Operating Manual

Tecnosint Sintering Oven Zirconium

Strada Cavalli 4
43038 Sala Baganza – Parma
Tel.: +39 0521 8380
Fax: +39 0521 833391
E-mail: info@tecnogaz.com

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General information

Limitation of liability

The content of this operating manual has been created taking the applicable laws and standards into account.
The unit has been developed using state-of-the-art technology.

NOTICE

The manufacturer assumes no liability for damage resulting from:

- ➤ Disregard/non-observance of the operating manual
- ➤ Intentional misuse
- ➤ Use other than as intended
- ➤ Operation by untrained personnel
- ➤ Operation by lay persons (to carry out maintenance work, etc.)
- ➤ Technical modifications to the unit that have not been agreed with the manufacturer
- ➤ Use of replacement parts that have not been approved by the manufacturer

Responsibilities of the operator

The unit is used for commercial purposes. The operator of the unit is therefore subject to the statutory obligations relating to occupational safety.
In addition to the safety instructions in this operating manual, the regulations on safety, accident prevention and environmental protection that apply to the unit's field of use must be complied with.

In particular, the following apply:

- The operator must be familiar with the applicable occupational safety regulations.
- The operator must ensure that all employees who use the unit have read and understood this operating manual.
- The operator must also train personnel at regular intervals and inform them of the dangers that can arise when using the unit.
- The operator must provide personnel with the necessary protective equipment.
- The operator must have all safety devices checked regularly for operability and completeness.

Documentation

Content and structure

This operating manual is an essential part of this unit. It contains instructions and information on how to use the unit safely and must be available to all users throughout the unit's service life. This operating manual is intended for use by trained operating personnel.

Labelling scheme for integrated text boxes and references

The following safety notices are used in this manual:

⚠ DANGER

Indicates an imminent danger that may cause serious physical injury or death.

⚠ WARNING

Indicates a potentially dangerous situation that may cause serious physical injury or death.

⚠ CAUTION

Indicates a potentially dangerous situation that may cause minor physical injury.

NOTICE

Indicates a potentially harmful situation in which the product or an object in its vicinity may be damaged.

NOTICE

Information or tips for easier operation.

Formatting and symbols

⚠ *indicates a general safety instruction*

☑ indicates that a requirement must be met

1. indicates a step to be carried out

➲ indicates the outcome of carrying out a step

• indicates a list

indicates a button

Safety

The ***Tabeo sintering oven*** is a high-temperature oven for commercial use in dental laboratories and may be used only for sintering sinterable ceramics.

Requirements for personnel

Trained and qualified personnel who know how to use the unit and whose specialist training, skills, experience and knowledge of the relevant regulations enables them to carry out the tasks assigned to them independently and recognise and avoid potential hazards.

⚠ DANGER

Electricity!

Risk of death from electric shock.

- ➤ Do not touch live cables and components with wet hands.
- ➤ Observe the accident-prevention regulations when working with electric current.
- ➤ Before carrying out any installation, maintenance, cleaning or repair work, disconnect the power supply of the sintering oven (pull out mains plug) and secure it against being switched back on.

⚠ DANGER

Risk of ignition!

Use of inflammable and explosive materials near the oven.

- ➤ Do not operate the sintering oven near highly inflammable sources.
- ➤ Do not install the sintering oven on highly inflammable supporting surfaces.

⚠ WARNING

Risk of burns from hot surfaces!

The surfaces of the sintering oven become hot during operation.
These may cause burns if touched.

- ➤ Do not touch the housing or the oven door during operation.
- ➤ Do not reach into the heating chamber. It may still retain a high level of residual heat from the previous heating process.
- ➤ Ensure that the sintering oven has cooled down before carrying out maintenance, cleaning and repair work.
- ➤ Wear heat-resistant safety gloves if it is necessary to carry out work on hot components.
- ➤ Use a suitable and sufficiently long pair of tongs to place items to be sintered into the oven and remove sintered items from the oven.

⚠ CAUTION

Incorrect operation!

No liability is assumed for damage that may be caused by misuse, incorrect operation, incorrect connections or improper maintenance/repair work carried out by untrained personnel. All warranty services are also excluded in such cases.

The unit must not be used if it or the mains cable becomes damaged and no longer functions correctly.
In this case contact the manufacturer immediately.

For your own safety and to increase the service life of your unit, use only original replacement parts.

To ensure safe operation of the sintering oven, regional regulations (e.g. accident-prevention regulations) apply in addition to the instructions in this operating manual. The former must be made available by the operator of the unit. The safety notices on the sintering oven must be kept in a legible condition.

NOTICE

This operating manual must be read and understood by each user before working on and with the unit.

The operating manual must be kept for the specified service life of the sintering oven.

Transport, packaging and storage

Transport

⚠ WARNING

Injury due to the sintering oven falling down!

Slipping/falling when lifting and carrying the sintering oven can lead to serious injuries.

- ➤ Only carry/hold the sintering oven at the lower edge of the housing (base).
- ➤ Always have at least two persons carry the sintering oven (max. 30 kg/ person).

⚠ CAUTION

Risk of injury due to oven weight!

Physical strain/back injuries due to the high inherent weight.

- ➤ Have at least two persons carry/move the sintering oven together.

NOTICE

Transport damage!

To prevent injury to personnel and material damage:

- ➤ Transport the unit in an upright position only.
- ➤ Do not stack units on top of each other.
- ➤ Do not place any other objects on the unit.
- ➤ Transport must be as free of shaking and vibrations as possible to prevent the unit from being damaged.
- ➤ Make sure that the unit is secured against slipping and falling during transport.
- ➤ The goods must be inspected for damage and loss immediately upon receipt. Defects must be documented by the freight carrier on the letter of consignment in order to lodge claims. The manufacturer assumes no liability for any damage and loss that is only found subsequently.

Packaging

NOTICE

The packaging protects the sintering oven against transport damage, corrosion and other forms of damage. Only remove it shortly before initial commissioning and store it in dry conditions for later reuse.

Storage

NOTICE

Temperature damage!

To prevent temperature damage:

- ➤ Store the unit only at temperatures between +5 and +40 °C.
- ➤ Always store the unit in dry and dust-free conditions.
- ➤ Avoid exposure to direct sunlight.
- ➤ Avoid mechanical vibrations.

Technical description

Function

The ***Tabeo sintering oven*** is used to fire sinterable ceramics.

The product to be sintered is placed in the sintering dish and set on the support pins in the combustion chamber. The heat-up process starts after entering the heating parameters and pressing the Start button.

Once the heating program has ended and the sintering oven has cooled down, the finished product can be removed from the oven.

Heating chamber

The product is sintered in the heating chamber. This consists of two different ceramic insulation layers and is operated using four heating elements connected in series. The outer insulating layer is designed for temperatures up to 1200 °C; the inner layer for temperatures up to 1650 °C.

Oven door

The oven door consists of a two-part ceramic door panel. A safety switch disconnects the heating current as soon as the oven door is opened.

The oven door has an electronic lock and can be opened only if the temperature is below 300 °C.

Oven housing

The oven housing consists of steel plate coated with plastic on both the inside and the outside and is cooled by a permanent ventilation system.

Program controller

The program controller has a finishing-time setting that can be used to specify a day and time for the program to finish. The switch-on time is calculated automatically so that the heating process is stopped at the required time and the sintered item can be removed.

Operating parameters and heating programs are stored in a non-volatile memory and are retained even if the power supply fails.

The set target temperature is maintained within an accuracy of ± 1 °C.
A temperature sensor integrated into the heating chamber measures the temperature of the chamber close to the product.
A thermocouple fail-safe prevents the sintering oven from overheating if the temperature sensor becomes defective.

Conformity

mihmvogt

EC Declaration of Conformity according to Machinery Directive 2006/42/EC Annex II 1.

