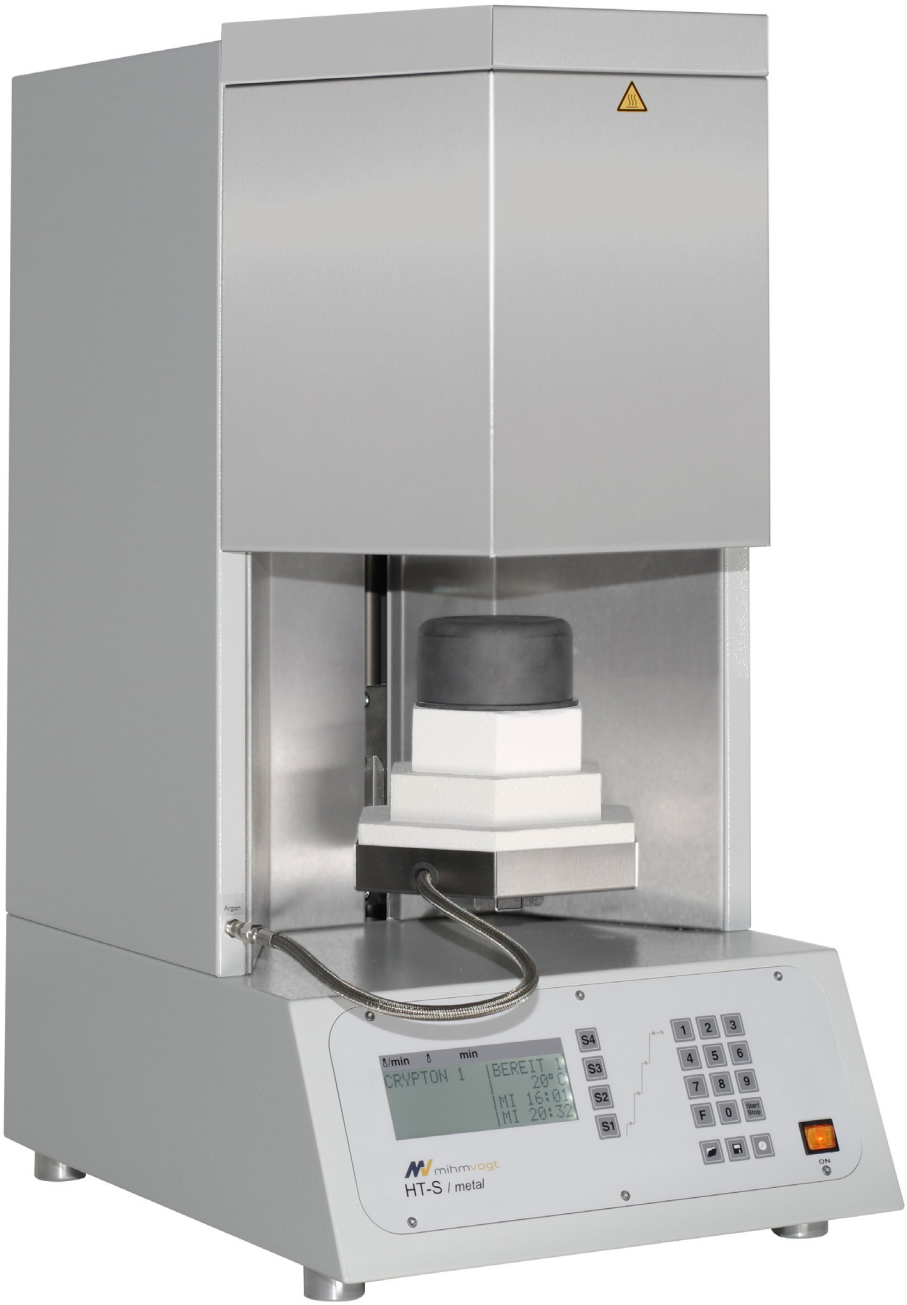
Original operating instructions
HT-S Metal sintering oven

English



Version 1.1 08/2015

Contents

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 non-professionals (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, regulations regarding safety, accident prevention and environmental protection that apply to the field of application of the unit must be complied with.

In particular, the following apply:

- The operator must be familiar with the applicable regulations on occupational safety.
- 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.

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

S1 indicates a button

Service address

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76297 Stutensee-Blankenloch, Germany
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Safety

The sintering oven is a high-temperature oven for commercial use in dental laboratories and may only be used for sintering sinterable Co-Cr alloys.

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.

NOTICE

Personal protective equipment must be worn when carrying out any work on the sintering oven in order to prevent accidents and damage to health.

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*** 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 in 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.

If the unit or the mains cable becomes damaged and no longer functions correctly, take the unit out of use and contact the manufacturer immediately.

