

Zirkonzahn®

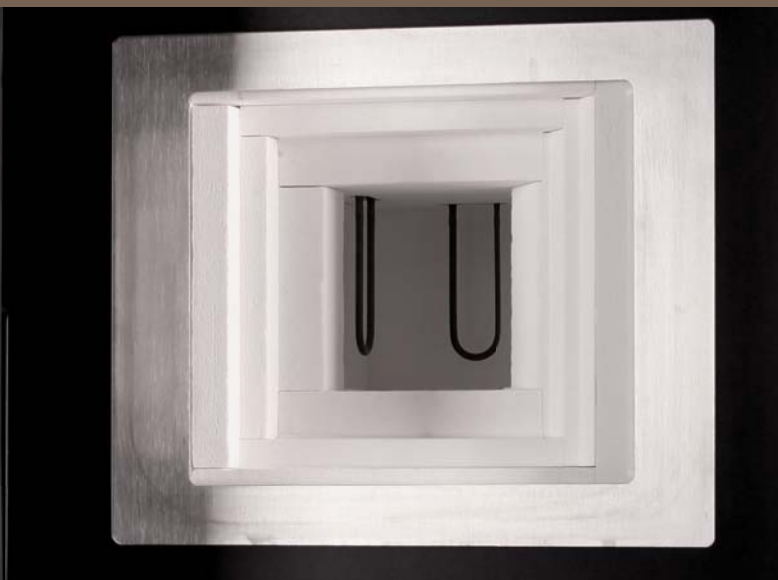
Human Zirconium Technology



SINTERING FURNACES

The new generation

ENGLISH



On fire for the future!

Fire is a force of nature with practically infinite energy. It is fascinating and yet dangerous.

The evolution of mankind would never have happened without the energy of fire. Fire has always been and remains the symbol for heat, energy and passion. Only people driven by an inner flame can conceive innovation and create works of art.

Such a person which is being consumed by this inner fire will never be satisfied with the status quo but wants to be ready for whatever the future may bring, even before it happens – they are always one step ahead, on fire for the future.

People bursting with enthusiasm are capable of convincing others, laying the basis for their success.

Light your fire!

Andreas Stejnar



Out the air, in the gas - our new generation of furnaces

All of the furnaces in our new series are real space savers and built in a very compact way. Thanks to the very high temperatures – up to 1800°C – these furnaces are ideal for the material technologies of the future. Some models allow firing without oxygen under vacuum and by using a protective gas such as argon, thus making Prettau® Zirconia still more translucent and they can even be used for sintering non-ferrous metals.

The time required for sintering has also been reduced: with the new microwave furnace 1800 with vacuum and protection gas, a large range of materials can be sintered rapidly. All furnace parts are easily replaceable without the need for special technical assistance.

Special features



Oxygen-free sintering



Greater stability



4,3" colour touchscreen control panel



Memory for up to 2000 programmes



Larger combustion chamber



Prettau® Zirconia resulting more translucent



Susceptors exchangeable



14 preset programmes



Individual programmes on request



Improved air circulation



Ideal for technologies of the future



Variable combustion chamber



High vacuum for sintered metals



3 MoSi₂ heating elements



New sintering technique, temp. of up to 1700°C



High speed sintering



High quality all-glass casing



Updatable via USB port



Controlled cooling





Sintering furnace Zirkonofen 600/V2

Special features

- Up to 5 programmes can be preset
- Adjustable up to 1700° C (caters for latest developments in zirconia technology and advanced sinter programmes)

5

Up to 5 programmes can be preset



New sintering technique, temp. of up to 1700° C

Technical data

Size (W x H x D)	28,5 x 60,5 x 43 cm
Weight	approx. 45 kg
Output Power	700 W
Combustion Chamber Capacity	0,6 l
Dimension Combustion Chamber (W x H x D)	6 x 10 x 10 cm
Max. Temperature	1700 °C
Vacuum	No
Capacity	approx. 60 elements



