Zirconia Sintering Furnace

6F

MANUAL

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1. Technical information

1.1 Technical data

Dimensions:
Furnace unit: 585 mm x 380 mm x 830 mm (W x H x D)
Weight: 52 kg
Firing chamber – Diameter x Height: Φ60mm×130mm

1.2 Max Temperature

Temperature: max 1630℃

1.3 Electrical data

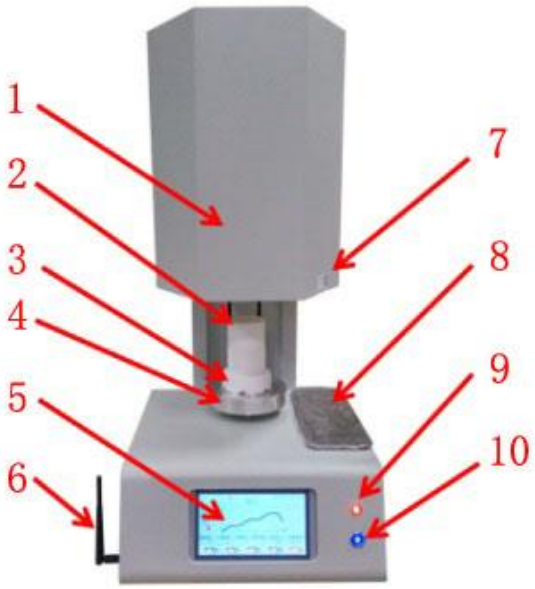
Power supply: 220V±10% 50Hz
Power consumption: max 2500W

1.4 Features

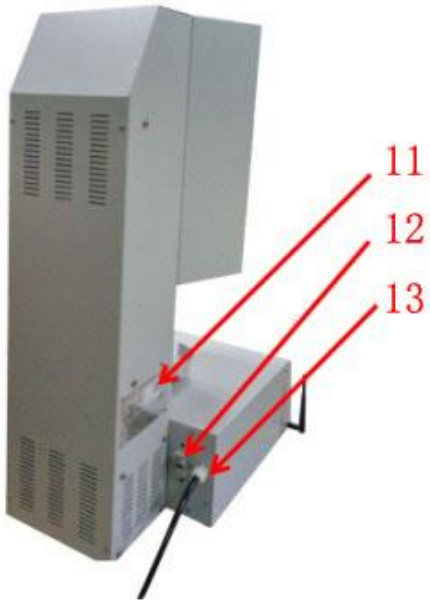
• Touch Screen
• Mobile APP Operating System
• Real-time Display of Temperature, Voltage, Current, Power and Program Running Curve;
• High-quality Heating Element; Long Service Life;
• Record Function when Power Outage: if the furnace is suddenly power off or shutdown during operating, the information of furnace running state is automatically recorded after power on again.

2. Installation and starting-up

2.1 Front and Rear View of Furnace *(See Picture 2-1 and 2-2)*



Picture 2-1



Picture 2-2

1. Furnace shell 2. Crucible 3. Firing Platform 4. Sintering Tray
5. Touch Screen 6. WIFI Antenna 7. QR code of Furnace 8. Working Table
9. Power indicator 10. Switch Button 11. Data Plate 12. Fuse Holder
13. Power Cord

2.2 Placement of Unit

- In order to avoid heating element broken, the filling material is filled in the chamber. Please be sure to take off all filling material before using furnace.
- When positioning the furnace, the minimum distance of the furnace and any wall is at least 30 cm.
- The furnace must be placed into a dry room and should be placed on a stable surface.
- The unit must not be exposed to direct sunlight.
- Do not place any combustible objects near the furnace.

Special Remind: this machine must be grounded wire

In order to ensure that your personal safety and protect the furnace during operation, please be sure to use three-phase power supply with ground wire. Fire wire, zero line and ground wire are connected correctly.

2.3 Switch on the furnace

• Put the plug in the socket. The power indicator is on.

• After pressing SWITCH button, the tray is opened slowly.

• Due to vibrations during transport, the particles of the firing chamber insulation are probably accumulated on the firing tray platform. They must be removed with a dry cloth.

• Place the platform on the center of firing tray.

2.4 Switching off the furnace

• Please close the tray, and then switch off the power button. Pull the plug.

• If the furnace is not used, the tray should be closed completely, which can protect the insulation and avoid the absorption of moisture.

2.5. If the furnace is not used for a long time, please running sintering cycles for several times before using again.

3. Safety Advice

For your personal safety, we would like you to read the following safety-relevant Information completely before using the furnace.

- Do not place any clutter near the tray and platform.
- Furnace can't be operated if the platform is not placed on the tray.
- During continuous sintering (the furnace runs with maximum temperature), the temperature of some parts on the furnace's shell may reach the temperature up to about 30℃.. Don't touch the cover of furnace to avoid scalding.
- When the furnace unit is connected to the mains supply, don't touch into the opened firing chamber to avoid contact with the hot components.
- Pull the plug from the power unit each time before the furnace is cleaned.
- It is necessary to remove the dust inside the firing chamber and PCB parts. Cleaning of the casing with a clean cloth within regular intervals will ensure operational reliability.
- No flammable liquids must be used for any type of cleaning work.

Special Installation Notes

Strong electric and mechanical parts can cause harm and should be repaired by qualified professionals.

4. Technical Equipment

4.1 Program values (parameters)

Each parameter of firing program may be set within following values range:

Program: 01～10

Heat Rate: 0～50℃/minute at temperature range from 0℃ to 1000℃;

0～40℃/minute at temperature range from 1000℃ to 1300℃;

0～20℃/minute at temperature range from 1300℃ to 1630℃;

Sintering Temperature: 0～1630℃

Hold-time for Sintering Temperature: 0～360 minutes

5. Operating Instructions of Touch Screen

5.1 Function description

Click NEXT icon to view every function menus: sintering, selecting program, timing sintering, program running curve, alarm information, network settings, parameter configuration, user login, engineer login, time settings etc. (See Picture 5-1, 5-2 and 5-3)

In Standby Menu, the top part of screen shows network Icon, alarm and system time; the left part of screen shows the real-time temperature in the chamber; the middle and bottom parts of screen show every control functions menu and tray function.