For your own safety and to increase the service life of your unit, only use 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 retained for the specified service life of the ***sintering oven***.

Transport, packaging and storage

Transport

CAUTION

Risk of injury due to oven weight

Physical strain/back injuries due to high dead load.

- Have at least two people carry/move the ***sintering oven*** together.

NOTICE

Transport damage

To prevent injury to personnel and material damage:

- Only transport the unit in an upright position.
- 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. mihmvogt 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:

- Only store the unit 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 sintering oven is used to process sinterable Co-Cr alloys.

The product to be sintered is placed in the sintering dish and positioned on the support pins. After the heating parameters have been entered and the start button has been pressed, the electrically powered oven door will shut and the heating process will begin.

Once the heating program has finished and the ***sintering oven*** has cooled down, the oven door will open and 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 of up to 1200 °C, and the inner layer is designed for temperatures of 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.

A slip clutch inserted in the drive mechanism prevents excess contact pressure between the oven door and the heating chamber.

Oven housing

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

An integrated battery ensures that emergency cooling can take place even in the event of a power failure.

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 in the event of a power failure.

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

EC Declaration of Conformity

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

We hereby declare that the

HT, HT-S, HT Speed, HT-S Speed and HT-S Metal sintering ovens

meet the basic requirements 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. Machinery Directive 2006/42/EC
4. Low Voltage Directive 2006/95/EC
5. EMC Directive 2004/108/EC

The following 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, 2nd March 2015

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Intended use

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

NOTICE

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.

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 using argon

It is only possible to sinter non-ferrous metals in low-oxygen atmospheres. This is achieved by using argon. Argon is a noble gas contained in a compressed gas cylinder. Always use a manometer and a pressure regulator when using argon cylinders. The argon must have a purity of at least 4.6, or 99.996 vol%. The argon flow rate during a single sintering process is 1 l/min.

Determining the fill level of the compressed gas cylinder:

The fill level of the compressed gas cylinder can be determined using the manometer. A new compressed argon cylinder is filled with 200 bar.

Calculation:

A 50-litre compressed argon cylinder with a filling pressure of 200 bar contains approximately 10,000 litres of argon.
At a flow rate of 1 l/min, approximately 270 litres of argon are used per sintering process.
Thus, approximately 35 non-ferrous metal sintering processes are possible using one 50-litre compressed argon cylinder.

Technical data

General information

Dimensions (W x H x D)	385 x 720 x 500 mm
Combustion chamber volume	1 dish dia. 85 x 40 mm
Max. temperature	1400 °C
Weight	58 kg
Minimum clearance around the sintering oven	50 mm

Connected electrical load

Voltage supply	200 - 240 V (± 10% deviation)
Frequency	50/60 Hz
Max. power consumption	1.3 kW
Energy consumption/cycle	Approx. 4.1 kWh
Protection (to be provided on site)	Connection to a separate electrical circuit with a 10-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 - +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
Argon supply pressure range	6-7 bar

Installation

Installation location

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

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***.

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 high dead load.

➤ Have at least two people carry/move the ***sintering oven*** together.

CAUTION

Risk of overheating

The electronic system will switch off in the event of overheating.

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

1. Align the supporting surface horizontally.
2. Place the ***sintering oven*** on the supporting surface.

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

Electrical connection

Local installation

☑ The ***sintering oven*** requires its own electrical circuit.

☑ The electrical circuit of the building must have a type-K or type-Z circuit breaker with a rated current of at least 10 A (other types of circuit breaker corresponding to the country of use).

☑ If an additional residual-current circuit breaker is used, it must be designed for a maximum tripping current of 30 mA.

☑ To ensure electrically safe operation, the ***sintering oven*** requires a protective earth conductor to be 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.

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.

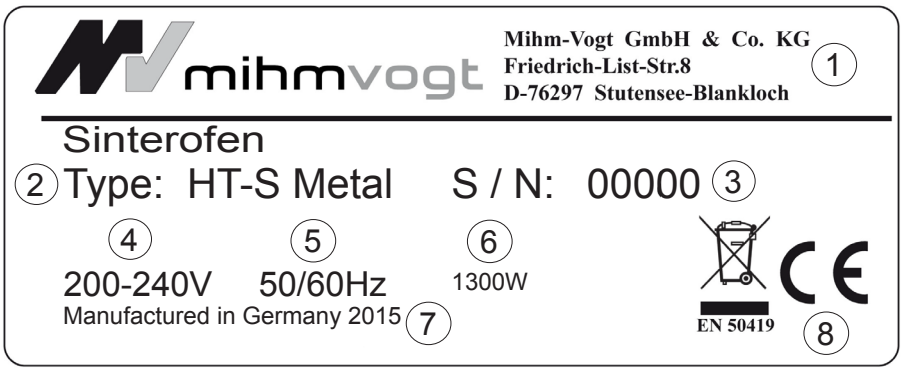


Fig. 1: Rating plate (example)