Sintering furnace Zirkonofen 600/V3

Special features

- Improved air circulation
- Adjustable up to 1.700 °C (caters for latest developments in zirconia technology and advanced sintering programmes)
- Modern, high quality all-glass
- 4,3" colour touchscreen control panel
- 10 preset programmes
- Updatable via USB port
- Memory for up to 2000 programmes
- Special sintering programmes upon request of the customer



Improved air circulation

10

10 preset programmes



New sintering technique, temp. of up to 1700° C

USB

Updatable via USB port



High quality all-glass casing

<2000

Memory for up to 2000 programmes



4,3" colour touchscreen control panel



Individual programmes on request

Technical data

Size (W x H x D)	39,4 x 69,3 x 46 cm
Weight	57 kg
Output Power	700 W
Combustion Chamber Capacity	0,6 l
Dimension Combustion Chamber (W x H x D)	6 x 10 x 10 cm
Max. Temperature	1700 °C
Vacuum	No
Capacity	approx. 60 elements



Sintering furnace

Zirkonofen 700

Special features

- 3 MoSi₂ heating elements
- New control unit for controlled cooling
- Bigger combustion chamber
- Modern, high quality all-glass
- 4,3" colour touchscreen control panel
- 10 preset programmes
- Updatable via USB port
- Memory for up to 2000 programmes
- Special sintering programmes upon request of the customer



3 MoSi₂
heating elements

10 10 preset
programmes



Controlled cooling

USB Updatable via
USB port



Larger combus-
tion chamber

<2000 Memory for up to
2000 programmes



High quality
all-glass casing

Individual
programmes
on request



4,3" colour
touchscreen
control panel

Technical data

Size (W x H x D)	48,4 x 69,3 x 54,5 cm
Weight	97 kg
Output Power	1500 W
Combustion Chamber Capacity	0,8 l
Dimension Combustion Chamber (W x H x D)	8 x 10 x 10 cm
Max. Temperature	1700 °C
Vacuum	No
Capacity	approx. 80 elements

*with vacuum
with protection gas*

COMING SOON!



Sintering furnace Zirkonofen 700 Vakuum

with protection gas

Special features

- 3 MoSi₂ heating elements
- To be charged with 3 diff. protection gases for oxygen-free sintering
- Prettau® Zirconia will become even more translucent
- Ideal for the material technologies of the future
- New control unit for controlled cooling
- Bigger combustion chamber
- Modern, high quality all-glass
- 4,3" colour touchscreen control panel
- 14 preset programmes
- Updatable via USB port
- Memory for up to 2000 programmes
- Special sintering programmes upon request of the customer
- With high vacuum for sintering of sintered metals



3 MoSi₂
heating elements



4,3" colour
touchscreen
control panel



Oxygen-free
sintering



14
14 preset
programmes



Prettau® Zirconia
resulting more
translucent



USB
Updatable via
USB port



Ideal for technolo-
gies of the future



<2000
Memory for up to
2000 programmes



Controlled cooling



Individual
programmes
on request



Larger combus-
tion chamber



High vacuum for
sintered metals



High quality
all-glass casing

Technical data

Size (W x H x D)	48,4 x 69,3 x 54,5 cm
Weight	117 kg
Output Power	1600 W
Combustion Chamber Capacity	0,8 l
Dimension Combustion Chamber (W x H x D)	8 x 10 x 10 cm
Max. Temperature	1700 °C
Vacuum	Yes
Capacity	approx. 80 elements

COMING SOON!



Microwave furnace

Mikrowellenofen 1800

Special features

- High speed sintering possible
- The zirconia's crystal structure remains compact, resulting in higher stability
- Susceptors exchangeable
- Variable combustion chamber up to max. 12 x 8 x 11 cm
- Modern, high quality all-glass
- 4,3" colour touchscreen control panel
- 10 preset programmes
- Updatable via USB port
- Memory for up to 2000 programmes
- Special sintering programmes upon request of the customer



High speed sintering



4,3" colour touchscreen control panel



Greater stability



10 preset programmes



Susceptors exchangeable



Updatable via USB port



Variable combustion chamber



Memory for up to 2000 programmes



High quality all-glass casing



Individual programmes on request

Technical data

Size (W x H x D)	48,4 x 69,3 x 54,5 cm
Weight	97 kg
Output Power	approx. 1900 W
Combustion Chamber Capacity	max. 1 l
Dimension Combustion Chamber (W x H x D)	max. 12 x 8 x 11 cm
Max. Temperature	1800 °C
Vacuum	No
Capacity	approx. 100 elements

*with vacuum
with protection gas*

COMING!



