

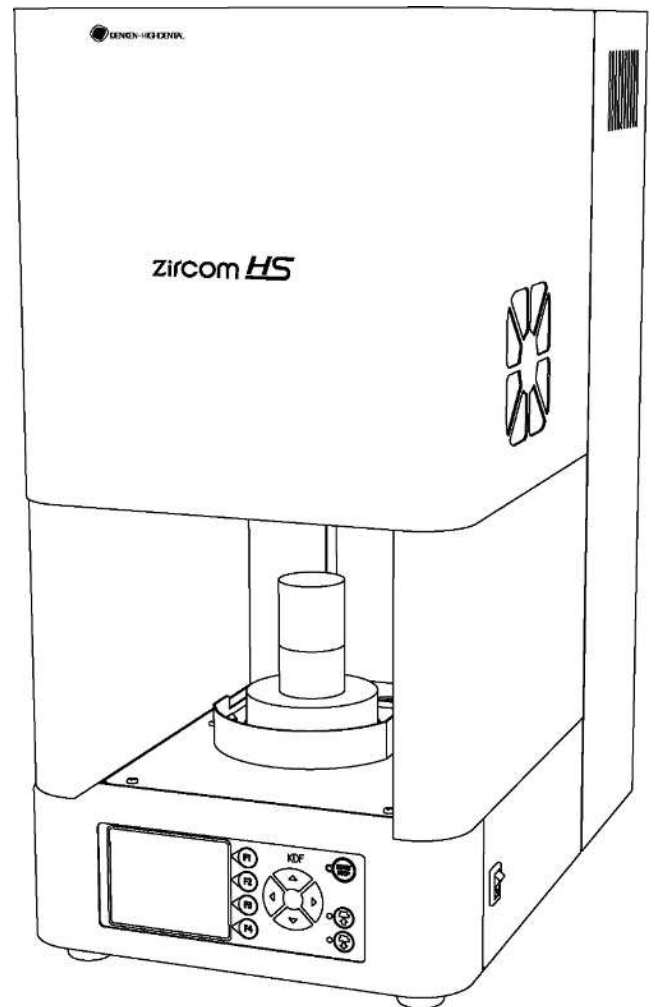
Zircon *HS*

Instruction Manual

Thank you for purchasing KDF's Sintering Furnace, Zircon HS. Before using the unit, please read the manual thoroughly and understand the capabilities and proper usage for this machine. Please keep this manual in an easily accessible location for future reference.

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Safety Precautions

About labels which are put on the unit.



This mark means that do not fail to read the instruction manual before use of the unit.



This mark means a warning that "Be careful not to jam something when the firing table moves up and down".



This mark means a warning that "Hot parts. Be careful not to burn".

We recommend you to follow these instructions for proper use of the unit.

Directions

The safety precautions contained herein and the accompanying icons provided for the safe use of this machine and to prevent injuries and loss on material resources. Please read them carefully prior to your actual machine operation.



WARNING

Failure to follow or ignorance of the directions may cause severe injury or death.



CAUTION

Failure to follow or ignorance of the directions may cause injuries or damages to material properties.



⊘ This mark means prohibited actions as shown inside or around it. The illustration on the left means "Do not disassemble".











● This mark means forced action and directions to follow as shown inside or around it. The illustration on the left means "Unplug out of power outlet".








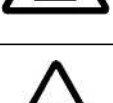






△ This mark requires a user to pay attention to the caution mark as shown inside or around it. The illustration on the left means "Be careful not to jam your fingers "

WARNING

	<ul style="list-style-type: none"> ● In the event when there is smoke, abnormal odors or sounds, turn off the power, unplug immediately and contact the dealer for repairs. ● In the event when water enters the machine, turn off the power, unplug immediately and contact the dealer for advice. Continued use may cause electric shock or fire. ● In the event when debris enters the machine, turn off the power, unplug immediately and contact the dealer for advice. Continued use may cause electric shock or fire.
	<ul style="list-style-type: none"> ● Do not remove the panels or parts uninstructed or modify them in any manner. This may cause electric shock or fire.
	<ul style="list-style-type: none"> ● In the event, when the machine is dropped or the furnace frame is dented, unplug immediately and contact the dealer for advice. Continued use may cause electric shock or fire.
	<ul style="list-style-type: none"> ● Do not block the air intake on the top and back of the instrument, or the exhaust vents on the sides. Doing so can cause the internal temperature to rise, which could cause a fire or equipment failure.
	<ul style="list-style-type: none"> ● Plug to the outlet of the designated voltage described in the main specifications. Use of other voltage may cause fire or shock.
	<ul style="list-style-type: none"> ● Keep the unit away from other equipment and walls. Leave minimum of 20cm of space around the unit. Do not place anything on the top of the unit to prevent temperature increase inside the unit. Continued use may cause fire or malfunction.
	<ul style="list-style-type: none"> ● When the unit is used, the firing stand provided must be set on the firing table. Continued use without the firing stand may cause burn or fire.
	<ul style="list-style-type: none"> ● Do not place heavy items or place machine on the power cord and make sure that the cord is not damaged. This may cause fire or electric shock. ● Please do not damage the power cord, or process, excessive bending, twisting, pull. Doing so could damage the cord and cause fire or electric shock. ● Do not unplug the power cord while the cooling fan is running, as the cooling fan will stop and the outer case will become hot. This may damage the components and could also lead to a fire.

