Setup **2**
Usage **3**
Contact **3**
Safety Notice: Retaining This Document & Danger Levels **4**
Usage **5**
Furnace Error Messages **11**
⚠ Heat Sensor Error 11
⚠ Can not Heat Error 11
⚠ Overheating 12
⚠ Upper & Lower Switch Error, or "Two switches can't signal at the same time" 12
⚠ Lower Limit Error / Lower Scale Error 12
Coloration Problems **13**
White Spots 13
Yellow, brown or dark colorations 14
Greenish coloration 16
Contamination 16
Loss of MoSi2 silica layer 17
Software Updates **19**
Lift And Limit Switches **19**
Thermocouple Replacement **19**
Calibration **20**
Video: Calibration with PTC rings 21
Heating Element Replacement **22**
Video 22
Electrical Maintenance **24**
Voltage 24
Fuse Blowing Problems 24

Do not reproduce this manual without official authorization

You may only print one copy per device

We make this document available only through the QR code on the front panel of the furnace

https://docs.google.com/document/d/1PBs_oqGzYdGJUnJtiDPRpKe7O0E3aswRWLtstq0fr0Q



Content

Setup

- ☐ The furnace needs its own power line without any other device sharing the line.
- ☐ The power line needs to be properly grounded and 3.5 mm high quality copper cables
- ☐ The mains fuse must be at least 40 AMP C Type
- ☐ When the lift is closing, make sure the tray is centered properly
- ☐ We recommend an empty firing to clean the impurity buildup before starting to work.
- ☐ Your furnace is calibrated before delivery, however we recommend one more calibration before usage when it is installed to its working place.

Usage

Dear Customer,

We are glad to introduce you to our high speed zirconia sintering furnace. With its maximum temperature of 1550 °C this model is perfectly suitable for sintering high temp material such as base, translucent and multilayered zirconia. The electrically driven lift provides easy loading, automated operation and heater protection.

The heating all around the furnace chamber provides uniform temperature distribution. Since specially designed molybdenum disilicide heating elements are used in the furnace, crowns and bridges are protected against chemical reactions/oxidations. The load is placed in a tray made of technical ceramics. Up to 3 trays on top of each other can be placed to achieve higher productivity.

Tegra Speed is equipped with a rapid cooling function which allows the furnace to automatically open stepwise for controlled faster cooling. Depending on the load and the type of trays a processing time shorter than 90 minutes can be realized.

Care must be taken to follow the instructions in the manual. It is your responsibility to set up the device in accordance with the local electrical authorities regulations . The device is produced to only sinter a dental restoration at high temperatures in dental labs.

The control unit has a capability of 100 programs and 10 steps for each individual program.

Contact

Email: info@teknikdental.com

Whatsapp & Phone +90 (532) 392 99 96

Address
Büyük Coşkun Sokak 1C
Ali Enderer İş Merkezi
34040, Bayrampaşa İstanbul, Türkiye

Safety Notice: Retaining This Document & Danger Levels

This document is digitally available for download. You must download and print this operating manual and it must be kept in a readily accessible location for future reference. In the event of the sale or transfer of the device to a third party, ensure the manual is included. This ensures the new owner can familiarise themselves with the operation of the device, as well as all relevant safety precautions and warnings.

Please follow the warning and safety information in these instructions to prevent injury or material damage. These warnings are identified as follows:

	**DANGER** An imminent danger that could result in serious bodily injury or death.

	**WARNING** A possibly dangerous situation that could result in serious bodily injury or death.

	**CAUTION** A possibly dangerous situation that could result in minor or moderate bodily injury

⚠	**INFORMATION** A possibly harmful situation which could lead to damage of the product or an object in its environment.

Usage

Use indoors only.
Never operate the unit in close proximity to combustible materials.
The unit must be electrically grounded to a three wire electrical outlet. Do not use a power strip.
The electrical service provided must be of the proper way according to local electrical directives.
Unit must be placed in a position that allows the power cord to be easily disconnected from the wall or inlet socket.