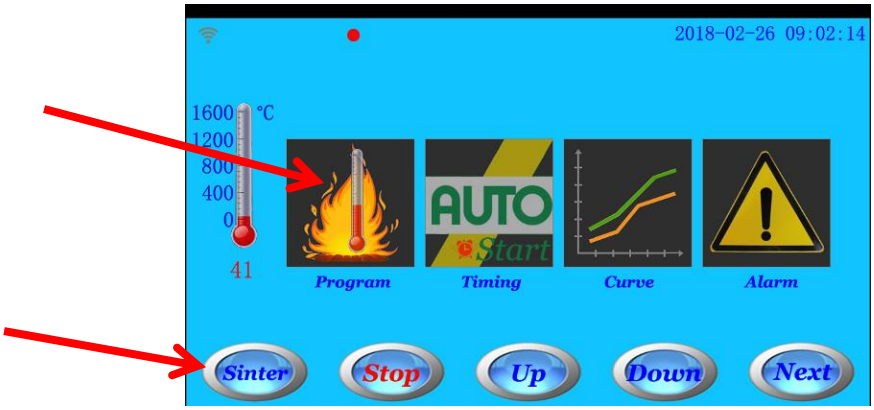
Picture 5-1

Picture 5-2

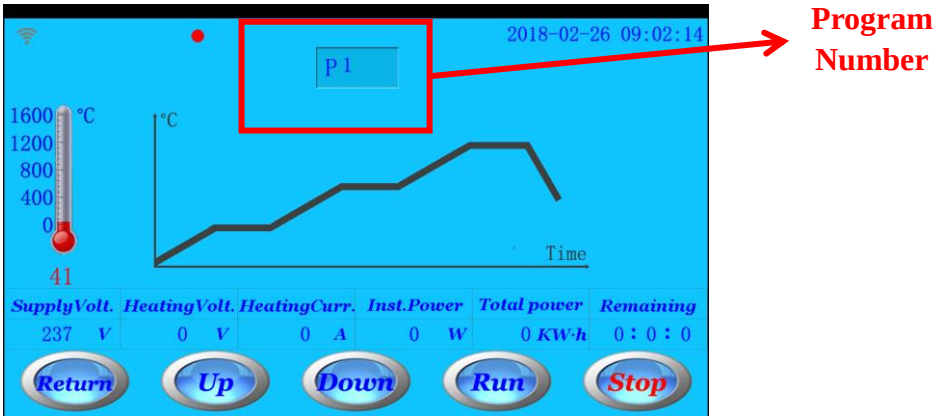
Picture 5-3

5.2 Sintering Program

Click Program icon or Sintering Button in Standby Menu to enter the Sintering Standby Menu. (See Picture 5-1 and Picture 5-4)



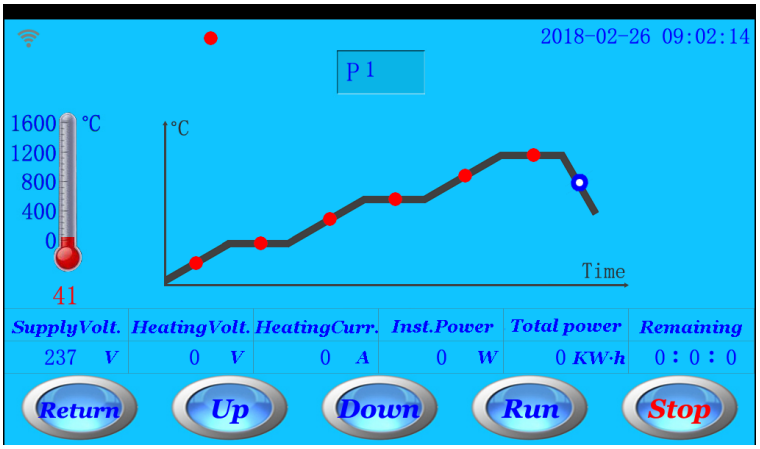
Picture 5-1



Picture 5-4 for Sintering Standby Menu

In Sintering standby menu (Picture 5-4), the function of every icons is following:
- RETURN: click this icon to return to Standby menu;
- UP: click this icon to close the tray;
- DOWN: click this icon to open the tray;
- STOP: click this icon to stop the opening and closing process of tray;
- START: clicking this icon, the selected program will start running;
- Click Program number icon to enter the selecting program interface and parameters setting interface. (See Picture 5-8)

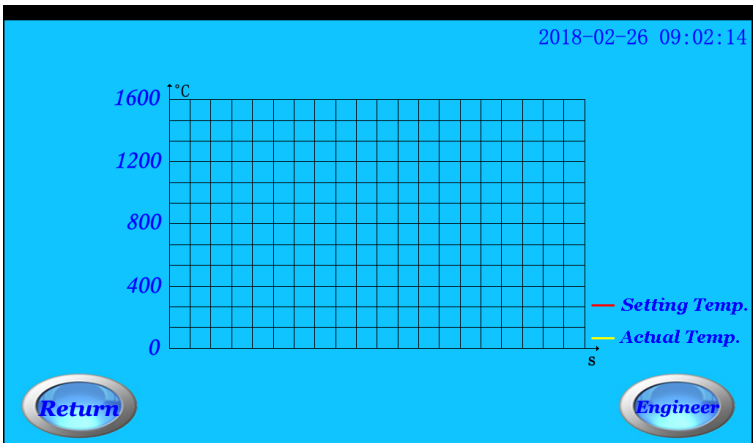
In Sintering Standby Menu, when pressing START icon, the selected program will start running. The screen is showed Program Running Menu. (See Picture 5-5)



Picture 5-5 for Program Running Menu

In Program Running Menu (Picture 5-5), the function of every icons is following:

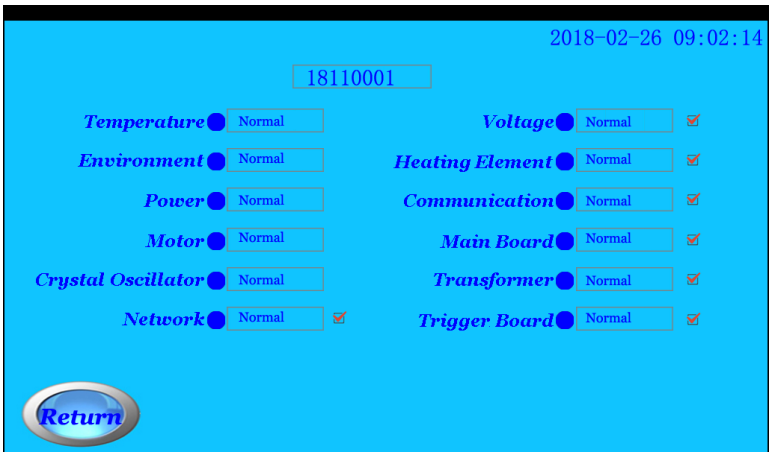
- CURVE: click this icon to enter program running curve menu (See Picture 5-6). The real-time program running curve is showed. Please note that the Engineer Icon in curve menu is only used for the testing of manufacturer.



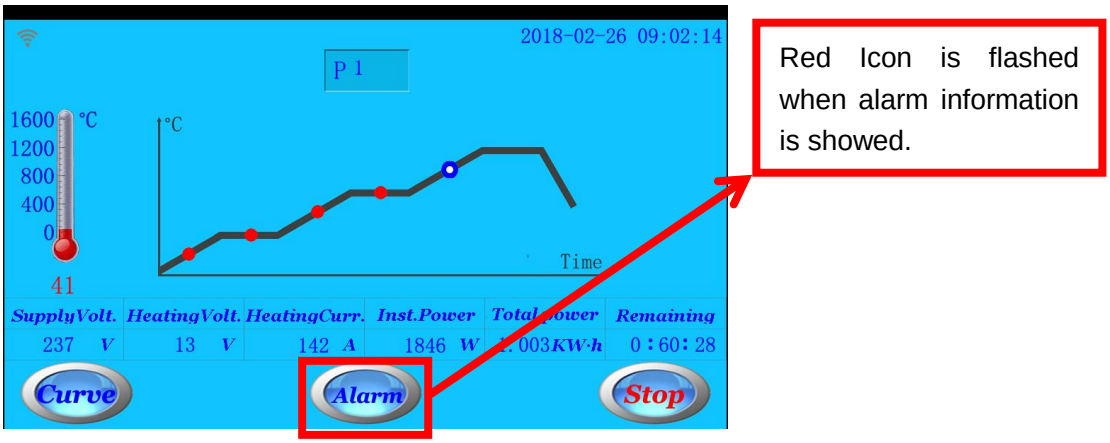
Picture 5-6 for real-time program running curve