The manufacturer / distributor

MIHM-VOGT GmbH & Co. KG
Friedrich-List-Str. 8
76297 Stutensee
Tel.: +49 (0) 72 44/7 08 71-0
Fax: +49 (0) 72 44/7 08 71-20
Email: info@mihm-vogt.de

hereby declares that the following

product

Product designation:	Tabeo sintering oven
series Make:	TABEO-1/M/Zirkon-100 TABEO-1/S/Zirkon-100 TABEO-2/M/Zirkon-120 TABEO-2/S/Zirkon-120 TABEO-2/M/Metal-120

Description:
The Tabeo sintering oven is a high-temperature oven for commercial use in dental laboratories and may only be used for sintering sinterable ceramics.
corresponds to all relevant regulations of the above directive as well as the further applied directives (below) – including their amendments applicable at the time of the declaration.

The following EU directives were applied: EMC
2014/30/EU
RoHS 2011/65/EU
The protection objectives of the Low Voltage Directive 2014/35/EU were complied with.

The following harmonised standards were applied:

EN 61010-1:2010	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements (IEC 61010-1:2010)
EN 61010-2-010:2014	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-010: Particular requirements for laboratory equipment for the heating of materials (IEC 61010-2-010:2014)
EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements (IEC 61326-1:2012)
EN ISO 12100:2010	Safety of machinery – General principles for design – Risk assessment and risk reduction (ISO 12100:2010)

The following national or international standards (or parts/clauses thereof) and specifications were applied: –

Name and address of the person who is authorised to compile the technical documents: Gillen, Tobias

Place: Stutensee / Date: 15.09.2016

_____
(Signature) Dietmar Gräbe

Certification

CE Mark

This product bears the CE mark in line with the provisions of Directive 2006/42/EC (Machinery Directive).

CAUTION

CE mark with connected products!

Products that are connected to this product must also bear the CE mark. These products must be test in accordance with the respective standards.

We declare conformity for sintering oven Tabeo Zirkon based on the following standards:

- Safety: EN 61010-1:2010 and EN 61010-2-010:2014
- EMC: EN 61326-1:2013
- Risk assessment and risk reduction EN ISO 12100:2010

EAC Certification

The Eurasian Economic Community Conformity Mark

Certificate number ЕАЭС N RU Д-DE.АД75.В.02156

RoHS Conformity

This symbol indicates that this product does not contain any poisonous or dangerous substances and can be recycled after disposal, and should not be thoughtlessly discarded.

Intended use

The ***Tabeo sintering oven*** is a high-temperature oven for commercial application in dental laboratories and may be used only for sintering sinterable chromium cobalt using original spare parts.

At a total output >1kW, no limit values for the harmonics apply.

NOTICE

The protection of persons can no longer be ensured and no liability can be assumed for damage that is caused by misuse, incorrect operation, incorrect connections or improper maintenance/repair work carried out by untrained personnel. All warranty services are also excluded in such cases.

The use of spare and wearing parts that have not been procured from the manufacturer will render the approval and guarantee of the sintering oven null and void.

Potential misuse

- Operation by untrained and insufficiently qualified personnel.
- Use of products that have not been approved by the manufacturer.
- Use of replacement parts that have not been approved by the manufacturer.
- Any use not in accordance with the declaration of conformity.
- Technical modifications to and conversions of the unit that have not been approved by the manufacturer.

Sintering with argon

The sintering of NEM is possible only in an oxygen-reduced atmosphere. This is attained by using argon. Argon is an inert gas in a compressed gas bottle. Always use argon bottles with a pressure gauge as well as a pressure reducer. The purity of the argon must be at least 4.6= 99.996 % vol. During the sintering process the argon flow is 1 l/min.

Determining the filling level of the compressed gas bottle:

The filling level of the compressed gas can be determined at the pressure gauge. A new argon compressed gas bottle is filled with 200 bar.

Calculation:

A 50 litre compressed gas bottle of argon with a filling pressure of 200 bar contains approx. 10,000 litres of argon.
At a flow of 1 l/min, the consumption per sintering process is approx. 270 litres.
With a 50 litre compressed gas bottle, approx. 35 NEM sintering processes are possible.

Technical data

General information	TABEO-1/M/ Zirkon-100	TABEO-1/S/ Zirkon-100	TABEO-2/M/ Zirkon-120	TABEO-2/S/ Zirkon-120
Dimensions (W x D x H)	400 x 400 x 600 mm	400 x 400 x 600 mm	480 x 460 x 680 mm	480 x 460 x 680 mm
Combustion chamber volume	1 dish Ø 100 x 3 mm	1 dish Ø 100 x 3 mm	3 dishes Ø 120 x 3 mm	3 dishes Ø 120 x 3 mm
Max. temperature	1650 °C	1550 °C	1650 °C	1550 °C
Weight	55 kg	55 kg	78 kg	78 kg
Minimum clearance around the sintering oven	50 mm			
Connected electrical load				
Voltage supply	220 - 240 V	200 - 240 V	200 - 240 V	200 - 240 V
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Max. power consumption	1500 W	1700 W	1800 W	2000 W
Protection Device end Customer end	 10 AT Connection to a separate electrical circuit with a 16-A circuit breaker, type K or type Z (other types of circuit breaker depending on the country of use)		 12 AT Connection to a separate electrical circuit with a 16-A circuit breaker, type K or type Z (other types of circuit breaker depending on the country of use)	
Protection class	IP 20 (protection against the ingress of foreign bodies, but not against the ingress of water)			
Operating conditions				
Installation area	Indoors only (in dry rooms)			
Temperature range	+5 to +40 °C			
Relative air humidity	Up to 31 °C: 80%			
Maximum air humidity	Up to 40 °C: 50% No condensation			
Height	Max. 2000 m			
Pollution degree	2			

Combustion chamber

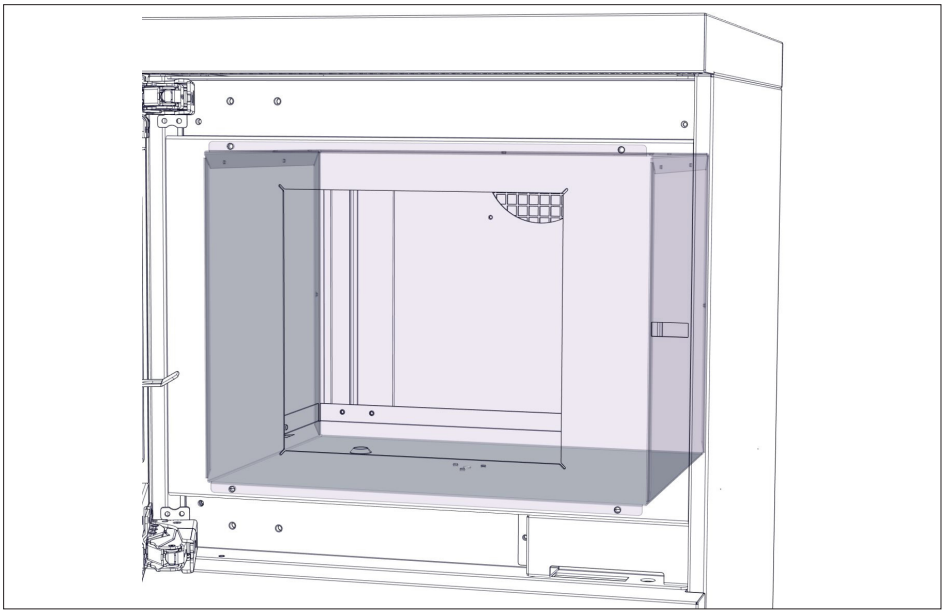


Abb. 1: Combustion chamber volume

Max. useful space of the combustion chamber (WxDxH):

TABEO-1/M/Zirkon-100:	100 x 115 x 45 mm
TABEO-1/S/Zirkon-100:	100 x 115 x 45 mm
TABEO-2/M/Zirkon-120:	120 x 135 x 105mm
TABEO-2/S/Zirkon-120:	120 x 135 x 105mm