Disconnect the line cord before attempting to service the unit.
Do not attempt to operate or maintain the unit until you have read and understand this operation manual. If the unit is not operated in the manner as specified in this manual, the protection provided by the unit may be impaired.

Do not place firing trays or other hot objects directly in front of the furnace; they will melt the touchscreen display cover.
Switch the furnace off when it is not in use.
Close the lift and turn of the furnace when it's not in use

Failure to use the furnace according to this manual may impair protection provided by the furnace. tegra SPEED furnaces are dental laboratory heat treatment furnaces for sintering zirconia.

The furnace was built according to safety regulations of the European Community. Do not use the furnace for anything other than the intended usage.

The firing chamber contains insulating material comprised of ceramic fib- ers classified as carcinogens. When working on the muffle fiber dust may get released. Exposure can potentially be carcinogenic if inhaled, as well
as irritate skin, eyes and respiratory organs. Wear appropriate protective clothing when working with the insulation material.

The interior of the main assembly is only accessible by removing hard- ware with tools and should only be opened and serviced by qualified technicians. Since the interior of the unit may contain high voltage and dangerous compenents, failure to follow this warning may result in equipment and personal damage.

Environmental conditions
Indoor use
Max altitude 2000 meters.
Ambient operating temperature 5°C - 40°C (41°F - 104°F)
Maximum relative humidity 80%, non-condensing for temperatures up to 31°C
Mains supply voltage fluctuations not to exceed +/- 10% of the nominal voltage. Use 10 kwA regulator in this case

Technical Specifications
High temperature: 1600°C Heating speed: Max. 40 C/min

Electrical Specifications
Voltage Range: 220-230 V - 50 Hz Current: 1-15 AMP
Power: 3000 Watts

Exterior Dimensions	Box Dimensions
Height : 73 cm	86 cm
Width : 38 cm	47 cm
Depth : 41 cm	57 cm

Weight : 55 kg

Chamber: 3,5 liters

Unpack and remove the furnace from its packing case. Save the case and other packing material for future transportation needs.

Check the package content.
Furnace
Operator manual
Tray and powder

Shipping damage should be reported to the dealer and carrier as soon as detected.

Ensure the unit is properly grounded. To avoid electrical shock, this furnace must be installed by a qualified electrician who can understand fuse specifications, electrical source and grounding code requirements.

There may be some debris due to freight. Before first use, make sure the muffle is intact and no large parts have fallen off. Clean the muffle with a brush. If there is any dust or pieces of isolation in the burning chamber , it must be swiped away very gently without touching the heating rods and isolation walls.

This device may momentarily use very high current during heating curves. Make sure your main fuse is at least 40 Amp and C Type. Ask your electrician to check your cabling and make sure your electrical setup confirms the furnace specification.

OPERATION

CAUTION
Keep the chamber closed when not in use. Materials entering the furnace may damage the heating elements or affect the quality of your workpieces.

Pre-heating Notice
The furnace automatically begins heating to 150 °C upon being switched on. Do not start a program until this temperature has been reached.

Program Specifications
The furnace features 100 programs, each consisting of 10 steps.
Each step contains three parameters.
The first nine steps control the heating phases and the lift mechanism.
The final step defines the parameters for the lift opening temperature and duration.
The last segment is dedicated to the cooling phase.

Parameter Definitions
First Parameter: Target temperature (measured in degrees Celsius).
Second Parameter: Heating or cooling rate (measured in degrees per minute).
Third Parameter: Holding time (the duration the temperature is maintained after the target is reached).

Power Interruption
The running program cycle will automatically resume following the restoration of power after a failure.

Keep your firing trays stored inside the furnace. Make sure that they do not get contaminated with any foreign material. They should be cleaned regularly and handled with clean instruments.

If you are using zirconia beads, make sure that the zirconia work is not burried in beads. The zirconia needs to be free to move as it shrinks during firing.

Programming
The furnace has 100 programmable slots. Touch the P icon on the top navigation to see a list of programs. Touch the program you wish to load.
You can directly edit a program on the main screen. Any changed values will be permanently saved to memory.
When the program is running, changed parameters are reset to their original value. This function allows you to change parameters when a program is running without changing the original program. For example if you accidentally run a fast program and you wish to increase the holding period, you can change the holding time for the current run. You can only change the parameters of the next segments. The current active segment can not be changed during run.

