

Original operating manual HT-S sintering furnace HT-S Speed sintering furnace

English

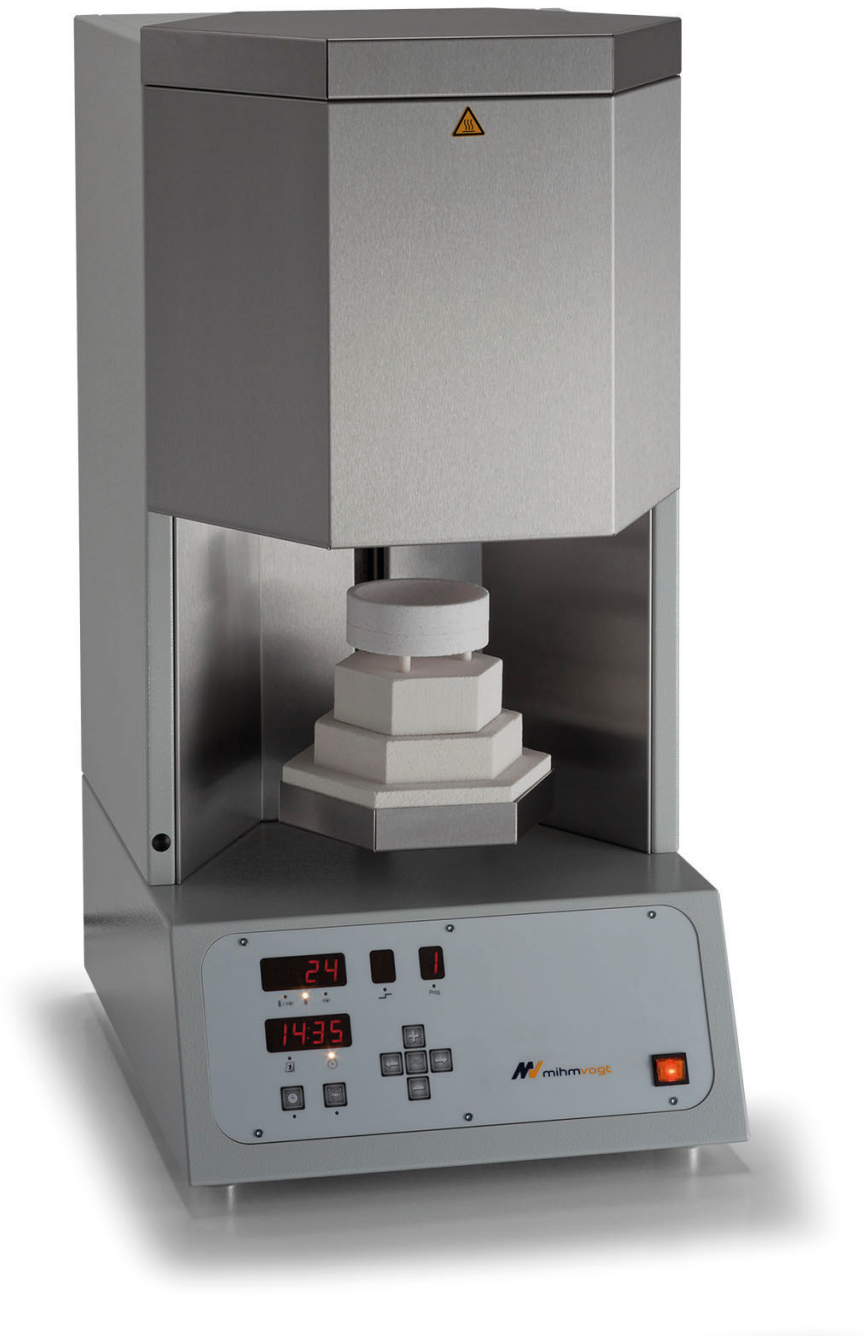


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General information

Limitation of liability

The contents of this operating manual have been generated taking the applicable laws and standards into account.
The equipment has been developed according to state-of-the-art engineering.



NOTICE

The manufacturer assumes no liability for damage resulting from:

- Disregarding/non-observance of the operating manual
- Intentional misuse
- Non-designated use
- Use of untrained personnel
- Use of non-specialists (for maintenance work, etc.)
- Technical modifications to the equipment that have not been agreed with the manufacturer
- Use of spare parts that have not been approved by the manufacturer

Responsibilities of the operating company

The equipment is used for commercial purposes. The operating company of the equipment is therefore subject to the statutory obligations for work safety.

In addition to the safety instructions in this operating manual, the applicable safety, accident prevention and environmental regulations must be complied with for the field of use.

In particular, the following applies:

- The operating company must be aware of the applicable work protection provisions.
- The operating company must ensure that all employees involved with the equipment have read and understood this operating manual.
- The operating company must also train the personnel at regular intervals and inform them of the dangers involved in using the equipment.
- The operating company must provide the personnel with the necessary protective equipment.
- The operating company must have all safety devices checked regularly for functionality and completeness.

Documentation

Contents and structure

This operating manual is an integral part of this equipment. It contains instructions and information for the safe handling of the equipment and must be available to each user throughout the entire operating life of the equipment. This operating manual is intended for trained operating personnel.

Labelling scheme for integrated texts and references

The following safety indications are used:



DANGER

Indicates an immediate threat of danger that can cause serious physical injury or death.



WARNING

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



CAUTION

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




NOTICE

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

NOTICE

Note/Tip for easier operation.

