

VACUUM PORCELAIN FURNACE

Ref. 100249

Thank you for having purchased the vacuum porcelain furnace Ref. 100249. This manual provides a help for the operation of the furnace. Please, read this manual carefully before installation and use.

1. Unpack

We take many packing measures to ensure the security of the furnace during transportation. If you have any questions when you use our furnace, please contact your dealer or manufacturer immediately.

1.1. Unpacking

- Remove the packing belt and carton.
- Remove the plastic bag outside the furnace.
- Take out the outside foam.
- Take out the firing platform and firing plate which are placed in the upper foam.
- Take out furnace from foam base carefully. Place it on the stability of the desktop.
- Take the vacuum pump out of the carton. Place it on the ground nearby the furnace.
- Recommend keeping the original packaging for future transportation purposes.

1.2. Checking

- Please check whether the model and quantity of accessories accord with the list and whether the appearance of the furnace is in good condition.

1.3. Accessories

- Vacuum Pump: 1 set;
- Platform: 1 PCS;
- Firing Tray: 2PCS;
- Silicon Tube: 1 PCS;
- Support Pin: 1 Bag;
- Fuse (15A): 1 PCS;
- Fuse (5A): 1 PCS;

2. 2. Technical specifications

Dimensions: 320 x 392 x 426 mm (W x D x H)

Weight: 24 kg (furnace)

..... 8 kg (pump)

Max. temperature: 1200 °C

Max. working vacuum: -98 kPa

Power supply: 220 V ±10 %, 15 A

Power consumption: 1.5 kVA ±10 %

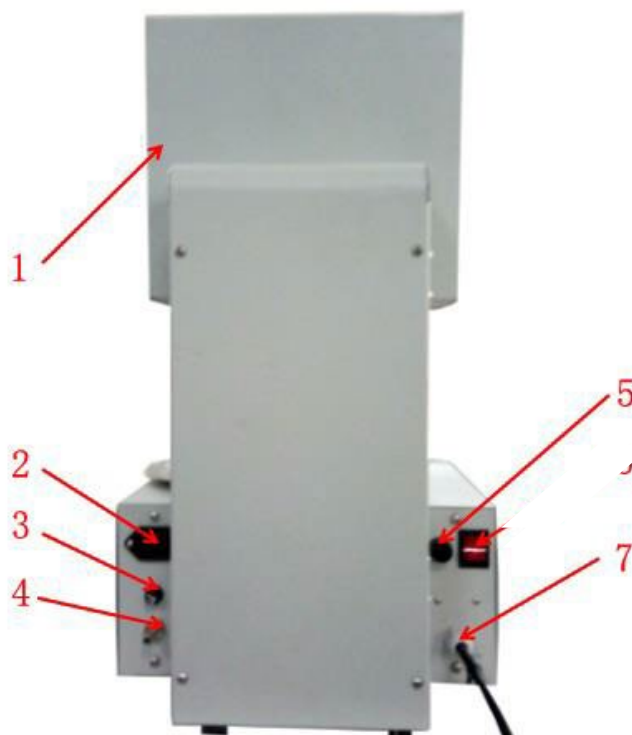
3. Structure

3.1. Front view of furnace unit



- | | |
|--------------------|--------------------|
| 1. Furnace shell | 6. Metal tray |
| 2. Crucible | 7. Working table |
| 3. Firing plate | 8. Touch screen |
| 4. Firing platform | 9. Power indicator |
| 5. Sealing ring | |

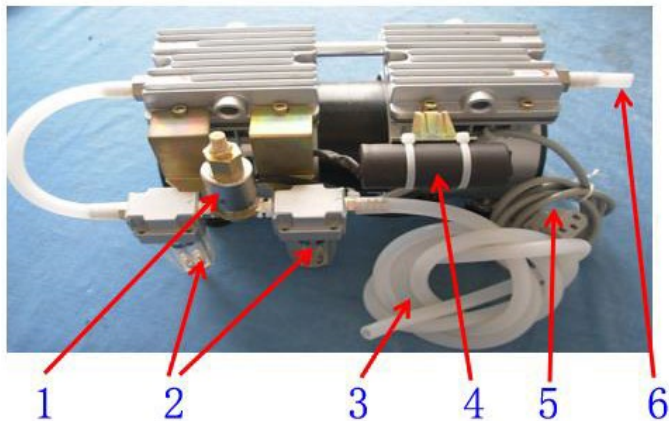
3.2. Rear view of furnace unit



1. Cooling shell
2. Vacuum pump electrical outlet
3. Fuse of vacuum pump
4. Vacuum hose connector
5. Fuse of power supply
6. Power switch
7. Power wire

4. Installation

- 4.1. Take out furnace from foam base carefully. Place it on the stability of the desktop.
- 4.2. Take the vacuum pump out of the carton and place it on the ground nearby the furnace. The position of vacuum pump should be lower about 80 cm than furnace.