SETTINGS

The settings screen will let you change the date/time, language and offset values. Offset values can be -100/+100 C degrees. This is used to callibrate your furnace.
Use positive values if the zirconia looks over fired. Use negative values if the zirconia looks fired insufficently. For example, if the zirconia looks like it needs 10 C more, enter -10, if the zirconia looks like it was overfired by 10 degrees, enter +10 to callibrate your furnace.

TRAY HANDLING
Make sure that tray and bottom pieces are all centered vertically, before placing your works in the furnace. Tray and bottom piece should enter the chamber precisely without touching the muffle. The plate must close smoothly to the furnace. Misplaced pieces can damage the muffle and lift arm.

TRAYS MUST BE PLACED VERTICALLY CENTERED TO AVOID LIFT DAMAGE

HEATER PROTECTION

HP the drying oven is a heatradiating in frared heater, works at 200 digress. It serves the purpose of pre-drying zirconia fram e work in order to prevent damagetothe furnace heating elements by acid contained in the zirconiablocks.Thedrying time of the frameworks depends on the dimensions of the bridge. For bridges
of up to five elements a drying time of 45minutes is recommended for larger bridges.
Use a drying Furnace!

For individual crowns and small bridges of up to 5 elements a drying time of 45 minutes is recommended, for larger bridges up to one and a half hours.

Check cooling fans regularly

Cooling fans begin operation above 400C. Periodically check to see if all the fans are operational.

Check heater connections periodically

Heater connections should be checked every 6 months. Open the top of the furnace and check if the bolts are loose or not. Loose bolts need to be carefully tightened again.

Cleaning

Clean exterior of furnace only by wiping unit with a damp cloth coated with a mild non abrasive cleaner. Turn of the furnace and use a soft brush to remove any dust that may have accumulated inside the muffle. Attention: The muffle may be still be very hot even after the furnace is turned off and detached from the power supply

Purging the Muffle

The muffle will naturally get contaminated with foreign material and excess humidity. This will affect the quality of the work. Depending on your rate of usage, periodically run high temperature programs with an empty tray to burn off contamination and excess humidity. Never use any detergents or flammable liquids.

Heater Protection - IMPORTANT

Heaters are not under warranty. To ensure long lifetime and perfor- mance, you have to wash and dry zirconia after using liquid coloring
material. Please use a preheating oven at 200C for 30 minutes to dry the zirconia so it can release its acidic vapour. Otherwise, acidic va- pours will contaminate the heating chamber and destroy the heating elements protective silica coating, this will cause yellow coloring of your work.

WARRANTY: Except with respect to those components parts and uses which are hereinafter described, Teknik Dental. warrants this furnace to be free from defects in material and workmanship for a period of 2 years from the date of sale.Teknik Dental's liability under this warranty is limited solely to repair- ing or, at Teknik Dental's discretion, replacing those products included within the warranty which are returned to Teknik Dental within the applicable warranty period and which are determined by Teknik Dental to be defective. Dealer, labor, shipping and handling charges are not covered by this warranty. This warranty shall not apply to any product which has been subject to misuse; negligence; or accident; or misapplied; or modified; or repaired by unauthorized persons or improperly installed. This warranty does not cover heating elements. Failure of regular maintenance voids warranty, health and monetary risks.

INSPECTION: Buyer shall inspect the product upon receipt. The buyer shall notify Teknik Dental in writing of any claims of defects in material and workmanship within thirty days after the buyer discovers or should have discovered the facts upon which such a claim is based. Failure of the buyer to give written notice of such a claim within this time period shall be deemed to be a waiver of such claim.

DISCLAIMER: The provisions here-in stated are Teknik Dental sole obligation and excludes all other remedies or warranties, expressed or implied, including those related to MERCHANTABILITY and FIT- NESS FOR A PARTICULAR PURPOSE. No representative or person is authorized to assume for us any liability in connection with the sale of our equipment.

