



PRODUCT CATALOGUE

For the dental industry



CONTENTS

TOPIC & PRODUCT

PAGE

Thermo-Star

3

Sintering furnace

4

Denta-Star M2

6

Denta-Star P1

8

Denta-Star R2

10

Denta-Star S1

12

Denta-Star K2

Zirkon dryer

14

Sintering aids

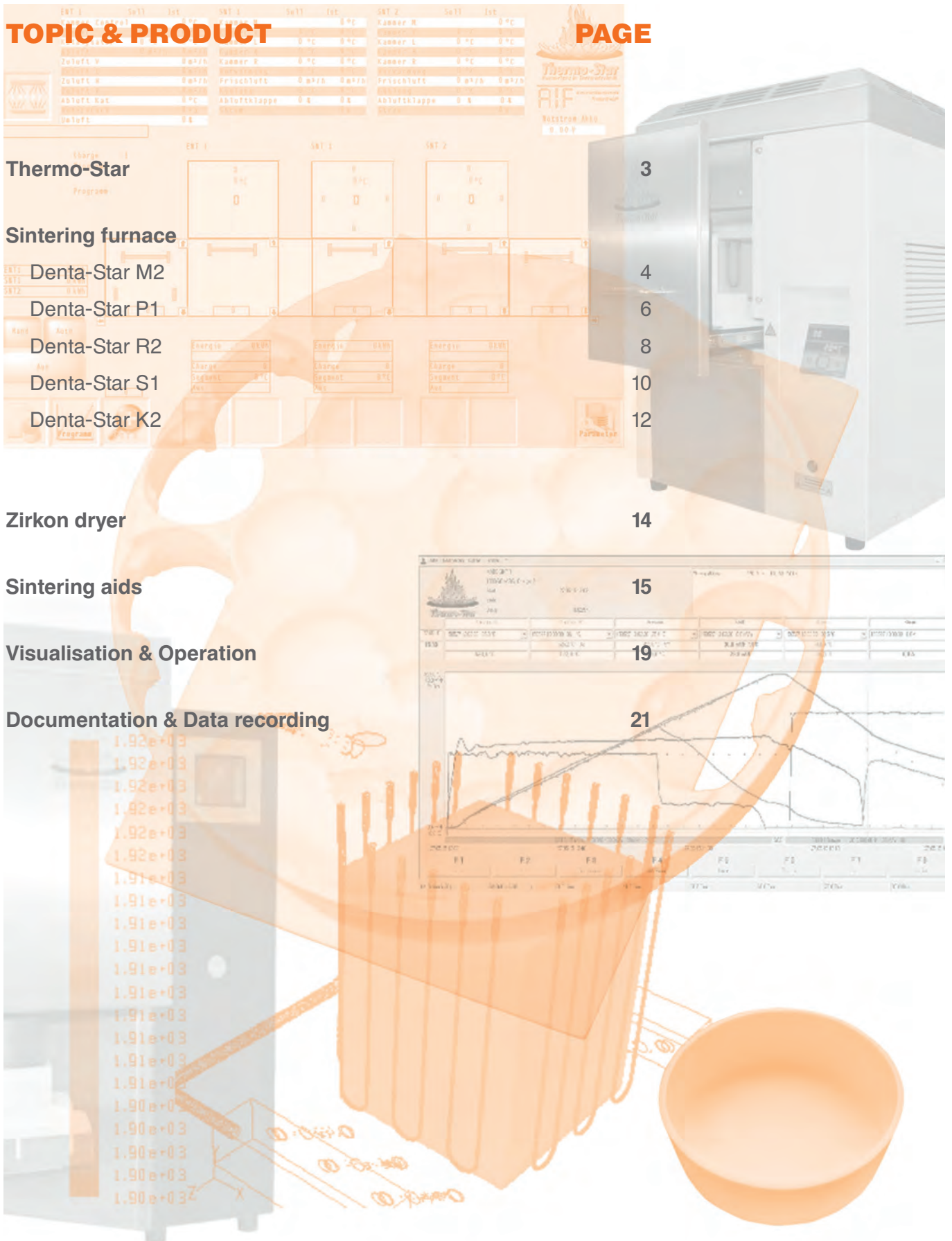
15

Visualisation & Operation

19

Documentation & Data recording

21





The competence in thermal technology

represents:

HIGHEST QUALITY DEMANDS

RELIABILITY AND

CUSTOMER ORIENTED INNOVATIONS.

Thermo-Star is being run by the second generation and the company's customers continue to be impressed by the quality and reliability of the products created according to customer requirements. The foundation of the company philosophy was laid by founder Hans Kelichhaus more than 25 years ago.

Since 2011, his daughter Sonja Kelichhaus has been leading the company from the top and became managing director since 2013 after graduating her studies in law.

A qualified team of employees looks after construction, quality management, assembly production and internal logistics, ensuring the smooth operation of product creation in accordance with customer needs.

