LABDEX

18 L Muffle Furnace

LX668MF

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1. Safety Measures

1.1 Attention

1) Check the state of the equipment after opening the furnace package.
2) Check the sintering temperature curve, rising speed should not be too quick.
3) The furnace door should not be opened unless the temperature is below 200°C, and it is better to open the furnace door at room temperature.
4) Be careful of high temperatures and pay attention to the scald.
5) If 15 days of no use of the furnace, the furnace should be warmed up for two hours at about 600°C when operating.

1.2 Operation safety instructions

- Before operating, check the wire connection as per the electric wiring requirement to ensure the power cord, plug, and switch capacity match the power of the equipment.
- The furnace circuit must be grounded to ensure safety.
- For the first-time use of a furnace, warm up the furnace to 600C for two hours to remove moisture environment in the furnace. 1700°C furnace suggests warm up to 1200°C.
- After a longer time of no use, warm up the furnace again before normal work.
- Do not get directly reached by liquids and acidic corrosive materials to alumina ceramic fiber chamber lines and heaters. The user should put a protective pad plate at the bottom of the chamber if available.
- When operating the furnace, the sample material should not reach the heating elements, and a safe distance must be kept avoiding any short circuit and electric shock.
- Flammable and explosive materials mustn't be placed into the furnace and kept away from the danger of explosion.
- Sample materials with large amounts of moisture water or large gas smoke produced during the heating process are not suitable for standard furnaces and should have gas-out accessories to protect the furnace chamber line and heating element.
- The furnace alumina chamber has low strength, operate the sample carefully. Do not make furnace door insulating fiber touch the samples when closing the furnace door.
- If any abnormality is found During the operation, turn off the power and air switch immediately and contact the professional electrician personnel to check it.
- When it is needed to open the furnace door under high temperature, turn off the power of the furnace to keep it safe and be careful of burnt.
- The furnace door should be closed immediately after the sample is taken out at high temperature. Try to avoid the door being open for a long time at high temperatures to prevent the chamber line fracture crack or any other problem caused by sharp cooling with temperature difference.

- The alumina chamber material is made by a wet way of vacuum suction filter molding, and it is a kind of porous inorganic material. With the principle " Expand with heat and contract with cold ", the surface of the chamber structure may have the condition of surface external crack or scaling when it is in the process of operating with heating and cooling frequently for some time or opens the furnace door in the high temperature. And these are normal phenomena with this kind of material features and it does not affect normal use. And high solid refractory brick chamber is better with good thermal shock features.
- When you use the furnace for the first time, the ceramic fiber chamber may appear a slight white smoke. The reason is that the alumina ceramic fiber board contains 4%-5% organic compounds. For the first time using, when the temperature reaches some degrees and the organic compounds are volatile, the fiberboard will have a slight white smoke or local yellow color on the chamber this is a normal phenomenon and it does not affect use. When the organic substance is volatilized, this condition will not happen again. Warm up furnace operation for the first time using, refer to the manual operation.
- Check regularly whether the electrical connection of the temperature control system is fixed well and pay special attention to whether the connecting point of the heating element is fastened.
- When loading samples in the chamber furnace, try to keep some distance from samples to the edge of the furnace chamber and furnace bottom for hot air flow in the chamber to get a good heating effect. Too full load is not good for samples heating and furnace working.
- When using the furnace from a cold state, the heating rate of the low-temperature section should not be too fast since the furnace is cold and needs a lot of heat absorption. The heating rate of each temperature section should not be a large difference.
- The physical and chemical properties of the fired material should be fully considered when setting the heating rate to avoid the phenomenon of heating material spraying and contaminating or breaking the furnace reactor tube.

1.3 Attention for PID parameters

The temperature control instrument uses an advanced PID adjustment algorithm that integrates artificial intelligence technology, has solved the overshoot problem of the standard PID algorithm, and enables high precision of control. When operating, the user can start the auto-tuning function to help determine the PID and other parameters.

When using, record the parameters(P, I, D) to prevent the control accuracy from being affected by accidental loss of operation.

The parameter lock is not permitted to be modified by the user, otherwise, the control programs may be disordered.

2. Introduction

18 L Muffle Furnace LX668MF is a microprocessor controlled chamber with stable PID temperature control system. Equipped with a rapid heating speed of 0 to 30 °C / min, the chamber adopts vacuum forming ceramic fiber with no power drops off with high temperature. Temperature uniformity with excellent protection of heating elements (SiC rod) is maintained. One press start button for pre-set programmes with alerting signal for overheating of chamber.