Formatting and signs

- ⚠ *refers to a general safety instruction*
- ☑ indicates that a prerequisite must be fulfilled
- 1. refers to handling steps
- ➡ refers to a handling outcome
- refers to a list
-  refers to a key

Service address



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Safety

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

Requirements on the personnel

Trained specialist who is familiar in handling the equipment and is able to carry out the assigned tasks due to specialised training, knowledge, experience, and knowledge of the relevant provisions, and is also able to independently recognise and avoid potential hazards.



DANGER

Electrical power!

Danger of fatal injury from electric shock.

- Do not touch live cables and components with wet hands.
- Heed the accident prevention instructions when handling electric current.
- Before any installation, maintenance, cleaning and repair work, disconnect the power supply of the **sintering furnace** and secure it from being switched back on.



DANGER

Danger of ignition!

Use of inflammable and explosive materials in the furnace area.

- Do not operate the **sintering furnace** in the vicinity of highly inflammable sources.
- Do not install the **sintering furnace** on highly inflammable installation surfaces.



WARNING

Danger of burns from hot surfaces!

Operation of the *sintering furnace* causes surfaces to become hot where burns are possible if touched.

- Do not touch the housing or the furnace door during operation.
- Do not reach into the heating chamber. It can still have high residual heat from a previous heating process.
- Ensure the *sintering furnace* has cooled down before maintenance, cleaning and repair work.
- Wear heat-resistant safety gloves when working on hot components.
- Use suitable removal tongs that are long enough for putting in and removing sintered goods.



CAUTION

Incorrect operation!

No liability is assumed for any damage due to misuse, incorrect operation, incorrect connected or improper maintenance/repair by untrained personnel. All warranty services are also excluded in such cases.

If there is any damage to the equipment or mains cable and it is no longer functioning properly, the equipment must no longer be used.

In this event, contact the manufacturer immediately.

Only original spare parts must be used for your own safety and the longevity of your equipment.

For safe operation of the *sintering furnace*, regional regulations (e.g. accident prevention regulations) also apply in addition to the instructions in this operating manual which must be provided by the operating company of the equipment. The safety signs on the *sintering furnace* must be kept in a legible condition.



NOTICE

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

The operating manual must be safeguarded for the specified lifetime of the *sintering furnace*.

Transport, packing and storage

Transport



CAUTION

Risk of injury due to furnace weight!

Physical strain/back complaints due to high inherent weight.


- Carry/move the *sintering furnace* using at least two persons.



NOTICE

Transport damage!

To avoid injury to personnel and material damage:

- Only transport the equipment in a upright position.
- Do not stack equipment on top of each other.
- Do not place any other objects on the equipment.
- The transport must be as free of shaking and vibration as possible to prevent damage to the equipment.
- Make sure that the equipment is secured against slipping and falling over during transport.
- Immediately upon receipt, the goods must be inspected for any damage and losses, which must be documented by the freight carrier on the letter of consignment in order to lodge claims.  **mihm vogt** assumes no liability for any damage and losses only determined subsequently.

Packaging



NOTICE

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

Storage



NOTICE

Temperature damage!

To prevent temperature damage:

- Only store the equipment at temperatures from +5 °C to +40 °C.
- Always store the equipment in dry and dust-free conditions.
- Avoid any direct sunlight.
- Avoid mechanical vibrations.

Technical description

Function

The **sintering furnace** is used for processing sinterable ceramics.

The product to be sintered is placed in the sintering bowl and set on the support pins. After entering the heating parameters and pressing the start button, the electrically-operated furnace door closes and the heating process begins.

After the heating program has run and the **sintering furnace** has cooled down, the furnace door opens and the finished product can be removed.

Heating chamber

The product is sintered in the heating chamber. It consists of two different, ceramic insulation layers and is operated with 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.

Furnace door

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

A slip coupling used in the drive mechanism prevents excessive contact pressure between the furnace door and heating chamber.

Furnace housing

The furnace housing consists of steel plate coated on the inside and outside with plastic and is cooled by an emergency cooling system.

An integrated battery assures the emergency cooling, even upon failure of the voltage supply.

Program controller

The program controller is equipped with a finished time setting according to weekday and time. The switch-on time is calculated automatically so that the heating process is stopped at the required time and the sintered goods can be removed.

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

The set target temperature is maintained at an accuracy of ± 1 °C.

A temperature sensor integrated in the heating chamber records the chamber temperature close to the product.

Overheating of the **sintering furnace** due to a defective temperature sensor is prevented by means of a thermocouple fail-safe mechanism.

Conformity



EC Declaration of conformity for machinery

MIHM-VOGT GmbH & Co. KG
Friedrich-List-Str. 8
76297 Stutensee – Blankenloch
Germany

We herewith declare that the sintering furnace models

HT, HT-S, HT Speed, and HT-S Speed

are in conformity with all the relevant provisions of the following European directives:

1. Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
2. Directive 2002/96/EC on waste electrical and electronic equipment (WEEE)
3. Directive 2006/42/EC on machinery
4. Low voltage directive 2006/95/EC
5. EMC directive 2004/108/EC

And furthermore, we declare that the following European harmonised standards have been used:

DIN EN 61010-1: 2002-08
DIN EN 61010-2-010: 2004-06
DIN EN 61326-1: 2006-10

Stutensee, 17 July 2013



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Intended use

The *sintering furnace* is a high temperature furnace for commercial use in dental laboratories and must only be used for sintering sinterable ceramics.



NOTICE

No liability is assumed for any damage due to misuse, incorrect operation, incorrect connected or improper maintenance/repair by untrained personnel. All warranty services are also excluded in such cases.

