

Programat[®] S2

Operating Instructions

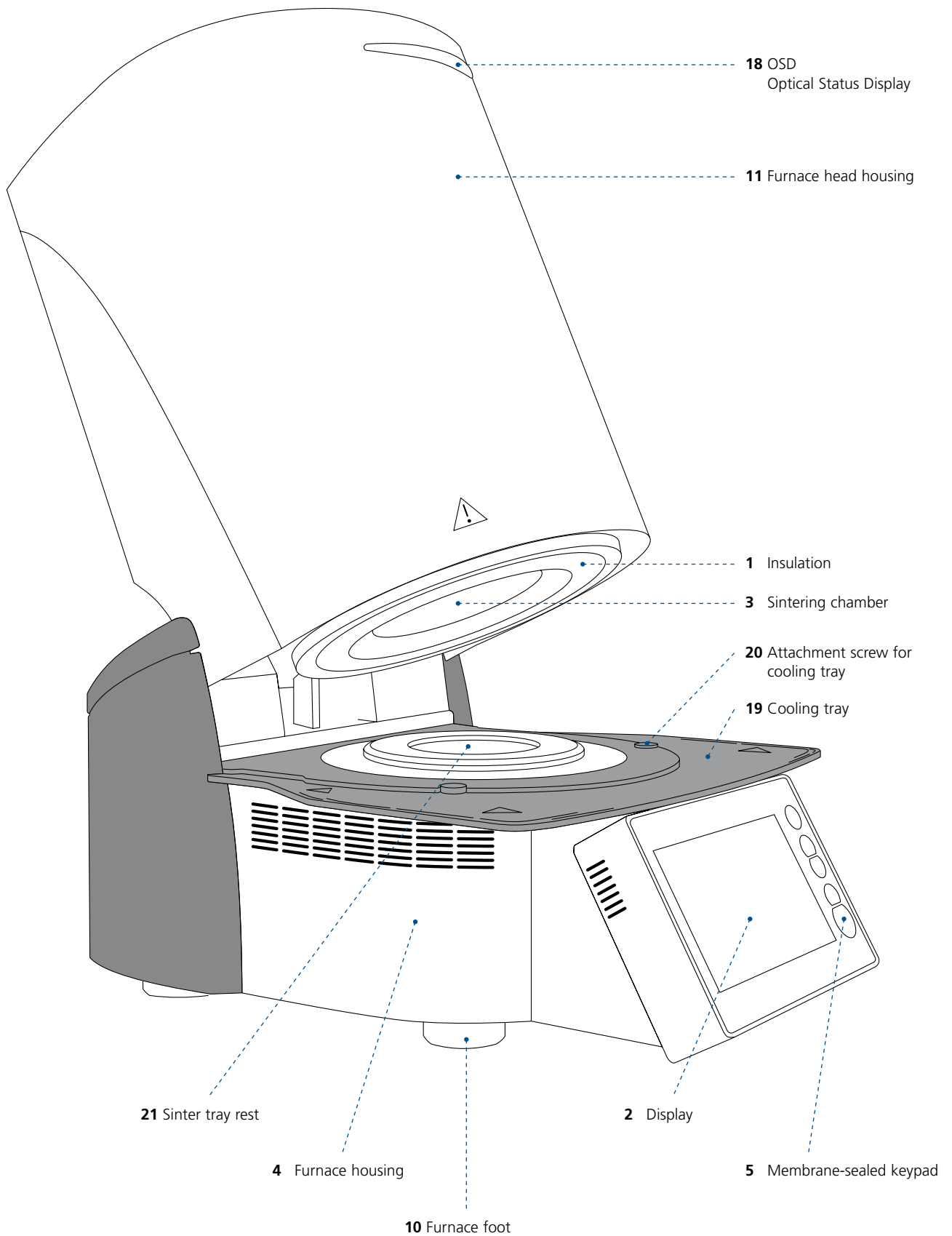


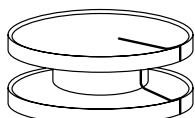