The small sintering furnaces, originally intended for industrial testing purposes, have been refined in terms of both construction and appearance



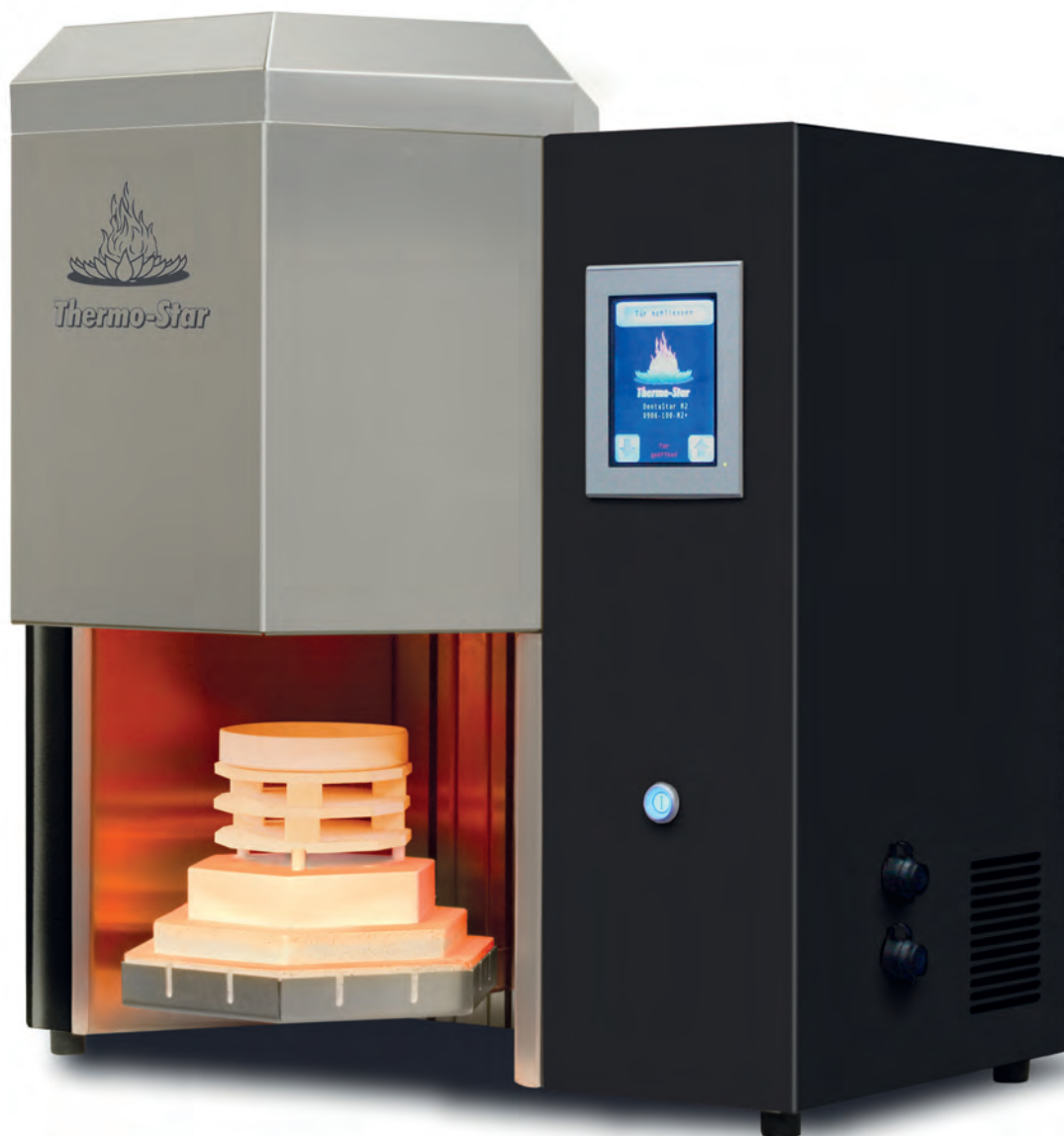
over recent years. As a consequence of creating smaller chambers it was possible to achieve faster heating and cooling rates, just as required by dental laboratories for use with CAD/CAM systems for the manufacture of dental supplies in ceramic or NEM alloys.

Thanks to close cooperation with partner companies and universities, we are increasingly acting as competent contacts for many issues with regard to heat treatments, above and beyond pure furnace technology.

DENTA-STAR M2

Atmospheric sintering furnace for oxide ceramics

Available as of: € 12.480*



The Denta-Star M2 is a compact elevator furnace in which the base plate of the sintering chamber are motorised and move up and down. This concept enables the heating of all 6 sides

and ensures almost unbeatable temperature homogeneity. The simple and clean loading and unloading process is carried out via a large opening underneath the sintering chamber.

* plus VAT

Elevator furnace with high capacity

The maximum required electrical power is ≤ 2500 W. Thanks to the electronic power monitoring system, the Denta-Star M2 can be operated on most traditional power sockets.

It is operated via an intuitive, multiple language, coloured, graphical touch screen.

An Ethernet interface can be used to connect it either directly or via an existing network to a PC, enabling the supplied monitoring software "ThermoView" to be used to create or save programmed sintering processes as well as automatically log entire sintering procedures. In addition (alternatively), sintering procedures can be recorded using a USB data carrier.