Potential misuse

- Use of non-instructed and insufficiently qualified personnel.
- Use of products not approved by the manufacturer.
- Use of spare parts not approved by the manufacturer.
- Any use not in accordance with the declaration of conformity.
- Technical modifications and conversions to/of the equipment not approved by the manufacturer.

Technical data

General specifications

Dimensions (W x H x D)	385 x 720 x 500 mm
Combustion chamber volume	1 bowl Ø 100 x 35 mm
Max. temperature	1650 °C
Weight	58 kg
Minimum distance around the Sintering furnace	50 mm

Connected electrical load

Voltage supply	200 - 240 V (± 10 % deviation)
Frequency	50 - 60 Hz
Max. power consumption	
HT-S	1.72 kW
HT-S Speed	2.00 kW
Energy consumption/cycle	approx. 4.1 kWh
Fusing (on site)	Connect to a separate power circuit with 10 A fuse, type K,Z (other fuse types according to the country of use)
Protection class	IP 20 (protection against penetration of foreign bodies, but not against the penetration of water)

Operating conditions

Installation area:	Indoor area only (in dry rooms)
Temperature range	+5 - +40 °C
Relative air humidity	Up to 31 °C: 80 %
Maximum air humidity	Up to 40 °C: 50 %
	No condensation
Height	Max. 2000 m
Degree of soiling	2

Installation

Installing

The **sintering furnace** is designed as a table-top unit. A level surface of at least 50 cm x 60 cm that supports a load up to 60 kg is recommended for stability.

Installation conditions

- ▶ Always install the **sintering furnace** in dry rooms that are as dust-free as possible and make sure liquids cannot get into the equipment.
- ▶ No highly inflammable and combustible gases and liquids must be stored in the installation rooms.
- ▶ Do not place any combustible and inflammable objects in the vicinity of the **sintering furnace**.



CAUTION

Tilting loads!

Insufficient load-bearing capacity of the supporting surface.

- ▶ When installing the **sintering furnace**, ensure sufficient load-bearing capacity of the supporting surface.



CAUTION

Risk of injury due to furnace weight!

Physical strain/back complaints due to high inherent weight.

- ▶ Carry/move the **sintering furnace** using at least two persons.



CAUTION

Danger of overheating!

The electronics system shuts down in case of overheating.

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

1. Align the supporting surface horizontally.
 2. Place the **sintering furnace** on the supporting surface.
- ⚠ *Make sure the surface is non-slip.*

Electrical connection

Building installation

- ☑ The **sintering furnace** requires its own power circuit.
- ☑ The power circuit must be installed on the building side via an automatic circuit-breaker with at least 10 A type K,Z (other circuit-breaker types according to the country of use).
- ☑ If an additional residual-current circuit-breaker is used, it must be designed for a maximum triggering current of 30 mA.
- ☑ For electrically-safe operation, the **sintering furnace** requires a protective earth connected to the power socket.
- ☑ When selecting the installation location, ensure that the accompanying mains cable has a length of 2.5 m and note that cable extensions are not permitted. The voltage supply must lie in the nominal voltage range of 200 - 240 Volt.



DANGER

Electrical power!

Danger of fatal injury from electric shock.

- Do not touch live cables and components with wet hands.
- Heed the accident prevention instructions when handling electric current.
- Only connect the equipment to a voltage supply that conforms with the specifications on the rating plate.

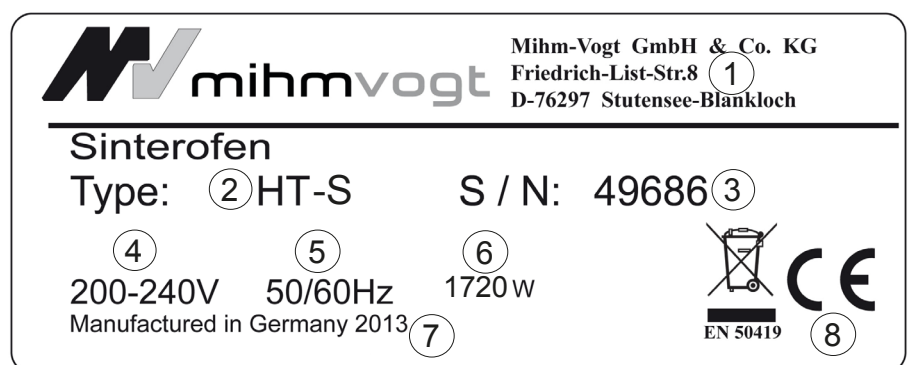


Fig. 1: Rating plate (example illustration)

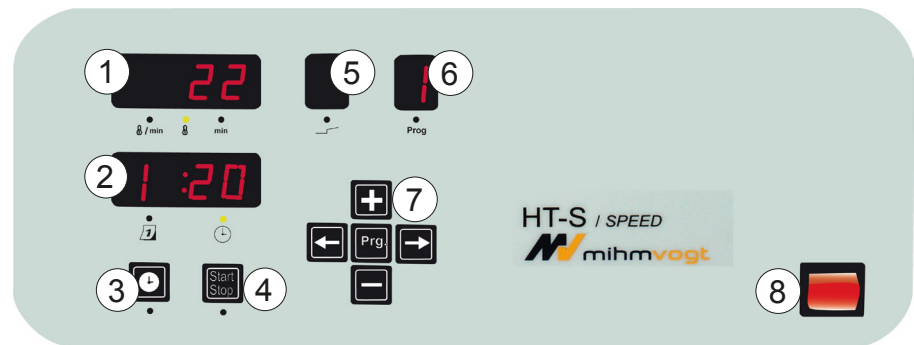
- | | | | |
|---|----------------------------|---|---------------------|
| 1 | Manufacturer's information | 5 | Mains frequency |
| 2 | Machine type/designation | 6 | Capacity |
| 3 | Serial number | 7 | Year of manufacture |
| 4 | Operating voltage | 8 | CE label |

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 operation is menu-controlled which is realised using a membrane keyboard and displayed on an LCD display.