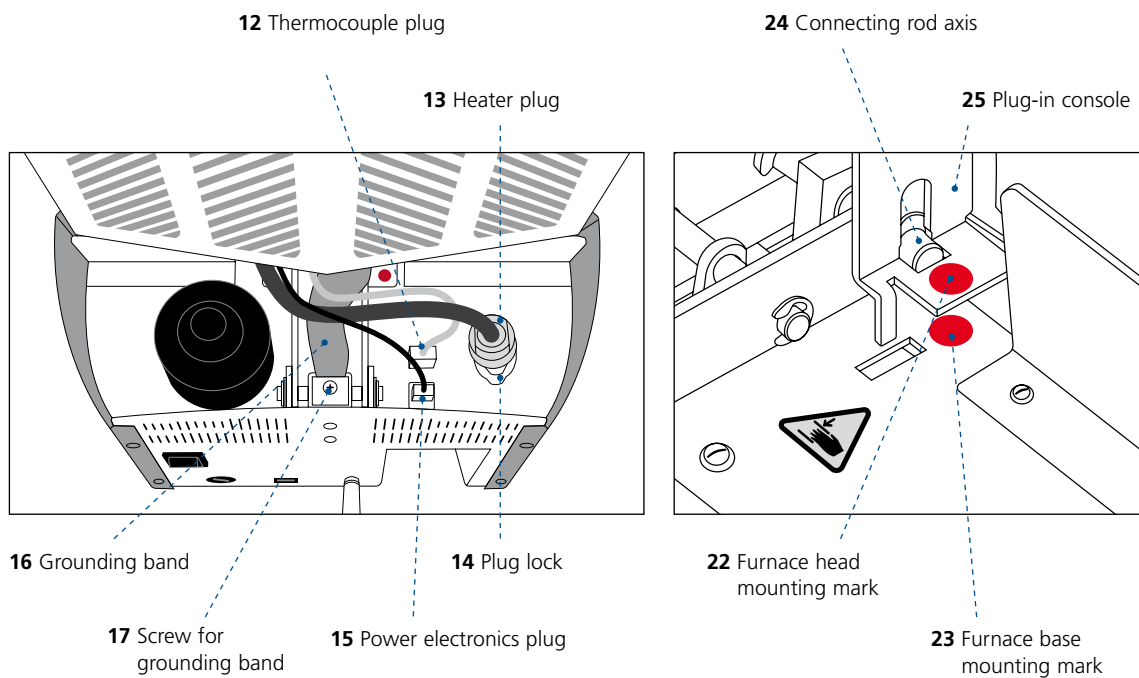
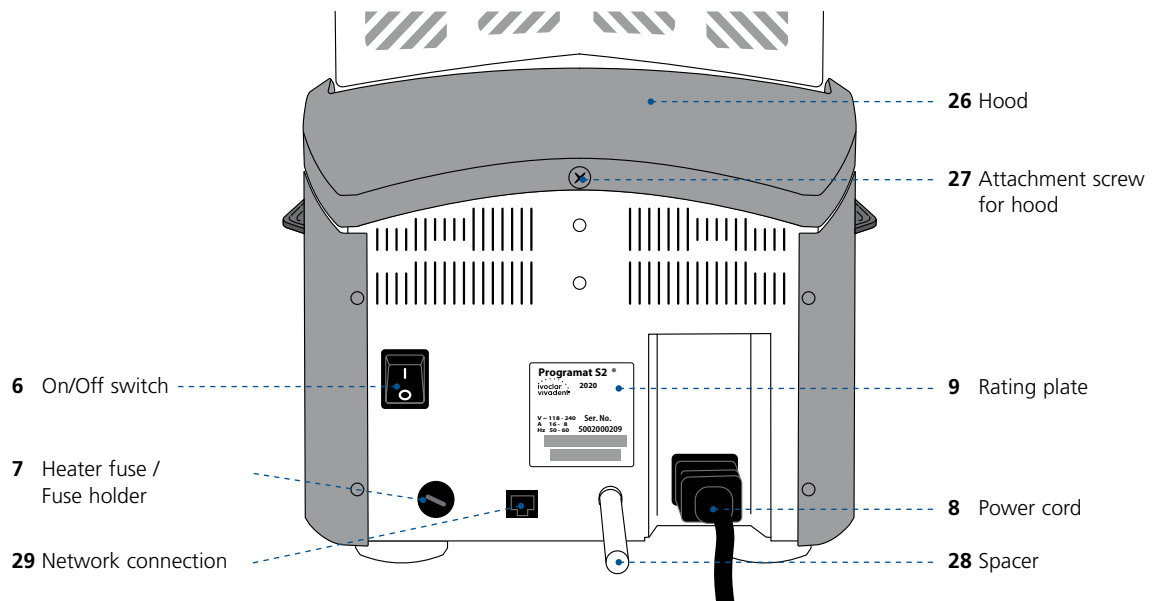
ivoclar[®]
digital[®]