Microwave furnace

Mikrowellenofen 1800 Vakuum

with protection gas

Special features

- To be charged with 3 diff. protection gases for oxygen-free sintering
- Pretttau® Zirconia will become even more translucent
- Ideal for the material technologies of the future
- High speed sintering possible
- The zirconia's crystal structure remains compact, resulting in higher stability
- Susceptors exchangeable
- Variable combustion chamber up to max. 12 x 8 x 11 cm
- Modern, high quality all-glass
- 4,3" colour touchscreen control panel
- 14 preset programmes
- Updatable via USB port
- Memory for up to 2000 programmes
- Special sintering programmes upon request of the customer
- With high vacuum for sintering of sintered metals



Oxygen-free sintering



High quality all-glass casing



Pretttau® Zirconia resulting more translucent



4,3" colour touchscreen control panel



Ideal for technologies of the future



14 14 preset programmes



High speed sintering



USB Updatable via USB port



Greater stability



<math>< 2000</math> Memory for up to 2000 programmes



Susceptors exchangeable



Individual programmes on request



Variable combustion chamber



High vacuum for sintered metals

Technical data

Size (W x H x D)	48,4 x 69,3 x 54,5 cm
Weight	117 kg
Output Power	2000 W
Combustion Chamber Capacity	max. 1 l
Dimension Combustion Chamber (W x H x D)	max. 12 x 8 x 11 cm
Max. Temperature	1800 °C
Vacuum	Yes
Capacity	approx. 100 elements



Overview: Special features



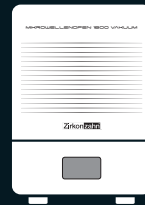
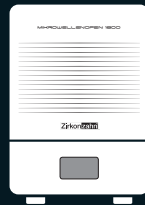
*Sintering furnace
Zirkonofen 600/V2*



*Sintering furnace
Zirkonofen 600/V3*

-  Up to 5 programmes can be preset
-  New sintering technique, using a temp. up to 1700°C

-  Improved air circulation
-  New sintering technique, using a temp. up to 1700°C
-  High quality all-glass casing
-  4,3" colour touchscreen control panel
-  10 preset programmes
-  Updatable via USB port
-  Memory for up to 2000 programmes
-  Individual programmes on request

















*Sintering furnace
Zirkonofen 700*











*Sintering furnace
Zirkonofen 700 Vakuum
with protection gas*

*Microwave furnace
Mikrowellenofen 1800*

*Microwave furnace
Mikrowellenofen 1800
Vakuum
with protection gas*

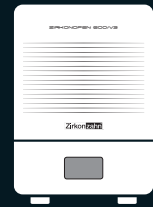
-  3 MoSi₂ heating elements
-  Controlled cooling
-  Larger combustion chamber
-  High quality all-glass casing
-  4,3" colour touchscreen control panel
-  10 preset programmes
-  USB Updatable via USB port
-  <2000 Memory for up to 2000 programmes
-  Individual programmes on request

-  3 MoSi₂ heating elements
-  Oxygen-free sintering
-  Prettau® Zirconia resulting more translucent
-  Ideal for technologies of the future
-  Controlled cooling
-  Larger combustion chamber
-  High quality all-glass casing
-  4,3" colour touchscreen control panel
-  14 preset programmes
-  USB Updatable via USB port
-  <2000 Memory for up to 2000 programmes
-  Individual programmes on request
-  High vacuum for sintered metals