The program controller contains the following operating elements:



- | | |
|--------------------|----------------------|
| 1 Function display | 5 Program stage |
| 2 Date/Time | 6 Current program |
| 3 Finished time | 7 Navigation keys |
| 4 Start/Stop | 8 Main switch on/off |

Operating elements

Function

-  Mains switch, lights when switched on (at bottom switch position)
-  Changing the display mode
-  Changing the display mode
-  Increasing the value
-  Decreasing the value
-  Activating programming mode
-  Starting/stopping the program
-  Starting/stopping the finishing time function

Displays

Function



In heating mode: Display of furnace temperature/holding time.

In program mode: Display of increase rate/holding temperature/holding time.



Display of the current program stage.



Display of the current program number.



In standby mode: Display of the day (1 = Mon, 2 = Tues, 3 = Wed, etc.) and time (hh:mm).

In heating mode: Display of the finishing time.



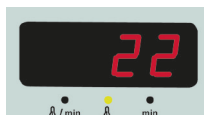
LED lights green with activated finishing time mode.



LED lights green with activated heating mode.

Switching on the Sintering furnace

1. Connect the voltage supply.
 2. Switch on the **sintering furnace** at the mains switch.
- ➔ The mains switch pilot lamp lights.
 - ➔ The current furnace temperature is displayed after approx. 3 s.
 - ➔ The furnace door opens automatically.



Initial commissioning

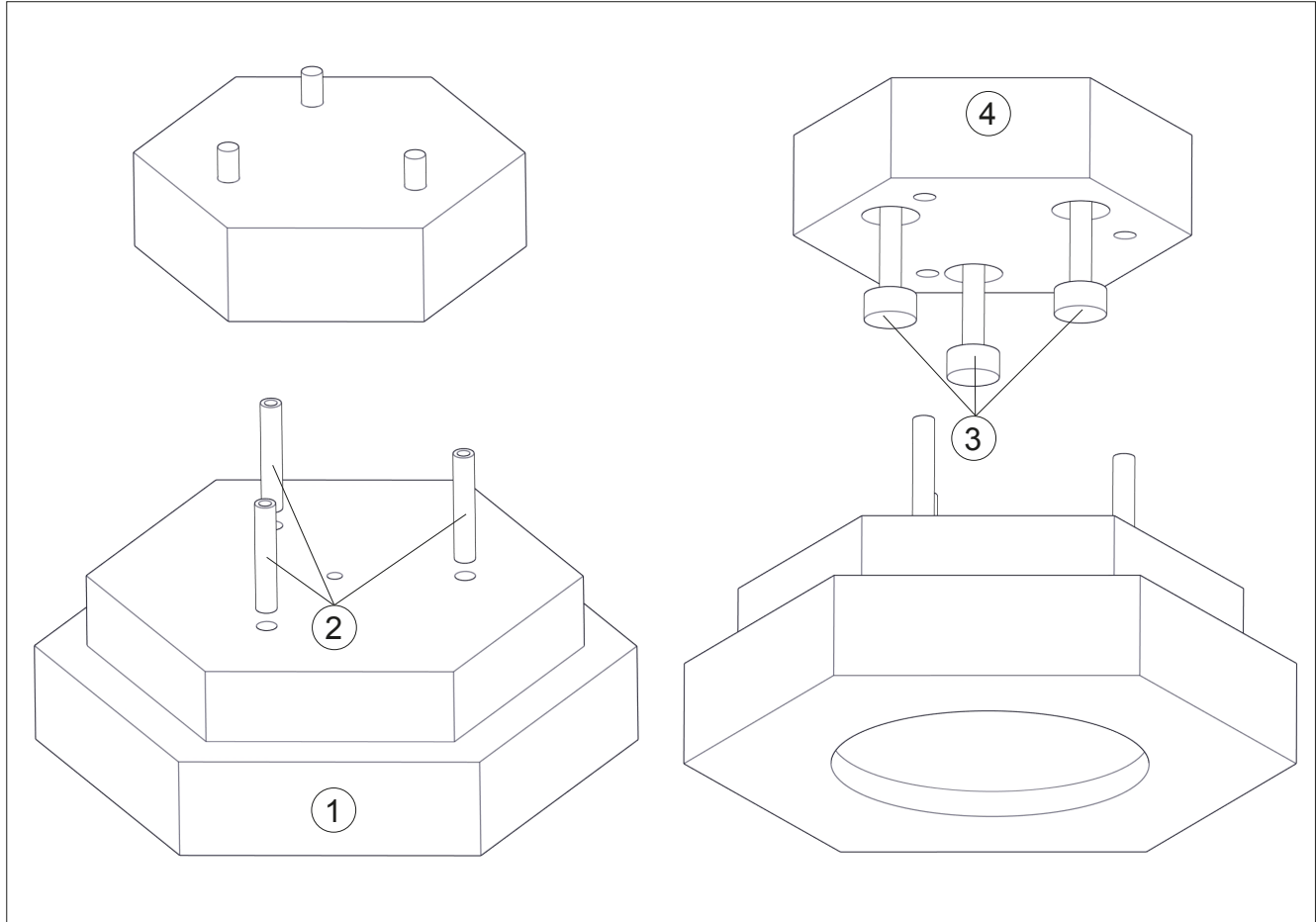


NOTICE

Check the basic settings of the Sintering furnace (see “Basic settings” on page 33).