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

Connecting the argon supply

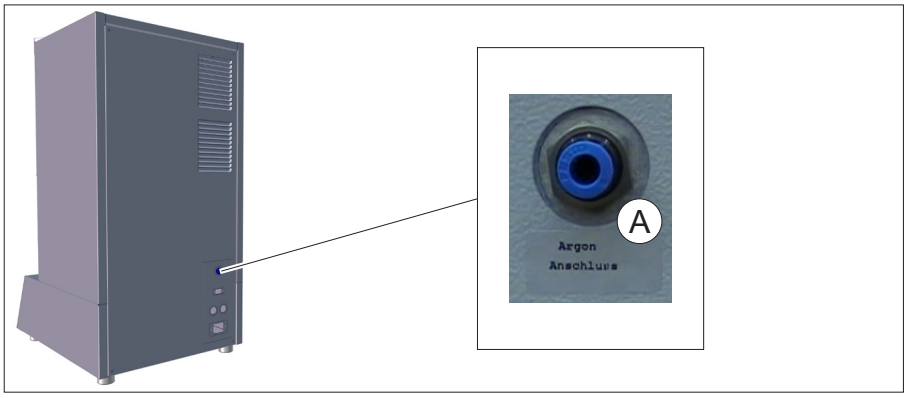
DANGER

Danger due to escaping gas!

Possible explosion hazard and fire hazard as well as danger of suffocation.

- Whenever work is carried out on the ***HT-S Metal***, the argon supply and power supply must be disconnected and the gas cylinder must be closed.
- When working with argon, observe the TRGS526 (Technische Regeln für Gefahrstoffe, or Technical Rules for Hazardous Substances) German national safety regulations (section 5.2.11, "Druckgasflaschen und Armaturen", or "Pressurised gas cylinders and valves").

1. Connect the connecting hose supplied with the unit to the sintering oven (A) and the argon supply (gas cylinder).



2. Set the outlet pressure of the gas cylinder to 6-7 bar.

NOTICE

If the outlet pressure of the gas cylinder is set higher or lower than 6-7 bar, too much or too little argon will reach the sintering dish and the sintering process will fail.

3. Check the gas lines and connected couplings for leaks and ensure that they are fitted securely.

➲ The volume of gas contained within a single argon cylinder is enough to flood an entire room if a malfunction occurs.
A ventilation system is recommended at ground level (argon is heavier than air and will settle at ground level).

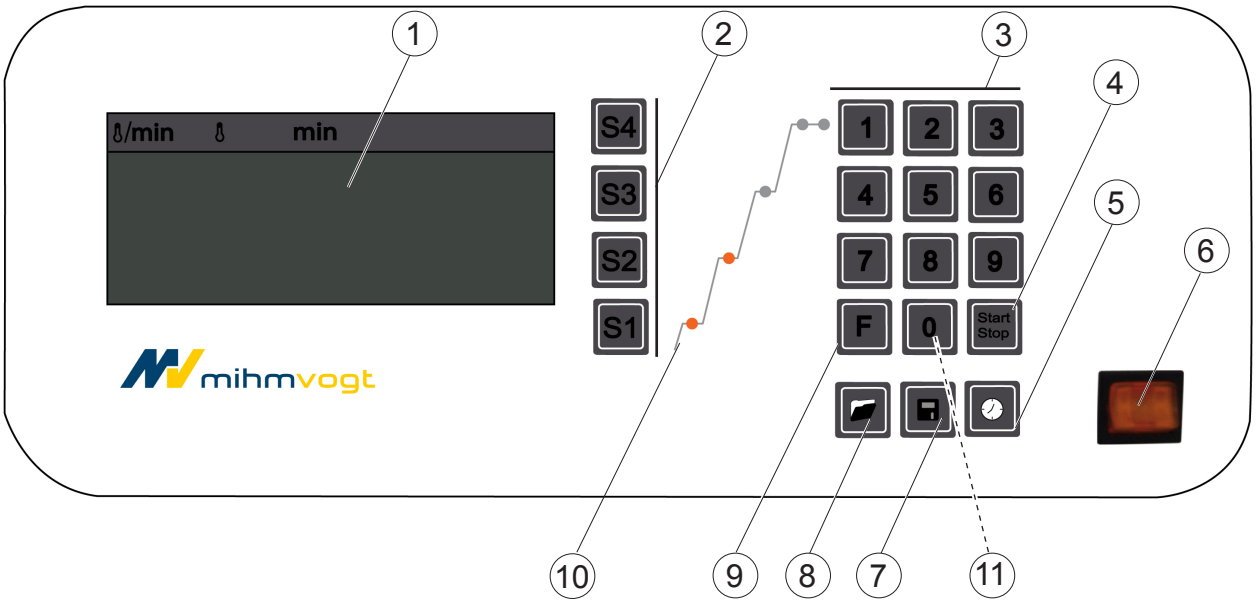
4. Protect all ducts and shafts against gas penetration.