With its large sintering chamber and the ability to implement multiple layer loading, it is the ideal choice for a large dental laboratory or mill centre.

Basic data

- 6 sided heating
- Power failure protection
- Up to 180 units per load (on up to three levels)
- Coloured touchscreen operating panel
- Multiple language menu
- 6 individual sintering programmes each with 20 segments
- Interfaces: Ethernet & USB
- "Thermo-View" PC software

Voltage:	230 V or 115V (50 - 60Hz)
Current:	≤ 16 A (at 230V) ≤ 32 A (115V)
Power:	≤ 2500 W
Temperature:	≤ 1600 °C
Heating rate:	≤ 800 K/h
Useful volume:	70 x 100 x 70 mm (WxHxD)
Dimensions:	730 x 600 (400) x 810 mm (WxHxD)
Weight:	92 kg
Power consumption:	Approximately 9.63 kW/h (Standard ZrO2 programme)



DENTA-STAR P1

Atmospheric sintering furnace for oxide ceramics

Available as of: € 9.250*



The Denta-Star P1 is, basically, a chamber furnace, but it has a drawer design in which the front wall and the base of the sintering chamber

can be manually moved forwards on rails. This design ensures convenient loading from three directions. The entire construction and well-

* plus VAT

The small all-rounder amongst sintering furnaces

considered arrangement of the individual components enable a very compact construction.

The three heating elements are arranged asymmetrically in order to ensure the best possible homogeneity of temperature over the entire occupied area.

The maximum required electrical power is a unexpected low ≤ 1000 W.

This enables the Denta-Star P1 to easily be operated on any ordinary power socket.

It is operated via an intuitive, multiple language, graphical touchscreen. An Ethernet interface can be used to connect it either directly or via an existing network to a PC. The supplied monitoring software "ThermoView" can be used to more easily create or save sintering programs as well as automatically log entire sintering procedures.

With a heating rate of up to 3000° C/h throughout the entire temperature range the Denta-Star P1 is one of the fastest sintering furnaces on the market and qualifies for so-called "speed sintering".

Voltage:	230 V or 115V (50 - 60Hz)
Current:	≤ 10 A (at 230V) ≤ 20 A (115 V)
Power:	≤ 1000 W
Temperature:	≤ 1600 °C
Heating rate:	≤ 3000 K/h
Useful volume:	70 x 100 x 70 mm (WxHxD)
Dimensions:	450 x 390 x 660 mm (WxHxD)
Weight:	62 kg
Power consumption:	Approximately 6.85 kW/h (Standard ZrO2 programme)

Basic data

- 3 sided heating
- Rapid heat-up rate and quick cooling
- Up to 30 units per load (on two levels)
- Coloured touchscreen operating panel
- Multiple language menu
- 6 individual sintering programmes (internal)
- 30 individual sintering programmes (external via USB)
- Interfaces: Ethernet & USB
- "Thermo-View" PC software



DENTA-STAR R2

Atmospheric sintering furnace for oxide ceramics

Available as of: € 11.400*

New version of the extremely robust Denta-Star Rubin



The Denta-Star R2 is a compact elevator furnace in which the base plate of the sintering chamber are motorised and move up and down. This concept enables the heating of all 6 sides

and ensures almost unbeatable temperature homogeneity.

The simple and clean loading and unloading process is carried out via a large opening un-

* plus VAT

Compact sintering elevator with the latest technology

derneath the sintering chamber. The maximum required electrical power is ≤ 2500 W. Thanks to the electronic power monitoring system, the Denta-Star R2 can be operated on most traditional power sockets.

It is operated via an intuitive, multiple language, coloured, graphical touch screen.

An Ethernet interface can be used to connect it either directly or via an existing network to a PC. The supplied monitoring software "ThermoView" can be used to simply create or save sintering programs as well as automatically log entire sintering procedures.