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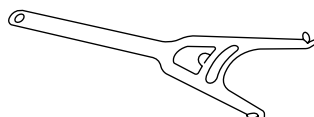
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List of Parts

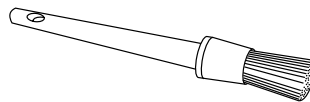




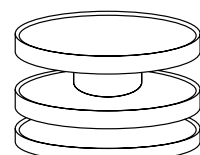
100 Sintering tray



101 Sinter tray fork



102 Cleaning brush



103 Programat Dosto Tray

Introduction

Dear Customer

Thank you for having purchased the Programat® S2. It is a sintering furnace for dental laboratories requiring such a furnace for the CAD/CAM technique. The Programat S2 is suitable for the sintering of zirconium oxide materials. It has been especially designed and constructed for this purpose.

The furnace has been designed according to the latest industry standards. However, inappropriate use may damage the equipment and be harmful to personnel. Please observe the relevant safety instructions and read the Operating Instructions carefully.

We hope you enjoy working with the Programat S2.

1 Intended Use

Intended purpose

Furnace for dental restorations for the sintering of zirconium oxide materials, such as IPS e.max ZirCAD Prime.

Use

The Programat S2 is a sintering furnace for dental restorations made of zirconium oxide materials, such as IPS e.max ZirCAD Prime.

Use the Programat S2 exclusively for this purpose. Other uses than the ones stipulated, e.g. cooking of food, firing of other materials, etc., are contraindicated. The manufacturer does not assume any liability for damage resulting from misuse. The user is solely responsible for any risk resulting from failure to observe these Instructions.

Further instructions to assure proper use of the furnace:

- The instructions, regulations and notes in these Operating Instructions must be observed.
- The instructions, regulations and notes in the material's Instructions for Use must be observed.
- The furnace must be operated under the indicated environmental and operating conditions (see Chapter 6).
- The Programat S2 must be properly maintained.

Additional information









Do not use colouring liquids containing chlorine or hydrochloric acid in Programat S2 furnaces.

Due to the aggressive components of the liquids, the furnace surface or individual parts may be chemically corroded or damaged.

If colouring liquids containing chlorine or hydrochloric acid are used, irritating gases may develop during the heating phase. These gases pose a risk to users particularly when infiltrated frameworks are not correctly pre-dried.

Signs and symbols









The signs and symbols in these Operating Instructions facilitate the finding of important points and have the following meanings:


Symbol	Note
	Observe Operating Instructions
	Risks and dangers
	Contraindication
	Warning, hot surface (burn hazard)
	Beware of hand injuries (risk of crushing)
	Important information


1. Introduction / Signs and Symbols

Warning signs and symbols on the furnace

The symbols on the furnace have the following meanings:

Symbol	Note
	Alternating current
	Direct current
	Dispose of the product according to the national legal provisions regarding the disposal of electronic devices.
	Recyclable
	General warning sign. Caution when using the device. Please read these Operating Instructions.
	Warning, hot surface (burn hazard)
	Beware of hand injuries (risk of crushing)
	Observe the Operating Instructions (Failure to observe the Operating Instructions may expose the patient or operators to a risk)

 This chapter is especially important for individuals who work with the Programat S2 or who have to carry out maintenance or repair work. This chapter must be read and the corresponding instructions followed!