- ALARM: click this icon to enter alarm information interface. (See Picture 5-7)

During program running process, if the furnace has problem, the red icon is flashed. Click Alarm icon to check the detailed alarm information. (See Picture 5-7-1)



Picture 5-7 for alarm information interface



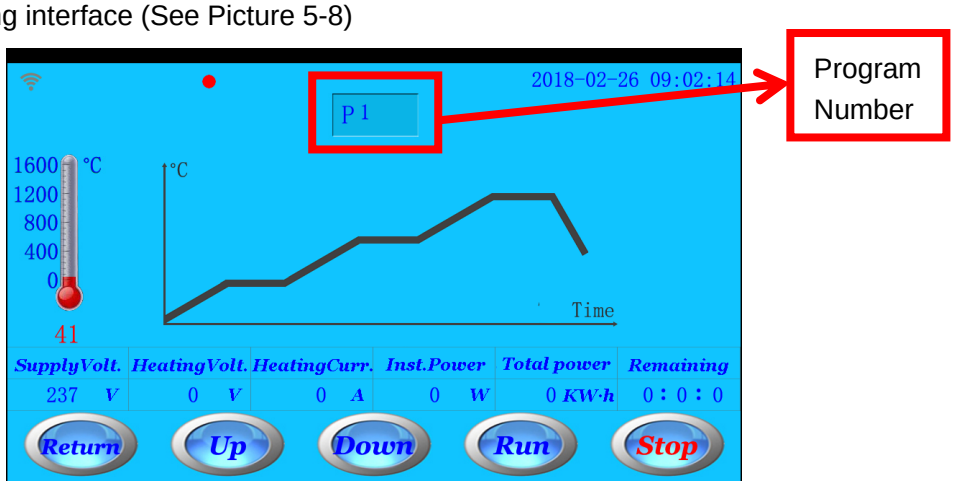
Picture 5-7-1 for Sintering Program Running Menu

Notice:

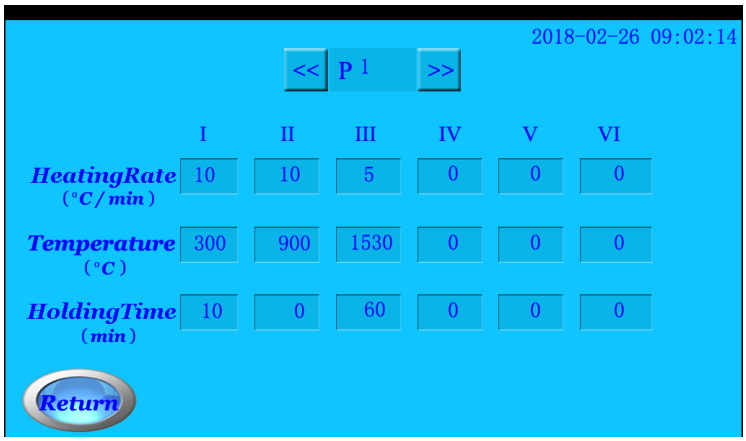
1. When the tray is opened more than 30 minutes, the tray will be closed automatically.
2. When the furnace is in standby status or is not run more than 30 minutes, the screen brightness will be dimmed automatically. Click on the screen to light the screen.
3. Only when the furnace is not in program running status and temperature is less on 1200C, the tray can be opened.

5.3 Program

In Standby Menu, click Program number icon (See picture 5-4) to enter the selecting program interface and parameters setting interface (See Picture 5-8)



Picture 5-4 for Sintering Standby Menu



Picture 5-8 for Parameters Setting Interface

This furnace has 10 sintering programs.

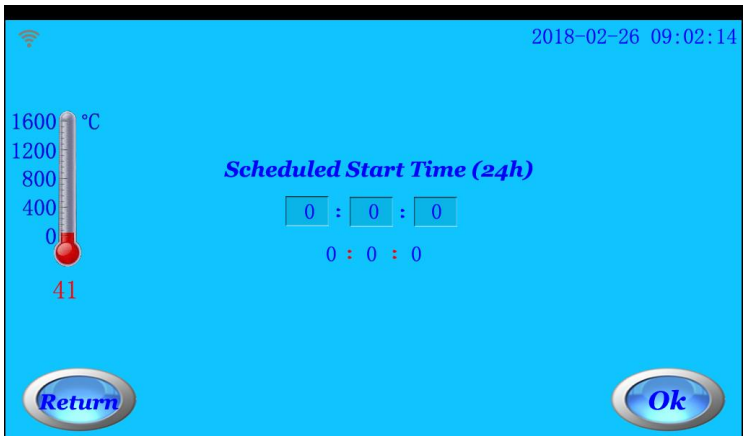
- Program number can be selected by “<<” and “>>” icons; Click program number icon to enter number directly;
- Every program number has 6 stages (total 18 parameters) for setting; click every parameter icon to set values by numeric keypad;
- Please note that 6 stages of every program should be set from Stage Ⅰ to Stage Ⅵ successively.
- The parameter of every Stage can be set within following values range:

Heat Rate: 0～50℃/minute at temperature range from 0℃ to 1000℃;
0～40℃/minute at temperature range from 1000℃ to 1300℃;
0～20℃/minute at temperature range from 1300℃ to 1630℃;
Sintering Temperature: 0～1630℃
Hold-time for Sintering Temperature: 0～360 minutes

5.4 Timing Sintering

In Standby Menu (See picture 5-1), click Timing Sintering icon to enter Timing Sintering Menu. (See Picture 5-9). In Timing Sintering Menu, you can preset a starting sintering time (in 24-hour time system). When furnace’s system time reaches to the setting time, the program will start to run automatically (except the time 00:00:00).

Picture 5-1 for Standby Menu



Picture 5-9 for Timing Sintering Menu

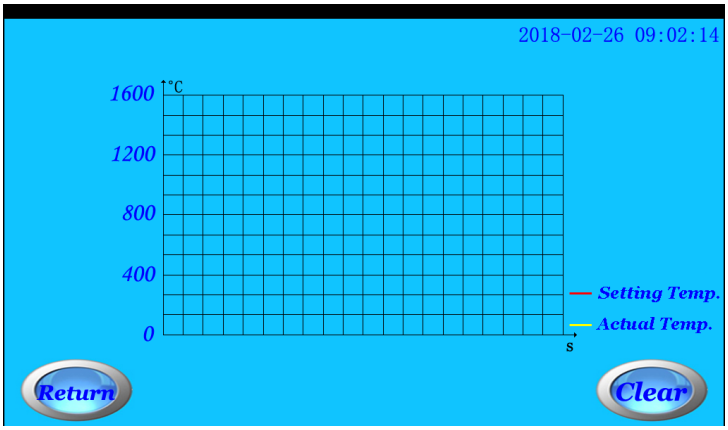
- If you want to cancel setting time, please enter 0:0:0 and press OK icon.
- Note: when setting a starting sintering time, the screen will stay in Timing Sintering Menu, unless the setting time is cancelled.

5.5 Program Running Curve

In Standby Menu (See picture 5-1), click Running Curve icon to enter Program Running Curve Menu. (See Picture 5-10).

In Program Running Curve, you may see the temperature process curve. When new program is running, the last program curve is removed automatically. Click Clear icon also to empty the curves.