-  High speed sintering
-  Greater stability
-  Susceptors exchangeable
-  Variable combustion chamber
-  High quality all-glass casing
-  4,3" colour touchscreen control panel
-  10 preset programmes
-  USB Updatable via USB port
-  <2000 Memory for up to 2000 programmes
-  Individual programmes on request

-  Oxygen-free sintering
-  Prettau® Zirconia resulting more translucent
-  Ideal for technologies of the future
-  High speed sintering
-  Greater stability
-  Susceptors exchangeable
-  Variable combustion chamber
-  High quality all-glass casing
-  4,3" colour touchscreen control panel
-  14 preset programmes
-  USB Updatable via USB port
-  <2000 Memory for up to 2000 programmes
-  Individual programmes on request
-  High vacuum for sintered metals

Overview: Technical data



*Sintering furnace
Zirkonofen 600/V2*

*Sintering furnace
Zirkonofen 600/V3*

<i>Size (W x H x D)</i>	28,5 x 60,5 x 43 cm	39,4 x 69,3 x 46 cm
<i>Weight</i>	approx. 45 kg	57 kg
<i>Output Power</i>	700 W	700 W
<i>Combustion Chamber Capacity</i>	0,61	0,61
<i>Dimension Combustion Chamber (W x H x D)</i>	6 x 10 x 10 cm	6 x 10 x 10 cm
<i>Max. Temperature</i>	1700 °C	1700 °C
<i>Vacuum</i>	No	No
<i>Capacity</i>	approx. 60 elements	approx. 60 elements



*Sintering furnace
Zirkonofen 700*

*Sintering furnace
Zirkonofen 700 Vakuum
with protection gas*

*Microwave furnace
Mikrowellenofen 1800*

*Microwave furnace
Mikrowellenofen 1800
Vakuum
with protection gas*

48,4 x 69,3 x 54,5 cm

48,4 x 69,3 x 54,5 cm

48,4 x 69,3 x 54,5 cm

48,4 x 69,3 x 54,5 cm

97 kg

117 kg

97 kg

117 kg

1500 W

1600 W

ca. 1900 W

2000 W

0,8 l

0,8 l

max. 1 l

max. 1 l

8 x 10 x 10 cm

8 x 10 x 10 cm

max. 12 x 8 x 11 cm

max. 12 x 8 x 11 cm

1700 °C

1700 °C

1800 °C

1800 °C

No

Yes

No

Yes

approx. 80 elements

approx. 80 elements

approx. 100 elements

approx. 100 elements

FAQs

How many different programs can be installed in the new furnaces?

Up to 2000 programs can be entered, out of which up to 14 are already programmed ex works (see table below). Upon customer's request, our service technicians compile personalized programs. Those can be uploaded on the respective furnace by the customer with a PC or USB cable. The necessary software can be downloaded on request and updated at any time.