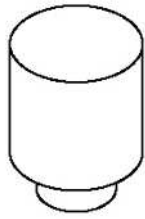
CAUTION

	<ul style="list-style-type: none"> ● Unplug the main power cord from the power outlet when the machine is not in use for a long period of time. ● In case of a periodic machine maintenance, unplug the power cord from the power outlet.
	<ul style="list-style-type: none"> ● Do not handle the plug with wet hands. ● When you unplug the power cord from the power outlet, do not pull the cord. If the cord is damaged, it may cause fire or shock. Always remove by handling the plug.
	<ul style="list-style-type: none"> ● This machine is for dental sintering furnace. We do not recommend you to use the machine for any other purpose.
	<ul style="list-style-type: none"> ● The improper installation or use may impair the safety protection function.
	<ul style="list-style-type: none"> ● Do not move up/down the table than necessary. The parts may be heated and fire or breakdown may occur.
	<ul style="list-style-type: none"> ● Do not use the accessories and consumables we do not recommend. Breakdown or fire may occur.
	<ul style="list-style-type: none"> ● Use heat-resistant gloves and tongs or tweezers to insert and remove the baking tray, as the temperature inside the furnace may be high. ● Do not touch around the furnace (firing table) during heating up because of high temperature. If any operations is required during heating up, use the heat-resistant glove.
	<ul style="list-style-type: none"> ● Do not place anything or put a hand under the firing table while the table is moving down. Injury or breakdown may occur.
	<ul style="list-style-type: none"> ● When you move this machine, power off the switch, and unplug the main power cord from the power outlet. This may cause fire.
	<ul style="list-style-type: none"> ● When connecting to this device's UPS Inlet, be sure to use a commercially available UPS output that meets or exceeds the specifications below. Failure to do so may cause the fan to stop during a power outage and cause the device to malfunction. <ul style="list-style-type: none"> • Output: Any within the range of 100 to 240 VAC , 300 VA or more.
	<ul style="list-style-type: none"> ● In case of using of coloring liquid, sinter firing objects after they are dried completely with other burnout furnace. The insufficient dry may contaminate inside the unit and occurs the malfunction of the unit.
	<ul style="list-style-type: none"> ● Be sure to install and use the Upper and Lower Firing Stands. Failure to do so may cause a fire or malfunction.

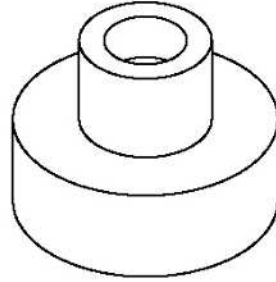
Standard Accessories

When you open the box, we recommend you to make sure that the following standard accessories are included. In addition, please check the unit for any damage or dent. Contact our technical support team if there is any damage.

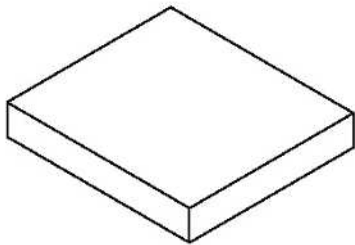
※Cracked insulator inside the muffle chamber is normal. This is not defected.



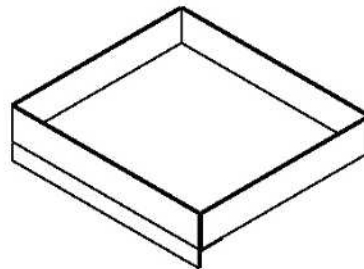
Upper Firing Stand



Lower Firing Stand



Ceramic Tray



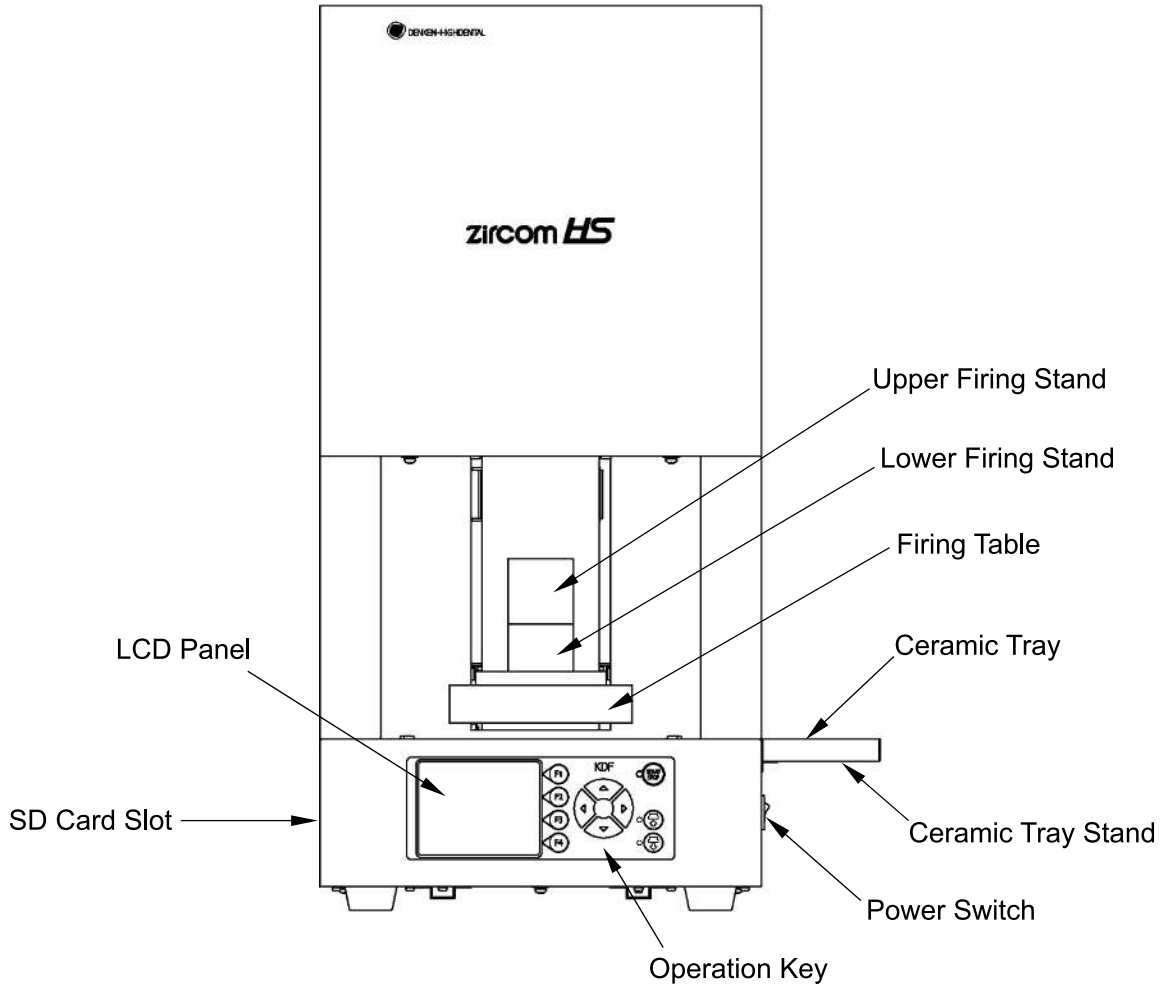
Ceramic Tray Stand

- UPS Power Cord 1 pc
- SD Card 1 pc
- Instruction Manual 1 booklet

We recommend you to save the carton and all packing materials for future use.