- | | |
|-------------------|-----------------|
| 1. Solenoid valve | 4. Capacitor |
| 2. Filter | 5. Vacuum pump |
| 3. Vacuum hose | 6. Exhaust hole |

- 4.3. Connect the vacuum pump hose to the vacuum hose connector at the rear of the furnace.
- 4.4. Plug the vacuum pump power cord into the electrical outlet at the rear of the furnace.
- 4.5. This furnace should be connected to a grounded 220 V, 15 A power socket.
- 4.6. Press power switch ON. The furnace will enter the stand-by mode.
- 4.7. Press UP key to lift the muffle. Place the firing platform on the middle of the tray.

NOTE: After switch on the furnace, the firing platform must be placed on the tray. Otherwise the sealing ring (O-ring) on the tray will be burnout. The firing platform can't be taken out from the furnace except for long-distance transportation.

- 4.8. The moisture in the muffle should be removed correctly, otherwise the moisture may enter the vacuum system to damage the vacuum pump and solenoid valve etc. The service life of the furnace may be shortened and even the furnace may be damaged.
- 4.9. In order to prevent the accumulation of moisture in the muffle, the new furnace should be operated strictly according to following steps before using.
 - Switch on the furnace.
 - Select cleaning program "CLEAN".

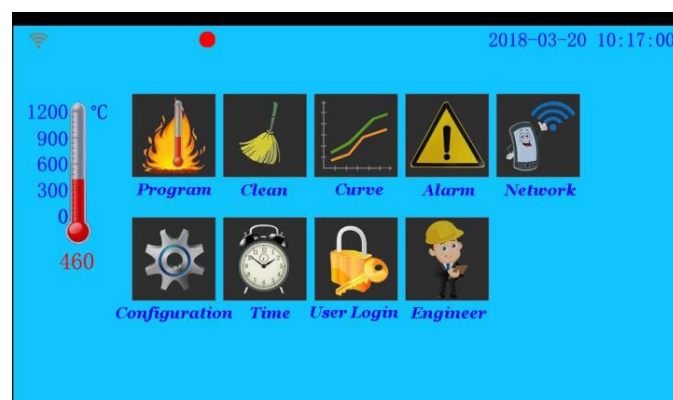
- Press "START" key to run the program.
- After the program completes, repeat above steps at least ten times to dry the muffle completely so that remove moisture in the muffle.
- If the furnace is not used for a long period of time, the user had better operate according to above steps.

When the water level in the filter of vacuum pump approaches 1/3 height, please unscrew the bolt at the bottom of the filter immediately to drain off water. Prevent water vapor from entering and damaging the vacuum pump.

5. Operating instructions

Function description

The *standby menu* shows every function icon: Program, Clean, Curve, Alarm, Configuration, Time, User Login.



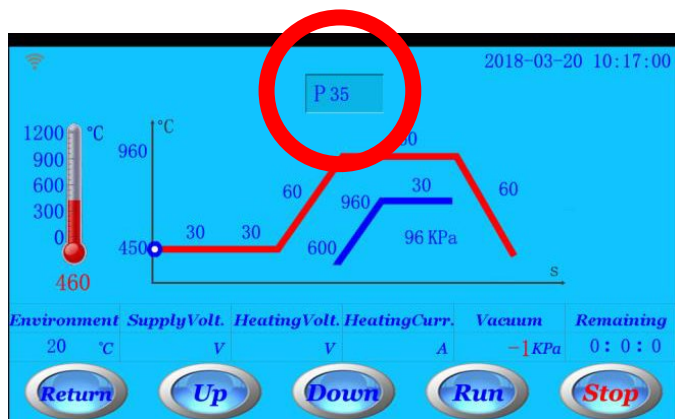
NOTE: After switching on the furnace, please operating it only when the tray is opened completely.