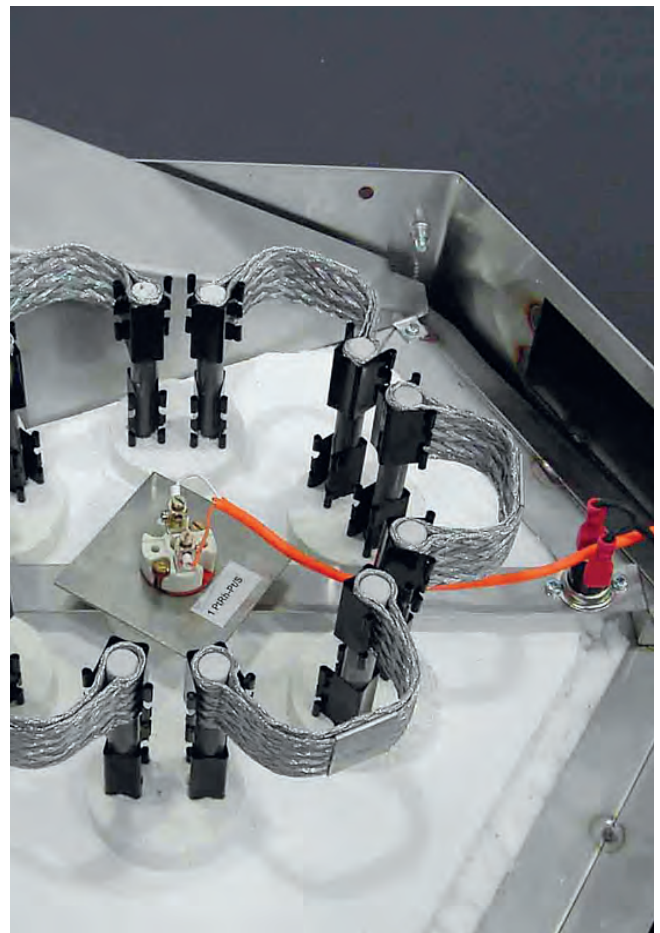
Voltage:	230 V (50 - 60Hz)
Current:	≤ 16 A
Power:	≤ 2500 W
Temperature:	≤ 1650 °C
Heating rate:	≤ 1000 K/h
Useful volume:	120 x 100 mm (dm x H)
Dimensions:	670 x 560 (390) x 750 mm (WxHxD)
Weight:	90 kg
Power consumption:	Approximately 6.85 kW/h (Standard ZrO2 programme)

The Denta-Star R2 also has a USB interface with a functional scope that has been expanded considerably.

Alongside data recording, (additional or alternative to PC software), up to 30 additional sintering programmes may be saved, imported or exported. In this way, back ups of sintering programmes can be created or programmes transferred over to other furnaces (with the same functional scope).

Basic data

- 6 sided heating
- Power failure protection
- Up to 70 units per load
(on up to three levels)
- Coloured touchscreen operating panel
- Multiple language menu
- 6 individual sintering programmes (internal)
- 30 individual sintering programmes (external via USB)
- Internal 72 hour logging of the sintering process
- Interfaces: Ethernet & USB
- "Thermo-View" PC software



DENTA-STAR S1

Atmospheric sintering furnace for oxide ceramics

Available as of: € 7.150*



The Denta-Star S1 is, basically, a chamber furnace, but it has a drawer design in which the front wall and the base of the sintering chamber

can be manually moved forwards on rails. This design ensures convenient loading from three directions. The entire construction and well-

* plus VAT

Starter model in tried and tested quality

considered arrangement of the individual components enable a very compact construction.

The three heating elements are arranged asymmetrically in order to ensure the best possible homogeneity of temperature over the entire stacked area.

The maximum required electrical power is a surprisingly low ≤ 1000 W.

This enables the Denta-Star S1 to easily be operated on any ordinary power socket.

The maximum temperature of the Denta-Star S1 is 1550°C . The operator has the option of creating up to 6 individual programmes.

Voltage:	230 V (50 - 60Hz)
Current:	≤ 10 A
Power:	≤ 1000 W
Temperature:	$\leq 1550^{\circ}\text{C}$
Heating rate:	≤ 999 K/h
Useful volume:	70 x 100 x 70 mm (WxHxD)
Dimensions:	450 x 390 x 660 mm (WxHxD)
Weight:	62 kg
Power consumption:	Approximately 6.85 kW/h (Standard ZrO2 programme)

Basic data

- 3 sided heating
- Quick heating and cooling
- Up to 30 units per load
(on two levels)
- Industrial controller
- 6 individual programmes



DENTA-STAR K2

Atmospheric sintering furnace with inert gas mechanism for powder-metal alloys

Available as of: € 15.900*



The Denta-Star K2 is based on the Denta-Star R2. They share control technology and the majority of technical characteristics, but pursue

completely different concepts. Whereas the Denta-Star R2 is designed for sintering of oxide ceramics at higher temperatures, the Denta-Star

* plus VAT

Sintering furnace for cobalt-chrome (CoCr)

K2 has been designed specifically to carry out thermal treatment of metals at low temperatures in a controlled atmosphere.

The use of special sintering aids creates a muffle inside the furnace which separates the chamber and the stacking space from each other. In this way, different atmospheres can be generated and metal alloys can be thermally treated with the exclusion of oxygen. The well-considered and innovative conditioning of flushing gases makes the Denta-Star K2 a real all-rounder. It is suitable for stress relief, cleaning, annealing and sintering of already sintered metal alloys. Further, the powdered metals containing binders (soft blanks) can be debinded and sintered in a single procedure.

In addition to the classic temperature-time profile (sintering curve), storing the amount of flushing gas (e.g. argon) for each individual segment is done by this furnace model as well. The electronic monitoring and regulation ensure increased process safety and a considerably reduced gas consumption.