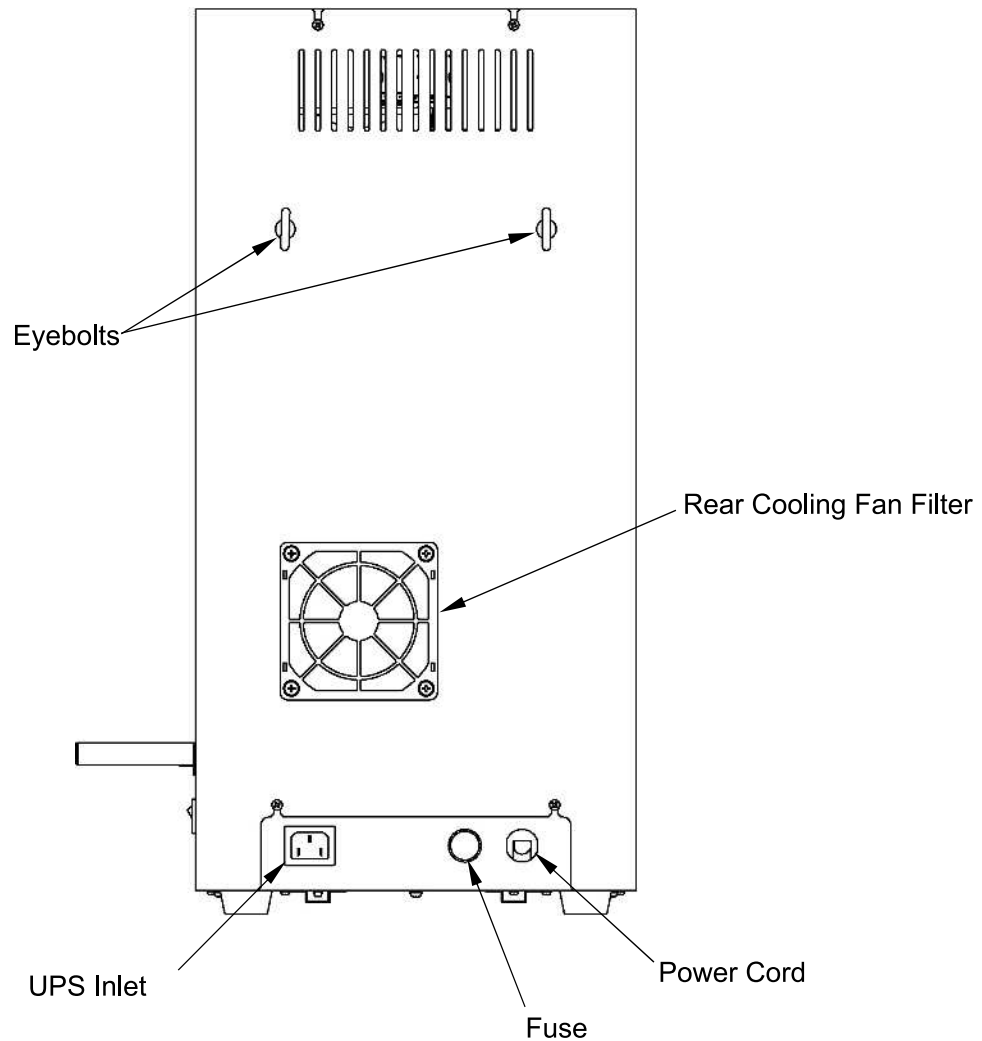
Descriptions of Component Parts

● Front View



- Upper Firing Stand : Platform for placing firing objects.
- Lower Firing Stand : Place to put upper firing stand.
- Firing Table : Table to place firing stand and it moves up and down.
- LCD Panel : LCD panel allows you to check programs/settings and operate the unit.
- Operation Key : F1~F4, Up/Down/Left/Right, Start/Stop and Table Up/Down are used to Operate the unit.
- Power Switch : Power switch for the unit.
- SD Card Slot : The slot allows you place SD card to backup and/or download firing data.
- Ceramic Tray : Set it in the depression of the Ceramic Tray Stand.
- Ceramic Tray Stand : Attach the magnetic part to the side of this device when using it.

● Back View



- Fuse : ϕ 6.4-20A glass fuse. [250V T20A]
- UPS Inlet : Use the included UPS (uninterruptible power supply) power cord to connect the inlet to a commercially available UPS.
[Output: Any within the range of 100 to 240VAC, 300VA or more]
- Power Cord : This is the power cord for this device. Connect it to the specified power source.
- Rear Cooling Fan Filter : This is the cooling fan filter at the back. Be sure to clean it regularly.
- Eyebolts : These are eyebolts for preventing falls.

Preparations before Use


Location & Environment

- Lift the unit up with catching hold of the bottom of the unit and handle on the back of the unit.
- Set up the unit on the center of a flat stable table.
- Keep the unit away from walls and other equipment. Leave the unit minimum of 20cm of space around the unit.
- Secure the unit with the eyebolt on the back of the unit.
Caution) Set the unit to be able to disconnect the plug easily if problems occur.

Power Requirement

- The unit requires a power outlet with independently wired, 220-240V single-phase, 20A and grounding.
- Connect the output of a commercially available UPS to the UPS Inlet at the rear of the unit using the supplied power cord.
[Output: Any within the range of 100 to 240 VAC , 300 VA or more]
Purchase a suitable commercially available UPS separately.
- *The UPS is to prevent the device's cooling fan from stopping if there is a power outage. If none is connected, the device may malfunction if the power supply is lost.