5.1. Firing type

5.1.1. This furnace has two firing types:

- (1) Program number P1-P40: you can edit parameters by yourself.
 - (2) Program number P41-P47: special programs for Blue porcelain block.
- Choose the Program number in Standby Menu to enter the *program parameter menu*.

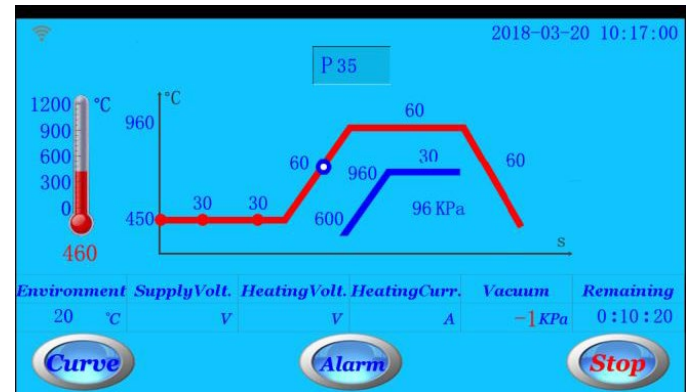
5.1.2. Click **program** icon to enter *firing standby menu*.



5.1.3. In *firing standby menu*, the following functional icons can be used:

- **UP** and **Down** icons: click these icons to open or close the tray door.
- **Return**: click this icon to return the Standby menu.
- **Run**: click this icon to start the program.
- Click every parameter to revise the value.
- Click **program number** icon to enter the selecting program menu and parameters setting menu.

5.1.4. In *firing standby menu*, if pressing **Run** icon, confirmation question will appear. If pressing **Yes** icon, the selected program will start running. The screen is showed *program running menu*.

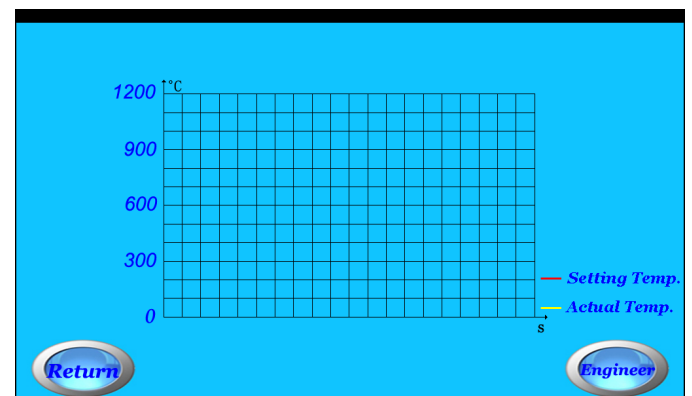


5.1.5.

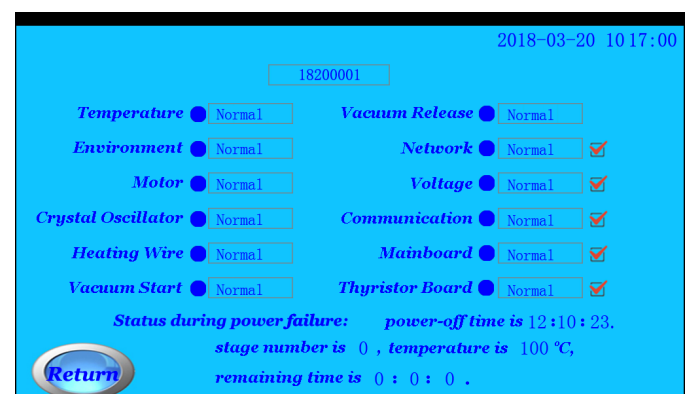
- If you want to set the vacuum, please click **vacuum value** icon to set directly.
- If you don't need the vacuum, please click **vacuum value** icon to set "0" directly.

5.1.6. During firing program running, the firing curve, firing time countdown and real vacuum value inside the furnace will be showed on the *firing menu*.

5.1.7. During firing program running, click **Curve** icon to enter program running curve menu. The real-time program running curve is showed.



5.1.8. During firing program running, if the furnace has problem, the red icon is flashed. Click **Alarm** icon to check the detailed alarm information.