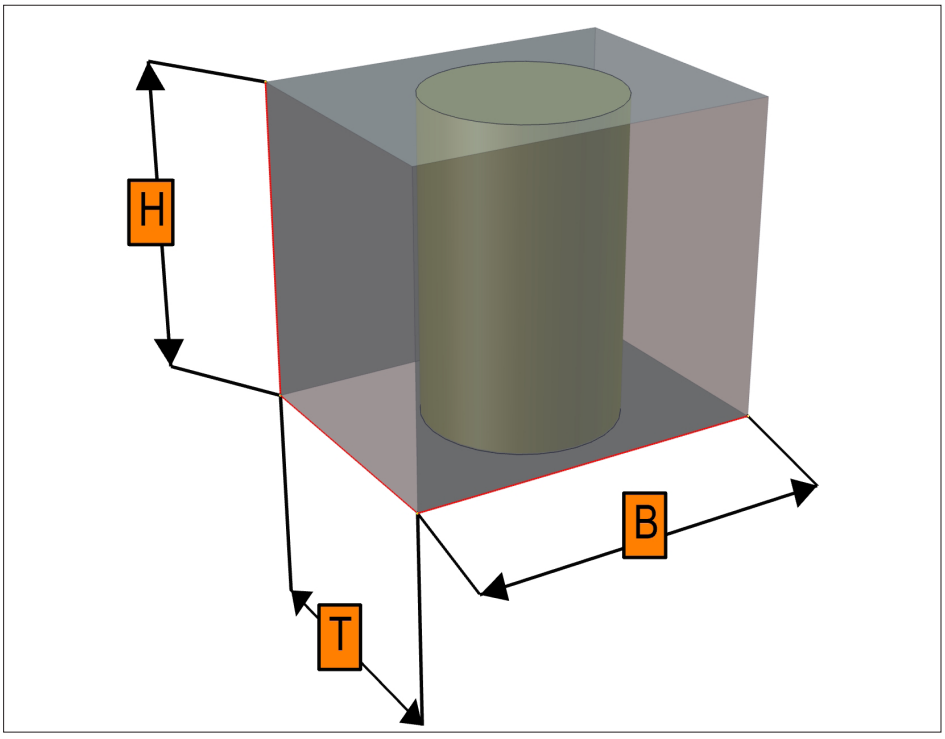


Abb. 2: Combustion chamber volume, max. filling

Installation

Installation location

The ***Tabeo sintering oven*** is designed as a table-top unit. To ensure stability, we recommend a level surface of at least:

- Tabeo-1: 50 cm x 60 cm that can support a load of up to 60 kg
- Tabeo-2: 60 cm x 60 cm that can support a load of up to 80 kg

Installation conditions

► Always install the sintering oven in dry rooms that are as dust-free as possible and make sure that liquids cannot penetrate the unit.

► Highly inflammable and combustible gases and liquids must not be stored in the installation rooms.

► Do not place any combustible and inflammable objects near the sintering oven.

► Keep a distance of 50 mm around the sintering oven for sufficient cooling.

⚠ CAUTION

Tipping loads!

Supporting surface with an insufficient load-bearing capacity.

➤ When installing the sintering oven, make sure that the supporting surface has a sufficient load-bearing capacity.

⚠ CAUTION

Risk of injury due to oven weight!

Physical strain/back injuries due to the high inherent weight.

➤ Have at least two persons carry/move the sintering oven together (max. 30 kg load bearing capacity/person).

⚠ CAUTION

Risk of overheating!

In the event of overheating, the electronic system will switch the heater off.

➤ Make sure that the air vents remain clear on all sides.

1. Align the supporting surface horizontally.

Lift and carry the sintering oven only at the unit base.

2. Place the sintering oven on the supporting surface.

⚠ *Make sure the surface is non-slip.*

Electrical connection

Local installation

⚠ WARNING

Release of pollutants!

Pollutants can be inhaled when the insulating materials are handled.

➤ Wear personal protective equipment (respiratory protection) during disposal.

☑ The sintering oven requires its own electrical circuit.

☑ The building's electrical circuit must have a type-K or type-Z circuit breaker with a rated current of at least 16 A (other types of circuit breaker depending on the country of use).

☑ An additional residual-current circuit breaker (designed for 30 mA tripping current) must be installed.

☑ To ensure electrically safe operation, the sintering oven requires a protective earth conductor connected to the power socket.

☑ When selecting the installation location, ensure that the accompanying mains cable is 2.0 m long. Extending the cable is not permitted. The supply voltage must be within the rated voltage range of 200 - 240 V (see „Technische Daten“ on page 14).

⚠ DANGER

Electricity!

Risk of death from electric shock.

➤ Do not touch live cables and components with wet hands.

➤ Observe the accident-prevention regulations when working with electric current.

➤ Only connect the unit to a voltage supply that matches the specifications on the rating plate.

Rating plate

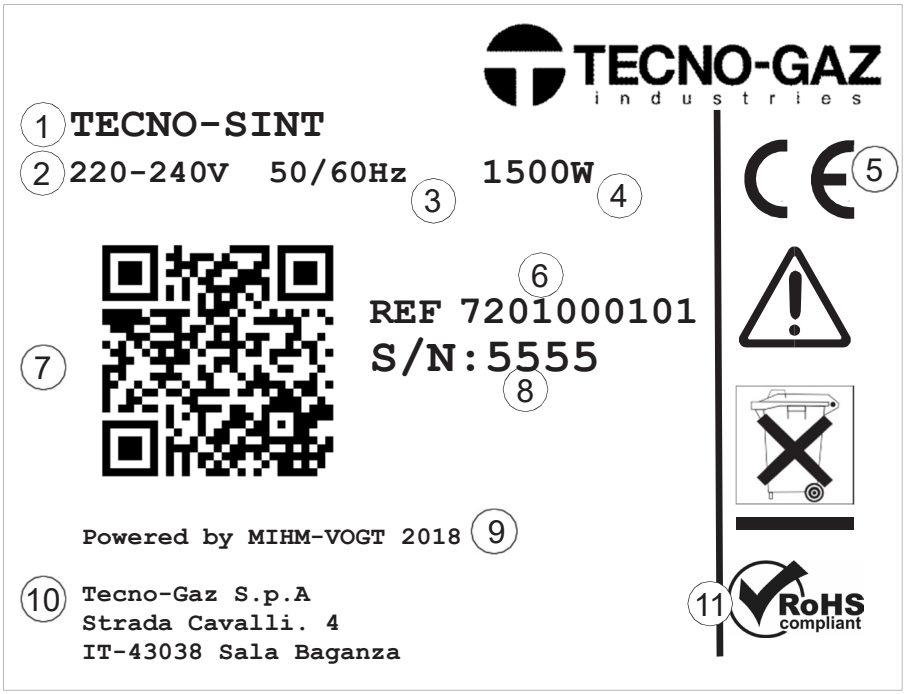


Abb. 3: Rating plate (example)

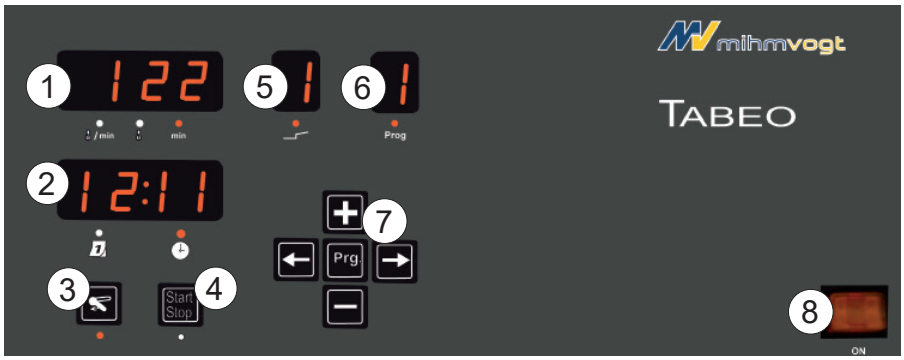
1	Machine type/designation	7	QR code
2	Operating voltage	8	Serial number
3	Mains frequency	9	Year of manufacture
4	Output	10	Manufacturer's details
5	CE mark	11	RoHS mark
6	Reference number Mihm-Vogt		

Operation

Operating elements and displays

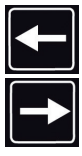
The microprocessor-controlled program controller enables a wide range of heating curves to be run through with high precision. The unit is operated via a membrane keyboard and menus displayed on a 7-segment screen.