LIMITATION OF LIABILITY: Under no circumstances shall Teknik Dental be liable to the buyer for any incidental, consequential or special damages, losses or expenses.Teknik Dental is not responsible for other circumstances not mentioned above. Dealers can't guarantee additional items. Using the furnace for other purposes than zirconia sintering is not covered.

LIMITATION OF ACTIONS: The buyer must initiate any action with respect to claims under the warranty described in the first paragraph within 30 days after the cause of action has accrued.

Furnace Error Messages

Lower Scale Limit Error

If you have just installed the Thermocouple, you may have to switch the negative and positive poles. If the connections are made in reverse, the temperature will either not display or it will go down when heating. Reverse the cables to fix this.

⚠ Heat Sensor Error

The system can not detect a heat sensor: Use a multimeter to:

- Check Thermocouple
- Check Thermocouple connections

⚠ **Can not Heat Error**

- Check heaters
- Check heater connections
- Check SSR
- Check Transformer

⚠ Overheating

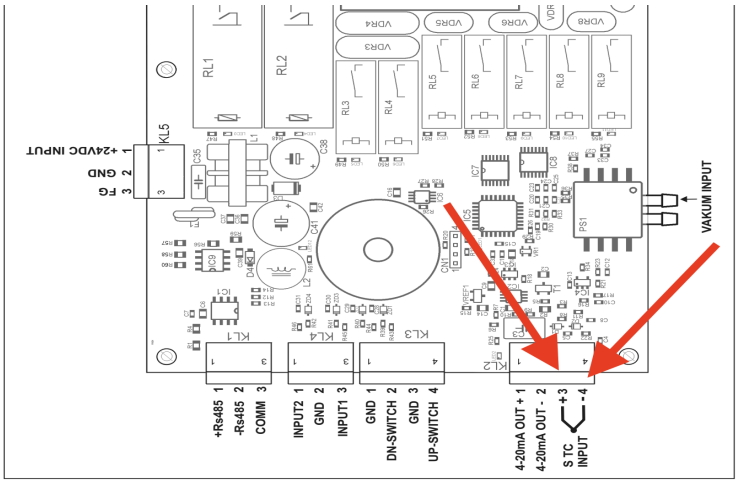
- Check SSR - If it has short circuited it will cause uncontrollable full heating and will give error. Test and replace the SSR

⚠ Upper & Lower Switch Error, or "Two switches can't signal at the same time"

- Perform a lift calibration (Factory Setup & Settings)
- Check the switches for hardware malfunction
- Check the cabling

⚠ Lower Limit Error / Lower Scale Error

This error means the thermocouple/heat sensor temperature reading is negative (It is counting down when the heat goes up or displays " *** " as temperature) Reverse the position of the cabling to fix the error. You can do this simply on the board socket by replacing the position of the cables:



Coloration Problems

Brown	Undercooked	Check calibration, increase heat.
Too Yellow or yellow spots	Contamination	1. Heaters Check heater silica layer. Check for quartz formation (white) on hearers 2. Chamber or Tray contamination
Green	Heating elements have lost the silica layer.	Try to run the MoSi2 regeneration program
Too Much White/Translucent	Overfired	Check calibration, decrease heat.
White Spots	Contamination	Quartz scaling off the heaters or metal contamination from burs. Change Tray, Beads and Sand. Apply Purge and Regeneration Progams.

White Spots

The source of white spots on work pieces is often quartz crystals that have been shed into the crucible, the pot itself, or the material in the pot, such as sand or beads.

You can inspect your resistors up close by taking a video of them with a phone. If you detect white scaling on the shiny protective silica surface, your problem is sourced here and it is recommended that you renew the resistors.

A more difficult source to detect can be devices that generate metal dust. For example, if the metal of the burs you are using is not suitable for zirconia and creates invisible metal dust, its effects will also be reflected on the work pieces.

The easiest way to identify the source is to apply our chamber cleaning program, separate the crucible, break off a piece of the zirconia discs, clean it, and sinter it without the crucible. If the

problem persists, please refer to our articles to recreate the silica layer of the resistors. It is possible to extend the life of the resistors a little by regeneration, but it is also a sign that the time for replacement has come.