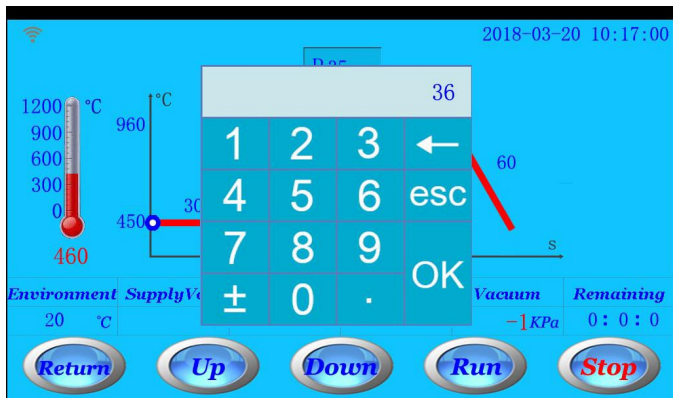
5.2. Program

This furnace has 47 firing programs.

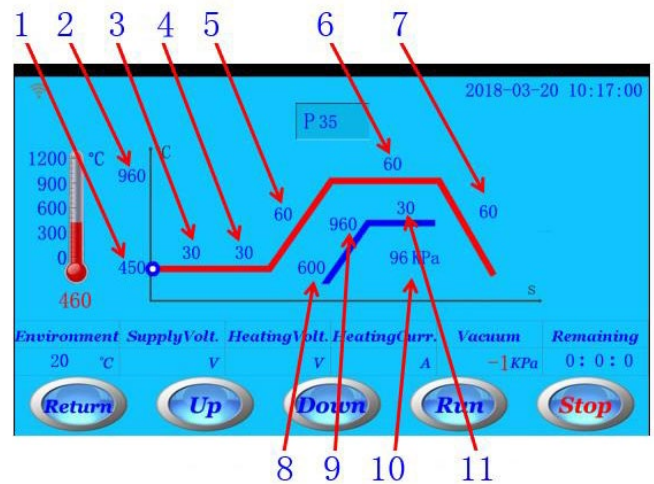
5.2.1. Program number **P1-P40** are for normal porcelain powder materials. These all 40 programs can be edited by yourself.

5.2.2. Program number **P41-P47** are for Blue Porcelain Block material. P41-P45 can't be edited. Use P46-P47 for editing your own programs.

5.2.3. In *standby menu*, you can click **program number** icon to choose the program number by the numeric keypad.



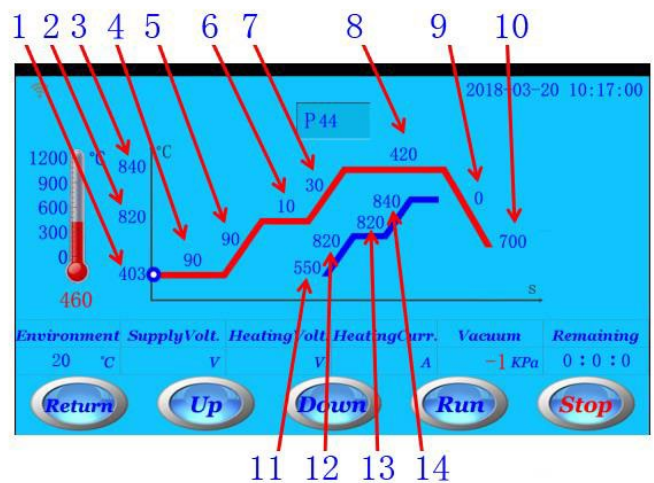
Parameter in standby menu (P1-P40) for normal materials.



1. Idle temperature
2. Firing temperature
3. Dry time
4. Preheat time
5. Heat rate
6. Firing time
7. Cooling time
8. Vacuum starting temperature
9. Vacuum releasing temperature
10. Real-time vacuum value
11. Vacuum time

Parameter in *standby menu* (P41-P47) for blue porcelain block.

If you choose program 41, 42... 47, selection menu of blue porcelain block will be showed on the screen.



1. Idle temperature
2. Firing temperature (part 1)
3. Firing temperature (part 2)
4. Preheat time
5. Heat rate (part 1)
6. Firing time (part 1)
7. Heat rate (part 2)
8. Firing time (part 2)
9. Cooling time
10. Cooling temperature
11. Vacuum starting temperature (part 1)
12. Vacuum releasing temperature (part 1)
13. Vacuum starting temperature (part 2)
14. Vacuum releasing temperature (part 2)

5.2.4. After choosing the suitable program, in *standby menu*, click every parameter icon to set and modify the related values by numeric keypad.

The parameters of programs P41-P45 can't be revised by yourself.