Installation of Firing Stand

- Power on the unit by pressing the power switch button. After Standby mode appears, press the  button to bring down the table.
- Put the provided Lower Firing Stand on the firing table.
- Put the provided Upper Firing Stand on top of the Lower Firing Stand.

Unloaded Muffle Firing

- The firing stand may contain residual moisture. Before using the unit for the first time, please perform a preliminary firing using the program below.

STEP	Temp. (°C)	Time (min:sec)	Table Position
1	1,300	5:00	0
2	1,300	30:00	0

If the above steps are successfully completed, installation of the device is complete.

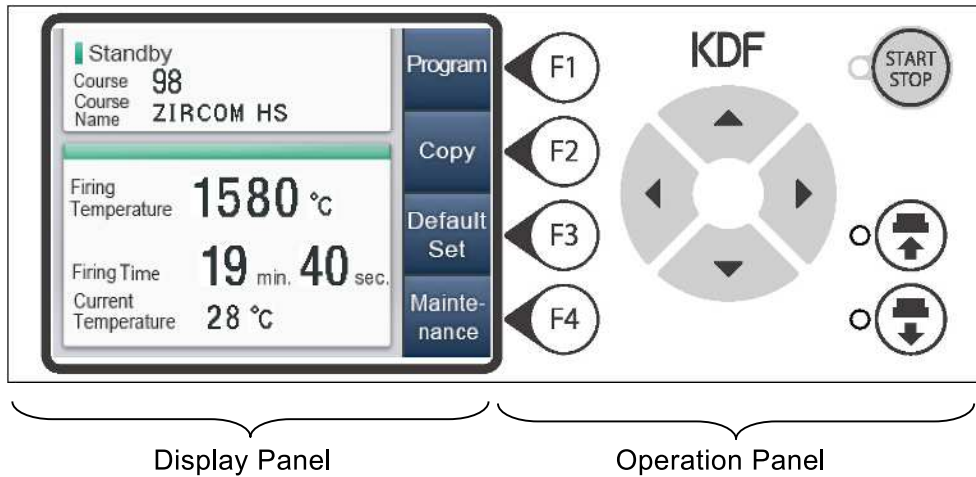
Operation

• Operation Panel

Features color LCD panel display.

The display shows information for content of the program, firing process, etc.

Firing operations and program input are operated by 11 keys.



• Operation Panel

Function Key (F1-F4) : Move to each mode, input programs and etc.



Key : Move cursor for set contents.

START STOP Key : Stop or Start firing operation.



Key : Move the table up/down.

• Operation Modes

The unit has 7 modes for various functions.

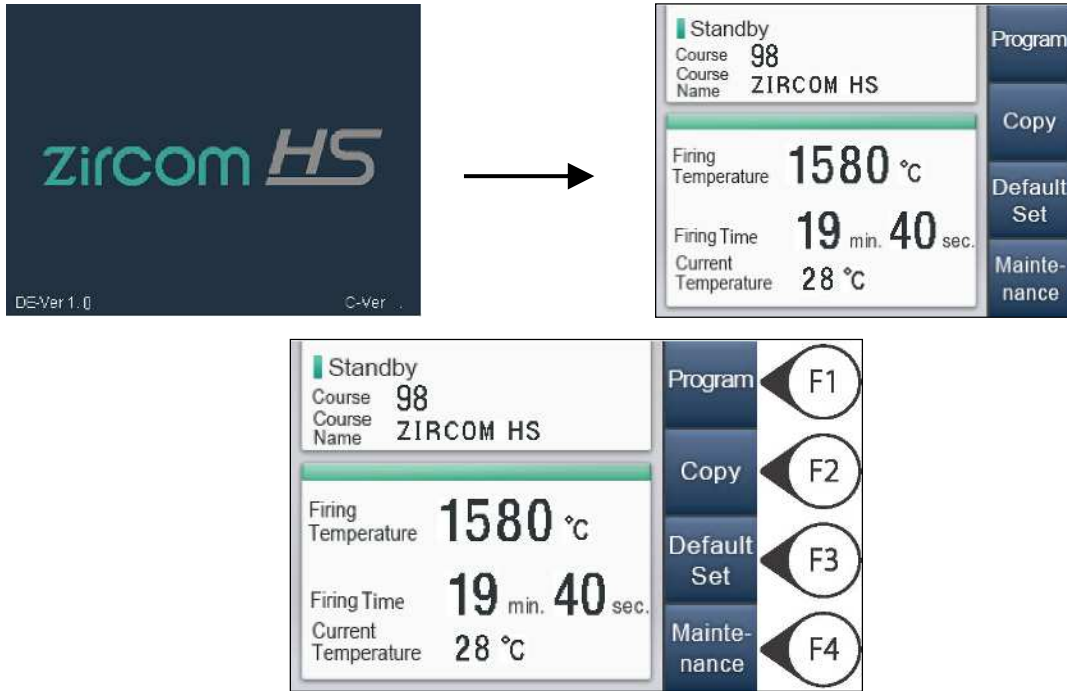
- Standby Mode : Standby mode before firing. After powering on, the unit will enter this mode. →P9
- Program Mode : Inputs a program for each course number. →P10
- Firing Mode : Displays temperature and firing process during firing process. →P12
- Copy Mode : Copies a program to a different course. →P14
- Default Mode : Sets each operation default value and operation process. →P14
- Maintenance Mode : Checks the unit usage and its condition. →P15
- SD Card Mode : Reads data of firing program from a SD Card. →P15

How to use

▪ Power On

Standby Mode

After powering on, the unit displays the Standby Mode which allows users to access to other modes. Please see the following instruction for the standby mode below.



Display

- Course : Current course number.
- Course Name : Course name for current course number.
- Firing Temperature : Maximum temperature in the program.
- Firing Time : Total programmed firing time.
- Current Temperature : Current muffle temperature.