Yellow, brown or dark colorations

As a proprietor or technician of a dental laboratory, you are aware of the need of preserving the quality of your supplies and machinery in order to provide restorations of the highest caliber.

The cleaning of the zirconia furnace is one area in the lab that is frequently disregarded.

The furnace is a crucial piece of machinery that needs to be cleaned frequently to keep it operating correctly and delivering precise results. In this article, we'll go through a straightforward but efficient technique for cleaning your zirconia furnace with the remaining zirconia blanks.

After milling, don't discard the leftover zirconia blanks. The components that have already been treated are ideal for cleaning your furnace. There is always some residual material while milling a zirconia repair that cannot be used for the finished product. You can use these parts to clean your furnace rather than discarding them. Due to its extreme hardness and abrasiveness, zirconia is the ideal material for cleaning out any pollutants that may have accumulated inside the furnace.

A cleaning program needs to be run on the zirconia furnaces after ten firings or 100 hours, whichever comes first. Even if you don't use your furnace frequently, it still has to be cleaned routinely to avoid pollutants or oxide buildup. Failing to clean your furnace might lead to substandard repairs and a shorter equipment lifespan.

You can load the broken zirconia blanks onto the tray and fire them at 1550 degrees for 4 hours to clean your furnace using the leftover zirconia blanks. This procedure will aid in the absorption of impurities and enable the MoSi2 heaters to regenerate their shielding silica layer.
All impurities will evaporate during the heating process, leaving a clean, fresh surface for your subsequent firing.

There are various benefits to using this cleaning technique on your zirconia furnace. The first benefit is that you may clean your furnace affordably by using waste materials that would otherwise be thrown away. Second, it's an eco-friendly approach that encourages sustainability and minimizes waste. Finally, it's a straightforward procedure that anyone in the lab can complete with little instruction.

There are further actions you may take to make sure your furnace is operating properly in addition to cleaning it using zirconia blanks. For instance, you should frequently examine the

heating components and thermocouple to make sure they are functioning properly. To make sure that it is accurate and consistent, you should also keep an eye on the furnace's internal temperature.

Oxide will begin to build up after the furnace is cold. If the furnace has not been used for even for several hours, this build up will form as yellow stains around the tray. We advise a 1 hour quick firing to remove these oxides before firing your original work.

MP1500 series sintering furnaces chamber and tray decontamination program

Step	Heat(C)	Rate(C/min)	Hold(min)
1	300	10	0
2	1550	25	240
Last	300	25	30

Greenish coloration

Contamination

The main sources of greenish coloring are metal contaminants in the tray or degradation of the MoSi2 heaters.

First make sure the tray and the sintering powder or beads are not contaminated. This can be achieved with visual inspection. It is very common that metal shavings and dust produced by daily dental laboratory functions reach and contaminate the sintering furnace tray or chamber.

If you detect any residue, cleaning or changing the tray and the powder/beads may alleviate your problems.

Loss of MoSi2 silica layer

Regeneration of the silica layer of the MoSi2 heating elements for tegra MP1500 sintering series

If the chamber and tray are clean, the culprit would be the heating elements. MoSi2 heating elements will loose their silica layer over time or during harsh conditions. This will cause the heating elements to discharge metal oxides into the chamber during firing and contaminate the zirconia.

The regeneration of SiO2 (silicon dioxide) is typically most effective within a specific temperature range. Thermodynamically, the best temperature range for SiO2 regeneration is generally between 800°C and 1100°C.

At temperatures below 800°C, the regeneration of SiO2 is limited due to slower reaction rates. The oxidation of silicon (Si) to form SiO2 is a relatively slow process at lower temperatures. Additionally, the diffusion of oxygen (O2) through the SiO2 layer to react with underlying silicon is less efficient at lower temperatures. Therefore, the regeneration of SiO2 at temperatures below 800°C may require longer exposure times or higher oxygen concentrations, making it less thermodynamically favorable.