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 an LCD screen.

The program controller has the following operating elements:



1	Display	6	Mains switch
2	Heating phases	7	Save button
3	Numeric keypad	8	Load button
4	Start/stop button	9	Function button
5	Finish time button	10	Heating phase LEDs

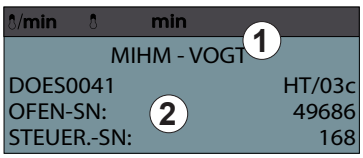
11 Additional function: Open oven door

Switch and button functions

	Function
	Mains switch; lights up when switched on (at bottom switch position)
Start Stop	Starts/stops the current heating program
	Loads an existing program from memory
	Saves a created program to memory
	Sets the finish time
F	Function button for adjusting the parameters (see the diagram "Parameter settings" on page 30)
0	Additional function: Open oven door This additional function is only active when the current oven temperature is lower than the temperature set in phase 4.

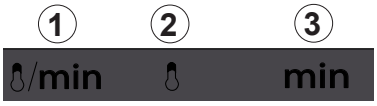
	Parameter	Function
S4	Language	Changes the system language (DE, EN, FR, IT, ES, DA, CZ, NL)
S3	Audio signal	Switches the audio signal on or off
S2	Date	Setting the day and the time
S1	Next	Skips to the next parameter menu Level 2:
S4	Adjustable lift opening temperature	Provides a second level of safety. The lift opening temperature is set at phase 4.
S3	Time format	Time display in 12 hour or 24 hour mode
S2	Temperature scale	Temperature units, °C or °F
S1	Next	Exit the parameter menu

Standby screen



1 Manufacturer

2 Details of the hardware status and software status



Function	
1	Heating rate in °C/min. (°F/min.)
2	End temperature set for this phase
3	Dwell set for this phase

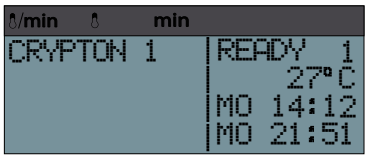
Switching on the HT-S Metal

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.



➲ The oven door opens automatically.

3. Open the compressed gas cylinder for the argon supply.

WARNING

Danger due to escaping argon gas!

- ➤ Close the compressed gas cylinder after every sintering process.
- ➤ Ensure that the laboratory is adequately ventilated after using argon gas.
- ➤ Regularly check the argon system for leaks.