Installing the door insulation

1. Insert the connecting pins (pos. 2) in the base support (pos. 1).
2. Set the support pins (pos. 3) into the support (pos. 4).
3. Set the support (pos. 4) onto the connecting pins (pos. 2).
4. Install the complete door panel in the furnace door.



Speed sintering operating mode

Feeding the Sintering furnace

⚠ *The ceramic door panel is highly porous and sensitive to scratches and impacts.*

⚠ *Do not grasp the door panel with the removal tongs.*

1. Switch on the **sintering furnace**.

➡ The furnace door opens automatically.

2. Fill the Speed sinter bowl included in the scope of delivery with sinter beads (see "Preparation of the sintering aid" on page 26).

3. Lay the sinter goods in the Speed sinter bowl.

4. Place the fitted Speed sinter bowl on the support pins with the aid of suitable removal tongs.



5. Start a firing program using the **START/STOP** key.

➡ The furnace door closes automatically.



CAUTION

Danger of crushed limbs!

The furnace door closes automatically.

- Press the **START/STOP** key only after the sinter goods have been positioned.
- Make sure that no one reaches between the furnace door and the heating chamber while the furnace door closes.

Selecting and loading the heating program



1. Press the **RIGHT ARROW** key until the LED under the "Prog." display lights.
2. Select a program (1 – 9) with the and keys.

Starting/stopping the heating program

Requirements

- Sintering furnace** is fed
- Heating program is loaded



1. Press the **START/STOP** key.
- The heating program starts.
 - The furnace door closes automatically.

While the program is running:



- the function display shows the furnace temperature or the remaining holding time
- the day/time display shows the finishing time of the program
- the respective target temperature/holding time can be displayed using the **RIGHT ARROW** key



⚠ *The program can be aborted at any time using the **START/STOP** key.*



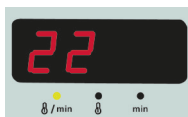
⚠ *After pressing the **START/STOP** key again, the program starts from the beginning.*

Removing the sinter bowl from the heating furnace

Requirements



- The furnace door is open
- 1. Guide suitable removal tongs under the Speed sinter bowl and lift it from the support.
- 2. Set the Speed sinter bowl on a suitable, heat-resistant support surface.

Programming the heating stages



NOTICE

Up to 9 different heating programs can be specified in the program controller.

1. Press the **RIGHT ARROW** key until the LED under the "Prog." display lights.
 2. Select a program (1 – 9) with the  and  keys.
 3. Keep the **PROGRAM** key pressed until the function display shows readiness for input.
- ↻ The LED flashes.

NOTICE

If a selection is not made within 10 s using the **PROGRAM** key, the program controller reverts to single display mode.

Programming stage temperatures, holding times

NOTICE

Up to 4 stages of individual heating curves can be specified in programming mode.

Entering the heating parameters for stage 1:



1. Select the heating speed with the **+** and **-** keys. The minimum heating speed is 1 °C/min (2 °F/min), the maximum heating speed is 70 °C/min (126 °F/min).



2. Select the temperature by pressing the **RIGHT ARROW** key.

NOTICE

The max. heating speed depends on the mains voltage and the furnace temperature.



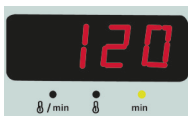
3. Set the temperature with the **+** and **-** keys.

NOTICE

The maximum temperature is 1650 °C (3002 °F).



4. Select the holding time by pressing the **RIGHT ARROW** key.



5. Set the holding time with the **+** and **-** keys.

NOTICE

The maximum holding time is 240 min.

If longer holding times are required, another stage must be inserted.

6. If necessary, select another stage using the **RIGHT ARROW** key.
7. Carry out steps 1 for 5 for further stages.

Storing the heating program

After the heating parameters for a stage have been programmed, the programming mode can be exited.



1. To exit the programming mode, keep the **PROGRAM** key pressed until the LED under the function display lights permanently.

➔ The program is permanently saved.

Speed sintering programming

It is possible to carry out a fast sintering process with the **sintering furnace**. To do this, the cooling speed must be set to more than 30 °C/min (54 °F/min) in stage **S3**. To reach the higher speed, the furnace door opens in steps.

Programming example

	Heating speed (°C/min)	Temperature (°C)	Holding time (min)
Stage 4	70	750	0
Stage 3	70	1100	0
Stage 2	70	1540	30
Stage 1	12	0	0

Heating at 70 °C/min. up to 1540 °C. This temperature is maintained for 30 min. The *sintering furnace* then cools down at 70 °C/min. The furnace door remains closed up to 1100 °C. From 1100 °C, the furnace door opens in steps up to max. half of the opening path. At 750 °C, the furnace door opens completely.

NOTICE

For an unused stage, it is enough to set the temperature to "0".

If the temperature in stage 3 is higher than the temperature in stage 4 and the cooling rate in stage 4 is greater than 30 °C/min (54 °F/min), cooling is generated from 1100 °C (2012 °F) by stepped opening of the furnace door.

The furnace door is fully open only at 750 °C (1382 °F).

Automatically starting a heating program

The *sintering furnace* can be programmed via an integrated timer so that it ends the currently loaded heating program at a specified finishing point.