Function Key

- F1 (Program) : Go to program mode. →P10
- F2 (Copy) : Go to copy mode. →P14
- F3 (Default Set) : Go to default mode. →P14
- F4 (Maintenance) : Go to maintenance mode. →P15
- Up & Down Key : Change course. Fast forward by holding the key longer.
- Left & Right Key : Invalid
- START STOP Key : Start firing and go to firing mode. →P12
- (Up) Key : Key used to move the table up.
- (Down) Key : Key used to move the table down.

Caution) When muffle temperature is high, for safety purpose, table moving down is limited as below.

- When muffle temperature is 1400°C and over, the unit keeps the table at the highest position (0).
- ※If the table position is set to other than 0 during sintering program, the table will not move down if the internal temperature is over 1400°C.
- When the muffle temperature is 1,201°C~1400°C, pressing the drop button will cause the table to move down to position 3. During sintering program operation, the table will move down to the set position (position 1 ~ 5).
- When muffle temperature is under 1,000°C, the table move down to the lowest position (5).

▪ Programming

Allows users to program up to 100 courses with maximum of 20 STEPS per program.

For each STEP, set temperature, time, table position, and buzzer type.

※Courses with () are not adjustable.

Programmable parameters and program instructions

Parameter	Programmable Values	Default
Course Name	Character Input : Alphabet & Number Character Max : 16 characters	_____
Temperature	0~1,620°C (2,948 °F)	0°C 32 °F
Time	0 : 00~99 : 59 (min. : sec.)	0 : 00
Table Position	0~5 0 : Highest position 5 : Lowest position (approx 5cm from the top) ※When muffle temperature is 1400°C or above, the table moves to [0] automatically.	0
Buzzer Type	0~5 5 types of sound. ※0 is no sound.	0

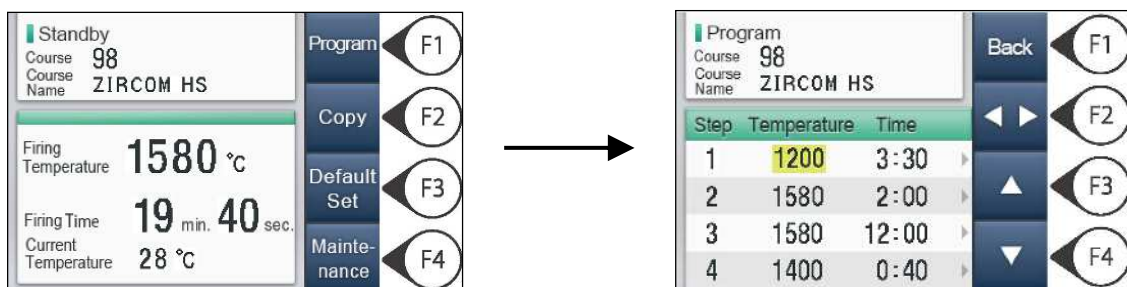
※Table Position

Table position affects temperature inside the muffle. Position 0 completely seals the furnace to quickly rise furnace temperature and position 2, 3, 4, and 5 give space between the furnace and the table to quickly decrease the furnace temperature. We recommend you to set the table at the appropriate position. For cooling stages, we strongly recommend you to program the table position.

Program Mode (F1 Key)

Program mode allows users to input firing program.

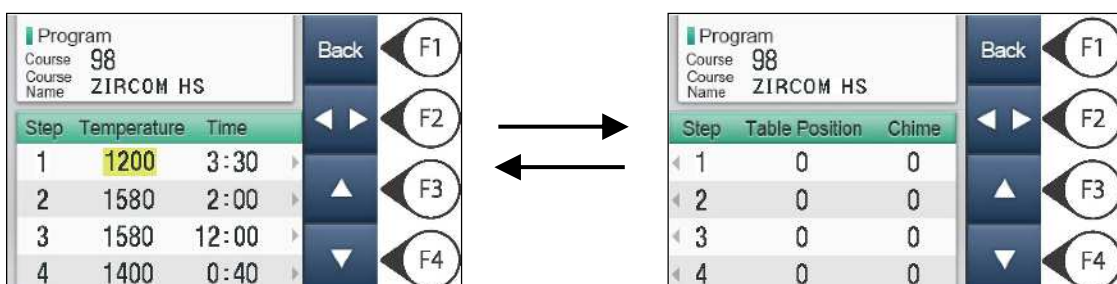
During Standby mode, press the [F1] key to enter the Program Mode.



Key Function

F1 (Back) : Go back to Standby Mode.

F2 (◀▶) : Change Setting Page. (「Temperature·Time」 ⇔ 「Table Position·Chime」)



- F3 (▲) : Increase the value.
 F4 (▼) : Decrease the value.
 Up, Down, Left, Right Keys : Moves the cursor in setting.

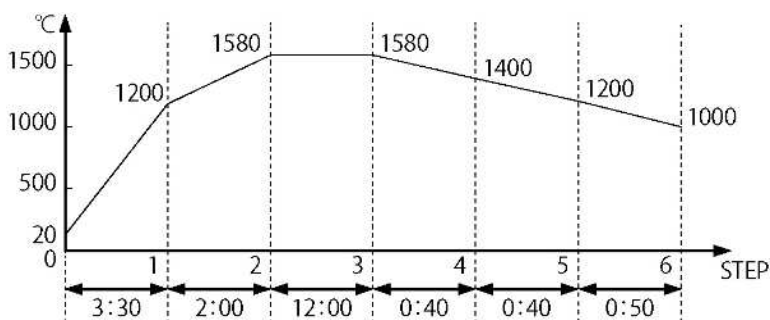
Changing Course Name

1. Enter the Program Mode.
2. Press the ▲ Key to go to the course name.
3. Use [F3] and [F4] key to select the letter (Number, alphabetical, letter) that you want to program.
 ※Holding the key longer will fast forward to the selecting character.
4. Press the Down key to move to STEP 1.