Picture 5-1 for Standby Menu

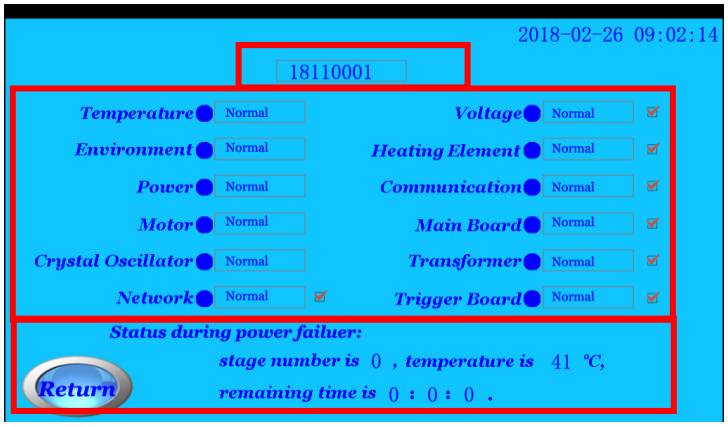


Picture 5-10 for Program Running Curve Menu

5.6 Alarm Information

In Standby Menu (See picture 5-1), click Alarm icon to enter Alarm Information Menu. (See Picture 5-11).

Picture 5-1 for Standby Menu



Picture 5-10 for Alarm Information Menu

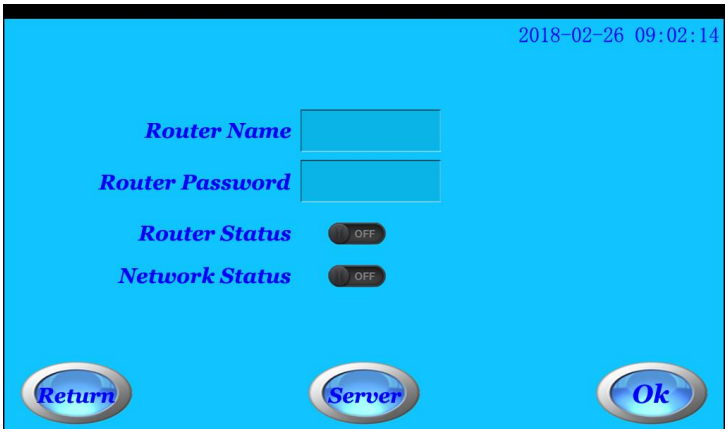
In Alarm Information Menu, the upper part of screen shows the serial number of this furnace; the bottom parts show the furnace's status in a recent of power failure; the middle part of screen shows 12 types of alarm information.

- Blue alarm information shows normal;
- Yellow alarm information shows common alarm;
- Red alarm information shows serious alarm;
- The detailed alarm information shows in boxes;
- Seven types of Alarm information can set to cancel reminder (including Network alarm, Voltage alarm, heating element broken, Communication alarm, Mainboard alarm, Transformer alarm and trigger board alarm). When one or all of them are canceled reminder, the relevant alarm information will not be showed.
- 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.

5.7 Network settings

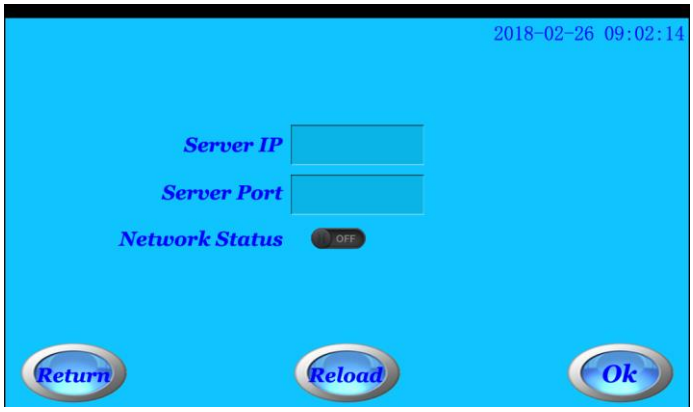
In Standby Menu (See picture 5-2), click Network icon to enter Router Configuration Menu (See Picture 5-12) and Server Configuration Menu (See Picture 5-13).

Picture 5-2 for Standby Menu



Picture 5-12 for Router Configuration Menu

- In Router Configuration Menu, you can enter router name and password to connect furnace with router.
- When the furnace connects with router, router status is changed from OFF to ON. If router is configured correctly and network status is good, network status is changed from OFF to ON. It shows that the furnace connects with server.
- In Router Configuration Menu, router name and router password are not showed on the screen after restarting furnace.
- When enter router name and password, if click OK icon, the OK icon will show the number from 1 to 8, which means the furnace is connecting with router. If OK icon doesn't show 1 to 8, it shows the furnace is not connected with router. Please click OK icon again to connect router. If the furnace is always not connected with router, please restart the furnace and enter the router name and password again.



Picture 5-13 for Server Configuration menu

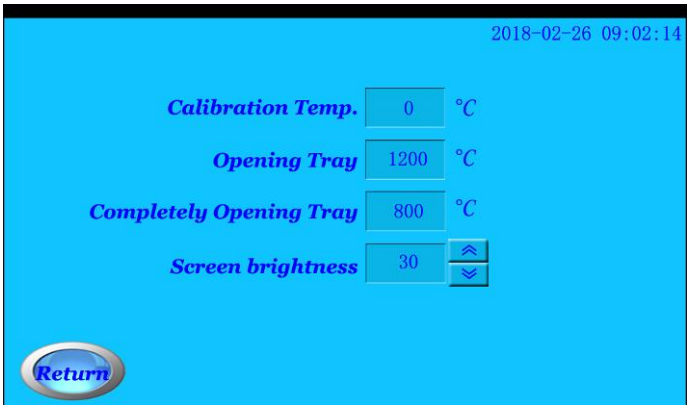
- In Router Configuration Menu, click Server icon to enter Server Configuration menu (See picture 5-13).
- The furnace has finished to set the server from the factory. You don't need to set the server again.
- In case there is real necessity to set the server again, please enter the IP address and network port, and then click OK icon.

- When entering router name and password, if click OK icon, OK icon will show the number from 1 to 8, which means the furnace is connecting with Server. If OK icon doesn't show 1 to 8, it shows the furnace is not connected with server. Please click OK icon again to connect router. If the furnace is always not connected with router, please restart the furnace and enter the router name and password again.
- Reload Icon: this icon has password protection function. When you confirm that it is unable to set the server and router by Router or Server menu, click reload icon to make the furnace to restore the initialization state. Please contact with dealer or manufacturer to set by mobile APP or website. When clicking reload icon, if the furnace is successfully initialized, it will show number changing.