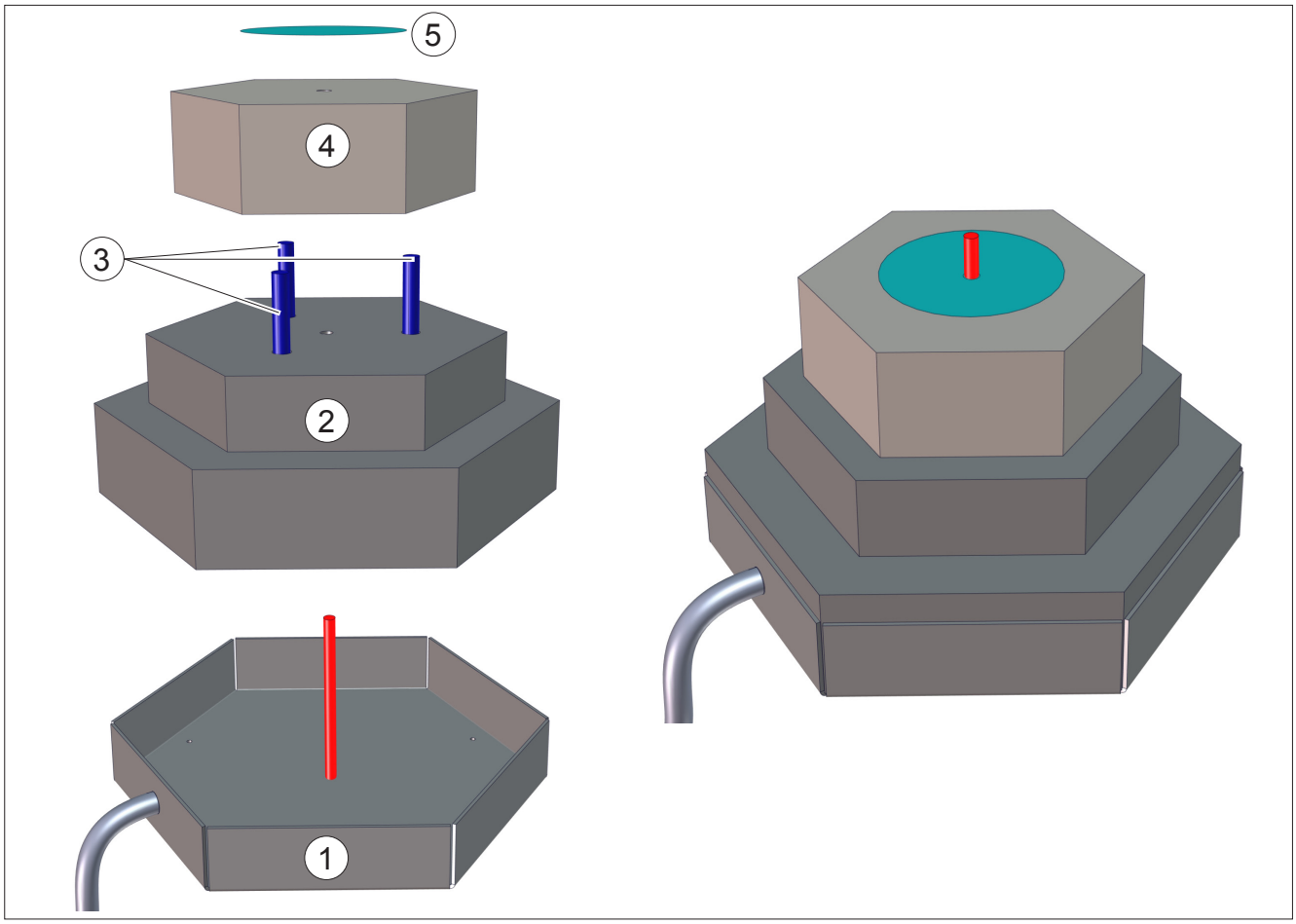
Initial commissioning

NOTICE

Check the basic settings of the ***sintering oven*** (see "Basic settings" on page 30).

Applying the door insulation

1. Insert the base supports (2) into the door (1).
2. Insert the support pins (3) into the base supports (2).
3. Set the plating (4) on top of the support pins (3).
4. Set the non-ferrous metal bottom plate (5) on top of the plating.



Sintering process

Feeding the HT-S Metal

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

⚠ *Do not grip the door panel using tongs.*

1. Switch the ***sintering oven*** on.

➲ The oven door opens automatically.

2. Open the argon supply.

3. Fill the sintering dish provided with the unit with the sintering beads (see "Preparing the sintering aid" on page 29).

4. Place the item to be sintered in the sintering dish.

5. Position the loaded sintering dish on the support pins using a suitable pair of tongs.

6. Place the lid over the sintering dish.

7. Position the sintering cover over the sintering dish.

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

➲ The oven door closes automatically.

CAUTION

Danger of crushing injury to limbs!

The oven door closes automatically.

- ➤ Only press the ***Start/Stop*** button once the item to be sintered has been positioned.
- ➤ Ensure that nobody reaches between the oven door and the heating chamber when the door is closing.

Selecting and loading a heating program

1. Press the ***LOAD*** button.

➲ The ***LOAD PROGRAM*** menu will open.

➲ The ***sintering oven*** loads the most recently used heating program.

2. Press the ***S4*** button repeatedly until you reach the required heating program, or enter the required heating program using the numerical keypad.

3. Press the ***S2*** button for "YES" to confirm loading the program.

➲ The loaded heating program will be displayed.

4. Press the ***S1*** button for "NO" to cancel loading the program.

➲ The most recently loaded heating program will be displayed.

Starting/stopping a heating program

Requirements

☑ The ***sintering oven*** has been fed

☑ The heating program has been loaded

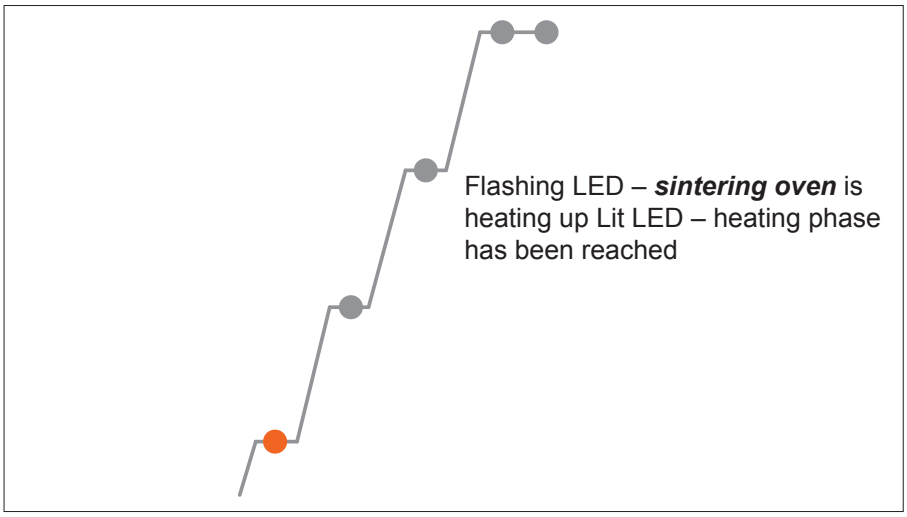
1. Press the ***START/STOP*** button.