Preset programs

Sintering furnaces

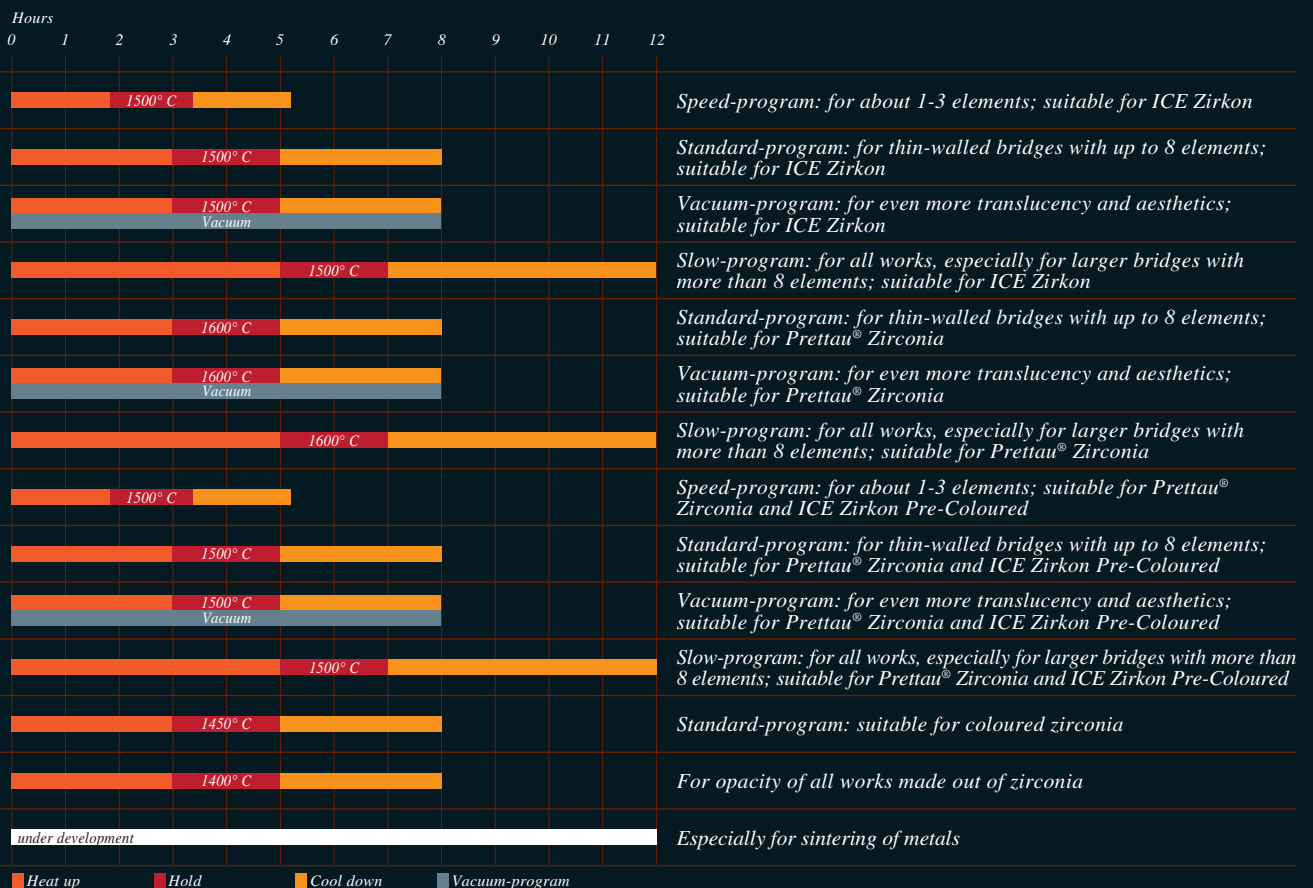
	Zirkonofen 600V3	Zirkonofen 700	Zirkonofen 700 Vakuum	Mikrowellenofen 1800	Mikrowellenofen 1800 Vakuum
ICE Speed	✓	✓	✓	✓	✓
ICE Standard	✓	✓	✓	✓	✓
ICE Vacuum			✓		✓
ICE Slow	✓	✓	✓	✓	✓
Prettau Standard	✓	✓	✓	✓	✓
Prettau Vacuum			✓		✓
Prettau Slow	✓	✓	✓	✓	✓
Pre-Coloured Speed	✓	✓	✓	✓	✓
Pre-Coloured Standard	✓	✓	✓	✓	✓
Pre-Coloured Vacuum			✓		✓
Pre-Coloured Slow	✓	✓	✓	✓	✓
Coloured Standard	✓	✓	✓	✓	✓
Opaque sintering	✓	✓	✓	✓	✓
Metal sintering			✓		✓

How fast can you sinter with the new furnaces?

The sintering duration depends on the chosen sintering program (see table below). The fastest program takes about 5 hours and can be used for thin single crowns made from zirconia. On larger frameworks a longer sintering duration is necessary.

Sintering duration

Description



Heat up Hold Cool down Vacuum-program

Why sintering with vacuum?

The vacuum function of the sintering furnaces is used to empty the combustion chamber, meaning to eliminate all air and therefore all the oxygen from the combustion chamber. Consequently all air and oxygen from the zirconia's and the metal's pores are being removed.