3. Features

- High temperature heating alloy wire for heating elements
- Rapid heating speed – 0 to 30 °C / min
- PID controlled temperature controller with a precision of 1 °C
- One button press start for pre-programmed functions
- Durable inner lining of light insulating bricks
- Double walled housing for high stability
- SIC heating rod
- Alert signal for overheating of chamber
- Heat curve can be preset with the programmable function
- 2 programmable groups with 8 segments in each group

4. Specifications

Model No.	**LX668MF**
Volume	18 L
Maximum temperature	1400 °C
Heating element	SiC
Heating speed	0 to 30 °C / min
Working temperature	1350 °C
Temperature precision	± 1 °C
Programmable groups	2
Programmable segments	8
Chamber material	Alumina Ceramic Fiber
Thermocouple	S style
Voltage	220 V
Power	5 kW
Dimension (W x L x H)	250 x 300 x 250 mm

5. Applications

Used for fusing glass, soldering, brazing, creating enamel coatings, ceramics , research centers, medical laboratories to determine the non-volatile and non-combustible proportion of the sample and for highly sophisticated metallurgical applications

6. Operations

Muffle Furnace Operation process

↓

Turn on the air switch on the side of the furnace

↓

Turn on the power switch on the control panel

↓

Temperature instrument self-inspection and display room temperature

↓

Open the furnace door and put the sintering sample then close the door

↓

Input the sintering temperature program process curve and save it

↓

Then press the start button after the instrument program is run

↓

The program ended and cooled to a low temperature to fetch the samples

↓

Turn off the power switch in turn

7. Software Operations

7.1 Boot Screen Description

1) **Welcome Interface**

Figure-1

2) Click the temp control interface button and enter the power-on password, **"111".**

Figure-2

7.2 Instrument Panel Description

Figure-3

1) **PV:** Measuring Value, also can be called present practical value
2) **SV:** Setting Value
3) **MV:** Percentage (%)of Output Power
4) **STEP:** The currently running program segment, the instrument can set 30 program segments
5) **RUN_TIME :** Running Time
6) **STATE:** Running Status (running, stopping, maintaining)
7) **RUN:** Run the button and press **RUN** to heat up the furnace after setting the temperature curve.
8) **STOP:** It can manually stop the operation by pressing **STOP** during the heating process or after the heating is over.
9) **HOLD:** If you want to stay at a certain temperature during the heating process, press **HOLD** to keep the state.
10) Pro Edit It is the program editing button to set the temperature and heating curve.

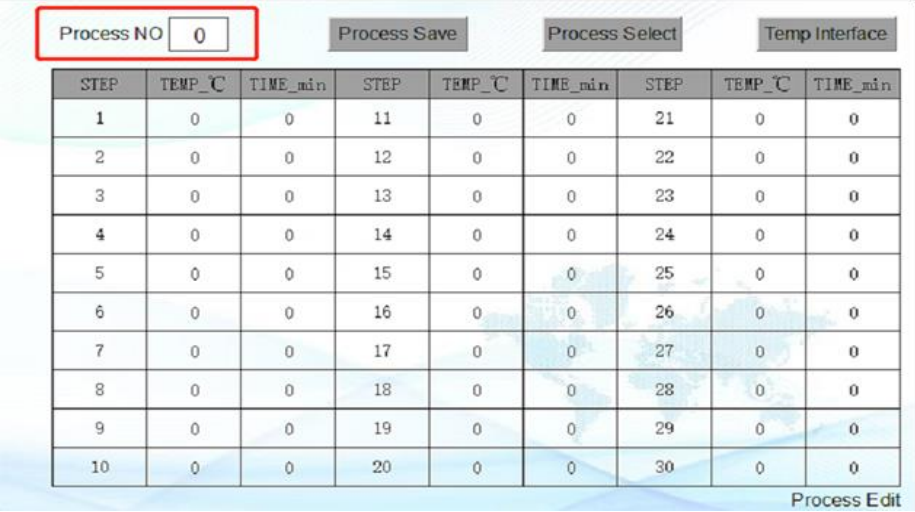
7.3 Quick operation instructions for heat

1) Turn on the main power switch and furnace air switch on the furnace side or rear part. Turn on the power switch button on the panel and the temperature control instrument lights up. The temperature control instrument displays the room temperature, PV displays the actual temperature, and SV displays the set temperature.
2) Input the program: prepare the heating curve using the sintering process.
   For example:
   - Starting from room temperature rise to 500℃ in 60 minutes.
   - Hold the temperature at 500℃ for 30 minutes.
   - Then Rise to 800℃ from 500℃ in 50 minutes.
   - Hold the temperature at 800℃ for 120 minutes.
   - The temp hold process ends, and the machine stops automatically.