5.8 Parameter Configuration

In Standby Menu (See picture 5-2), click Parameter icon to enter Parameter Configuration Menu (See Picture 5-14)

Picture 5-2 for Standby Menu



Picture 5-14 for Parameter Configuration Menu

There are three functions in Parameter Configuration Menu:

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

For Example 1: when temperature showed on screen is higher 10℃ than actual temperature, that is, actual temperature is lower than values on screen, please set temperature calibration to "**+10**";

For Example 2: when temperature showed on screen is lower 10℃ than actual temperature, that is, actual temperature is higher than values on screen, please set temperature calibration to "**-10**";

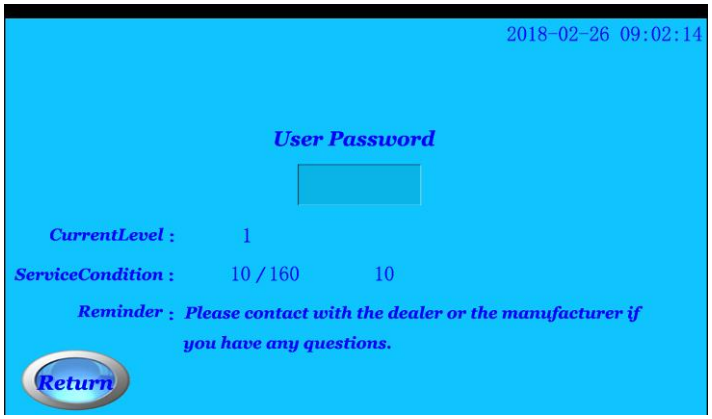
- Temperature of opening tray and temperature of completely opening tray: if a program is finished, when temperature is cooled to "Temperature of opening tray", the tray will be opened slowly; when temperature is cooled to "Temperature of completely opening tray", the tray will be opened completely.
- Temperature of opening tray is set between 600℃ to 1200℃;
- Temperature of opening tray is set between 300℃ to 800℃;
- Temperature of opening tray should be greater than Temperature of opening tray.
- If clicking UP, DOWN or STOP icons during finishing program to completely opening tray, the automatic opening tray function will be canceled.

- Screen brightness: adjust brightness value from 1 to 63;

5.9 User Login

In Standby Menu (See picture 5-2), click User Login icon to enter User Login Menu. (See Picture 5-15)

Picture 5-2 for Standby Menu



Picture 5-15 for 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.

Level 1: the first grade: limited number of uses;

Level 2: the second grade: limited number of uses;

Level 3: temporary permission: limited number of uses;

Level 4: forbidden permission; unavailable;

Level 5: the highest permission: unlimited number of uses;

5.10 Engineer Login

In Standby Menu (See picture 5-2), click Engineer Icon to enter Manufacturer Engineer Login Menu. This menu is only used for engineer of manufacturers.

Picture 5-2 for Standby Menu

5.11 Time Settings

In Standby Menu (See picture 5-3), click Time Setting Icon to enter Time Settings Menu. You may modify time in this menu.

Picture 5-3 for Standby Menu

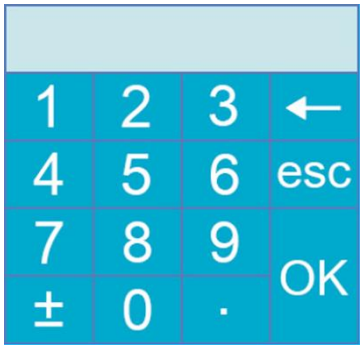
Picture 5-16 for Time Settings Menu

- Automatic time synchronization function can apply only in eastern eight zone. Other time zone is not suitable for this function.

5.12 Keypad

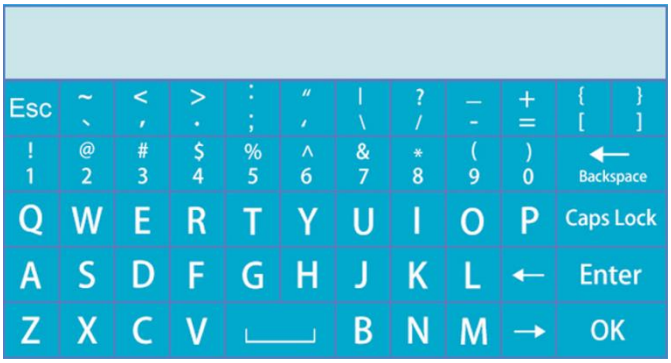
The screen shows three kinds of Keypad for inputting.

- Numeric Keypad (See Picture 5-17):



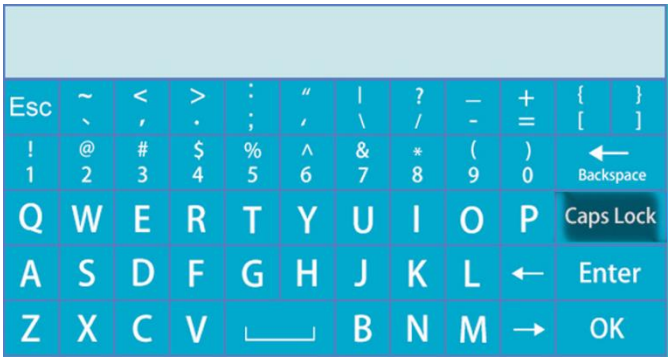
Picture 5-17 for Numeric Keypad

- Letter and Characters Keypad (See Picture 5-18): enter lowercase letters and characters showed at the bottom half of the first and second lines.



Picture 5-18 for Letter and Characters Keypad

- Letter and Characters Keypad (See Picture 5-19): click Caps Lock Icon to enter this Keypad.
This keypad is to input uppercase letters and characters showed in the upper half of the first and second lines.



Picture 5-19 for Letter and Characters Keypad

6. Operation Example

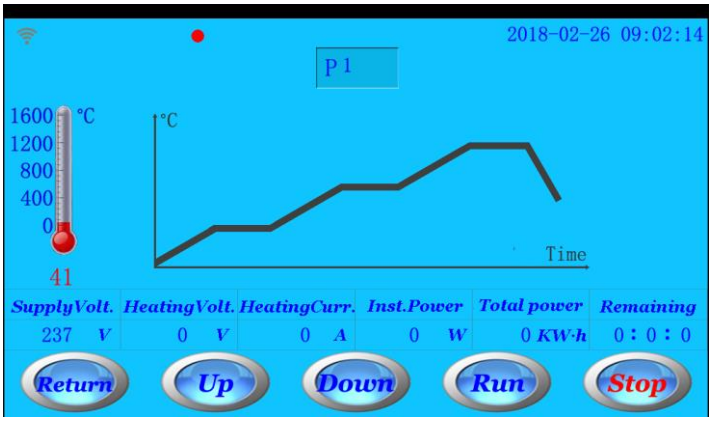
For Example: when furnace is in standby menu and shows No.1 Program. if we want to use No.3 Program to set the No.1 to No.3 Stage. The detailed parameters are following:

	Heat Rate	Firing temperature	Hold-time
Stage 1	50℃/minute	300℃	10 minutes
Stage 2	40℃/minute	900℃	0
Stage 3	20℃/minute	1530℃	60 minutes
Stage 4	0	0	0
Stage 5	0	0	0
Stage 6	0	0	0

6.1 Select the Program Number

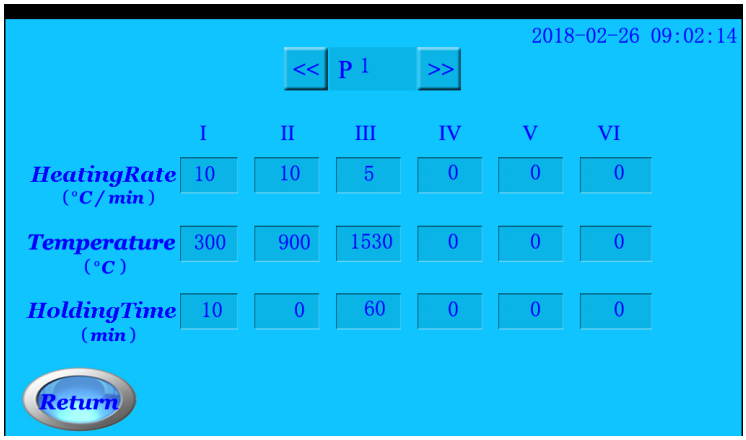
6.1.1 In the Standby Menu (See Picture 6-1), please click Sintering button or Program Icon to enter Sintering standby menu (See picture 6-2).