How to Program (Step by Step)

Suppose you store a firing program on Program Course 98 as follows :
 (Make sure firing table is down)

STEP	Temp. (°C)	Time (min:sec)	Table Position
1	1,200	3:30	0
2	1,580	2:00	0
3	1,580	12:00	0
4	1,400	0:40	0
5	1,200	0:40	3
6	1,000	0:50	5



Programmed Start temperature for Zircom HS is 20 °C.

1. Turn on the power to go to the Standby Mode.
 2. Press ▲▼ button to choose the course number 98.
 3. Press [F1] key to enter the Program Mode.
 4. Press ▲ to move to Course Name.
 5. Input the Course Name (ZIRCOM) by using [F3] & [F4] key and ►.
 6. Press ▼ to move back to STEP 1.
 7. Input 1200 by using [F3] & [F4] key.
 8. Press ► to adjust Time then input 3:30 by using [F3] & [F4] key.
 9. Use the same procedure to program for STEP2,3 and 4.
 10. Press ▼ to move down to STEP 5 then input 1200 and 0:40.
 11. Press [F2] key to change Setting Page (Table Position & Chime).
 12. Adjust Table Position to 0 by using [F3] & [F4] key.
 13. Press [F1] key to return to Standby Mode.
- ※Program will not be stored if you turn off the unit during programming.

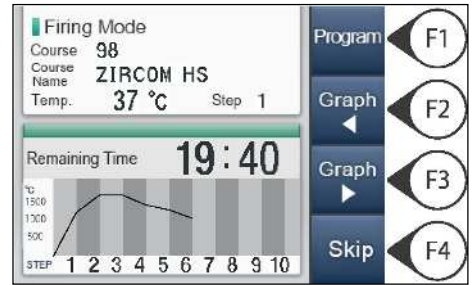
Programming of Course 98 is complete.

Firing

When programming is complete, you can start firing.

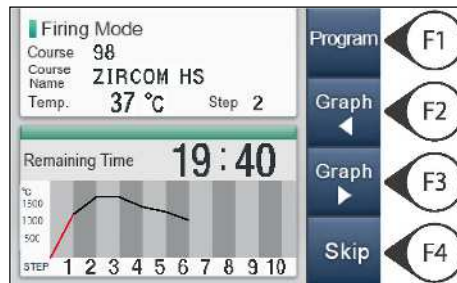
Shown below is an example using course 98.

- ① During Standby mode, press ▲▼ button to select course 98.
- ② Press the ⏪ key to move the table down to the lowest position.
- ③ Place the firing objects on the upper firing stand.
Caution) Place the firing objects on the middle of the upper firing stand.
Caution) The upper firing stand and the muffle will be hot.
Be sure use the tongs and heat-resistant glove when placing the firing objects onto the upper firing stand.
- ④ Press START/STOP key to start firing.



Firing Mode

When firing starts, the display turns to Firing Mode and shows furnace temperature, progress, & the remaining time.

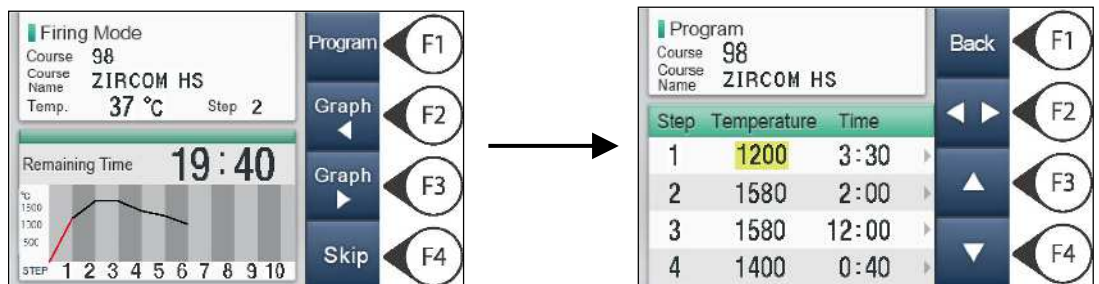


Display

- Course : Course that is in process.
- Course Name : Name of the course that is in process.
- Temperature : Current furnace temperature.
- STEP : STEP that is in process.
- Remaining Time : Remaining time until STEP is fully completed.
- Process Graph : Graph for the entire program.
The completed process is displayed in red.

Key Operation

- F1 (Program) : Access to Program Mode to make a change for the currently running program. Changes are effective from the next STEP. You cannot change the STEP that is in progress. The changes are reflected in the only operation in progress, it will not be saved in the storage data.



- F2 (Graph) : Switch page to STEP1~10 to the STEP graph display.
- F3 (Graph) : Switch page to STEP11~20 to the STEP graph display.
- F4 (Skip) : Pass running STEP. It is enabled when you press for about 1 second.
- Start/Stop : Stops the firing and return to standby mode. It is enabled when you press for about 1 second.

Editing of Running Program

1. Go to Program Mode.
2. Press [F1] key while pressing the ▲ key.
3. Use ▲▼ keys to adjust the program.
4. Press [F2] key (OK) to return to Program Mode.

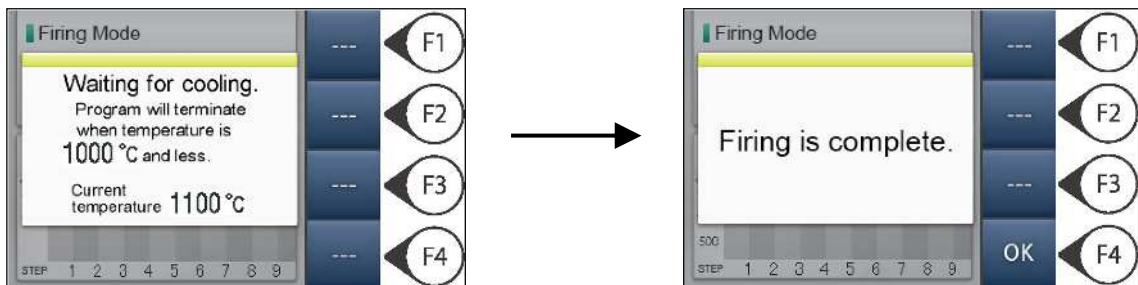


End of the Firing

If the furnace temperature at the completion of all STEPS is 850°C or higher, the table remains at the top on standby for cooling. Once the temperature has dropped below 850°C, the table descends to the bottom, completing the firing.