Step 1: Press the **"Process Edit"** button.

Figure-4

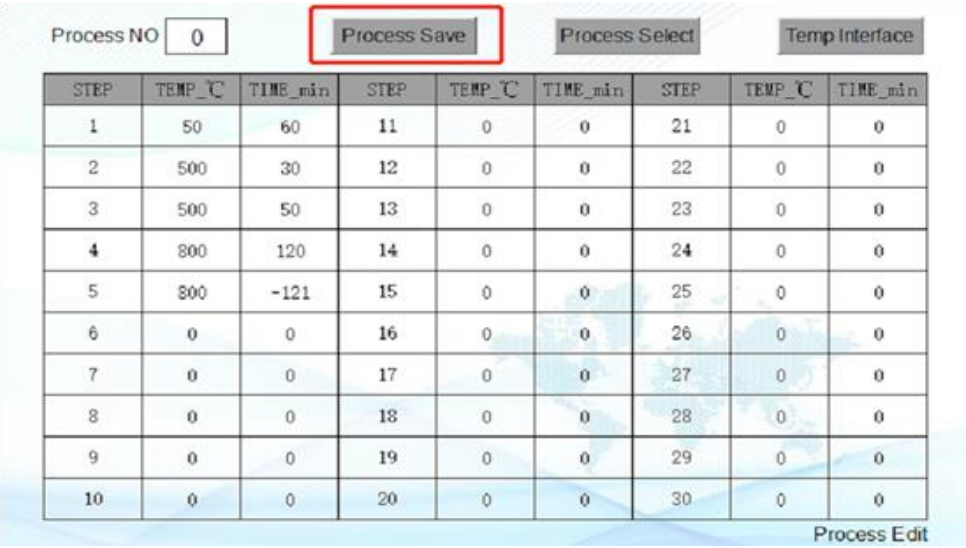
Step 2: Enter the program editing interface.
When editing the heating program, you need to first set the curve (process number) to be saved, enter a number 1-15, and a total of 15 curves can be set and saved.



STEP	TEMP_℃	TIME_min	STEP	TEMP_℃	TIME_min	STEP	TEMP_℃	TIME_min
1	0	0	11	0	0	21	0	0
2	0	0	12	0	0	22	0	0
3	0	0	13	0	0	23	0	0
4	0	0	14	0	0	24	0	0
5	0	0	15	0	0	25	0	0
6	0	0	16	0	0	26	0	0
7	0	0	17	0	0	27	0	0
8	0	0	18	0	0	28	0	0
9	0	0	19	0	0	29	0	0
10	0	0	20	0	0	30	0	0

Figure-5

Step 3: Edit the heating curve, for example, 60 minutes to 500℃, 500℃ hold for 30 minutes, then 50 minutes to 800℃ and 800℃ hold for 120 minutes, finally stop temp holding and automatically stop the heat. When the program editing is completed press "**Process Save**" to save.



STEP	TEMP_℃	TIME_min	STEP	TEMP_℃	TIME_min	STEP	TEMP_℃	TIME_min
1	50	60	11	0	0	21	0	0
2	500	30	12	0	0	22	0	0
3	500	50	13	0	0	23	0	0
4	800	120	14	0	0	24	0	0
5	800	-121	15	0	0	25	0	0
6	0	0	16	0	0	26	0	0
7	0	0	17	0	0	27	0	0
8	0	0	18	0	0	28	0	0
9	0	0	19	0	0	29	0	0
10	0	0	20	0	0	30	0	0

Figure-6

Step 4: Press the **"Process Select"** button to select the process curve.

STEP	TEMP_℃	TIME_min	STEP	TEMP_℃	TIME_min	STEP	TEMP_℃	TIME_min
1	50	60	11	0	0	21	0	0
2	500	30	12	0	0	22	0	0
3	500	50	13	0	0	23	0	0
4	800	120	14	0	0	24	0	0
5	800	-121	15	0	0	25	0	0
6	0	0	16	0	0	26	0	0
7	0	0	17	0	0	27	0	0
8	0	0	18	0	0	28	0	0
9	0	0	19	0	0	29	0	0
10	0	0	20	0	0	30	0	0

Figure-7

Step 5: If the process number is saved as " 1", select "1" and load it according to the loading process.