On the other hand, at temperatures above 1100°C, the SiO2 layer can become less stable and prone to degradation. High temperatures can lead to the formation of volatile silicon oxide species, such as SiO and SiO2(g), which can escape from the SiO2 layer. This loss of silicon oxide species can result in a thinner or disrupted SiO2 layer, reducing its protective properties. Therefore, regeneration at excessively high temperatures may be thermodynamically less favorable as the SiO2 layer may not maintain its integrity.

The temperature range of 800°C to 1100°C strikes a balance between efficient oxidation kinetics and maintaining the stability of the SiO2 layer. Within this range, the oxidation reaction between Si and O2 occurs at a reasonable rate, allowing for effective regeneration of SiO2. Moreover, the SiO2 layer remains stable and provides adequate protection against further oxidation at these temperatures.

Hold Time: The hold time at the regeneration temperature can vary but is generally in the range of 1 to 4 hours. This duration allows for sufficient diffusion and oxidation processes to occur, leading to the formation of a robust silica layer.

Heat Rate: The heat rate refers to the speed at which the temperature is increased during the regeneration process. It is crucial to ensure a controlled heat rate to prevent thermal shock and damage to the elements. A typical heat rate for MoSi2 elements is around 10-20°C/min.

This gradual increase in temperature helps in achieving uniform heating and minimizes the risk of cracking.

Procedure

Preheating: Start by preheating the chamber and the elements to a lower temperature, such as 300°C, to eliminate any moisture or contaminants present on the surface.

Heating Stage: Increase the temperature gradually with a heat rate of around 10-20°C/min until you reach the desired regeneration temperature, such as 900-1000°C. This gradual heating ensures even temperature distribution and reduces the risk of thermal stress.

Hold at Regeneration Temperature: Once the desired temperature is reached, maintain the chamber at this temperature for a recommended hold time of 1-4 hours. This duration allows for the necessary diffusion and oxidation processes to occur, resulting in the formation of a protective silica layer.

Cooling: After the hold time, gradually cool down the chamber and the elements to room temperature. Avoid rapid cooling to prevent thermal shock and potential damage to the elements.

The temperature range of 1000-1200 degrees Celsius (°C) is significant for the regeneration of the silica layer on MoSi2 elements due to several chemical and physical processes that occur at this temperature range.

Software Updates

We update our software with features and bug fixes periodically. Please check our website for the latest software version. Get in touch with us to apply the updates if you are running an older version.

Lift And Limit Switches

[TBD]

Thermocouple Replacement

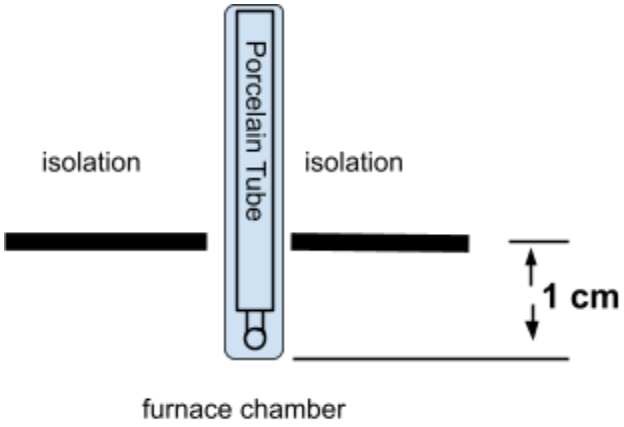
The thermocouple warning indicates there is a problem reading heat. This can be caused by the thermocouple itself, cabling, or in extremely rare cases the electronics parts.

You can check the thermocouple by disconnecting one pole from the main board and using the contact/sound function of a voltmeter to figure out if the connection is intact.

It is also possible to check the tip of the thermocouple to see if it is still connected to broken.

On older models, the screen will display "PFA" which means thermocouple failure. Either the cables going to the thermocouple or the thermocouple itself is broken.

Use an R type thermocouple for replacement. The tip of the thermocouple sheat must be placed 1 cm into the the heating chamber. After replacement, run a program and check the temperature on the display. If the furnace is heating up but the temperature is going down, or if the display is showing asterisks instead of the temperature (****) it means that the negative and positive wire connections of the thermocouple are wrong and must be switched.