Voltage:	230 V (50 - 60Hz)
Current:	≤ 16 A
Power:	≤ 2500 W
Temperature:	≤ 1350 °C
Heating rate:	≤ 1100 K/h
Gas quantity:	≤ 5 l/m (@ 1.4 bar + 0.6)
Dimensions:	670 x 560 (390) x 750 mm (WxHxD)
Weight:	90 kg
Power consumption:	Approximately 6.85 kW/h (Standard ZrO2 programme)

Basic data

- 6 sided heating
- Power failure protection
- Short sintering times
- Multiple inert gas systems available
- Low gas consumption thanks to electronic gas regulation
- 6 individual sintering programmes (internal)
- 30 individual sintering programmes (external via USB)
- Interfaces: Ethernet & USB
- "Thermo-View" PC software



Available as of: € 250*



Basic data

- Time switch
- Operating time display
- 2 performance levels
- Low weight
- Simple operation
- Easy cleaning
- Inserts available individually

Voltage:	230 V (50 - 60Hz)
Power:	≤ 520 W
Temperature:	≤ 80° C
Dimensions:	320 x 180 mm (dm/H)
Weight:	1.8 kg

The Zirkon dryer is a compact unit for the intensive and even drying of pigmentation fluids on scaffolds or crowns made from oxide ceramic. The device uses the tried and tested principle of hot air dryer. The heated air accelerates the evaporation on the surface of the ceramic and accommodates up to 10-times the humidity (compared to air at room temperature). The constant motion of the air warms the scaffolds evenly from all sides and prevents the local saturation of humidity which may occur with "standing" air. The constant air exchange facilitated by the outlet on the top of the unit improves the performance of the dryer and enables simple extraction of vapours using an extraction system.

The completed drying of the scaffolds leads to better and more even results in pigmentation and reduces/prevents the formation of stains on the surface of the ceramic. Another positive effect is the protection of the sintering furnace with regard to contamination by (process-relevant, but not processed by the furnace) substances from pigmentation fluids, such as metals, polymers, acids or the volatile products of decomposition of such.

