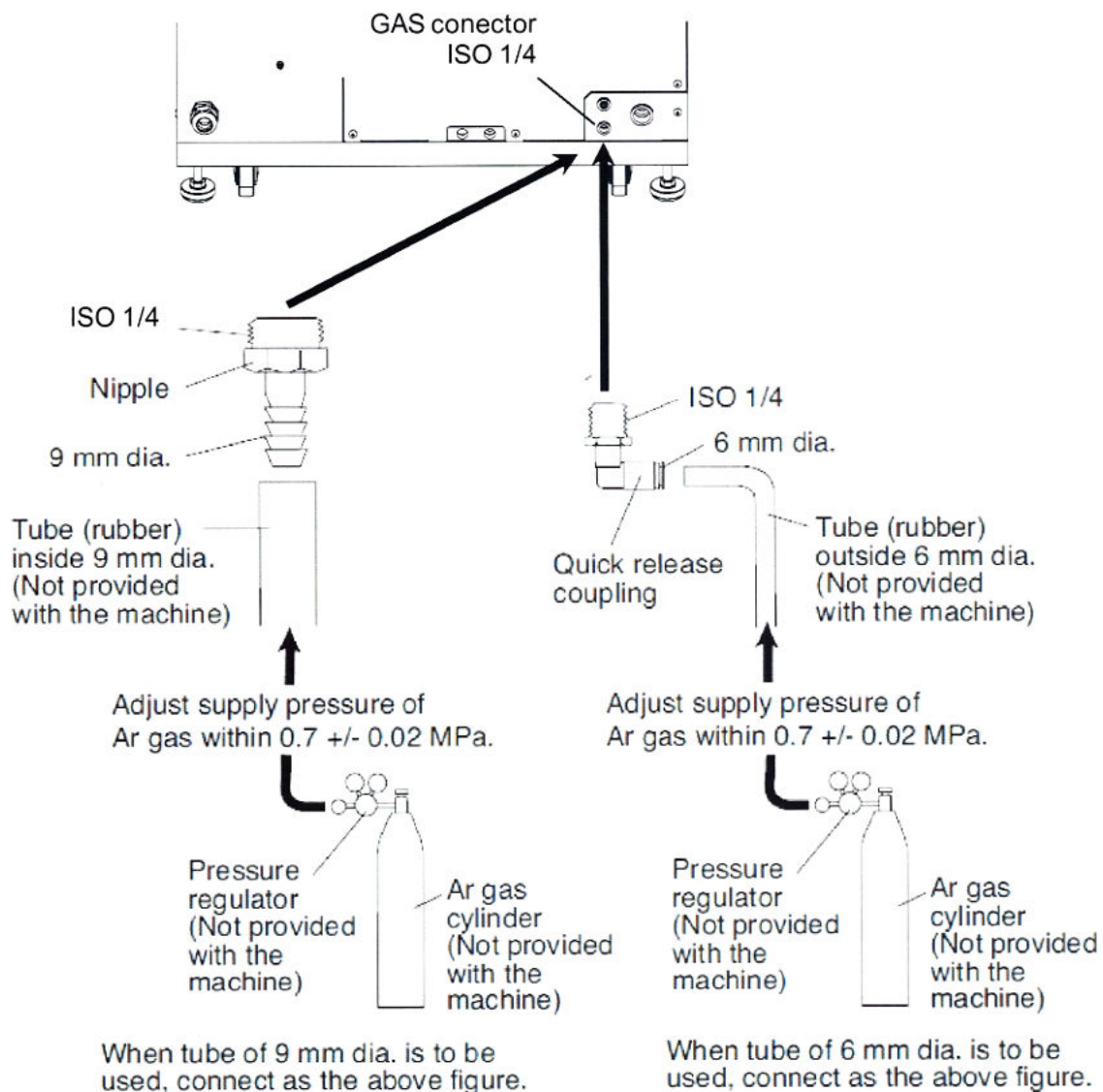
### WARNING

- 1) Never use inflammable gas (such as hydrogen gas, etc.).
- 2) Never replace the gas cylinder while the machine is in operation.
- 3) Observe the below mentioned requirement of gas supply. In case gas supply flow rate is extremely small (for example: gas pipe from gas cylinder to K2 NEXT is narrow and long), the machine may not work properly.