The finishing point is specified by weekday and time using the integrated timer.

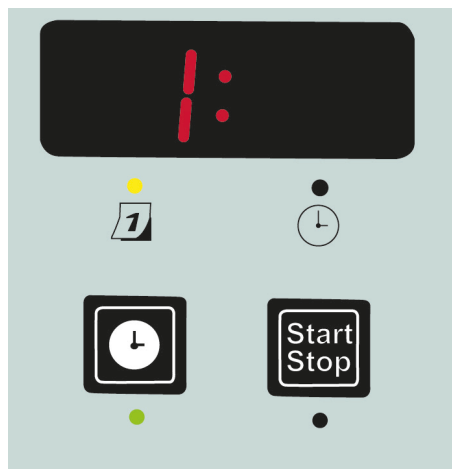
1. Select a program.



2. Activate the timer by pressing the **FINISHING TIME FUNCTION** key.

➔ The green LED under the **FINISHING TIME FUNCTION** key lights.

➔ The yellow "Weekday" LED flashes.





3. Select a weekday with the **+** and **-** keys (1 = Mon, 2 = Tues, 3 = Wed, etc.).



4. Press the **RIGHT ARROW** key.

➔ The yellow "Time" LED flashes.





5. Select the hours with the  and  keys.



6. Press the **RIGHT ARROW** key.



7. Select the minutes with the  and  keys.



8. Press the **RIGHT ARROW** key to complete entry of the finishing time.



NOTICE


Pressing the **FINISHING TIME FUNCTION** key again will deactivate the integrated time again.


This allows the selected program to be immediately started manually.

Preparation of the sintering aid

Recommended filling of the Speed sinter bowl

1. Fill the Speed sinter bowl with a layer of sinter beads.
2. Place the parts to be sintered in the Speed sinter bowl.

 *Make sure that the bottom of the bowl is covered by a layer of sinter beads and the sinter beads can move freely.*

 *Manufacturer's information of the material manufacturer can vary and must be heeded.*



Standard sintering operating mode

Feeding the Sintering furnace

⚠ *The ceramic door panel is highly porous and sensitive to scratches and impacts.*

⚠ *Do not grasp the door panel with the removal tongs.*

1. Switch on the **sintering furnace**.

➡ The furnace door opens automatically.

2. Fill the standard sinter bowl included in the scope of delivery.

3. Lay the sinter goods in the Standard sinter bowl.

4. Place the fitted Standard sinter bowl on the support pins with the aid of suitable removal tongs.



5. Start a firing program using the **START/STOP** key.

➡ The door closes automatically.



CAUTION

Danger of crushed limbs!



The furnace door closes automatically.

- Press the **START/STOP** key only after the sinter goods have been positioned.
- Make sure that no one reaches between the furnace door and the heating chamber while the furnace door closes.

Selecting and loading the heating program



1. Press the **RIGHT ARROW** key until the LED under the "Prog." display lights.

2. Select a program (1 – 9) with the  and  keys.

Starting/stopping the heating program

Requirements

- ☑ *Sintering furnace* is fed
- ☑ Heating program is loaded



1. Press the **START/STOP** key.
- ➞ The heating program starts.
 - ➞ The furnace door closes automatically.

While the program is running:

- ➞ The function display shows the furnace temperature or the remaining holding time.
- ➞ The day/time display shows the finishing time of the program.



- ➞ The respective target temperature/holding time can be displayed using the **RIGHT ARROW** key.



- ⚠ *The program can be aborted at any time using the **START/STOP** key.*



- ⚠ *After pressing the **START/STOP** key again, the program starts from the beginning.*

Removing the sinter bowl from the heating furnace

Requirements

- ☑ The furnace door is open
1. Guide suitable removal tongs under the sinter bowl and lift it from the support.
 2. Set the sinter bowl on a suitable, heat-resistant support surface.

Programming the heating stages



NOTICE

Up to 9 different heating programs can be specified in the program controller.



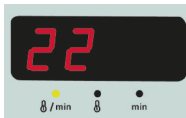
1. Press the **RIGHT ARROW** key until the LED under the "Prog." display lights.

2. Select a program (1 – 9) with the **+** and **-** keys.



3. Keep the **PROGRAM** key pressed until the function display shows readiness for input.

↻ The LED flashes.



NOTICE

If a selection is not made within 10 seconds using the **PROGRAM** key, the program controller reverts to the single display mode.

Programming stage temperatures, holding times

NOTICE

Up to 4 stages of individual heating curves can be specified in programming mode.

Entering the heating parameters for stage 1:





1. Select the heating speed with the **+** and **-** keys. The minimum heating speed is 1 °C/min (2 °F/min), the maximum heating speed is 30 °C/min (54 °F/min).



2. Select the temperature by pressing the **RIGHT ARROW** key.



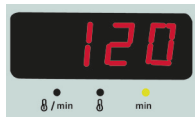
- Set the temperature with the  and  keys.



NOTICE

The maximum temperature is 1650 °C (3002 °F).



- Select the holding time by pressing the **RIGHT ARROW** key.



- Set the holding time with the  and  keys.

NOTICE

The maximum holding time is 240 min.

If longer holding times are required, another stage must be inserted.

- If necessary, select another stage using the **RIGHT ARROW** key.
- Carry out steps 1 for 5 for further stages.

Storing the heating program

After the heating parameters for a stage have been programmed, the programming mode can be exited.



- To exit the programming mode, keep the **PROGRAM** key pressed until the LED under the function display lights permanently.

- ➔ The program is permanently saved.