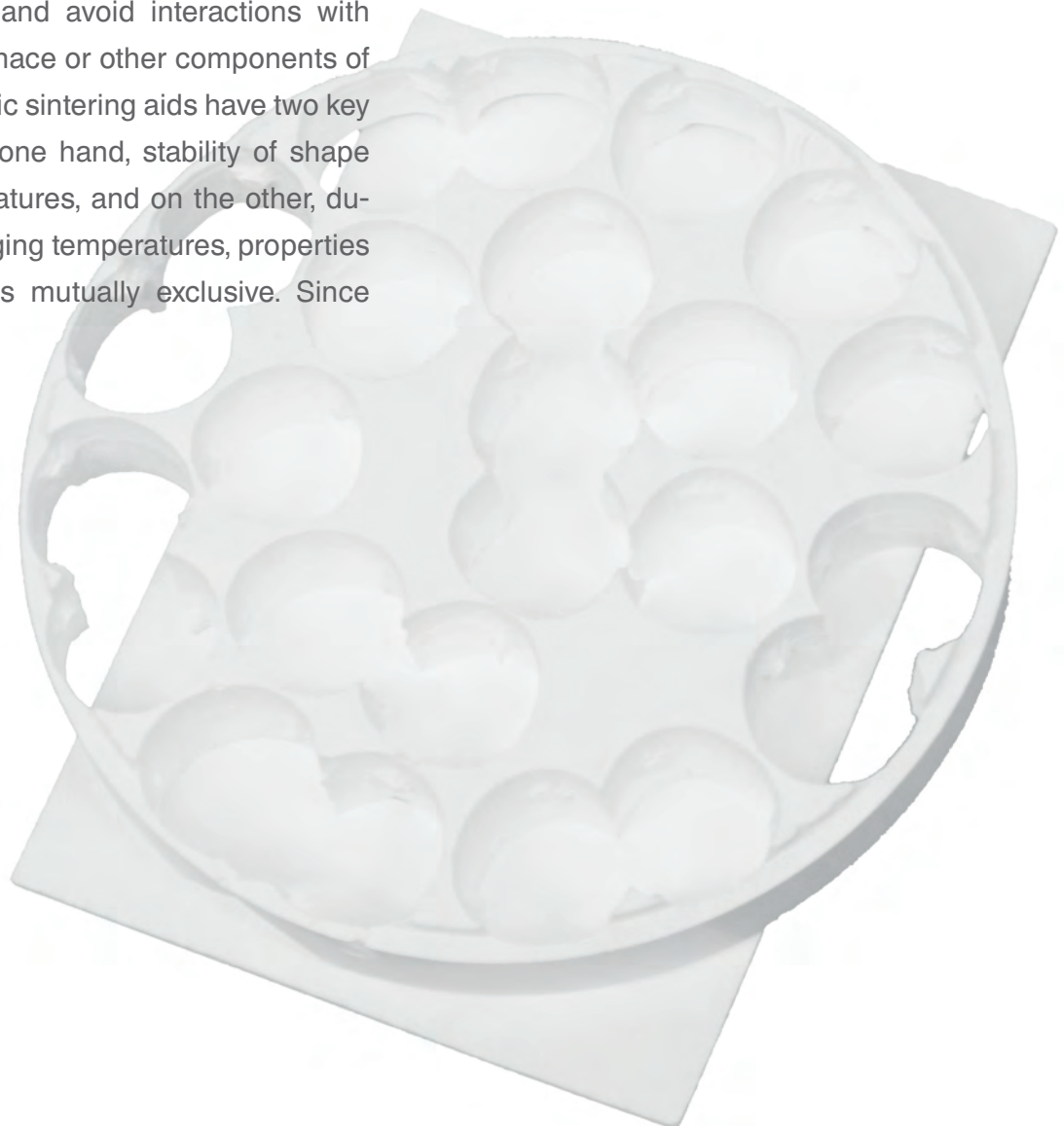
* plus VAT

SINTERING AIDS

Sintering aids are ceramic moulded parts on which the items in the combustion chamber can be arranged. These are adapted according to the process being used. For this reason, they are available in a variety of materials (for different temperatures), shapes (plates, pots, hoods, bowls, supports, sinter pearls, etc.) and sizes.

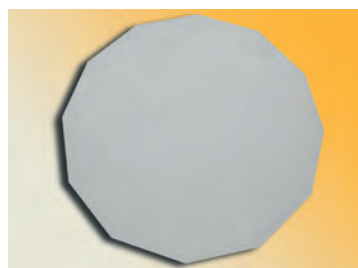
The sintering aids must be designed in such a way that they can be optimally fitted into the combustion chamber in order to not damage it and enable the maximum possible occupation. The aim is to ensure a high level of temperature homogeneity and avoid interactions with the items in the furnace or other components of the furnace. Ceramic sintering aids have two key properties, on the one hand, stability of shape under high temperatures, and on the other, durability under changing temperatures, properties that are sometimes mutually exclusive. Since

the key task is to ensure as distortion-free a sintering process of the items (scaffolds, bridges or crowns), the form stability will have considerably higher priority in the majority of instances.



SINTERING AIDS

Base plate, dodecagonal



Item number

Price Quantity

Suitable for

7.012.0050
118 x 8 mm

€ 169.74

1

Denta-Star
R2

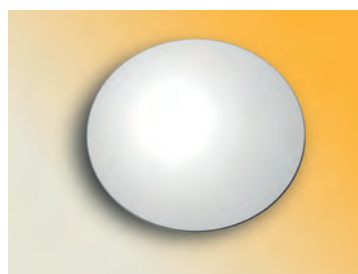
7.012.0030
140 x 8 mm

€ 183.13

1

Denta-Star
M2

Setter, round, smooth



7.015.0030
120 x 2 mm

€ 49.74

1

Denta-Star
R2

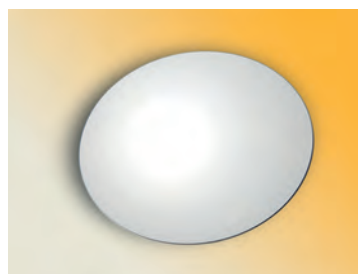
7.012.0020
140 x 2 mm

€ 64.29

1

Denta-Star
M2

Setter, round, ground



7.012.0080
120 x 7 mm

€ 181.73

1

Denta-Star
R2

7.012.0120
140 x 7 mm

€ 166.38

1

Denta-Star
M2

Protective Cover / Crucible, round



7.012.0060
118 x 40 mm

€ 151.33

1

Denta-Star
R2

7.012.0070
118 x 28 mm

€ 133.19

1

Denta-Star
R2

7.012.0040
140 x 40 mm

€ 203.00

1

Denta-Star
M2

7.012.0110
140 x 28 mm

€ 191.00

1

Denta-Star
M2

All prices plus VAT

Base plate, rectangular



Item number

7.012.0010
70 x 100 x 8 mm

Price

€ 87.90

Quantity

1

Suitable for

Denta-Star P1 Denta-Star S1

Setter, rectangular, smooth



7.015.0010
70 x 100 x 2 mm

€ 34.13

1

Denta-Star P1 Denta-Star S1

Setter, rectangular, ground



7.012.0100
70 x 100 x 7 mm

€ 145.80

1

Denta-Star P1 Denta-Star S1

Protective Cover / Crucible, rectangular



7.012.0020
70 x 100 x 30 mm

€ 87.50

1

Denta-Star P1 Denta-Star S1

7.012.0090
70 x 100 x 20 mm

€ 81.25

1

Denta-Star P1 Denta-Star S1

SINTERING AIDS

Spacer



Item number	Price	Quantity	Suitable for
7.006.0010	€ 13.63	1	M2, R2 P1, S1
7.006.0011	€ 41.00	3	M2, R2 --
7.006.0012 15 mm	€ 54.69	4	-- P1, S1
7.006.0020	€ 16.41	1	M2, R2 P1, S1
7.006.0021	€ 49.25	3	M2, R2 --
7.006.0022 20 mm	€ 65.63	4	-- P1, S1
7.006.0030	€ 19.14	1	M2, R2 P1, S1
7.006.0031	€ 57.43	3	M2, R2 --
7.006.0032 30 mm	€ 76.56	4	-- P1, S1