Parameters can be set within following values range:

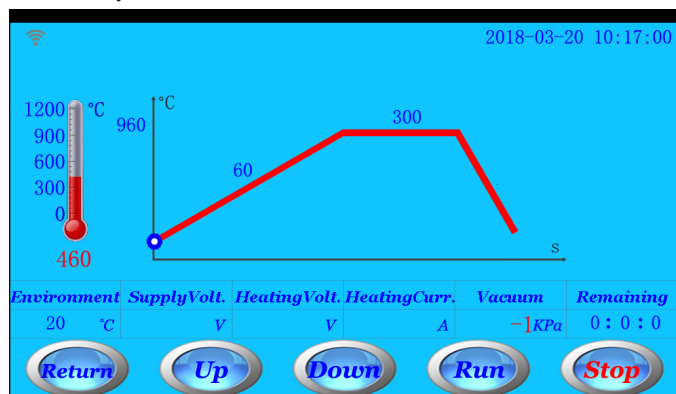
- Idle temperature: 350 ~ 750 °C
- Firing temperature: 500 ~ 1150 °C
- Times: 0 ~ 3600 seconds
- Heat rate: 2 ~ 120 °C/minute
- Vacuum value: 0 ~ 99 kPa
- Vacuum starting temperature: 400 ~ 960 °C
- Vacuum releasing temperature: 600 ~ 1200 °C

When setting every firing parameter, please note following important points:

- Firing temperature should be greater than idle temperature.
- If cooling time is less than 60 seconds, the tray will be opened after 60 seconds.
- Vacuum releasing temperature should be greater than Vacuum starting temperature.
- Vacuum starting temperature should be greater than Idle temperature.
- Vacuum releasing temperature should be less than Firing temperature.
- Vacuum time should be less than firing time.
- When you need to hold vacuum, please be sure to set the vacuum value in parameter menu.
- If vacuum time is set to 0:
 - When temperature in the chamber is reached to vacuum starting temperature, the vacuum pump will be started.
 - When temperature in the chamber is reached to vacuum releasing temperature, the vacuum in the chamber will be released.
- If vacuum time is not set to 0, the vacuum pump will be started only when temperature is rising and after tray is closed; the vacuum in the chamber will be released after vacuum time is completed.

5.3. Purge

In *standby menu*, click **Clean** icon to enter *clean menu*.



If the muffle is moistened, contaminated or not used for a long time, the clean function is recommended. This clean function can also be used for testing vacuum pump.

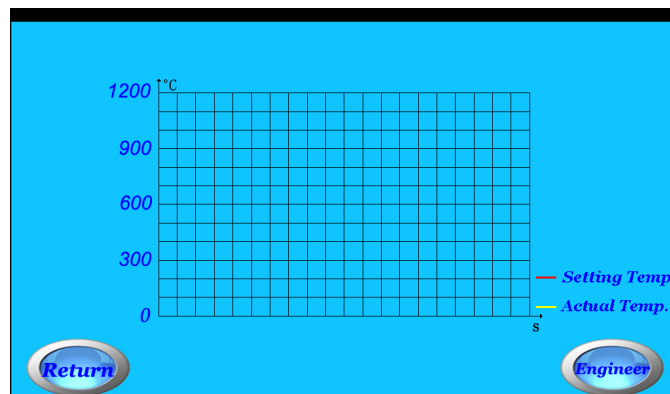
- Click **Run** icon, the clean program will be started to run. The temperature will reach to 960 °C, and then firing time will hold 300 seconds. During clean

program running, the vacuum pump will start to work after tray is closed. The vacuum will be released in the last 30 seconds of firing time.

- **NOTE:** before vacuum is released, if vacuum in the chamber is lowered to the limit, vacuum pump will start to work again.

5.4. Program running curve

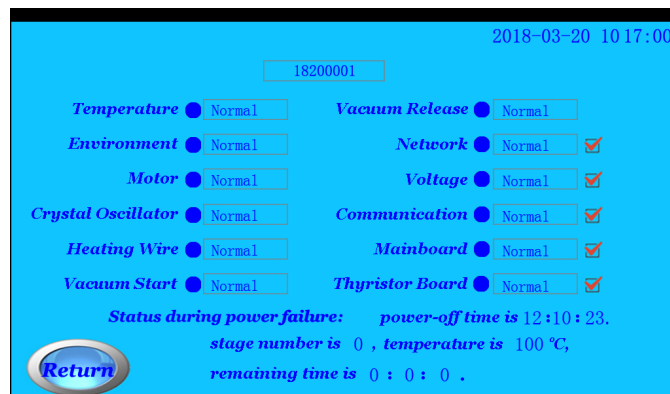
In *standby menu*, click **Curve** icon to enter *program running curve menu*.