➲ The heating program starts.

➲ The oven door closes automatically.

➲ The status display changes from ***READY*** to ***RUNNING***.

➲ The status of the process will also be displayed in a phase diagram:



2. Press the ***START/STOP*** button again.

➲ The heating program will be paused.

➲ The status display changes from ***RUNNING*** to ***READY***.

3. Press the ***START/STOP*** button again to continue the heating program.

Removing the sintering dish from the HT-S Metal

Requirements

☑ The oven door is open

1. Guide a suitable pair of 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

The control system enables the heating process for the ***sintering oven*** to be defined in 1 - 4 heating phases as a heating program. A heating program can consist of heating up or cooling down.

If no adjustments are made within one minute when carrying out programming, the program will automatically return to an overview of the most recently accessed heating program.

1. Press the ***S1*** button.

➲ The input cursor will be blinking in the **°/min** field.

2. Enter the heating up speed using the digits 0-9.
   The minimum heating speed is 1 °C/min (2 °F/min),
   the maximum heating speed is 30 °C/min (54 °F/min).

➲ If the length of the value entered is less than two digits, the cursor must be moved to the next entry field using the appropriate phase button.

➲ After the heating up speed has been entered, the cursor moves to the next entry field.

3. Using the digits 0-9, enter a four-digit holding temperature to be reached in heating phase ***S1***.

NOTICE

The maximum programmable temperature of the ***sintering oven*** is 1400 °C.
If a temperature higher than this is entered, the display will return to the previous value.

➲ After the temperature value has been entered, the cursor moves to the next entry field.

➲ If the length of the value entered is less than four digits, the cursor must be moved to the next entry field using the appropriate phase button.

4. Using the digits 0-9, enter the holding value in minutes for the selected temperature.

NOTICE

The maximum programmable holding time is 999 minutes (holding time in ***S1***-***S3***; the entry in ***S4*** controls the audible alarm for "Program end").

➲ Once all three values have been entered, programming of heating phase 1 is finished.

Programming phases S2 to S4

To program additional heating phases, follow the steps for the first heating phase, substituting the appropriate heating phase button (e.g. ***S2*** for the second heating phase, ***S3*** for the third heating phase, etc.).

If any of the four heating phases are not required, the temperature for the unused phases must be set to zero.

Phases ***S1*** to ***S3*** can be set to zero.

Phase ***S4*** controls the door opening temperature and must be entered.

Saving the heating program

The ***sintering oven*** can save up to 30 different heating programs.

Saved heating programs are retained even after the ***sintering oven*** is switched off.

Heating programs are always saved under the program number that they were previously loaded under.

1. Press the ***SAVE*** button.

➲ The ***SAVE*** menu will be displayed.

2. Press the ***S2*** button for "YES" to save the heating program.

3. Press the ***S1*** button for "NO" to cancel the saving process.

Saving program values under names

Requirements

☑ The program values have been entered for all phases.

1. Press the ***Save*** button.

➲ The ***SAVE*** menu will be displayed.

Using the buttons, a name of up to four lines in length can now be entered for saving the file in the left-hand field.

➲ You can gradually move the cursor to the right using the ***S4*** button.

Renaming a heating program

Individual heating programs can be saved under any name desired in order to ensure that they can be clearly identified.

1. Press the ***Save*** button.

➲ The ***SAVE*** menu will be displayed.

2. Press the ***Function*** button to change the first letter.
   You can cycle through the entire alphabet from A to Z by repeatedly pressing this button.

3. Press the ***S4*** button to move to the next letter.

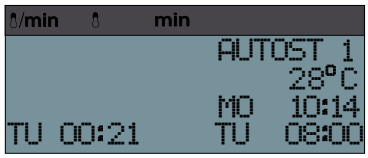
4. After you have entered the desired name, press the ***S2*** button to save the changes.

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 heating program.

2. Press the ***Finish time*** button.



➲ The ***AUTOSTART*** program will open.