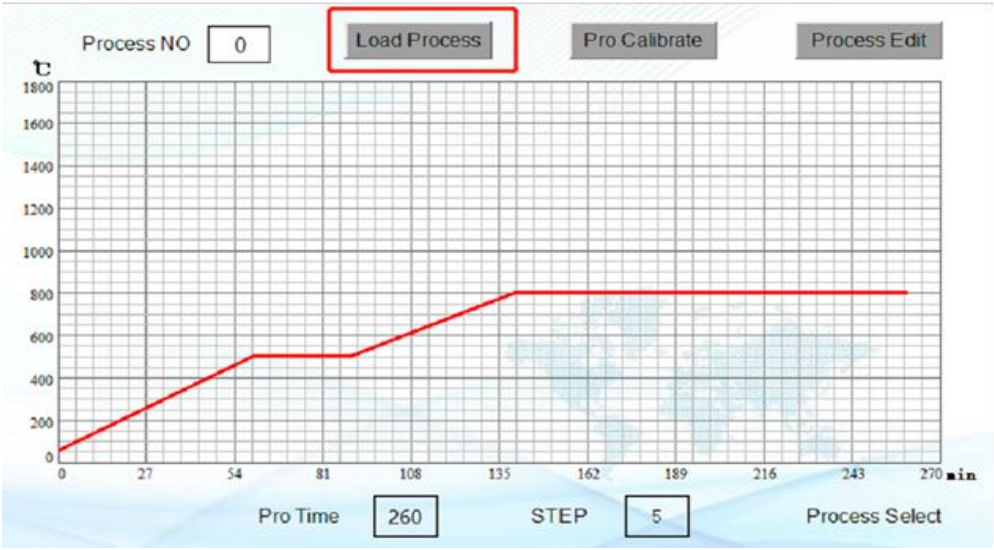


Figure-8

Step 6: After loading successfully, then click "**Pro Calibrate**" and check according to the process.

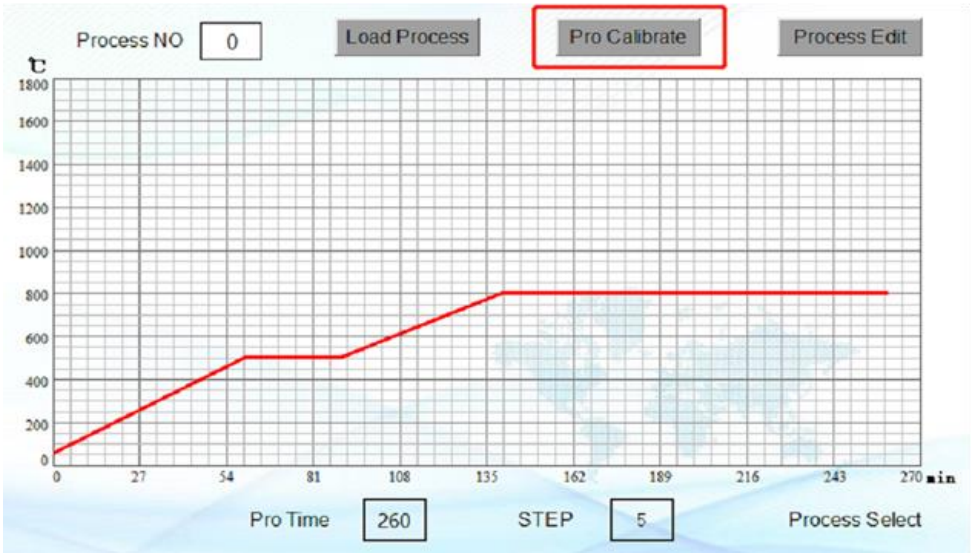


Figure-9

Step 7: Press the " **Run** " button to start running.

Figure-10

When the device starts heating, it will heat according to the set process curve. After the program is completed, it will automatically end and enter the stop state. If you need to stop the program in the process, press the "**STOP**" button to stop.
After the device work is finished, turn off the main power.

Note:

(1) The heating time and target temperature can be changed as required. Different heating elements have different heating speeds, as follows:

- **Resistance wire heating element (HRE):** Heating speed is not more than 25℃/min.
- **Silicon carbon rod heating element:** Heating speed is not more than 30℃/min.
- **Silicon molybdenum rod heating element:** Heating speed is not more than 10℃/min.
- Strictly implement the heating speed limit, otherwise it will damage the heating element or reduce the service life of the heating element.

(2) The heating curve cannot be changed during the heating process, and the heating curve must be re-edited after stopping.