After a thermocouple replacement it is necessary to calibrate the furnace. We advise you to use calibration rings or consult a heating calibration professional.

Calibration

Older Models:

Press and hold PRG until you see "Con.o". Press "PRG" one more time and you will see "Con.F" scroll down with the "down" key untill you see "Offset". Hold the "SET" button pressed while pressing the up and down buttons to adjust the calibration. When you are finished, press the PRG key once more to see SECU on the display. Turn the furnace off and back on and check the offset value again to make sure it is saved.

On touchscreen models, the offset calibration parameter can be found on the "Settings" tab.

Video: Calibration with PTC rings

https://teknikdental.com/videos/sinter-calibration





Heating Element Replacement

Video

https://teknikdental.com/video/sinter-heater-replacement



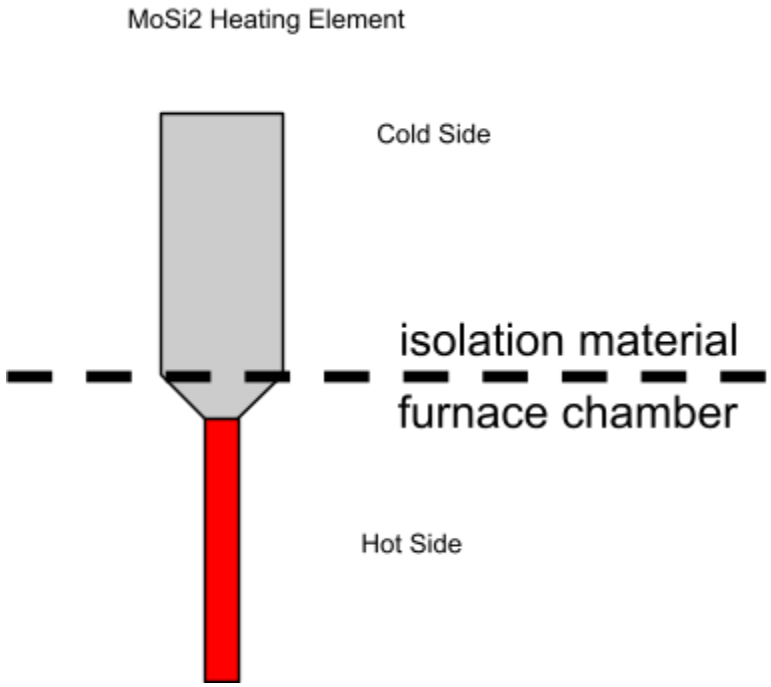
When replacing the heating element use

MP1500 - 1500 Degree furnace: Kanthal Super Heating Element - Grade 1800
MP1600 - 1600 Degree furnace: Kanthal Super Heating Element - Grade 1900

The heating element must be placed precisely so that the thin U shape side (hot side) is not obstructed by the isolation material.

The thicker cold side where the electric connections are made must be inside the isolation material. If the cold side enters the heating chamber, it will burn, deform or break.

After replacing the heating elements check the position carefully and if necessary adjust it by placing some isolation material under the heating element.


MoSi2 Heating Element
Cold Side
isolation material
furnace chamber
Hot Side

Electrical Maintenance

This device uses very high power and should be serviced by qualified electricians only

Voltage

The furnace is tuned for 220 Volts AC 50 hz.



If your electricity outlet is slightly higher or lower, you need to adjust the voltage output of the power supply with a screwdriver. The voltage needs to be exactly 24 volts DC

If your electric supply is not reliable or if your standard voltage is measured at or above 240 Volts or 210 Volts and below, we recommend using a voltage regulator that has at least 15 kVA rating to supply 1 sintering furnace.

Irregular voltage may cause the furnace to lag in time to reach the desired target temperature. This does not have an effect on the fired material.

Fuse Blowing Problems

There are several factors that can cause the Fuse the blow. Most common reasons are listed below.