In *program running curve*, you may see the latest temperature process curve.

5.5. Alarm information

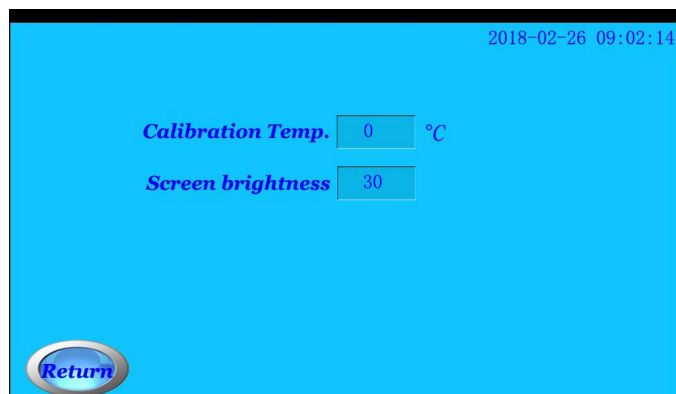
In *standby menu*, click **Alarm** icon to enter *alarm information menu*.



- When furnace has the trouble in standby status, a red round icon will be flashed. The detailed alarm information can be checked in *alarm information menu*.
- When the program is running, if power is failure, you can see the status of program running in this alarm menu when power is continued.
- In *alarm information menu*, the upper part of screen shows the serial number of this furnace; the bottom parts show the furnace's status in a recent of power failure;
- Five types of alarm information can set to cancel reminder (including network alarm, voltage alarm, communication alarm, mainboard alarm, thyristor board alarm). When one or all of them are canceled reminder, the relevant alarm information will not be showed.

5.6. Parameter configuration

In *standby menu*, click **Configuration** icon to enter *parameter configuration menu*.



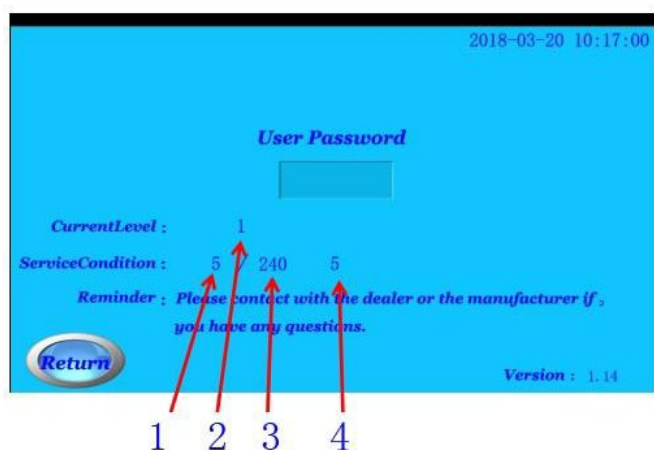
5.6.1. Temperature calibration: when there is some temperature deviation between actual temperature and showed values on screen, you may adjust it by *temperature calibration menu*.

- Example 1: when temperature showed on screen is higher 10 °C than actual temperature, that is, actual temperature is lower than values on screen, please set temperature calibration to “+10”.
- Example 2: when temperature showed on screen is lower 10 °C than actual temperature, that is, actual temperature is higher than values on screen, please set temperature calibration to “-10”.
- The temperature calibration can set between 0 and 80 °C.

5.6.2. Screen brightness: adjust brightness value from 1 to 63.

5.7. User login

In *standby menu*, click **User login** icon to enter *user login menu*.



▪ In *user login menu*, you may enter the password to get the corresponding permission. You may also get the information current user like level of permission for current user, number of times used under current permission, total number of times etc.

1. Number of uses under current level.
2. Current level.
3. Total number of uses under current level.
4. Total number of uses for this furnace.

5.8. Time settings

In *standby menu*, click **Time setting** icon to enter *time settings menu*. You may modify system time in this menu. You can also revise system time by clicking time in the top right corner.

6. Temperature calibration

If the chamber temperature is too higher or too lower during using furnace, the chamber temperature can be calibrated by Silver Calibration Cup.