 Please observe the safety notes in Chapter 5.

Notes on the images in the Operating Instructions

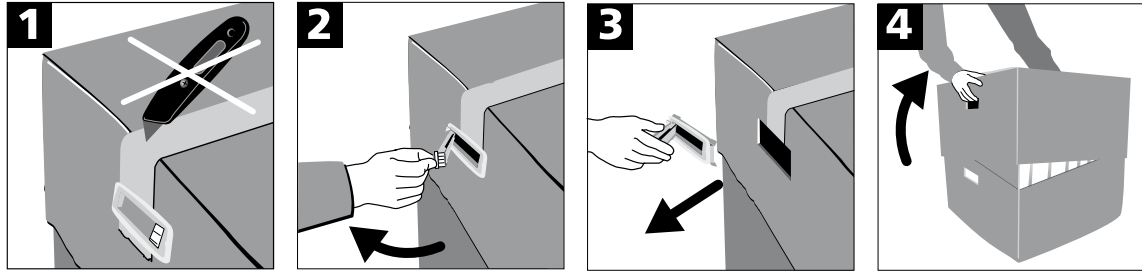
All images and illustrations in these Operating Instructions are used for exemplification and the details are not authoritative for the construction of the furnace. They are symbols, which may slightly differ from the original, e.g. due to simplification.

2 Application

2.1 Installation and initial start-up

2.1.1 Unpacking and checking the contents

Remove the furnace components from their packaging and place them on a suitable table. Please observe the instructions on the outer packaging.



There are no special transportation grips on the furnace. However, it can conveniently be carried by the grooves on the sides of the furnace bottom. Check the delivery for completeness (see delivery form in Chapter 8) and transportation damage. If parts are damaged or missing, contact your local Ivoclar Vivadent Service Centre.



We recommend keeping the original packaging for future service and transportation purposes.

2.1.2 Selecting the location

The device is only permitted for use in closed rooms, within the specified ambient conditions (see Chapter 6).

Place the furnace on a flat table using the rubber feet. Make sure that the furnace is not placed in the immediate vicinity of heaters or other sources of heat. Make sure that air may properly circulate between the wall and the furnace and that there is enough space for the swivel movement of the furnace head (at least 110 mm). Therefore, mounting the spacer (28) is absolutely mandatory.

Also ensure that there is enough space between the furnace and the user, as the furnace releases heat during the opening of the furnace head.



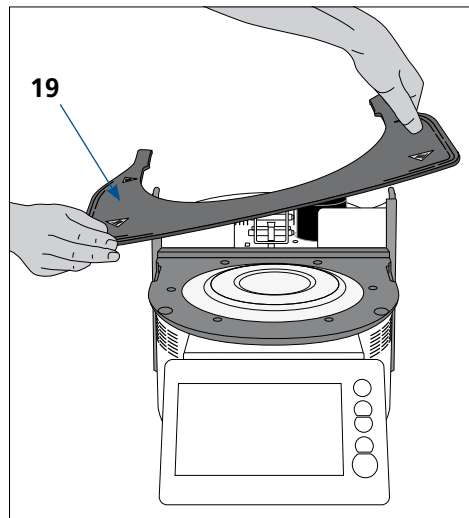
**The furnace should neither be placed nor operated in areas where there is an explosion hazard.
The furnace must not be connected to the power supply before or during assembly.**