Picture 6-1 for Standby Menu



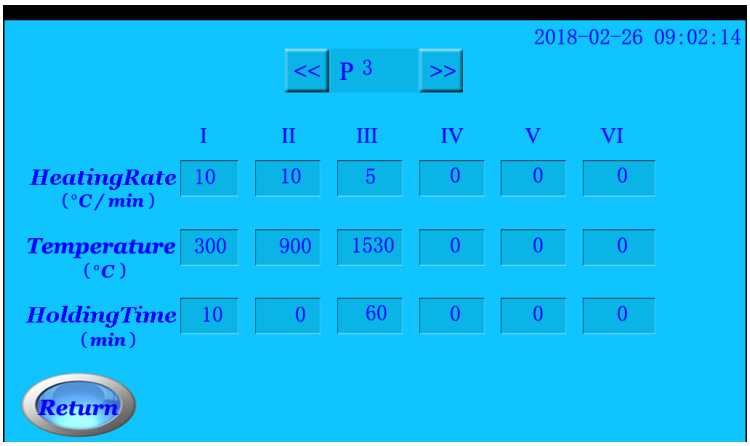
Picture 6-2 for Sintering Menu

6.1.2 Click Program Number P1 to enter program selection Menu (See Picture 6-3).



Picture 6-3 for Program Selection Menu

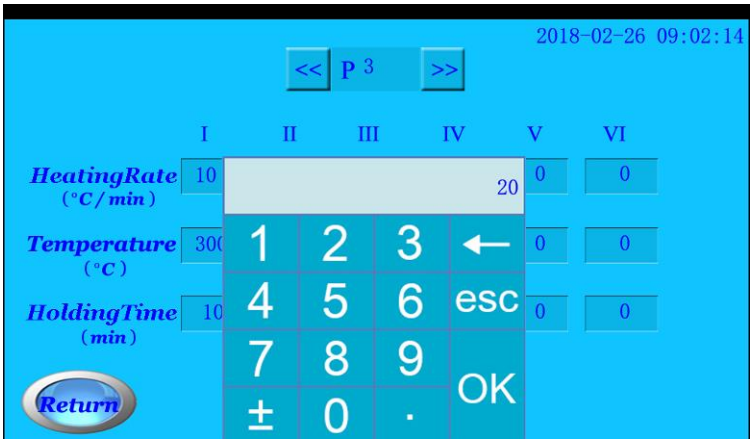
6.1.3 Program number can be selected by pressing “<<”and “>>” icons; Click program number icon directly to enter program number directly. For Example: click “>>” icon to Program P3 or enter 3 directly by pressing Numeric Keypad. (See Picture 6-4).



Picture 6-4 for selecting Program P3

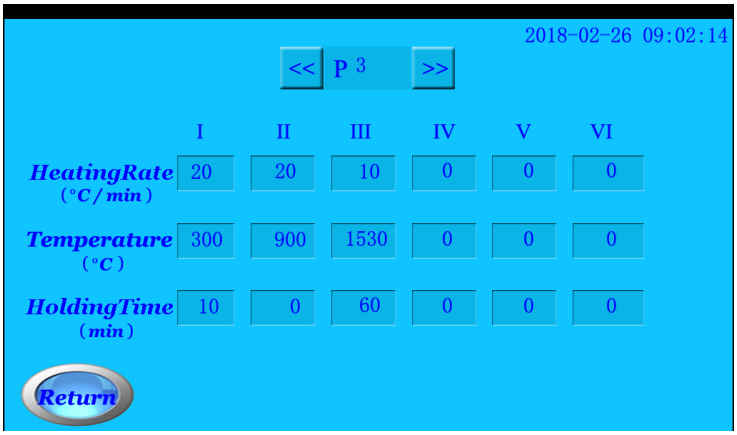
6.2 Set the parameters

6.2.1 After selecting Program P3, click every parameter in turn. Enter the parameters values by pop-up numeric keypad and click OK icon. (See Picture 6-5)

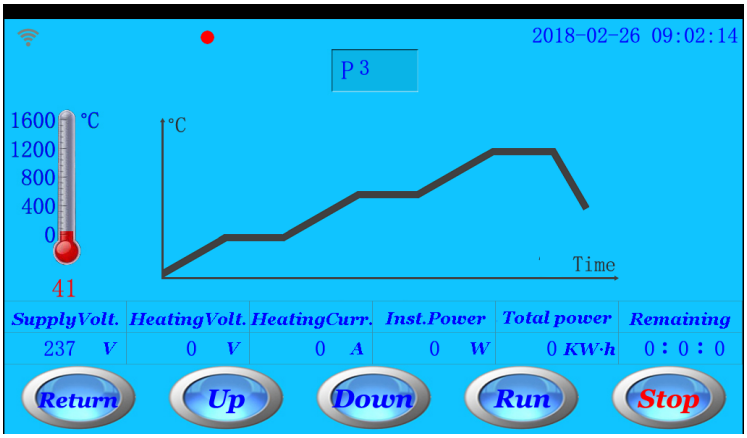


Picture 6-5 for Inputting parameter values

6.2.2 After entering all parameter values and pressing ok to store it (See Picture 6-6), click Return icon to return Sintering Menu. (See picture 6-7)



Picture 6-6 for finishing inputting parameter values

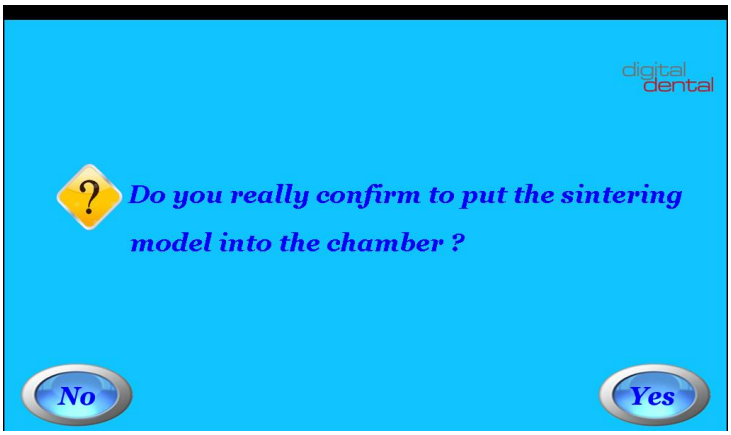


Picture 6-7 for Sintering Menu

Now all parameters values of Program P3 are set well.