Automatically starting a heating program

The *sintering furnace* can be programmed via an integrated timer so that it ends the currently loaded heating program at a specified finishing point.

The finishing point is specified by weekday and time using the integrated timer.

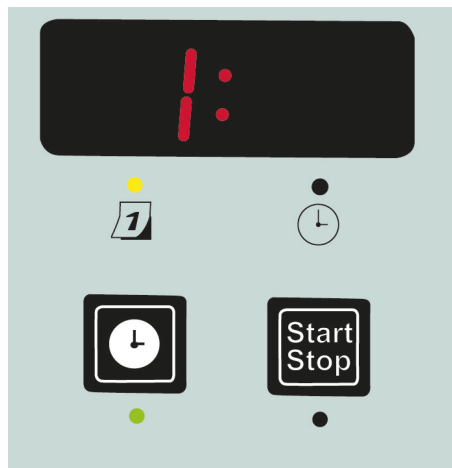
1. Select a program.



2. Activate the timer by pressing the **FINISHING TIME FUNCTION** key.

⇒ The green LED under the **FINISHING TIME FUNCTION** key lights.

⇒ The yellow "Weekday" LED flashes.



3. Select a weekday with the **+** and **-** keys (1 = Mon, 2 = Tues, 3 = Wed, etc.).



4. Press the **RIGHT ARROW** key.

⇒ The yellow "Time" LED flashes.





5. Select the hours with the **+** and **-** keys.



6. Press the **RIGHT ARROW** key.



7. Select the minutes with the  and  keys.



8. Press the **RIGHT ARROW** key to complete entry of the finishing time.



NOTICE

Pressing the **FINISHING TIME FUNCTION** key again will deactivate the integrated time again.

This allows the selected program to be immediately started manually.

Preparation of the sintering aid

Recommended filling of the Standard sinter bowl

1. Fill the Standard sinter bowl with a layer of sinter beads.
2. Place the parts to be sintered in the Standard sinter bowl.

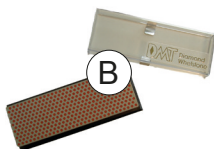


- ⚠ *Make sure that the bottom of the bowl is covered by a layer of sinter beads and the sinter beads can move freely.*
- ⚠ *Manufacturer's information of the material manufacturer can vary and must be heeded.*

Sintering with sintered disc



1. Check the sintered disc (pos. A) for roughness.



2. If necessary, rub the sintered disc (pos. A) using a suitable diamond grinding stone (pos. B).

Basic settings

Service settings

Parameter settings

NOTICE



The *sintering furnace* is supplied with preset time and default parameters ex-works.
The *sintering furnace* does not carry out automatic summer/winter time changeover.



1. Press and hold the **PROGRAM** key.
 2. Switch on the *sintering furnace*.
 3. Release the **PROGRAM** key.
- ⇒ Parameter mode is active.



4. Select the parameters using the **RIGHT ARROW** key.

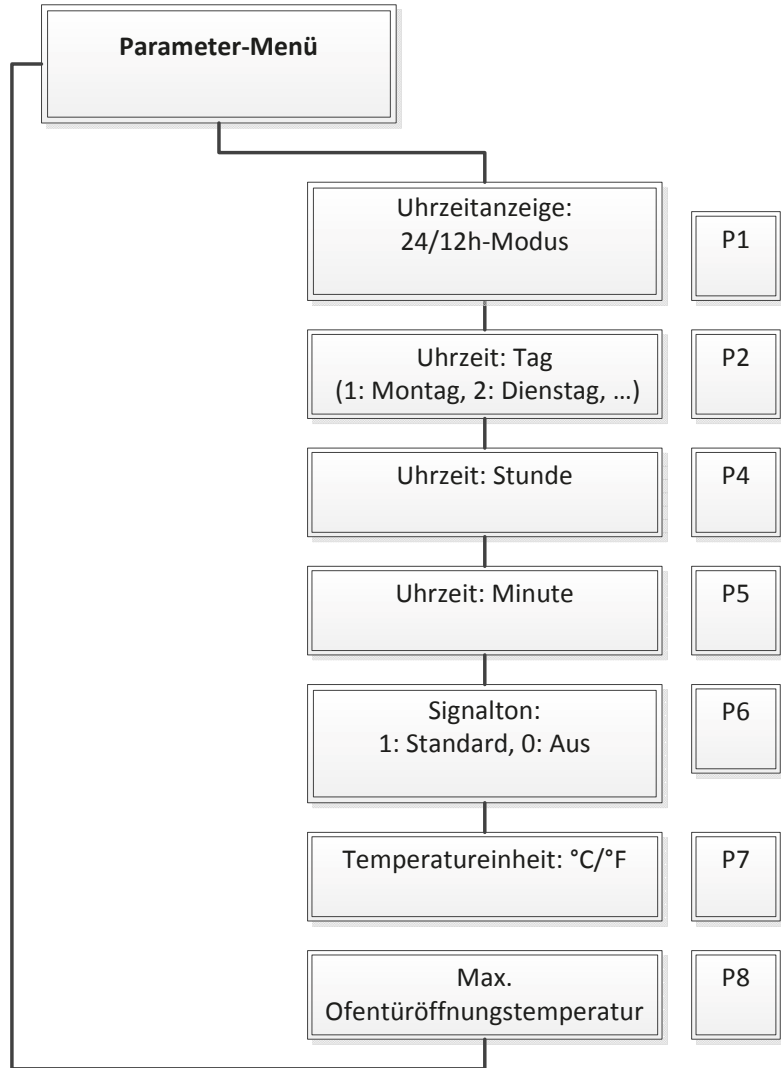
5. Change the parameter values with the  and  keys.