2. Application

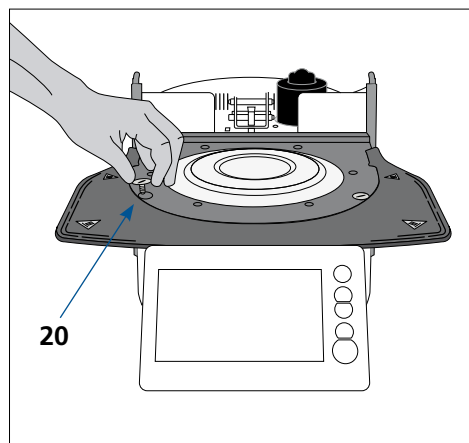
2.1.3 Assembling the furnace

Assembling the furnace is very easy and involves only few steps. Before you start assembling the furnace, make sure that the voltage indicated on the rating plate (9) complies with the local power supply. If this is not the case, the furnace must not be connected.

- A.** Place the cooling tray (19) on the frame plate. Make sure that the cooling tray rests on the frame plate correctly and that the hazard symbols are visible from above.

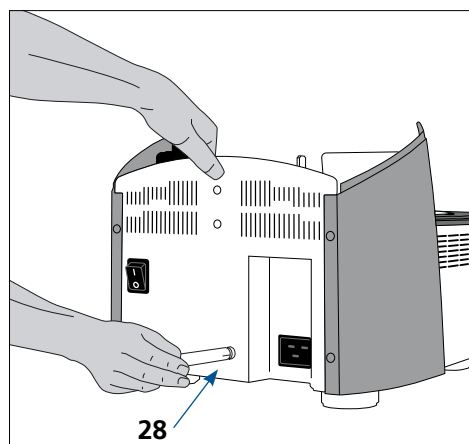


- B.** Secure the cooling tray with the two attachment screws (20) including the silicone washer.



- C.** Mounting the spacer

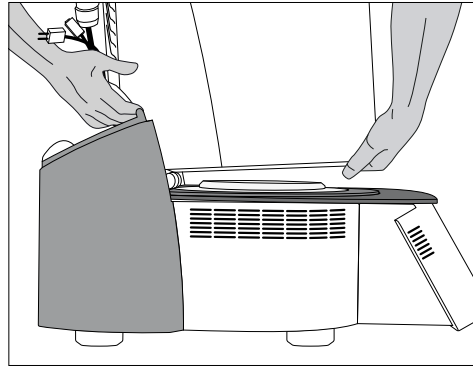
The spacer (28) can be mounted to the rear of the furnace with the help of the fastening pin intended for this purpose. Press the spacer strongly against the rear of the furnace. For safety reasons, the spacer must always be mounted. If the spacer does not provide enough space (e.g. because of a cable duct), the furnace should be placed in a way that the furnace head can be opened without problems.



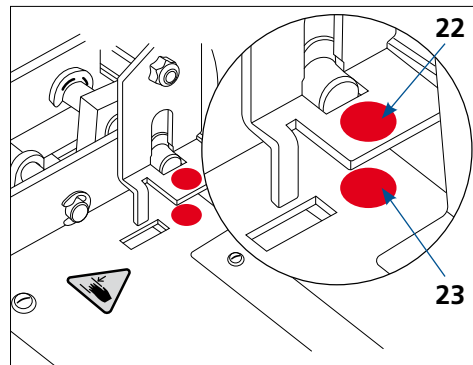
D. Mounting the furnace head

The complete furnace head is best mounted with the rear panel of the furnace pointing towards the user. Lift the furnace head with both hands (see picture) and carefully position it on the furnace head mounting.

Tip: Mounting the furnace head is facilitated if it is carried out by two people.