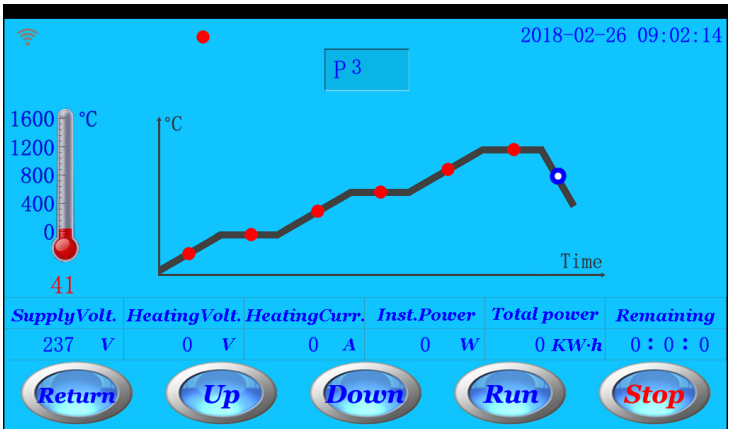
6.3 Run the program

6.3.1 After setting all parameters, when clicking RUN icon, a pop-up interface will be showed: Do you really confirm to put the sintering model into the chamber？ (See Picture 6-8)



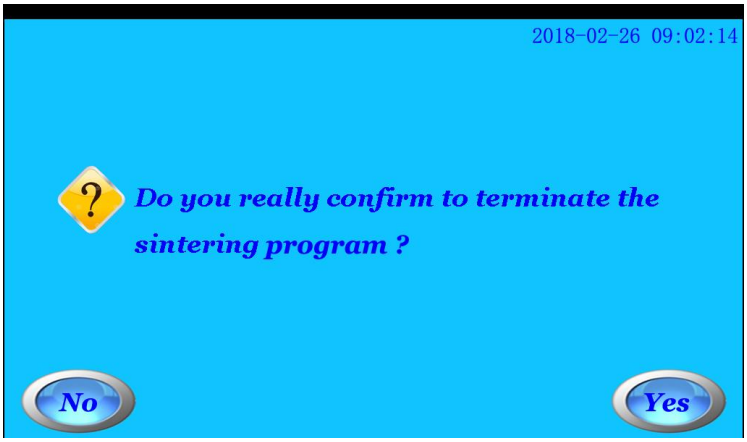
Picture 6-8 for Pop-up interface of sintering confirmation

6.3.2 If the sintering model has put into the chamber, when please click YES icon, the program will start to run. At this time, the screen will show Sintering Running Menu. (See Picture 6-9).



Picture 6-9 for Running Curve

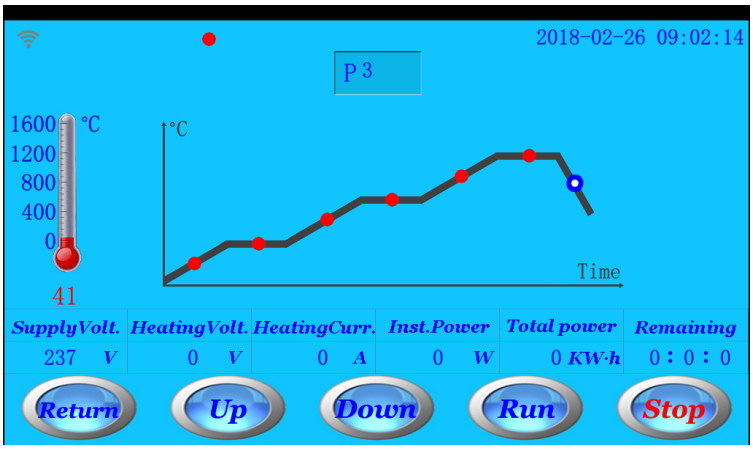
6.3.3 During program is running, if you want to terminate the program, please click STOP icon. At this time, a pop-up interface will be showed (See 6.11). Click YES icon, the program will be terminated.



Picture 6-11 for pop-up interface of terminating program

6.4 Finish the sintering

When program is finished, the buzzer will sound. The screen will return to Standby Menu.



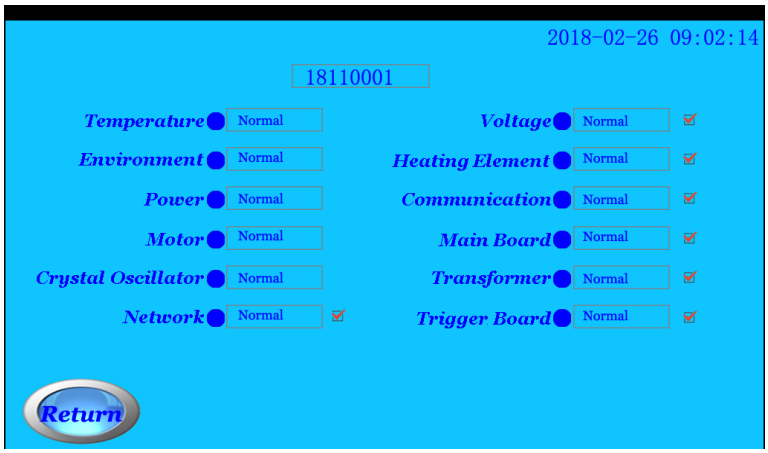
Picture 6-10 for finishing the program

6.4.1 If you don't click up, down or stop icons after finishing program, the tray will be opened slowly when temperature is cooled to "Temperature of opening tray"; and when temperature is cooled to "Temperature of completely opening tray", the tray will be opened completely.

6.4.2 After finishing program, if you click up, down or stop icons, the automatic opening tray function will be canceled. The tray will be opened or closed by clicking down or up icons.

7. Alarm Information

This furnace has 12 type of alarm information. (See Picture 7-1)



Picture 7-1 for finishing program

7.1 Temperature Alarm

(1) Thermocouple Broken alarm: when thermocouple has trouble, the temperature will show 1800C.
Solution: Try to restart the furnace for several times. If it is failure, please replace the thermocouple.
(2) Temperature reaches to Max limit: During program running, if temperature reaches to max setting limit, this alarm is triggered. If program is running, it will be stopped automatically to avoid chamber damaged.
Solution: please try to decrease the sintering temperature.

7.2 Ambient temperature Alarm

(1) High ambient temperature: this alarm is just a reminder that the current ambient temperature is high, but it doesn't affect the running program.
(2) Too high ambient temperature: this alarm still doesn't affect the furnace's working, but the service life will be reduced during long-term too high temperature.
Solution: please lower the ambient temperature in the room.
Note: if the temperature is too high showed on the screen, but the actual ambient temperature is not too high, maybe the ambient temperature sensor is damaged. Please try to replace new one.

7.3 Power alarm

Temporary unrealized

7.4 Motor alarm

(1) Lower limit switch alarm: it shows that motor or lower limit switch has problem.
Solution: please firstly check the motor. Please replace the motor if motor runs abnormally. Check if the lower limit switch part has problem.
(2) Upper limit switch alarm: it shows that motor or lower limit switch has problem.
Solution: please firstly check the motor. Please replace the motor if motor runs abnormally. Check if the upper limit switch part has problem.

7.5 Crystal Oscillator Alarm

This alarm shows the 16MHz Crystal Oscillator has problem.
Solution: replace the Crystal Oscillator.

7.6 Network alarm

This alarm is optional. You may set to open or close this alarm.
This alarm doesn't affect the furnace's working.

(1) Router abnormal operation: when furnace is not connected to router, this alarm is triggered.
Solution:
- Check router status. Input user name and password again.
- If router is damaged, please replace new one. (You may check router by mobile).
- If router and configuration are all normal, please check if wireless network part of furnace has problem. (You may check the nReday indicator and nLink indicator on the PCB)

(2) Network abnormal operation: when network has problem, the furnace can't send data to server or can't receive data from server.
Solution:
- Please check if the wireless network part of furnace has problem.
- Please contact with manufacturer to ask if the server IP address or port number is changed. If they are changed, please reset the network of furnace.
- Please check if network transmission has problem.