The program controller has the following operating elements:



1 Function display
2 Week day/Time
3 Door opener
4 Start/Stop
5 Program phase
6 Current program
7 Navigation buttons
8 Main on/off switch

Operating elements

Function	
	Mains switch; lights up when switched on (at bottom switch position)
	Changes the display mode, activate/deactivates the finishing time function
	Increases the value
	Decreases the value
	Activates programming mode
	Starts/stops the program
	Activates the door opener

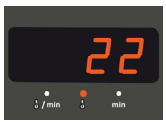
Displays

	Function
	In heating mode: Displays the oven temperature/holding time. In programming mode: Displays the increase rate/holding temperature/ holding time.
	Displays the current program phase.
	Displays the current program number.
	In standby mode: Displays the day (1 = Mon, 2 = Tue, 3 = Wed, etc.) and time (hh:mm). In heating mode: Displays the finishing time.
	LED lights up orange when finishing-time mode is activated.
	LED lights up green when heating mode is activated.
	Oven door is open.

Switching on the sintering oven

1. Connect the voltage supply.
2. Switch the sintering oven on at the mains switch.

➲ The mains-switch indicator lamp lights up.



➲ The current temperature of the oven is displayed after approximately three seconds.

Initial commissioning

NOTICE

Check the basic settings of the sintering oven (see “Basic settings” on page 29).

Feeding the sintering oven

⚠ *The ceramic door panel is extremely porous and sensitive to scratching and impacts.*

1. Switch the sintering oven on.

2. Press the ***door opener*** button.

➲ The electronic door lock is released for three seconds and the oven door can be opened.

NOTICE

The oven door has an electronic lock and can only be opened if the temperature is below 300 °C.

3. Place the supporting stone in the sintering oven

4. Fill the standard sintering dish included in the scope of delivery (you can find more information about filling the sintering dish in the section „Vorbereiten der Sinterhilfsmittel“ auf Seite 28).

5. Place the item to be sintered into the standard sintering dish.

6. Once filled, use a pair of tongs to place the standard sintering dish on the support pins.

7. Close the oven door.

8. Start a firing program by pressing the ***START/STOP*** button.

Selecting and loading a heating program

1. Press the ***RIGHT-HAND ARROW*** button until the LED under the "Prog." display lights up.

2. Select a program (1 - 9) using the ⊞ and ⊟ buttons.

Starting/stopping a heating program

Requirements

☑ The sintering oven has been fed

☑ The heating program has been loaded

1. Press the ***START/STOP*** button.

➲ The heating program starts.

While the program is running:

➲ The function display shows the oven temperature or the remaining holding time.

➲ The day/time display shows the finishing time of the program.

➲ The respective target temperature can be displayed by pressing the ***RIGHT-HAND ARROW*** button.

⚠ *The program can be stopped at any time by pressing the **START/STOP** button.*

⚠ *Pressing the **START/STOP** button again restarts the program from the beginning.*

Removing the sintering dish from the heating oven

Requirements

☑ The sintering oven has cooled down to 300 °C to enable the oven door to be opened.

1. Guide the tongs under the sintering dish and lift it off the support pins.

2. Place the sintering dish on a suitable heat-resistant surface.

Programming the heating phases

NOTICE

Up to nine different heating programs can be set in the program controller.

1. Press the ***RIGHT-HAND ARROW*** button until the LED under the "Prog." display lights up.

2. Select a program (1 - 9) using the + and − buttons.

3. Press and hold the ***PROGRAMMING*** button until the function display shows that it is ready for input.

➲ The LED flashes.

NOTICE

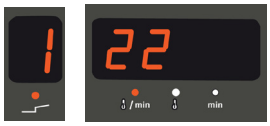
If a button is not pressed within 60 seconds in ***PROGRAMMING*** mode, the program controller will skip back to the previous display.

Programming phase temperatures and holding times

NOTICE

In programming mode, individual heating curves can be specified by setting up to four phases.

Entering the heating parameters for phase 1:



1. Select the heating speed using the + and − buttons.
The minimum heating speed is 1 °C/min (2 °F/min),
the maximum heating speed is 25 °C/min (54 °F/min).

2. Select the temperature by pressing the ***RIGHT-HAND ARROW*** button.

3. Select the temperature using the + and − buttons.

NOTICE

The maximum temperature is 1650°C (3002°F) for TABEO-1/M/ Zirkon-100/ TABEO-2/M/Zirkon-120 and 1550°C (2786°F) for TABEO-1/S/ Zirkon-100/ TABEO-2/S/Zirkon-120.

4. Select the holding time by pressing the ***RIGHT-HAND ARROW*** button.

5. Select the holding time using the + and − buttons.

NOTICE

The maximum holding time is 999 minutes.

If a longer holding time is required, another phase must be added.

6. Navigate to the level selection using the ***RIGHT-HAND ARROW*** button.

➲ The levels are selected using the + and − buttons.

7. Carry out steps 1 to 5 for additional phases.

Saving the heating program

After programming the specific heating parameters for a phase, you can exit programming mode.

1. To exit programming mode, press and hold the ***PROGRAM*** button until the LED under the function display lights up permanently.

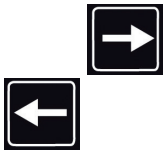
➲ The program has been permanently saved.

Starting a heating program automatically

The sintering oven can be programmed via an integrated timer so that it finishes the heating program currently loaded at a specific finishing time.

The integrated timer is used to specify the day and time at which a program should finish.

1. Select a program.



2. Activate the timer by pressing both of the ***ARROW BUTTONS***.

➲ The “weekday" LED (item A) lights up.

3. Select a day of the week using the + and − buttons (1 = Mon, 2 = Tue, 3 = Wed, etc.).

NOTICE

The next day is preselected automatically when the timer is activated.

4. Press the ***RIGHT-HAND ARROW*** button.

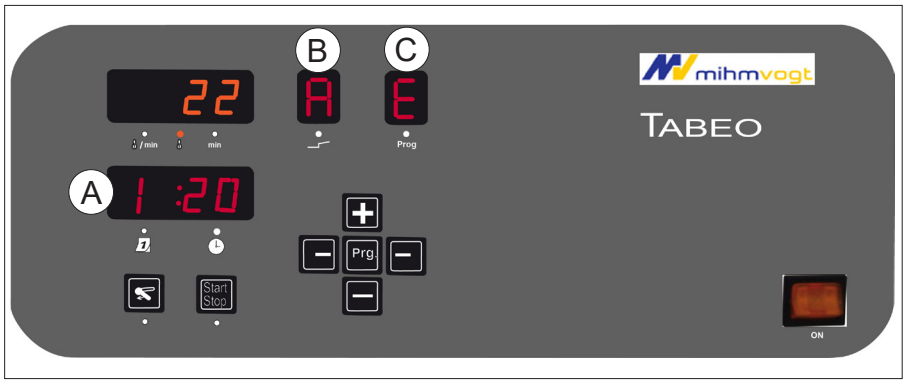
➲ The orange “Time" LED lights up.

5. Select the hour using the + and − buttons.

6. Press the ***RIGHT-HAND ARROW*** button.

7. Select the minutes using the + and − buttons.

8. Press the ***RIGHT-HAND ARROW*** button to finish entering the finishing time.



A Toggles between weekday/time of completion
B Displays Autostart mode
C Shows selected program

NOTICE

Pressing the ***ARROW BUTTONS*** again will deactivate the integrated timer again.

This allows the selected program to be immediately started manually.

Preparing the sintering aid

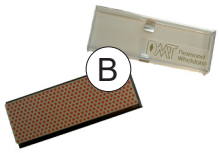
Recommended filling of the standard sintering dish

1. Fill the standard sintering dish with a layer of sintering beads.
2. Place the parts to be sintered into the standard sintering dish.