1. Electrical setup

The device is protected by an 32 AMP B-type fuse. The furnace must be connected directly to the mains by a single line (No extension switches, no other devices on the same line). You need to have a minimum 40 AMP Fuse on your main outlet. The cable used to connect the furnace to the mains needs to have 3 x 2.5 mm copper lines.

Improper connections will cause the cables to heat, melt and even fire. If the device can not get sufficient voltage it will overload the current capacity and blow the fuse.

The cable itself may deteriorate under heavy load, check if the cable is getting hot on regular cycles, if it gets hot, it needs to be replaced.

2. SSR

The SSR component supplies the transformer. SSR's have lifetimes and may short circuit over time. A shorted SSR would pass the voltage directly to the transformer. This would blow the fuse and may also damage the heaters. You can understand if an SSR is shorted by reading the output voltage, if it is the same as the input voltage you can conclude the SSR is broken. Replacing the SSR would resolve the issue.

3. Cracks and shorts in heaters

Cracks are sometimes very elusive and sometimes very hard to detect with the naked eye. A heater may look very healthy and new but contain inner shorts / cracks which will pass the load and not heat properly. This puts the heating job entirely on the remaining heater. The furnace will try to heat up with 1 heater while the other one is not doing its job. As a result the good heater would also break shortly and during this time it would cause the fuse to blow as well.

4. Chamber lift not closing properly

When the lift is at its 100% position on top, gaps may form in time. These will let the heat escape. If this gap is large, the furnace will draw more energy to try to heat and eventually damage the heaters or blow the fuse.

You can test this on a cold furnace by raising the lift to the top and try to pry it with your hand to the left and right. If it is fixed in place, you can conclude there is no issue. But it you are able to move it with your hand, it means it is not touching the chamber and letting hot air escape.

This problem can occur in time when the lift table isolation wears off or the lift switches gets displaced. To fix it, move the switch up a couple of millimeters according to the gap and make sure the closing is tight.

5. Heaters not properly installed.

Heater connections need to be very tight. The aluminum braids must touch and enclose the round ends of the heater and the connection must be very tight. These connections are responsible for carrying an average of 100 AMP's. They get very hot. The fans on the back of the furnace are responsible for keeping this area cold. Bad connections will cause arcs, oxidation and eventually fail to provide the required energy.

6. Improper Voltage Regulator

Voltage regulators are not advised. Please only use a regulator If you are in an area with bad electricity. The regulator has to be at least 15kwa. Lower grade regulator will fail to supply proper electricity and will damage the electrical components of the furnace as well as blowin the fuse.

7. Short circuits

Short circuits that can blow the fuse are always on the high power lines. The 24V DC lines will not blow the fuse.

Inspect the main power inlet, the EMC filter, the SSR and transformer cabling to detect short circuits. These can also happen on top of the furnace when the heating element power supply touches the chassis. The aluminum braids can elongate and change shape. If not properly secured they may touch the chassis and cause damage to heating elements and can blow the fuse.

8. The fuse itself

Rarely, the fuse itself can get broken. You can test this by replacing the fuse. Sintering furnaces MP1500, Speed and Multistep bear a 32 AMP B type fuse.

9. Voltage

The furnace is tuned to the voltage declared on the back of the furnace. The maximum deviation of the voltage can be a maximum of 10%.

Prolonged low voltage use may damage the furnace's electrical cable, check the cable to see if it gets too hot and replace if necessary.

For example if you have a 220-230 Volts furnace and the voltage drops to 200 volts and below, the furnace will require much more amps to reach its high temperature, blowing the fuse. During regular usage when climbing to the high temp, the device will use 12-14 Amps max. At 200 volts, this would jump to 20 Amps and above, at 190 volts, the furnace fuse (32 AMP) would blow.

Inspect your building, your area, sample your voltage at regular intervals, especially right when the fuse blows. This voltage drop usually occurs on lesser populated areas where voltage can vary. If this is your case, we recommend a 15 kva regulator.

-- Please inquire to your electricity provider and report that you can not get a reliable voltage.

-- Look for high power devices in your building and neighbors that may cause voltage drops when in use.