3. Press the ***S1*** button to enter the day of the week.
   Set the day of the week using the 1-7 buttons (1 = Mon, 2 = Tues, 3 = Weds, etc.).

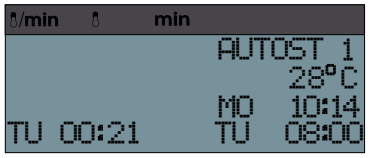
4. Press the ***S1*** button again to continue to time entry.

5. Set the hours using the 0-9 buttons.

6. Press the ***S1*** button to switch to the minute display.

7. Set the minutes using the 0-9 buttons.

➲ The timer is now activated.



➲ The finishing time and the calculated activation time will be shown in the display.

Preparing the sintering aid

Recommended procedure for filling the sintering dish

1. Fill the sintering dish with one packet of sintering beads (one packet of sintering beads is approximately 280 g).

2. Place the parts to be sintered in the sintering dish.

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

Basic settings

Service settings

Parameter settings

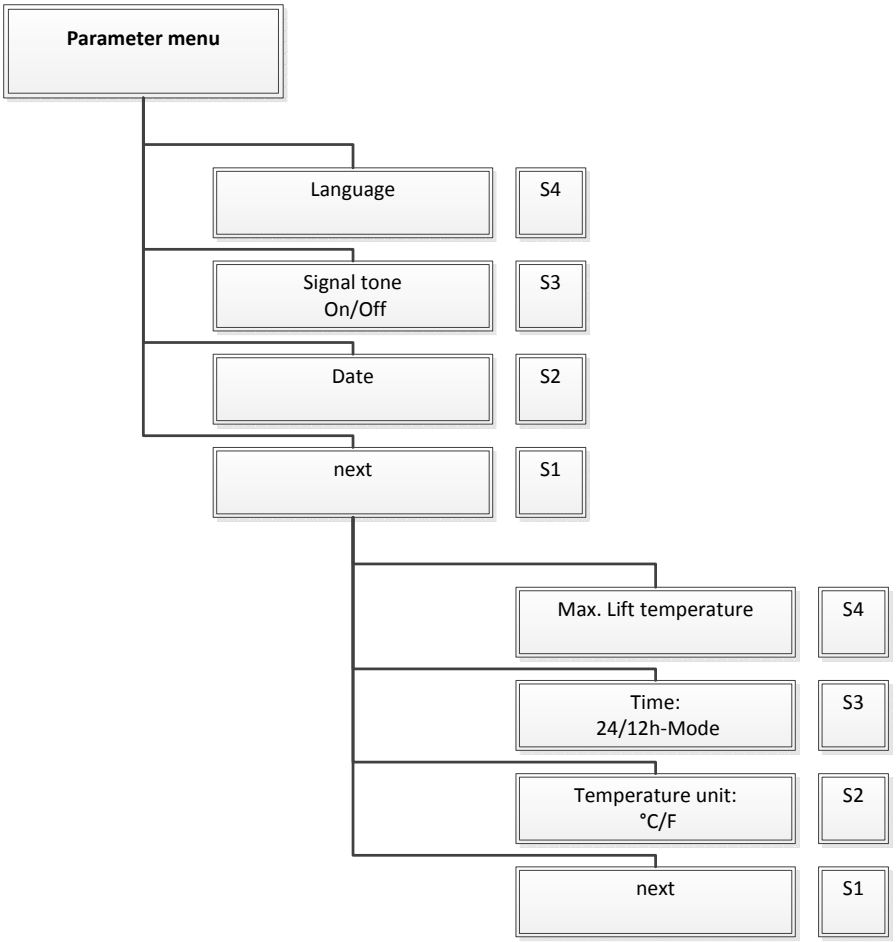
The default time and pre-programmed heating programs for the ***sintering oven*** are preset at the factory before delivery.

The ***sintering oven*** does not automatically switch to or from daylight savings time.

1. Switch the ***sintering oven*** on at the mains switch.

2. Press the **FUNCTION** button.

➲ The parameter menu will open.



3. Press one of the buttons (***S1-S4***) to select a parameter.

4. Repeatedly press the relevant parameter button until the required change has been made.

Parameter	But-ton	Function
Language	S4	Changes the system language (DE, EN, FR, IT, ES, DA, CZ, NL)
Audio signal	S3	Switches the audio signal on or off
Date	S2	Setting the day and the time
Next	S1	Skips to the next parameter menu Level 2:
Maximum setting for the lift opening temperature	S4	Provides a second level of safety. The lift opening temperature is set at phase 4.
Time format	S3	Time display in 12 hour or 24 hour mode
Temperature scale	S2	Temperature units, °C or °F
Next	S1	Exit the parameter menu

Setting the day and the time

F

1. Press the ***FUNCTION*** button.

S2

2. Press the ***S2*** button.

➲ The ***DATE*** will open.