⚠ *Make sure that the bottom of the dish is covered by a layer of sintering beads and that the sintering beads can move around freely.*

⚠ *The information provided by different material manufacturers may vary and must be observed.*

Sintering with the sintering disc



1. Check the sintering disc (item A) for roughness.
2. If necessary, smooth the sintering disc (item A) with a suitable diamond grinding stone (item B).

Basic settings

Parameter settings

NOTICE

The time and the standard parameters of the sintering oven are preset at the factory.
The sintering oven does not switch to summer/winter time automatically.

1. Press and hold the ***PROGRAMMING*** button.
2. Switch the sintering oven on.
3. Release the ***PROGRAMMING*** button.

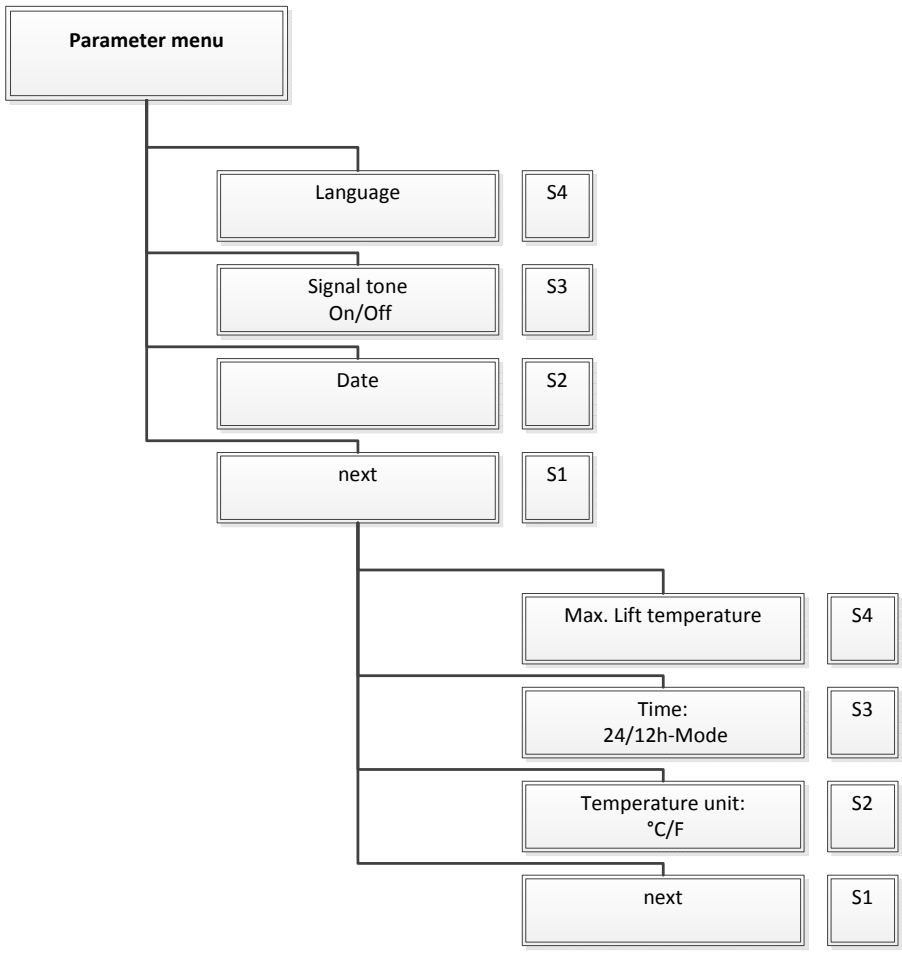
➲ Parameter mode has now been activated.

4. Select the parameters using the ***RIGHT-HAND ARROW*** button.
5. Change the parameter values using the  and  buttons.

6. Press the ***RIGHT-HAND ARROW*** button.

➲ This takes you to the next parameter.

➲ Changes to parameters will be saved automatically when you exit parameter mode.



Setting the day and the time

Requirements

☑ You are in the "Parameter settings" menu.

1. Select the time display by pressing the ⊞ and ⊟ buttons.

2. Press the ***RIGHT-HAND ARROW*** button.

➲ The weekday display is activated (LED lights up orange).

➲ The weekday display flashes.

3. Set the day of the week by pressing the ⊞ and ⊟ buttons (1 = Mon, 2 = Tue, 3 = Wed, etc.).

4. Press the ***RIGHT-HAND ARROW*** button.

➲ The time display is activated (LED lights up orange).

➲ The hour display flashes.

5. Select the hour by pressing the ⊞ and ⊟ buttons.

6. Press the ***RIGHT-HAND ARROW*** button.

➲ The minute display flashes.

7. Select the minutes by pressing the ⊞ and ⊟ buttons.

NOTICE

The day/time display shows the day of the week and the time alternately.

8. Press the ***RIGHT-HAND ARROW*** button.

➲ The acoustic signal settings are displayed.

9. Select the acoustic signal by pressing the ⊞ and ⊟ buttons. (0 = Off, 1 = Default)

10. Press the ***RIGHT-HAND ARROW*** button.

➲ The settings for the temperature unit are displayed.

11. Select the temperature unit using the ⊞ and ⊟ buttons. (C= °C, F = °F)

12. Press the ***RIGHT-HAND ARROW*** button.

➲ The settings for the max. oven opening temperature are displayed.

13. Select the max. oven opening temperature by pressing the ⊞ and ⊟ buttons (100 - 300).

14. Press the ***RIGHT-HAND ARROW*** button.

➲ This takes you back to normal operating mode.

Switching off the sintering oven

1. Switch the sintering oven off at the mains switch.

➲ The mains indicator lamp on the main switch goes out.

⚠ CAUTION

Risk of burns from the residual heat of the high-temperature oven!

The heating chamber can retain a significant amount of residual heat even when the oven is switched off. There is a risk of burns from the heating chamber walls and the oven door.

Therefore:

➤ Make sure the sintering oven has cooled down sufficiently before carrying out any work on it. It takes at least four hours for the sintering oven to cool down from the maximum temperature to around room temperature.

RS-232 interface

Abb. 4: RS-232 interface (illustrative example)

The sintering oven has an RS-232 interface (A) on the rear, which is used to save log files on a computer.

Requirements

- RS-232 interface cable
- Computer with RS-232 connection option
- Software “uCon” (available under: http://www.umonfw.com/ucon/)
- Microsoft Excel licence

NOTICE

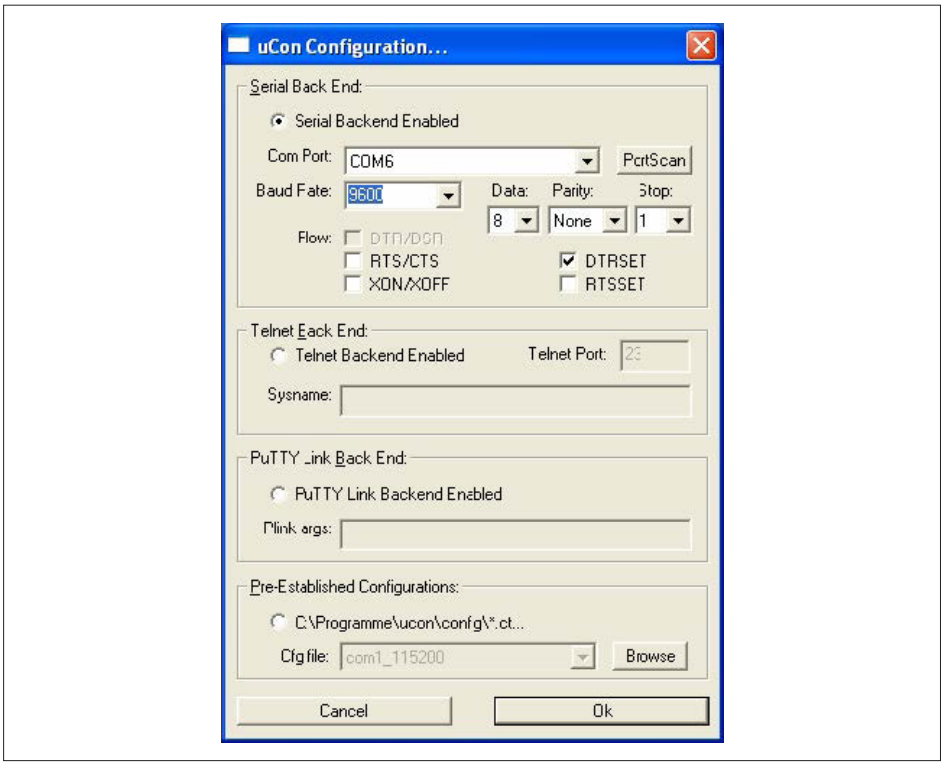
If the computer to be used has no RS-232 connection option, a USB adapter with installation CD can be ordered from the manufacturer.