NOTE: before operating temperature calibration, the chamber should be dried completely, otherwise it will cause the incorrect temperature calibration.

Please refer to follow steps to calibrate the muffle temperature:

STEP 1: Cut off a silver sample (2–3 mm) and put it in the calibration cup. Then place the calibration cup in the middle of firing plate.

NOTE: the length of silver sample should not be too longer, otherwise it will affect the judgment about muffle temperature.

STEP 2: Select a self-defined program (P39) and set the parameters as follows:

Dry time = 0
Preheat time = 0
Idle temperature = 600
Heat rate = 60
Firing temperature = 955
Firing time = 180
Cooling time = 0
Vacuum = 0

- After setting all parameters, please start to run this program.
- When the program is finished, the silver sample should not be melted.
- If the silver sample is melted, it shows the chamber temperature is still higher. Please enter the temperature calibration menu to decrease the chamber temperature.
- After calibrating temperature, please continue to operate SETP 1 and STEP 2 until the silver sample is not melted.
- If the silver sample is not melted, please continue to operate following calibration procedure STEP 3 and STEP 4:

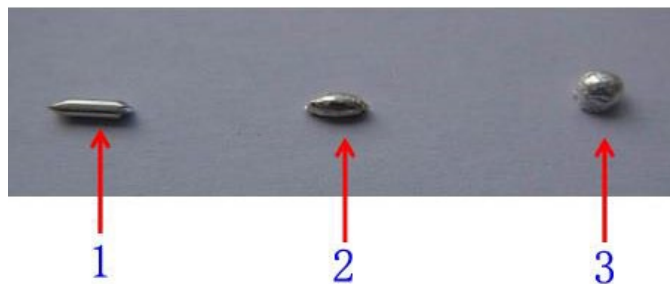
STEP 3: Cut off a silver sample (2–3mm) and put it in the calibration cup. Then place the calibration cup in the middle of firing plate;

NOTE: the length of silver sample should not be too longer, otherwise it will affect the judgment about muffle temperature.

STEP 4: Select a self-defined program P40 and set the parameters as follows:

Dry time = 0
 Preheat time = 0
 Idle temperature = 600
 Heat rate = 60
 Firing temperature = 965
 Firing time = 180
 Cooling time = 0
 Vacuum = 0

- After setting all parameters, please start to run this program.
- When the program is finished, please carefully check the silver sample:
- If silver sample is melted into a round ball, it shows that chamber temperature is calibrated accurately.
- If only the middle part of silver sample is bulged or only a part of silver sample is melted, which shows the chamber temperature is still lower. Please enter the temperature calibration menu to increase the chamber temperature.
- After calibrating temperature, please continue to operate STEP 3 and STEP 4 until the silver sample is melted to a round ball.



1. Original shape of silver sample before temperature calibration.
2. Only the middle part of silver sample is bulged or only a part of silver sample is melted.
3. Silver sample is melted to a round ball.

7. Vacuum conversion table

inHg	kPa	mmHg	inHg	kPa	mmHg
1	4	20	16	53	400
2	7	50	17	57	430
3	10	70	18	60	450
4	13	100	19	64	480
5	17	120	20	68	510
6	21	150	21	71	530
7	24	170	22	74	560
8	27	200	23	78	580
9	30	220	24	81	610
10	34	250	25	85	630
11	37	270	26	88	660
12	40	300	27	91	680
13	43	320	28	94	710
14	47	350	29	98	740
15	50	370	30	101	760