3. Set the day of the week using the 1-7 buttons (1 = Mon, 2 = Tues, 3 = Weds, etc.).

S2

4. Press the ***S2*** button to switch to the hour display.

5. Set the hours using the 0-9 buttons.

S2

6. Press the ***S2*** button to switch to the minute display.

7. Set the minutes using the 0-9 buttons.

NOTICE

Any changes made have only been applied if the cursor is no longer visible.

Setting the lift temperature

1. Press the **FINISH TIME** button.

2. Press the ***S1*** button.

➲ The second parameter menu will open.

3. Press the ***S4*** button.

➲ The ***LIFT TEMPERATURE*** menu will open.

4. Set the lift temperature using the 0-9 buttons.

Switching off the HT-S Metal

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

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

2. Close the compressed gas cylinder for the argon supply.

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 ***sintering 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.

Care and maintenance

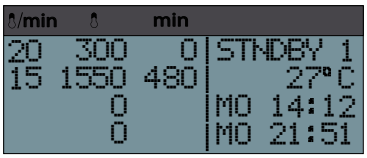
Clean of the housing of the ***sintering oven*** every so often with a mild cleaning agent.

NOTICE

Damage to the heater

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

Cleaning/regeneration program



A cleaning program should run periodically depending on how often the oven is used. This is used to regenerate the heating elements and remove residues from the porous insulation.

The message "Start cleaning program“ will be displayed after approximately 40 cycles.

1. Press "YES" to start the cleaning program.

➲ Program 29 will be accessed.

2. Press "NO" to carry out the cleaning program at a later time.

➲ After five cycles, the prompt "Please start the cleaning program" will be displayed again.

Checking the argon system

Regularly check that the argon supply (supply hoses, couplings, connections, etc.) is functioning correctly and that no leaks are present.

Faults and error messages

Safety

DANGER

Electricity

Risk of death from electric shock.

- Work on electrical systems must only be performed by qualified electricians.
- Before carrying out any installation, maintenance, cleaning or repair work, disconnect the power supply of the ***sintering oven*** 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	Remedial measure(s)	Respon-sibility
Incorrect time	The time in the cont-roller has been saved incorrectly	Set the correct time	User
The HT-S Metal does not start automatically	Power cut/interrupted power supply	Check the power supply for interrup-tions and notify a qualified electrician if necessary.	
Display is empty, mains indicator lamp is lit, the phase LEDs do not light up after the unit is swit-ched on	Faulty circuit breaker	Switch off the HT-S Metal, wait for ten seconds, then switch the unit back on again. If the malfunction continues to occur, notify the service department.	
Display is empty, mains indicator lamp is not lit	No mains voltage supply	Check the on-site fuses. Check the connection cables and no-tify a qualified electrician if necessary.	
Pieces of the door panel have chipped off or other damage to the door panel	Improper handling of the door panel	Replace the door panel.	
"Power failure" is dis-played	A power failure of longer than 10 seconds has occurred during the sintering process	Acknowledge the error display with the Start/Stop button.	
Display is empty, mains indicator lamp is lit, the phase LEDs light up briefly after the unit is switched on	Display faulty	Replace the controller.	Service department mihmvogt
Phase LED flashes but the oven does not heat	Heater faulty	Test the continuity of the heater.	Service department mihmvogt

Electronics error messages

Fault	Possible cause	Remedial measure(s)	Respon-sibility
Display: "Sensor faulty"	Faulty thermocouple	Replace the thermocouple.	Service department mihmvogt
	Loose thermocouple connections	Re-tighten the thermocouple connections.	
Display: "Sensor + <-> -"	Oven interior is signifi-cantly colder than the ambient temperature	Open the oven door to allow the chamber interior to adjust to the ambient temperature.	User
	Thermocouple incorrect-ly connected/thermo-couple poles reversed	Switch the thermocouple connections around.	Service department mihmvogt
Display: "Safety switch-off"	Oven temperature is over 1650 °C	Switch off the oven and allow it to cool down. If the malfunction continues to occur, notify the service department.	User
Display: "Sensor closed"	Faulty temperature sensor	Contact Customer Services.	Service department mihmvogt
Display: "Thyristor faulty"	Fault in the electronics	Contact Customer Services.	Service department mihmvogt
Long beep with empty LCD display, oven door does not close, program does not start	Door switch misaligned	Contact Customer Services.	Service department mihmvogt

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, thorough preparations for decommissioning must be carried out. 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.

3. Remove all connections (e.g. PC interface cable, etc.) from the ***sintering oven***.

Disposal

Safety

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 arrange for them to be recycled.