In this case contact the Mihm-Vogt customer service.

1. Connect the sintering oven to the computer using the connecting cable.

2. Start the “uCon” software.

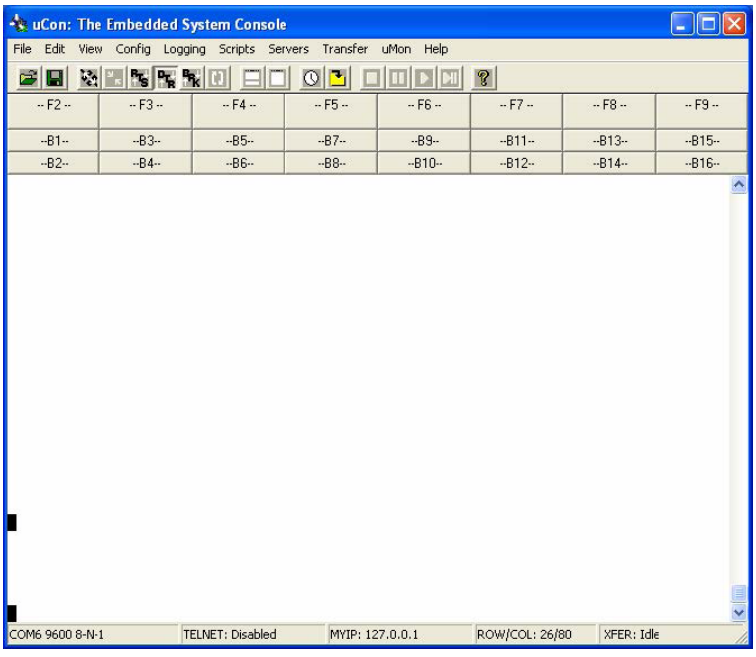
3. Set the configuration shown.

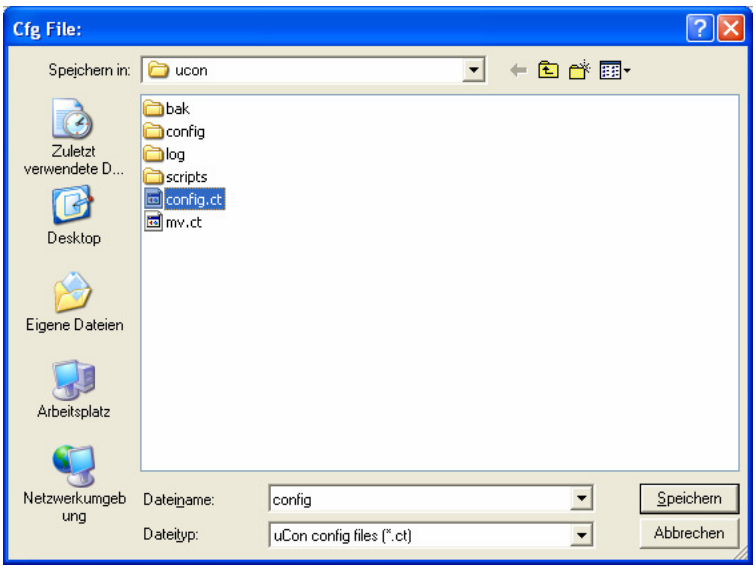


4. If the “Com Port” is not known, select a suitable one with “Portscan”.

5. Confirm your entry with “OK”.

6. Save your port configuration in the “File” menu and “Save As...”.



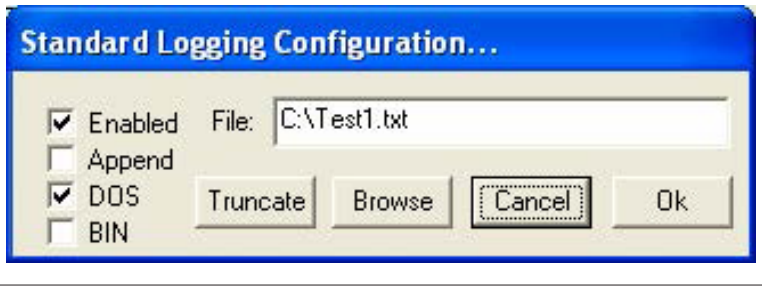


7. Configure the logging:

► Select the “Standard” option in the “Logging” menu.

➲ The configuration window is opened.

8. Set the checkmark as shown and give the TXT file a name.



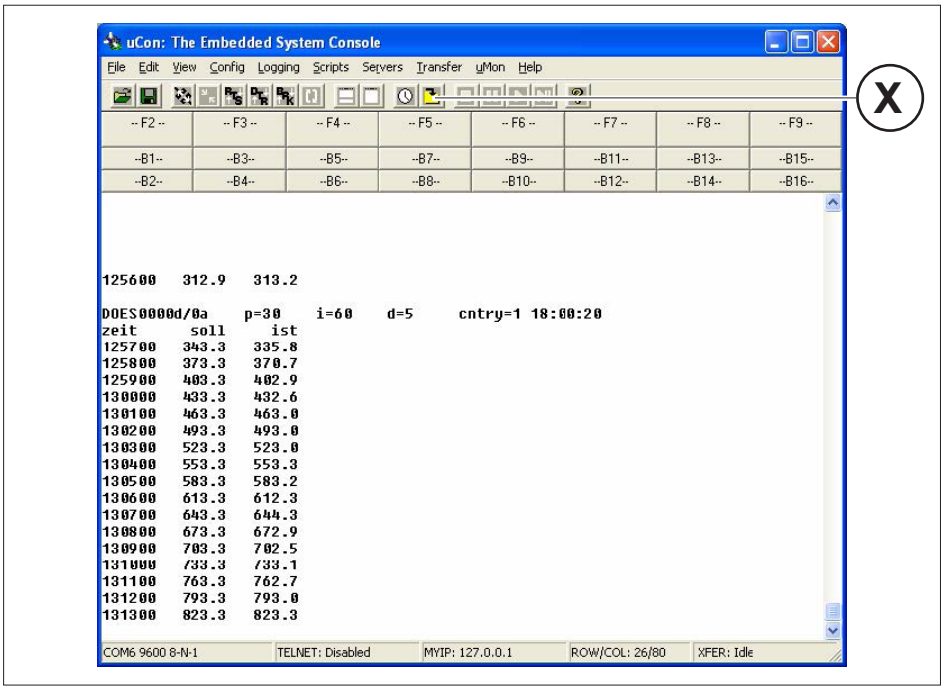
9. Confirm with “OK”.

10. Start the sintering program at the sintering oven.

➲ The sent data is displayed.
The target temperature appears in the left column, the actual temperature in the right column. New measured values are transferred at minute intervals.