Argon is standard supply gas of this machine.

Both below-mentioned 1) and 2) requirements should be satisfied.

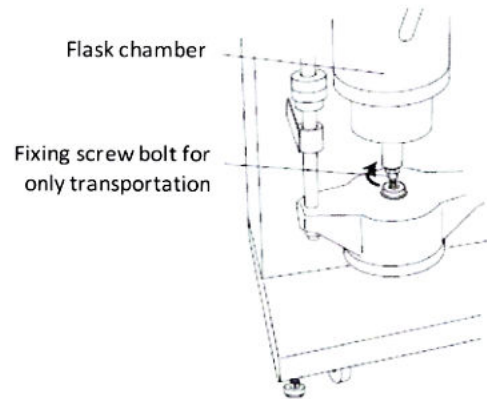
- 1) Gas supply pressure: 0.7 MPa
- 2) Gas supply flow rate: more than 120 liters per minute



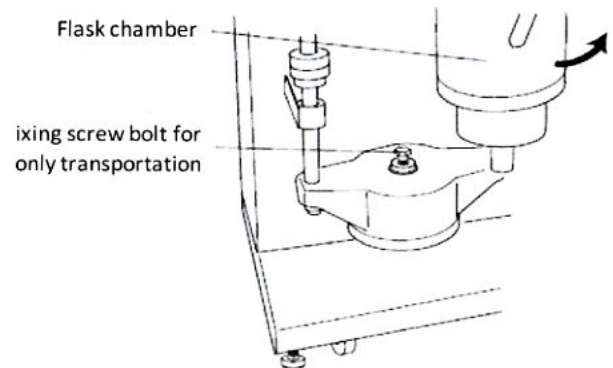
## 9-6. FLASK CHAMBER

### 9-6-1. REMOVING FIXATION BOLT FOR TRANSPORTATION

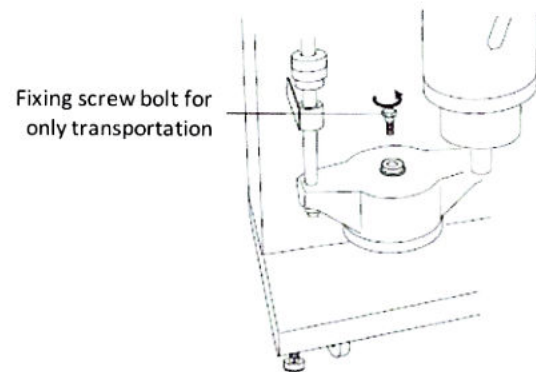
1) Turn the fixation bolt for transportation (Hexagonal head bolt, Size: ISO M12 L=45 mm) clockwise, so that the mold chamber can be moved back and forth freely.



2) Slide the mold chamber to front side.

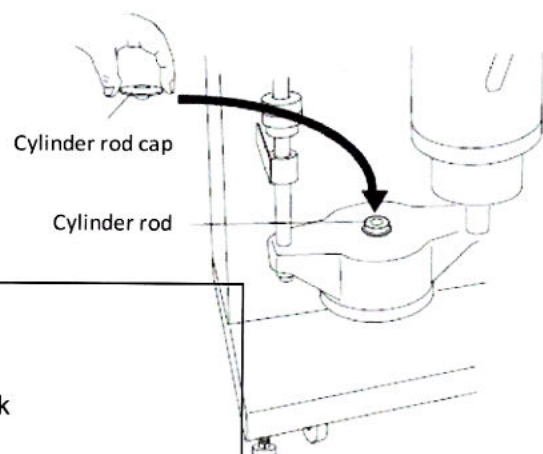


3) Remove the fixation bolt for mold chamber turning it counterclockwise



### 9-6-2. CYLINDER ROD HEAD COVER

Place the cover for cylinder rod on the top of the cylinder rod for protection.