7.4 Instrument Interface Switching

To switch between the two main interfaces, you need to manually click on a fixed area to switch the interface arbitrarily as shown in the below figure.

Figure-11

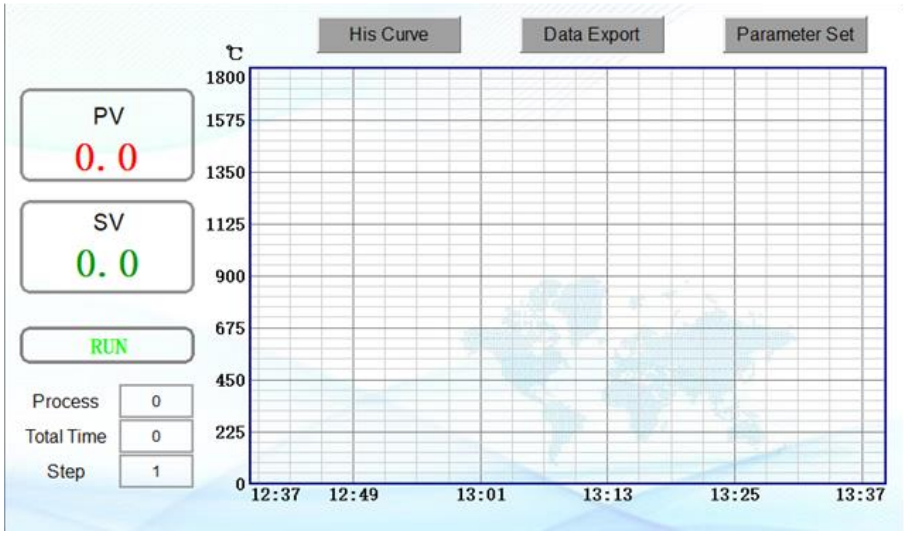


Figure-12

7.5 Other functions of the instrument

Real-time curve and historical curve:

Figure-13

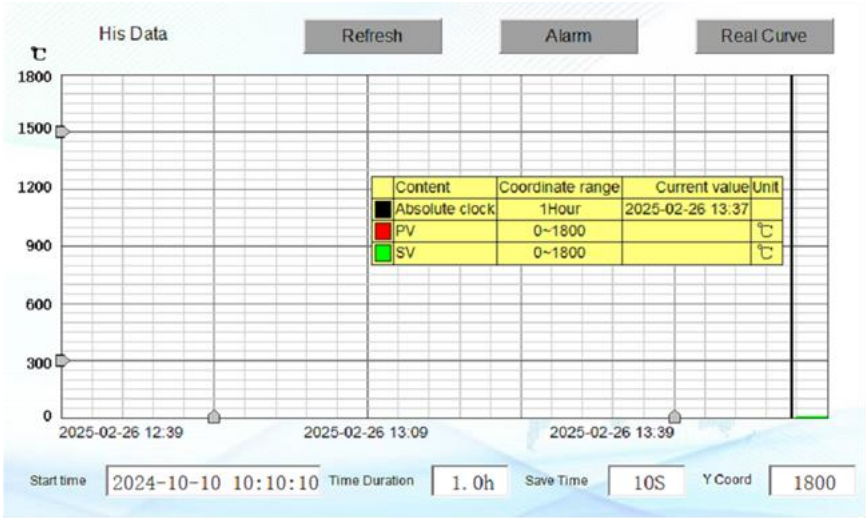


Figure-14

Export historical curve data (insert the USB flash drive into the USB port on the panel and click the data export button)

Figure-15

Click "**Export USB**".

Figure-16

After exporting data, click "**Back**" to the main interface.

Annotation:

1) **ACTUAL:** Actual real furnace temperature.
2) **SETTING:** Setting Temperature.
3) **HOLD:** This position will display the operating status of the device, like RUN, STOP, HOLD.
4) **Process NO:** This means the present running program and the controller can have 15 curve programs.
5) **PRO_TIME:** Running Time of the present curving program.
6) **STEP:** Segment of the current running curve program.
7) **His Curve:** Viewing historical curves.
8) **Data Export:** Curve data export.
9) **Par set:** Control parameter of the instrument and not recommended to modify.
10) **COMM:** Communication status of the temperature control instrument**.**

8. Accessories

Standard Accessories

Accessory No	Accessory
1	Crucible tong
2	High temperature gloves

Optional Accessories

Accessory No	Accessory
1	Paperless recorder
2	Alumina crucible
3	Stainless steel exhaust chamber