Sintering beads



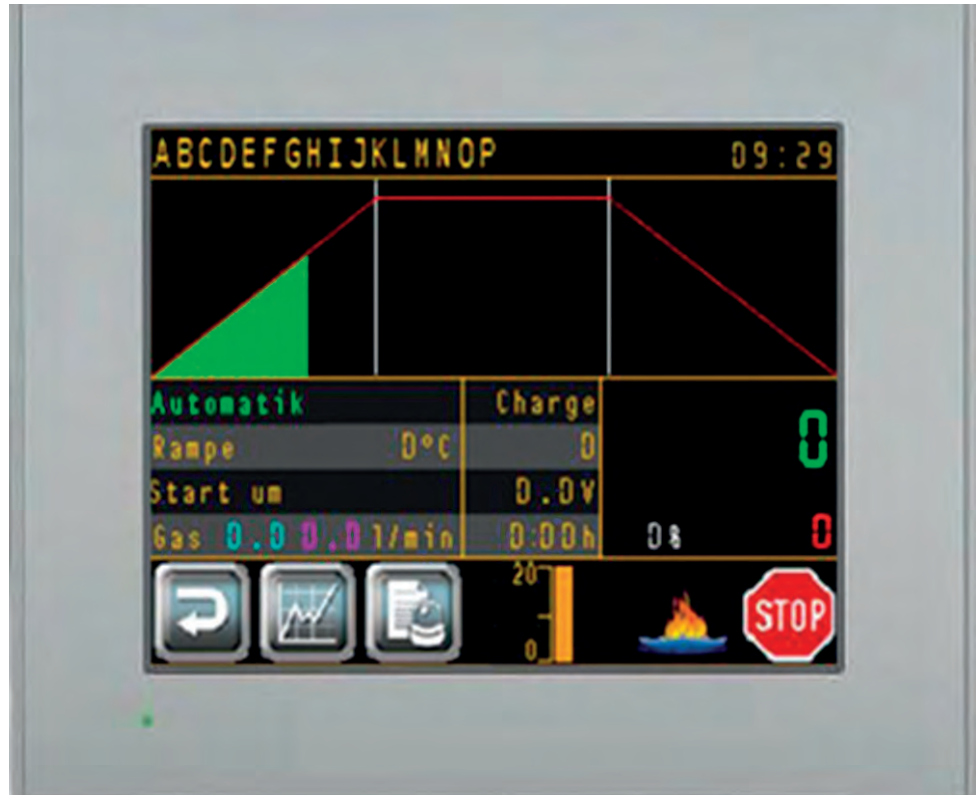
7.033.0010 1.8 - 2.0 mm, 200g	€ 70.00	1	All All
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All components are made from Al_2O_3 and are approved for the following temperature ratings. All components are made of Al_2O_3 and are approved for the following temperature ratings.: $T \leq 1600^\circ C$ & $\Delta T/t \leq 800^\circ C/h$ 1) $\Delta T/t \leq 1500^\circ C/h$

VISUALISATION

When it comes to the visualisation and operation of systems, Thermo-Star has been trusting its own experiences and competences for many years.

The programming as well as the entire process control is implemented with the help of an entry system developed by us which offers a high level of operating convenience via an HMI.



The key properties of the system are durability, robustness, reliability and almost unlimited adaptive capabilities. But for the user, the most important thing is the clearly structured, multiple-language operating interface.

All of the customer-specific process parameters such as intended and actual temperatures, process gas supply and much more can be displayed or hidden as required.

Programme administration is easily opened via the overview page. This page makes all func-

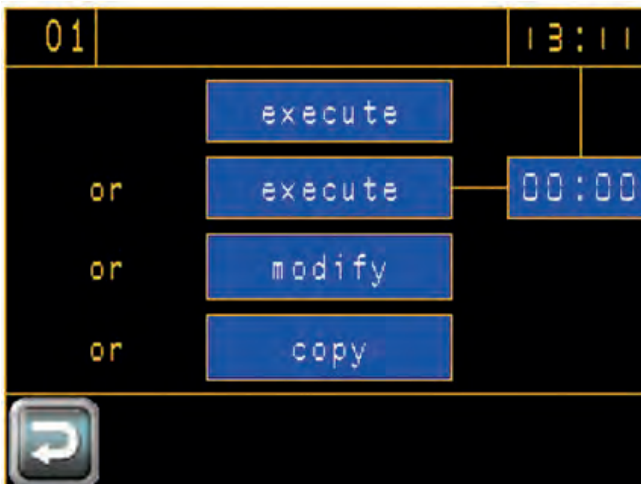
tions available that are directly associated with the programmes (including called sintering programmes, combustion programmes, recipes, temperature-time profile etc.).

1	ZR BRIDGE / CROWN
2	ZR BRIDGE TRANS
3	ZR SHORT
4	ZR STANDARD
5	
6	

At the bottom of the table, there are three icons: a left arrow, a graph, and a document.

& OPERATION

The internal scheme memory of the furnace offers space for 6-12 individual programs (according to version). An ordinary USB data carrier can be used to expand the scheme memory storage up to 30 programmes and can also be used for importing/exporting between furnaces of the same type. The letter "U" in front of a programme number indicates that it is a program located on the USB data carrier. In the fields after the program number, the name of the programme is shown.