The cool down phase takes longer than in a sintering process without vacuum. As a consequence the zirconia's density increases and it becomes even more translucent and aesthetic. For metals it is absolutely indispensable to sinter under vacuum or rather under shielding gas to avoid undesirable reactions with oxygen at high temperatures.

Why is shielding gas necessary and which are recommended?

Shielding gas prevents the metal's oxidation at high temperatures.

Shielding gases which can be utilized: argon, nitrogen or forming gas (a mix from nitrogen and hydrogen).

Do you need two different furnaces for the sintering of metal and zirconia?

No, because the metal is sintered under shielding gas and therefore impurities, which could discolor the zirconia, do not arise. Only a special vacuum device must be used.

Is it possible to sinter metal and zirconia at the same time?

No, because the two materials require different firing temperatures and atmospheres. Thus, different firing programs must be used.



4,3" color touchscreen
control panel

Are 3 heating elements (Zirkonofen 700) better than 2 (Zirkonofen 600)?

The number of heating elements in a combustion chamber depends on the size of the elements and the speed at which the combustion chamber or the firing material must be brought to a specific temperature. With 3 heating elements a bigger combustion chamber can be used and also be heated at higher rates, rather than with only 2 elements. However though, as a consequence, the electricity consumption will be slightly higher with 3 heating elements (approximately 700 W per heating element).



Combustion chamber of Zirkonofen 700 with MoSi_2 heating elements

How does the microwave furnace work?

Through accelerating electrons between anode and cathode, cavity magnetrons produce electromagnetic waves (fields) which are transferred to the resonator (the microwave furnace's combustion chamber) through a waveguide. In the resonator the waves are being reflected and thus spread evenly in the combustion chamber. The susceptors (and from a certain temperature on as well the zirconia) absorb the electromagnetic microwave energy, which penetrates the material and heats it evenly on the inside as well as on the outside.

The sintering durations are the same as with sintering furnaces with conventional heating procedures.

The advantages of the microwave sintering process are the increased fracture strength (15% higher than conventional sintering furnaces) and that the combustion chamber and the zirconia remain free from impurities, due to the ceramics susceptors.

What is a variable combustion chamber and what advantages does it provide?

The variable combustion chamber is used with microwave furnaces. Thus the position of the susceptors – and therefore the size of the combustion chamber – can be changed individually. Here we apply: the smaller the combustion chamber, the faster the sintering process, as less space must be heated.

Is a ceramic protection cover necessary with the new furnaces?

With the microwave furnace no ceramic protection cover is necessary, because the built-in ceramics susceptors do not cause any impurity. With the other zirconia furnaces a ceramic protection cover is generally recommended, in order to avoid stains on the zirconia. The use of sintering shelves and sintering granulate is also recommended, in order to make it possible to sinter several works at the same time.

What are the consumable parts in the different types of furnaces?

In the microwave furnace, mainly the susceptors wear out. But they can be retrofitted easily and economically.

In the various sintering furnaces with conventional heating procedures the heating elements must be replaced after a certain time. The average life span of the heating elements varies depending on the number and duration of the performed sintering processes, the final temperature reached during sintering and also on the heating-speed. On average it lies between 300 and 500* sintering cycles (when evenly using the standard programs for ICE Zirkon and Prettau® Zirconia). The embrittlement of the heating element's material rises through increased use. This can lead to the breaking of the heating element, caused by the temperature stresses of the heat-up and cool-down. On the bright electrical contact areas of the heating elements, it can come to an oxidation of the contact layers and consequently to a decrease of the electrical contact. Therefore it is recommended to exchange as well the contact straps on old heating elements (> 2 years), because they can wear out on the inner contact surfaces.

With all different types of furnaces the temperature sensor wears out and must be replaced if broken. The service life is in regular use about 2 – 3 years*.

* The above shaft values are approximate values and are no guarantee for the material's lifespan.



Built-in LEDs show the status of the different procedures



SINTERING FURNACES

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