#### IMPORTANT

If the cylinder rod head cover is forgotten, the lid lock action cannot be performed properly.

At the time of installing the machine, be sure to check it is set in place.

## 9-7. THERMOCOUPLE



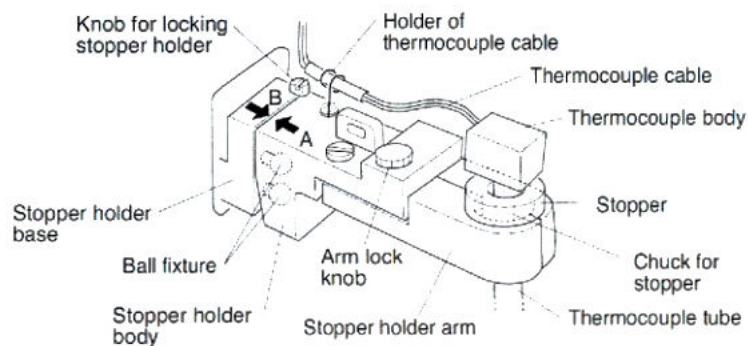
### CAUTION

In the case of the K-type machine, if the "R-type thermocouple" is connected to the "K-type socket" by mistake, display temperature will be lower, and actual temperature of metal will become too high. Such mistake at type selection may cause hazardous results, so always check that the type of Thermocouple is correct.

In the case of the R-type machine, if the "K-type thermocouple" is connected to the "R-type socket" by mistake, display temperature will be abnormally higher than actual metal temperature.

### IMPORTANT;

It is possible that a large amount of moisture is contained in protection tube of a new thermocouple. Carry out preheating up to around 200 degrees Celsius before actual casting.



- 1) Set the stopper holder in place, making alignment with the ball fixture.
- 2) Turn the knob for locking stopper holder, so that a part of the knob will be positioned over the upper rear edge of stopper holder body. This position of the knob can lock the stopper holder.

### IMPORTANT;

Check that the level of stopper holder (A) and that of stopper holder base (B) will be same as shown in the figure.

- 3) Lift the arm lock knob, so that the stopper holder arm will be released. Then, slide open the left arm to left side.
- 4) Lifting the stopper holder, set the stopper to the chuck and close the left arm. Lower the arm lock knob.
- 5) Put the tube of thermocouple body into the hole of stopper.





## CAUTION

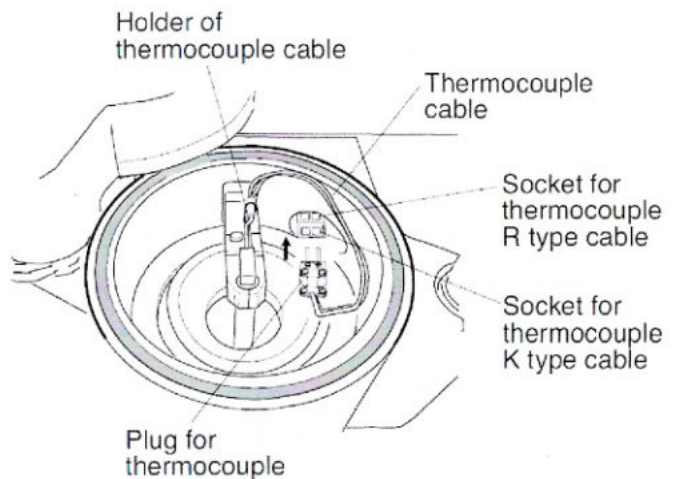
The thermocouple must be set in place until its lower end makes contact with the bottom of the stopper hole.

6) Route the thermocouple cable through the holder of thermocouple cable on the stopper holder body.



## CAUTION

- 1) Carefully route the thermocouple cable so that the cable should not be caught by other parts.
- 2) Do not kink the thermocouple cable.