6. Press the **RIGHT ARROW** key.

- ⇒ This brings you to the next parameter menu.



- ⇒ The parameter changes are automatically saved when exiting the parameter mode.



Setting the weekday and time

Requirements

- You are in the "Parameter settings" menu (see "Service settings" on page 33).

1. Set the time display by pressing the  and  keys.





2. Press the **RIGHT ARROW** key.

↻ The weekday display is active (LED lights yellow).



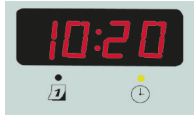
↻ The weekday display flashes.

3. Set the weekday by pressing the  and  keys (1 = Mon, 2 = Tues, 3 = Wed, etc.).



4. Press the **RIGHT ARROW** key.

➔ The time display is active (LED lights yellow).



➔ The hours display flashes.

5. Set the hours by pressing the and keys.



6. Press the **RIGHT ARROW** key.

➔ The minutes display flashes.

7. Set the minutes by pressing the and keys.

NOTICE

The weekday and time display alternately shows the weekday and the time.

Switching off the Sintering furnace

1. Switch off the **sintering furnace** at the mains switch.

➔ The mains pilot lamp in the main switch goes out.



CAUTION

Danger of burns from residual heat of the high-temperature furnace!

Even with the furnace switched off, the heating chamber can still have considerable residual heat. There is a danger of burns on the heating chamber walls and the furnace door.

Therefore:

- Before working on the **sintering furnace**, make sure it has cooled down sufficiently. The **sintering furnace** needs at least 4 hours to cool down from maximum temperature to roughly room temperature.

Care and maintenance

Clean the housing of the *sintering furnace* now and again with a mild cleaning agent.



NOTICE	
Damage to the heater!	
<ul style="list-style-type: none"> ➤ Make sure the heating chamber does not become contaminated. The heater can be damaged. 	



NOTICE	
Impairment of service life from colouring liquids!	
During the sintering process, colouring liquids can significantly shorten the service life of the heating elements.	

Cleaning/Regeneration firing

Depending on the frequency of use, a cleaning firing process should be carried out. This is used to regenerate the heating elements and to remove residues from the porous insulation.

	Heating speed (°C/min)	Temperature (°C)	Holding time (min)
Stage 4	30	300	0
Stage 3	25	1550	480
Stage 2	0	0	0
Stage 1	0	0	0

Faults and error messages

Safety



DANGER

Electrical power!

Danger of fatal injury from electric shock.

- Work on electrical power systems must only be performed by electricians.
- Before any installation, maintenance, cleaning and repair work, disconnect the power supply of the **sintering furnace** and secure it from being switched back on.
- Do not touch live cables and components with wet hands.
- Heed the accident prevention instructions when handling electric current.



WARNING

Hot surfaces!

Serious burns to the limbs.

- Do not touch the housing or the furnace door during operation.
- Ensure the **sintering furnace** has fully cooled down before maintenance, cleaning and repair work.
- Wear heat-resistant, thermally-insulated safety gloves when working on hot components.




NOTICE

Material damage due to improper repairs of electrical cables!


Malfunctions and defective components possible.

- Never repair any defective cables and connectors.

Faults

Fault	Possible cause	Troubleshooting	Responsibility
Incorrect time	Time in controller stored incorrectly	Set the time correctly (see "Setting the weekday and time" on page 34).	Operator
No display, mains pilot lamp lights	Defective protective fusing	Switch off the furnace, wait for 10 s, switch back on. If the malfunction reappears, have the controller replaced.	
No display, mains pilot lamp does not light	No voltage supply present	Check building-side fuses, check connection cable. Notify an electrician if necessary.	
Heating programs and time are not permanently saved	Memory battery discharged	Replace memory battery.	 service department

Error messages

Fault	Possible cause	Troubleshooting	Responsibility
"Er01" display	Overtemperature	Replace thermocouple.	 service department
"Er02" display	Broken sensor, measuring circuit	Retighten thermocouple connections.	
"Er03" display	Broken sensor	Replace thermocouple.	
"Er05" display	Thermocouple short-circuited or defective heater	Check heater/thermocouple and have them replaced if necessary.	
"Er06" display	Defective electronics	Check electronics and have them replaced if necessary.	
"Er08" display	Replace battery	Call Customer Service	
"Er09" display	Mains failure	In the event of singular power failures and temperatures below 1000 °C in a heating or cooling phase, the process continues when the power is restored. Above 1000 °C, the process is aborted after a power failure lasting more than 10 s and the display flashes.	

Decommissioning

Decommissioning can be carried out for two reasons:

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

If the **sintering furnace** is to be reinstalled at another location, decommissioning must be well prepared. All mounting and attachment parts must be carefully dismantled, labelled and packed for transport if necessary. This ensures that all parts are assigned correctly and can be fitted again at the right position when reinstalling.

1. Switch off the **sintering furnace**.
2. Disconnect the **sintering furnace** from the voltage supply.
3. Disconnect all connections (e.g. PC interface cable, etc.) from the **sintering furnace**.

Disposal

Safety



WARNING

Contamination of the environment and groundwater from improper disposal!

- The regulations and guidelines of the legislator in the country of operation must be adhered to when disposing of system parts and operating materials.

Disposal

1. Sort the component parts of the **sintering furnace** according to recyclable materials, hazardous substances and operating materials.
2. Dispose of the component parts of the **sintering furnace** or take them for recycling.