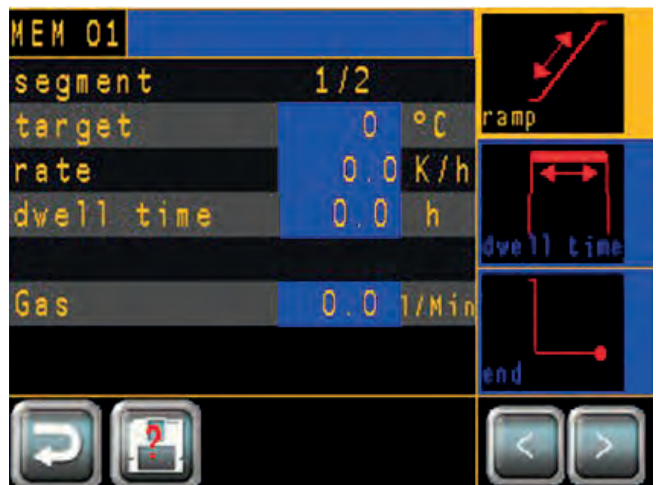
The screen for program actions opens immediately after a programme is selected in program administration. Alongside the selected program (number and name) it also shows the current system time of the furnace and the timer start time.

The possible actions are, from top to bottom:

- Direct start (execute)
- Timer start (execute with time specification within 24 hours)
- Modify
- Copy

After selecting a listed program, the programme editor opens automatically.

This screen is used to create new programs, or to modify existing programmings and then save them. Each programming consists of up to 20 segments which enable the setting of temperature target and other process parameters for each step separately.



The possible segment functions are:

- Ramp

A ramp is used to change the temperature (positive and negative). It is defined via the set point value (describes the temperature to be achieved at the end of this segment) and the increase rate (describes the speed or rate of temperature change which is used to achieve the setpoint).

- **Dwell time**

A holding time is designed to maintain the temperature achieved in the previous segment for a determined period of time. It is only defined by a time specification (duration).

- **End**

The end signalises to the controller that the programme ends with the previous segment. The end does not require further definition. The intended value is pre-set with the value "0" in order to enable as fast a cooling as possible.

As an absolute innovation, Thermo-Star offers customers the opportunity to control their systems via tablet or smartphone. This extremely innovative idea has the advantage that the system can be simply and quickly monitored, no matter where you are.

ThermoView

The company Thermo-Star offers a free PC software for the recording of data, documentation and monitoring of firing. This software can be linked via Ethernet to establish a quick and modern system connection. The software is a key basis for companies that wish to produce and certify products in accordance with DIN EN ISO 9000ff.

The "ThermoView" PC software also an own development, offers comprehensive programme administration and independently logs, on request, all relevant process data. It can be used to create programmes from the comfort of the office and to change or modify them. The number of programmes that can be saved is practically unlimited.

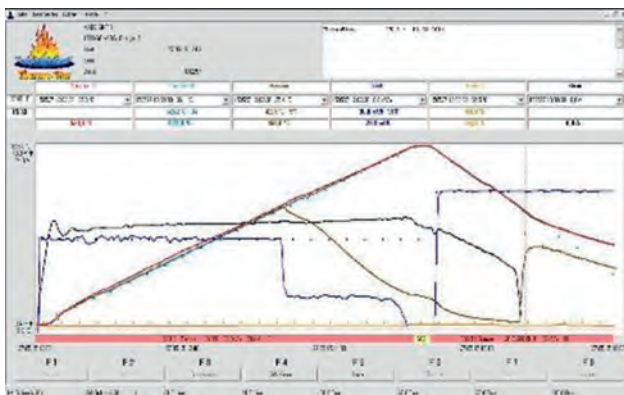


This data is available to the customer in table and graphical format on the PC for evaluation. Another great advantage of data recording is that only the active programmes need be kept on the system, the others can be saved securely on a protected server. This means that programmes

are protected from unauthorised access or the copying of sensitive data.



In online mode, the operator is able to monitor the actual state of the system in real time.



All process data can be written as a .CSV-File and thus archived securely and in a user-friendly way in databases.

Our QMS

A QMS (Quality Management System) covers all organisational measures including the monitoring of such that are required in order to achieve, ensure and improve upon a specific quality.

As well-considered and functional QMS (pursued and certified either internally or on the basis of an existing standard such as TQM, EFQM or DIN EN ISO 9000 ff) is a key component of a producing company.

In order to ensure we meet our own expectations, we trust in the long-lasting business relationships to our suppliers, to their competences and to shared experiences for all purchased raw materials, semi-finished products and finished parts. Nevertheless, all goods received are subject to a simple test and subsequently checked more intensively either by way of samples or when there is cause for suspicion. We are able to manage without a comprehensive or complete control of received goods at the time.

The passion with which we produce our systems, our uncompromising demands with regard to quality and the fact that many components can only sensibly be checked under temperature means that all systems are subject to a 100% check either immediately before delivery or after final installation on site.



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