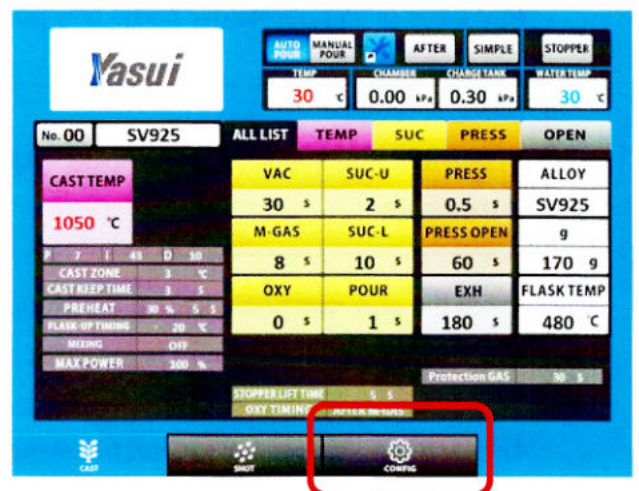


7) Plug the thermocouple into the socket of the machine. (It is not possible to connect the plug in reverse direction.)

## 9-8. CALIBRATION (Zero adjustment of pressure sensor)

You have to calibrate machine after installation and transportation.

- 1) Turn main breaker switch ON.
- 2) Push Master Button when requested.
- 3) Tap CONFIG button to open another page.

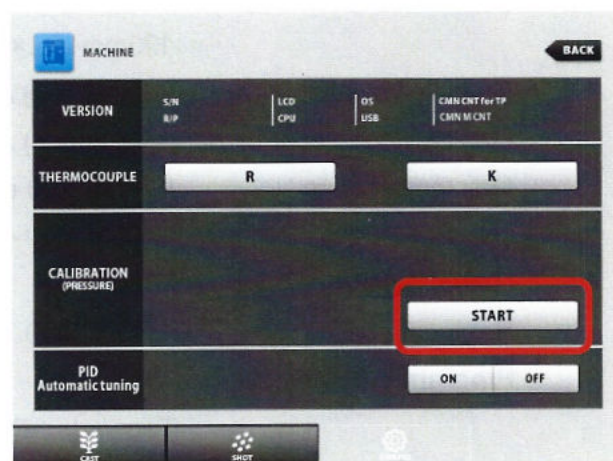




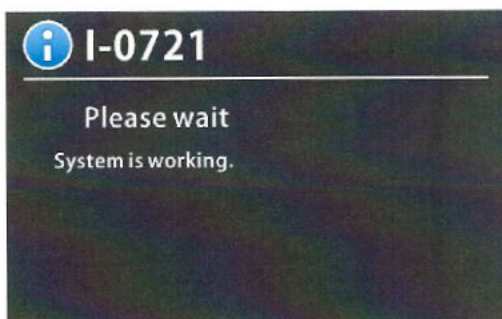
4) Tap MACHINE button



5) Tap START button



6) Calibration starts automatically  
Pop up message will be shown for a while.



End of procedure.

## 10. SPECIFICATIONS

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Power source	220VAC +/-10%, 50/60Hz 3phase , 9.5KVA(8kw) / 6.5KVA (5kw)
Oscillation	8kw / 5kw
Net Weight	Approx.185 Kg
Dimension	740 (W) x 687 (D) x 1,219 (H)mm
Max.flask size	125mm dia.×230mm(H) standard 125mm dia.×300m m(H) option
Crucible volume	242cc (8kw) / 158cc (5kw)
Max.castingamount	150cc (8kw) / 100cc (5kw)
Max.temperature	K type 1200 degrees C R type 1450 degrees C (8kw) / 1300 degrees C (5kw)
Max. pressure	300kPa
Replacing gas	Argon gas 0.7MPa / over 120 liters per min.
Program memory	100 Tap water direct cooling system
Cooling Water	more than 3L/min, more than 1.5kgf/cm <sup>2</sup> , Less than 30°C
Casting system	Casting system
Alarm	Digital indication by self diagnosis
Vacuum pump	Option over 300 liters/min.