7.7 Voltage alarm

This alarm is optional. You may set to open or close this alarm.
This alarm shows four types: high, too high, low; very low.
This alarm doesn't affect the furnace's working.

7.8 heating element broken Brocken

This alarm is optional. You may set to open or close this alarm.
This alarm shows three types: heating element broken, abnormal current circuit, abnormal voltage circuit.
When heating element broken alarm is showed, the furnace will stop working. Please try to restart the furnace for several times. If the heating element is damaged, please replace it.

7.9 Communication alarm

This alarm is optional. You may set to open or close this alarm.
When this alarm is triggered, all parameters values showed on the screen are always unchanged, and have no any respond after clicking icons. It is communication failure between PCB and screen. The possible failure is:
(1) communication cables failure on the PCB;
(2) data cables are damaged between PCB and screen;
(3) screen has problem.

7.10 Mainboard Alarm

This alarm is optional. You may set to open or close this alarm.
When this alarm is triggered, the mainboard has problem. Please try to restart the furnace for several times. If the mainboard is damaged, please replace it.

7.11 Transformer Alarm

This alarm is optional. You may set to open or close this alarm.
When this alarm is triggered, the transformer has problem. Please try to restart the furnace for several times. If the transformer is damaged, please replace it.

7.12 Trigger board Alarm

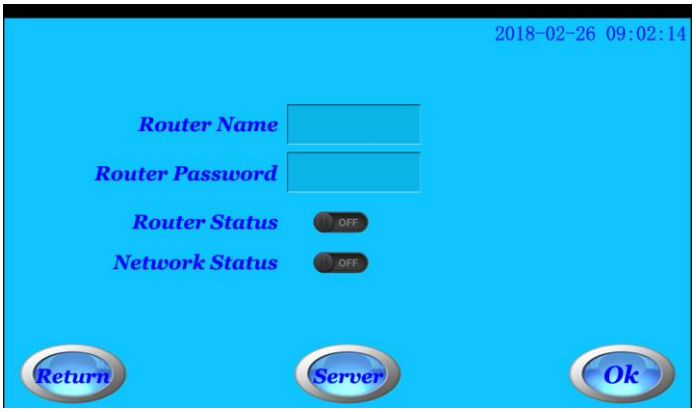
This alarm is optional. You may set to open or close this alarm.
When this alarm is triggered, the trigger board has problem. Please try to restart the furnace for several times. If the trigger board is damaged, please replace it.

8. LNY Intercloud APP

8.1 Network configuration (See section 5.7 Network Setting)

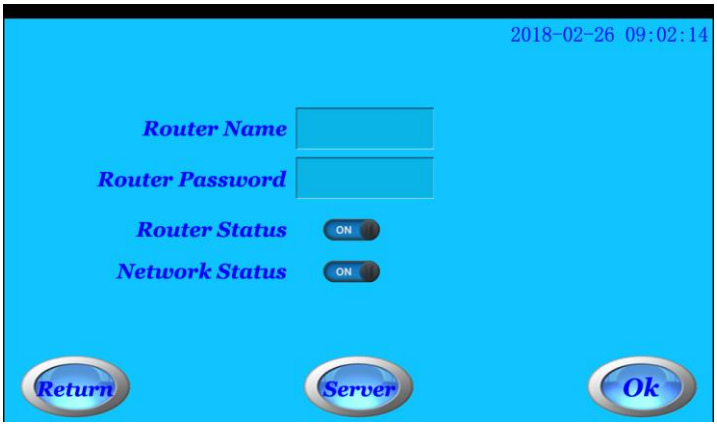
In Standby Menu (See picture 8-1), press Network Setting icon to enter Router Configuration Menu. (See Picture 8-2)

Picture 8-1 for Standby Menu



Picture 8-2 for Router Configuration Menu

- In Router Configuration Menu, you can input router name and password to connect furnace with router.
- When the furnace connects with router, router status is changed from OFF to ON. If router is configured correctly and network status is good, network status is changed from OFF to ON. It shows that the furnace connects with server. (See Picture 8-3)



Picture 8-3 for Network Connection Status Menu

Note:
- Some parts of APP software functions can be used only when furnace is connected to network.
- Please set your router correctly and open WIFI function to ensure that furnace can access to network.
- The furnace has finished to set the server from the factory. You don't need to set the server again, otherwise affects furnace's working.

8.2 Download and Install LNY Intercloud APP

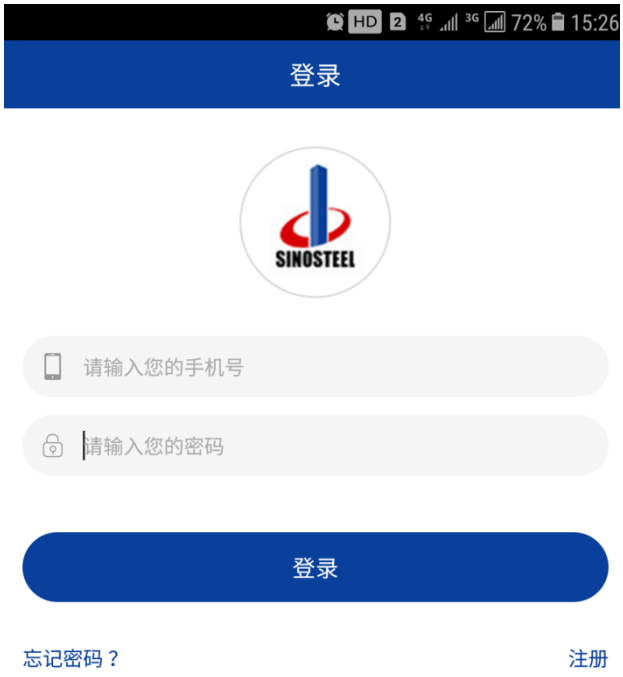
Download link of LNY intercloud APP is
http://222.88.69.147:6048/apk/kcj.apk

You may also scan QR code to download APP (Android versions):

Note: APP (Apple versions) is coming to Apple Store soon.

8.3 Register and login

After APP has been successfully downloaded and installed in your mobile, firstly please register it. Click Register button (See Picture 8-5) to show pop-up dialog (See Picture 8-6).
Fill in the information and submit registration information. It will be passed audits in 24 hours.



Picture 8-5 for register menu

Picture 8-6 for register dialog

8.4 Add new equipment

After login LNY intercloud APP and account is passed audits, you can add your furnace and manager it. You can click “+” in the top right corner of APP to add the furnace. (See red arrow in Picture 8-7)

Picture 8-7 for APP home page

(1) Scan to add the furnace

Click “+” in the top right corner of APP to choose SCAN function. Use your mobile to scan QR code printed on the shell of your furnace. When screen shows success, the furnace is added successfully.

(2) Manually adding the furnace

Click “+” in the top right corner of APP to choose Manually adding function (See picture 8-8). Follow the prompts to enter “serial number” and “random code” printed on the tags of furnace, and then click OK. When screen shows success, the furnace is added successfully.

Picture 8-8 for Manually adding the furnace

After the furnace is added into APP successfully, you may see the furnace's information by click function icon.