1 inHg = 3.38 kPa = 25.4 mmHg

1 MPa = 1000 kPa = 1000000 Pa

8. Program information

	Program number	Preheat temp.	Firint temp.	Dry time	Preheat time	Firing time	Cooling time	Heat rate	Vacuum	Vacuum time	Vacuum starting temp.	Vacuum release temp.
Unit		°C	°C	Second	Second	Second	Second	°C/min	kPa	Second	°C	°C
Other	P1-P11	450	960	120	120	180	0	60	0	150	600	960
Ivoclar common porcelain powder material	P12	450	980	0	0	90	60	80	95	0	500	980
	P13	450	950	120	120	90	240	60	95	0	500	950
	P14	450	930	180	180	90	240	60	95	0	500	930
	P15	450	900	180	180	90	240	55	95	0	500	900
	P16	450	900	180	180	90	240	60	0	0	500	900
	P17	450	890	120	120	90	240	60	95	0	500	890
Ivoclar zirconia porcelain powder material	P18	450	1000	200	200	900	300	100	0	0	500	1000
	P19	450	910	180	180	90	240	55	95	0	500	910
	P20	450	910	180	180	90	240	60	0	0	500	910
	P21	450	900	120	120	90	240	55	95	0	500	900
VITA common porcelain powder material	P22	450	980	0	0	90	60	60	95	0	500	980
	P23	450	950	120	120	90	240	60	95	0	500	950
	P24	450	930	180	180	90	240	60	95	0	500	930
	P25	450	930	180	180	90	240	55	95	0	500	930
	P26	450	930	120	120	90	240	60	0	0	500	930
	P27	450	920	120	120	90	240	60	95	0	500	920
VITA zirconia porcelain powder material	P28	450	1000	150	150	900	240	100	0	0	500	1000
	P29	450	980	180	180	60	240	80	95	0	500	980
	P30	450	930	180	180	60	240	55	95	0	500	930
	P31	450	900	120	120	60	240	80	0	0	500	900
	P32	450	760	120	120	60	240	60	95	0	500	760
Noritake porcelain powder material	P33	450	980	0	0	60	90	70	95	0	500	980
	P34	450	950	120	120	90	240	60	95	0	500	950
	P35	450	930	180	180	90	240	60	95	0	500	930
	P36	450	910	180	180	90	240	45	95	0	500	910
	P37	450	910	180	180	90	240	60	0	0	500	910
	P38	450	900	120	120	90	240	60	95	0	500	900
Calibration temp.	P39	600	955	0	0	180	0	60	0	0	600	955
	P40	600	965	0	0	180	0	60	0	0	600	955

Porcelain powder material	Program number	Program name
Other porcelain powder material	P1-P11	User-defined
Ivoclar common porcelain powder material	P12	Oxidation treatment for metal
	P13	Powdery opaque layer (W)
	P14	Powdery opaque layer (O)
	P15	Dentin
	P16	Glazing
	P17	Modification
Ivoclar zirconia porcelain powder material	P18	Heat treatment
	P19	Dentin
	P20	Glazing
	P21	Modification
VITA common porcelain powder material	P22	Oxidation treatment for metal
	P23	Powdery opaque layer (W)
	P24	Powdery opaque layer (O)
	P25	Dentin
	P26	Glazing
	P27	Modification
VITA zirconia porcelain powder material	P28	Heat treatment
	P29	Welding effect
	P30	Dentin
	P31	Glazing
	P32	Modification
	P33	Metal oxidation treatment
Noritake porcelain powder material	P34	Powdery opaque layer (W)
	P35	Powdery opaque layer (O)
	P36	Dentin
	P37	Glazing
	P38	Modification
Calibration temp.	P39	Low temp.
	P40	High temp.

Glass-Ceramics material

Program number	P41	P42	P43	P44	P45	P46	P47
Modificable	No	No	No	No	No	Yes	Yes
Preheat temp.	403	403	403	403	403	403	403
Dry time	360	360	90	360	360	360	360
Heat rate 1	90	90	90	90	90	90	90
Firing temp. 1	820	820	820	830	830	820	820
Firing time 1	10	10	10	10	10	10	10
Heat rate 2	30	30	30	30	30	30	30
Firing temp. 2	840	840	840	850	870	840	840
Firing time 2	420	180	420	180	180	420	420
Vacuum starting temp. 1	550	550	550	450	450	550	550
Vacuum release temp. 1	820	820	820	830	830	820	820
Vacuum starting temp. 2	820	820	820	830	830	820	820
Vacuum release temp. 2	840	840	840	849	869	840	840
Cooling temp.	700	700	700	710	870	700	700
Cooling time	0	0	0	0	0	0	0

Program number	Program name
P41	Blue porcelain block: Sintering / Glazing
P42	Blue porcelain block: Modification sintering
P43	Blue porcelain block: Fast sintering / Glaze spraying
P44	White porcelain block: empres CAD
P45	White porcelain block: ZirCAD
P46	User_defined
P47	User_defined



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Talleres Mestraitua S.L.

Txori-erri Etorbidea, 60

T: (+34) 944530388 - F: (+34) 944711725

mestra@mestra.es - www.mestra.es

48150 SONDIKA - BILBAO - ESPAÑA