If the table position in the last STEP of the program is not 0, the furnace will enter rapid-cooling mode. If the final temperature exceeds 1,000°C, rapid cooling will pause when the table is in the position of that in the last step and will end when the temperature falls below 1,000°C.

Press the [OK] key to go to Stand-by mode.



If set to a range of 1~100 °C the temperature of the final STEP, table does not decrease while the top-level firing at the end. Please set If you do not want to lower the firing table at the end of firing for the safety.

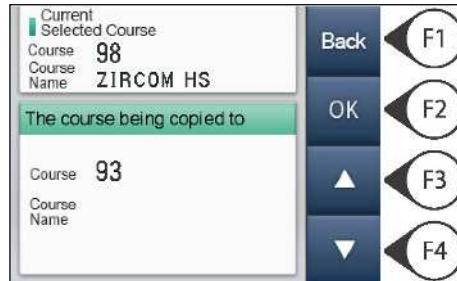
If temperature of the Final STEP is between 1~100°C, the firing table does not go down and stays at the highest position (0). If necessary for safety purpose, please program temperature of the final STEP to less than 100°C.

▪ Copy Mode

Copy mode is used to copy programs between courses.

Using Copy Mode

- ① Go to Stand-by mode, select the course you want to copy.
- ② Press the copy key to go to destination selection screen (shown below).



- ③ Press ▲▼ and select the course number where you want to copy the program to. Selected course will be in yellow.
- ④ Press the [OK] key to copy the program. If you want to copy to the course followed by another, repeat ④ and ⑤.
- ⑤ Press [Back] key to go back to Stand-by mode.

▪ Default Mode

This mode is used to set buzzer volume, temperature calibration, & temperature unit.

Enter Default Mode

During Standby Mode, press [Default Set] key. The screen displays the following screen.



Setting of each item in the default mode

Change the value to move the item by pressing the up or down arrow keys, press the key ▼,▲.

Setting the buzzer volume (4 stages : Consumption, Small, Medium, Large)

- ① Key Chime : Default is Small. (Volume level when you pressing a key)
- ② Finish Chime : Default is Large. (Volume of warning sound at the time of the error)
- ③ Alarm : Default is Medium.
(Volume of sound notification upon completion of each STEP)
- ④ Other Chime : Default is Small. (Volume of other sound, such as power-up)

Temperature Calibration : It allows you to adjust the furnace temperature of $30^{\circ}\text{C} \pm$ to 1500°C . For example, if you want to increase at 15°C 1500°C , please set the $+15^{\circ}\text{C}$. In that case, it will be about 1010°C at 1000°C . The initial value is $0^{\circ}\text{C} \pm$.

Temperature Unit : It can be set to F (Fahrenheit) or °C(Celsius) temperature scale.
The initial value is °C

▪ Maintenance Mode

Maintenance mode allows users to check total running time of the unit and total firing cycle.

Data of total firing cycle and total running time are useful when applying periodic maintenance or when the unit is in need of service.

Enter Maintenance Mode

Press [Maintenance] key in Standby Mode to display the following screen.



Descriptions of Maintenance Mode

Powered-on Time : Total running time since purchase.

Firing Cycles : Total number of firing cycle since purchase.

1,300°C and over : Total firing time above 1300°C.

Firing Cycle Memo : It is erasable memo firing frequency. Press the [Delete Memo] key to clear to 0. Please use as a guide, such as the next time to replace with clear at the time of replacement of the heater.

Press the [Back] key to return to the standby mode.

Press the [SD card] key to go to the SD card mode.

▪ SD Card Mode

SD Card Mode allows you to save firing program data or maintenance information in a SD card so you can edit or save on your PC.

Enter SD Card Mode

Go to Maintenance Mode and press [SD Card] key to display the following screen.



Using SD Card

Export Firing Program :

Press (F2) key to export the firing program content to the SD card. File name will be saved as "ZHS_PRG.csv". You can edit the file using software such as EXCEL on the PC.

Export Maintenance Information :

Press (F3) to key to the maintenance information to the SD card. File name will be saved as "ZHS_MNT.csv". In a case of troubleshooting, please send this date to our technical support team VIA e-mail.

Importing Firing Program from SD card to Zircom HS:

Press (F4) key to import data from the SD Card. In order to import a Firing Program data from SD card to the unit, you must create a program file named "ZHS_PRG.csv" on your PC and save it on your SD Card.

Periodic Maintenance

Please perform timely care of the following



Before cleaning the unit, turn off the unit and unplug the power cord.

If exterior of the unit is dirty, please use soft cloth with a mild detergent to wipe.