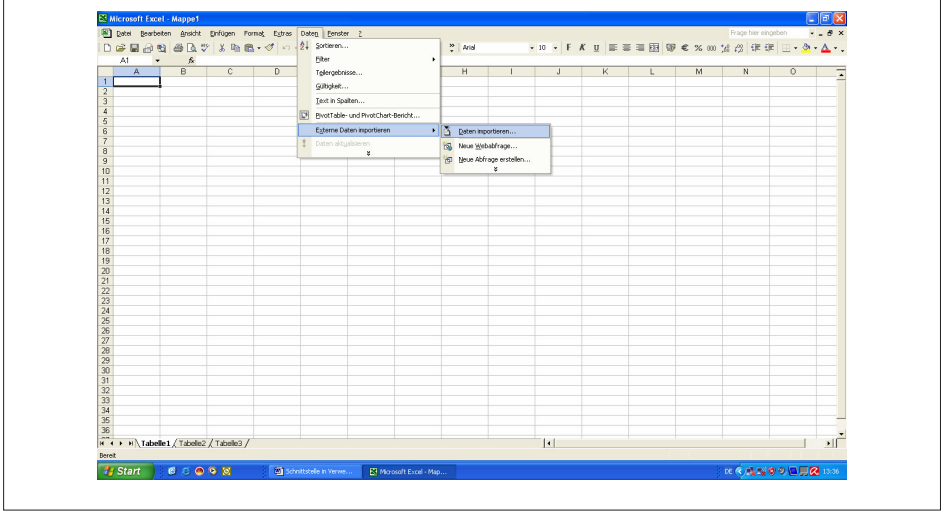
11. Click on the X button to write the data to the known TXT file (here Test1.txt).

12. The logging is terminated by clicking on the button.

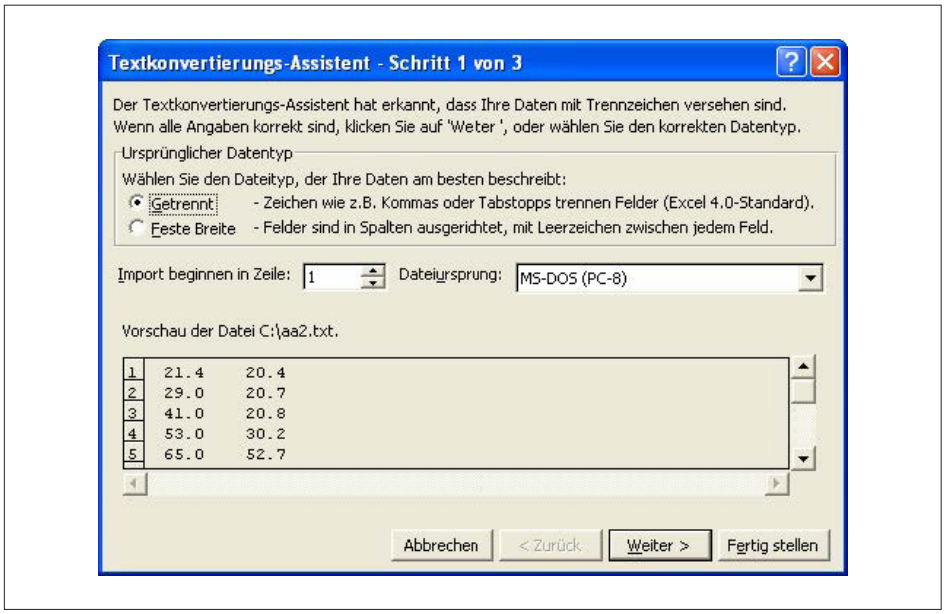


13. Call up Microsoft Excel to create a graphic.

14. Import the generated text file.

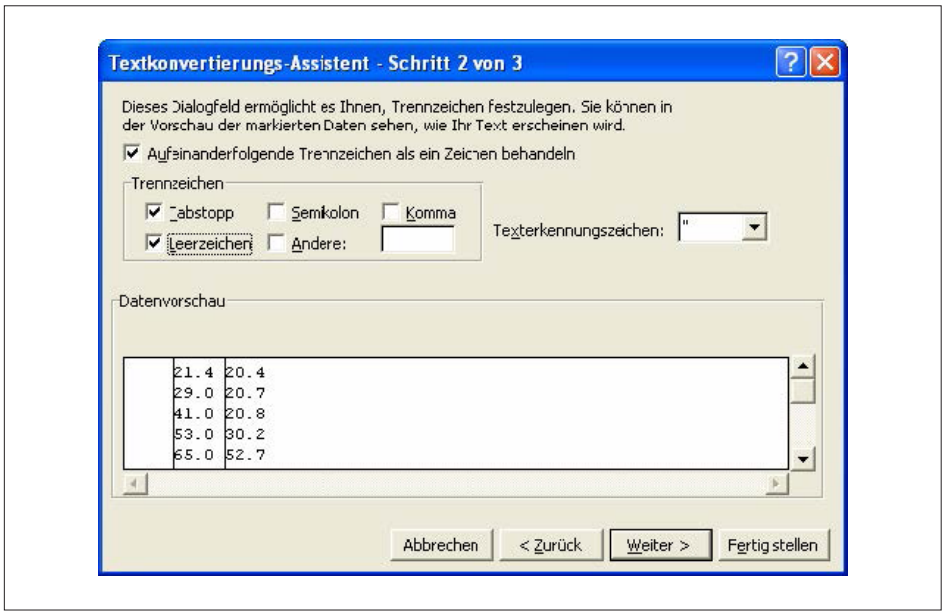


➲ The Text Conversion Assistant is opened.



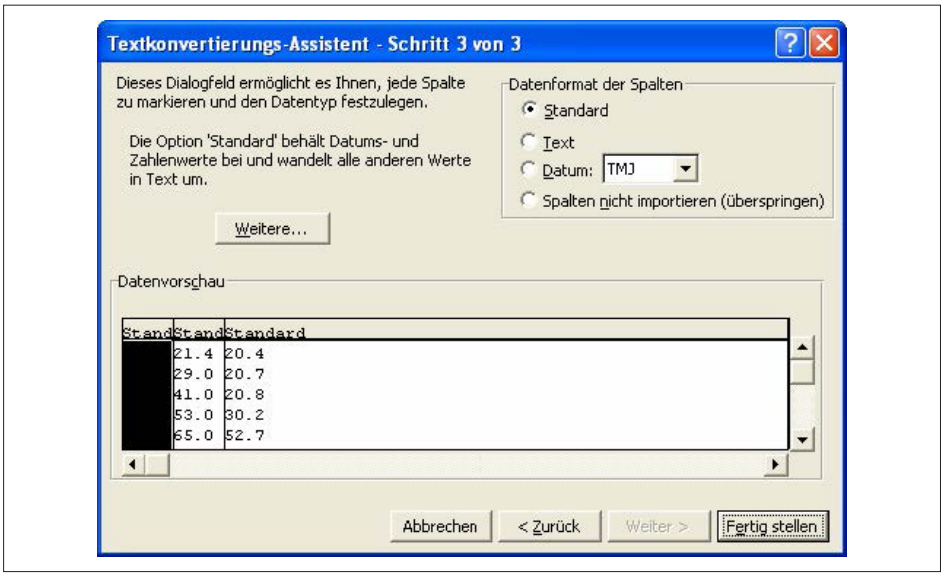
15. Click on “Next” and make the following settings:

16. Set the checkmark at “Space”.



17. Click on the “Next” button.

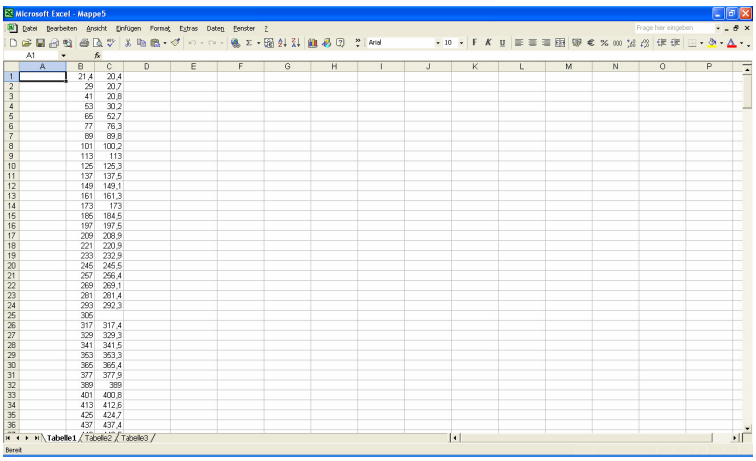
18. Click on the “More...” button.



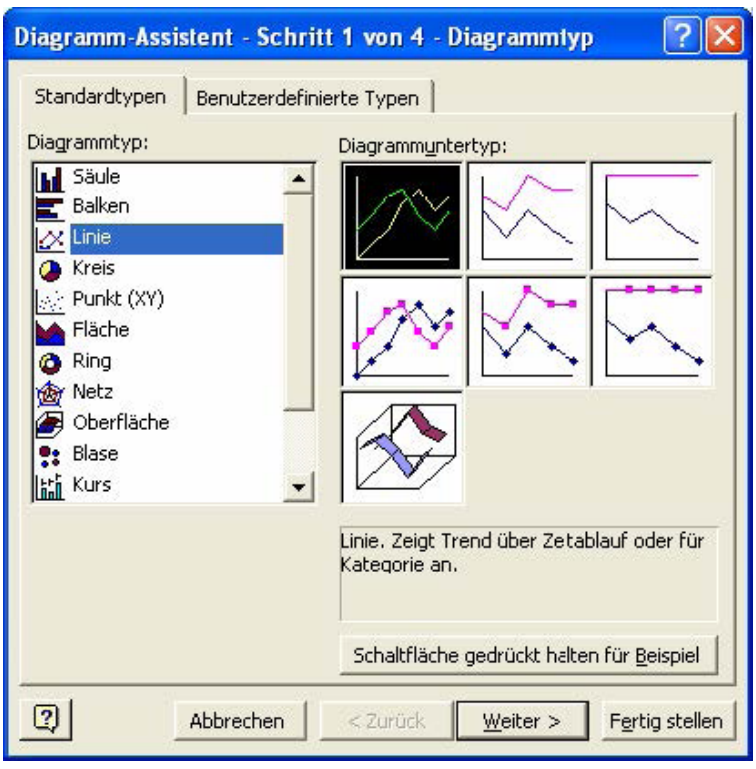
19. Permute point and comma for both settings and confirm with “OK”.

20. Click on the “Finish” button and “OK”.

21. The data series are displayed.

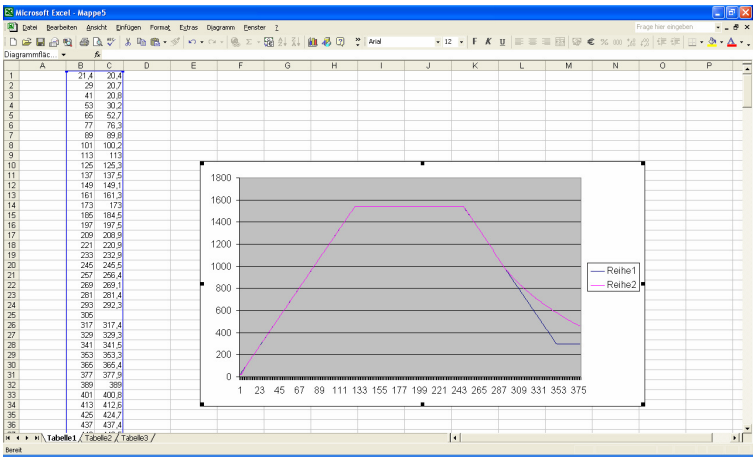


22. Select the Diagram Assistant and choose a diagram type (e.g. line).



23. Click on “Next” three times and then “Finish”.

24. The finished diagram is displayed.



Care and maintenance

Clean the housing of the sintering oven every so often with a damp cloth.

NOTICE

Damage to the heater!

➤ Make sure the heating chamber does not become dirty.
This could damage the heater.

NOTICE

Use of colouring liquids affects the unit's service life!

During the sintering process, the use of colouring liquids can significantly shorten the service life of the heating elements.

Service programs

A cleaning cycle should run periodically depending on how often the oven is used. This serves to remove contamination due to liquids and other impurities that become deposited in the insulation.

Depending on the frequency of use, a regeneration cycle should also be carried out, which is necessary for regeneration of the heating elements.

Service programs follow the normal program channels 1-9, selectable after program 9 as A, C or E.

TABEO-1/M/Zirkon-100 // Tabeo-2/M/Zirkon-120:

Program A - Temperature control[1]

Program C - Heating chamber cleaning

Program E - Heating element regeneration

TABEO-1/S/Zirkon-100 // Tabeo-2/S/Zirkon-120:

Program A - Temperature control[1]

Program C - Heating chamber cleaning

1 only in conjunction with test kit

Faults and error messages

Safety

⚠ DANGER

Electricity!

Risk of death from electric shock.

- ➤ Work on electrical systems may be performed by qualified electricians only.
- ➤ Before carrying out any installation, maintenance, cleaning or repair work, disconnect the power supply of the sintering oven (pull out mains plug) and secure it against being switched back on.
- ➤ Do not touch live cables and components with wet hands.
- ➤ Observe the accident-prevention regulations when working with electric current.

⚠ WARNING

Hot surfaces!

Risk of serious burns to the limbs.

- ➤ Do not touch the housing or the oven door during operation.
- ➤ Ensure that the sintering oven has cooled down completely before carrying out maintenance, cleaning and repair work.
- ➤ Wear heat-resistant, thermally insulated safety gloves when it is necessary to carry out work on hot components.

NOTICE

Material damage due to incorrect repair of electric cables!

This may cause malfunctions and make electric components defective.

- ➤ Do not repair defective cables or plugs.

Faults

Fault	Possible cause	Troubleshooting	Responsibility
Incorrect time	The time in the controller has been saved incorrectly	Set the correct time (see “Setting the day and the time” on page 29).	User
No display, mains indicator lamp is lit	Defective circuit breaker	Switch the oven off, wait for 10 seconds, switch the oven back on again. If the malfunction reoccurs, replace the controller.	
No display, mains indicator lamp does not light up	There is no mains voltage	Check the on-site circuit breakers and connection cable. If necessary, notify a qualified electrician.	
The heating programs and the time are not permanently saved	Storage battery depleted	Replace the storage battery.	Service department mihm vogt

Error messages

Fault	Possible cause	Troubleshooting	Responsibility
"Er00" displayed	Door open during process	Close door (“Press”) Poss. readjust door locking	User Service department TECNO-GAZ
“Er01" displayed	Excessive temperature	Replace the thermocouple.	Service department TECNO-GAZ
"Er02" displayed	Broken sensor, measuring circuit	Retighten the thermocouple connections.	
"Er03" displayed	Broken sensor	Replace the thermocouple.	
“Er04" displayed	Thermocouple reverse polarity	Connect thermocouple correctly + orange lin - white lin	
"Er05" displayed	Thermocouple short-circuited or heater defective	Check the heater/thermocouple and have it/them replaced if necessary.	
"Er06" displayed	Defective electronic system	Check the electronic system and have it replaced if necessary.	
"Er09" displayed	Power failure	If there is a brief power failure during a heating-up or cooling-down phase and the temperature is below 1000 °C, the process will be continued once power has been restored. If the power failure lasts longer than 10 seconds and the temperature is above 1000 °C, the process will be stopped and the display will flash.	The ***START/ STOP*** button must be pressed to acknowledge error Er09.

Decommissioning

Decommissioning can be carried out for two reasons:

- For the purpose of reinstalling the unit at another location.
- For the purpose of final disposal.

If the sintering oven is to be reinstalled at another location, decommissioning must be well prepared. All components and fittings must be carefully removed, labelled and, if necessary, packaged for transport. This ensures that all parts can be identified correctly and refitted in the correct positions when reassembling the unit.

1. Switch the sintering oven off.
2. Disconnect the sintering oven from the voltage supply (pull out mains plug).
3. Remove all connections (e.g. PC interface cable, etc.) from the sintering oven.

Disposal

Safety

WARNING

Release of pollutants!

Pollutants can be inhaled when the insulating materials are handled.

➤ Wear personal protective equipment (respiratory protection) during disposal.

WARNING

Potential contamination of the environment and groundwater due to improper disposal!

➤ The regulations and guidelines of the legislature in the country of operation must be complied with when disposing of parts of the unit and operating materials.

Disposal

1. Sort the component parts of the sintering oven into recyclable materials, hazardous substances and operating materials.
2. Dispose of the component parts of the sintering oven or take them to be recycled.