Cleaning the firing table

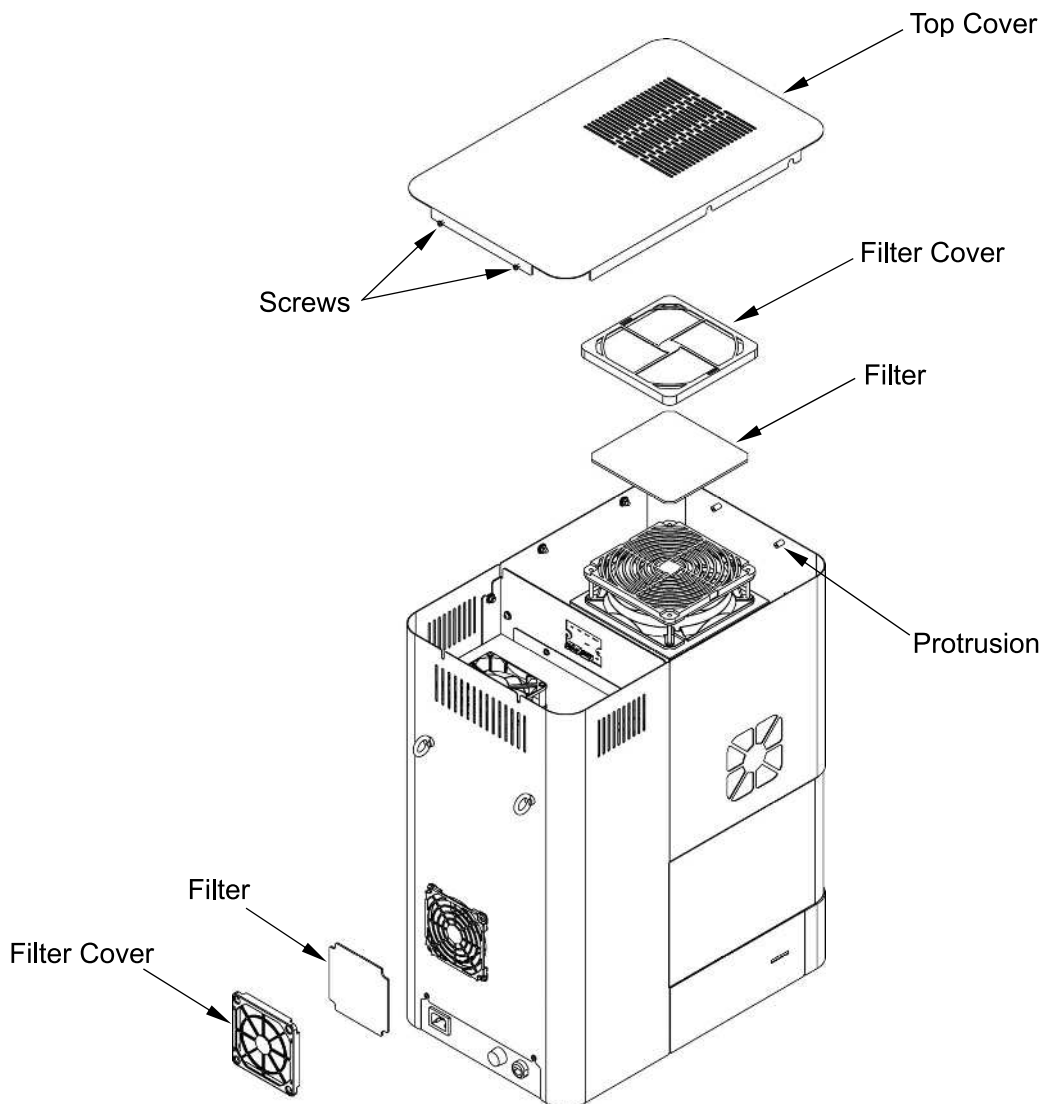
In a state in which the furnace, firing table is cold, please remove dust takes a firing platform.

Cleanness of Fan Filter

1. Slightly loosen the two screws at the top of the unit (do not remove them).
2. Hold the screws and lift the top cover to remove it.
3. Remove the filter cover and take out the filter as shown below.
4. Do the same for lower-back of the unit.
5. Vacuum the dust from the filter or replace it with a new one.

Caution) Do not wash the filter with water.

6. Put the protrusions on the unit through the holes on the front of the top cover and fix the top cover into place with the screws.



Error Messages

The unit shows a warning display as shown below. When there is an error sign, please follow the instruction carefully. When contacting our technical support team, please provide the error number. In the case when the unit is showing a warning sign due to abnormal or excessively loud noise, please turn off the unit and turn it back on.

Caution) In the case of rebooting the unit, the contents of the initial value and the program may be deleted.

The followings are examples of abnormal or excessively loud noise

- Lightning strike nearby, lightning
- Equipment high frequency casting equipment, such as arc casting apparatus
- Wireless device
- Motorized equipment



WARNING

No.2 Abnormal Controller

Warning 2 is displayed when the controller is operating abnormally due to abnormal or excessively loud noise.

No.4 Abnormal Table Up/Down

Warning 4 is displayed when error occurs during lifting the firing furnace.

No.6 Thermocouple Malfunction

Warning 6 is displayed when the thermocouple is short-circuited or disconnected.

No.8 Abnormal Memory

Warning 8 is displayed if the memory content is corrupted or lost by abnormal or excessively loud noise.

The unit also shows Error 8 when it is unable to read the memory. Turn off the unit and turn it back on to reset.

When you reset, program content may be deleted.

No.9 Abnormal Temperature Rise

Warning 9 is displayed when the muffle temperature rises excessively.

No.11 Abnormal Upper Fan

Warning 11 is displayed when an error occurs in the top cooling fan.

No.12 Abnormal Left and Right Fan

Warning 12 is displayed when an error occurs in the under cooling fan. [CODE 1 : Right] [CODE 2 : Left]

No.13 Abnormal Temperature Control Board

Warning 13 is displayed when an error occurs in the temperature control board inside.

No.14 Abnormal Current Control Board

Warning 14 is displayed when an error occurs in the current control board.

CODE 0: Power outage or control board communication failure

CODE 50: Upper fan failure

CODE 5: Heating coil failure

CODE 6: Breaking of the heating coil.

No.15 Coil Sensor Malfunction

Warning 15 is displayed when the coil temperature sensor is disconnected.

- Please contact the respective purchasing dealer for parts purchase and inquiries.

Specification

Product Name	Zircon HS
Power Requirement	220-240V ± 10% 50/60Hz
Power Consumption	3.0 kVA
Inner Muffle Size	φ 40 × 30 (H) mm
Overall Dimensions	270 (W) × 555 (H) × 430 (D) mm
Weight	25 kg
Temperature sensor	JIS R Thermocouple
Environment for use	Indoor use Room Temperature 10~35°C Humidity 30~90%RH no condensing Altitude: 2000 meter and under Pollution Degree 2 Over voltage Category II
Maximum Temperature	1,620°C
Program Memory Capacity	100 programs
Safety Function	Cooling Fan, Abnormal temperature monitoring circuit, 10 abnormal operation detection apparatuses
Accessories	Upper Firing Stand : 1 pc Lower Firing Stand : 1 pc Ceramic Tray : 1 pc Ceramic Tray Stand : 1 pc UPS Power Cord : 1 pc SD Card : 1 pc Instruction Manual : 1 booklet

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