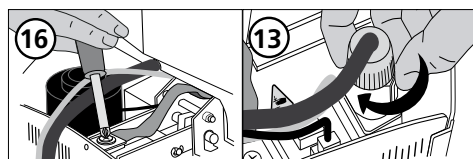
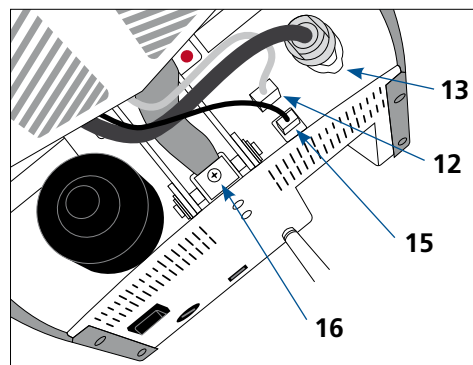
E. Position the furnace head mounting as shown in the picture until the furnace head audibly snaps into place. Ensure that the furnace head mounting mark (22) is aligned with the furnace base mounting mark (23). Make sure that the sintering chamber and the insulation are not damaged by mounting the furnace head.



F. Attaching the grounding band and establishing the connections

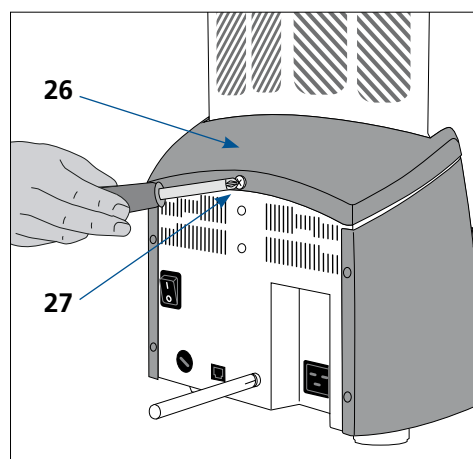
Connect the cables of the furnace head with the furnace base. Proceed as follows:

- Attach the grounding band (16) using the screw.
- Insert the thermocouple plug (12) (make sure that the polarity of the plug is correct)
- Insert the heater plug (13) and rotate it until a clicking sound can be heard.
- Insert the power electronics plug (15).



G. Mounting the hood

Once all cables are properly connected to the furnace base, the hood (26) can be mounted. Subsequently, secure the hood with the attachment screw (27).

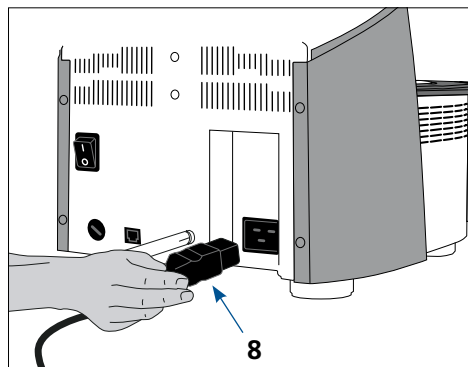


2. Application

H. Establishing additional connections

- Power connection
- Please make sure that the voltage indicated on the rating plate complies with the local power supply.
- Subsequently, connect the power cord (8) with the power socket of the furnace.

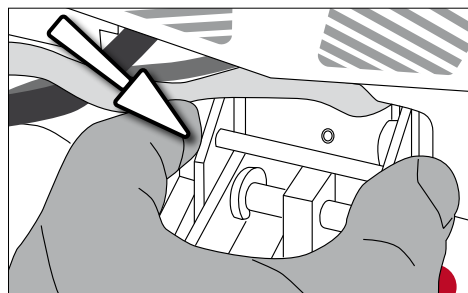
The device must only be operated with the supplied original power cord or a replacement cord with the same specifications.



2.1.4 Removing the furnace head

Before the hood (26) is removed, the furnace has to be switched off, cooled down and the power cord (8) disconnected from the power socket.

1. Loosen and remove the attachment screw (27) of the hood (26)
2. Remove the hood
3. Remove thermocouple plug (12)
4. Release the heater plug (13) and disconnect it
5. Disconnect the power electronics plug (15)
6. Loosen and remove the grounding band (16)
7. Press the leaf spring with a finger, lift off the furnace head at the same time and remove it



Tip: Removing the furnace head is facilitated if it is carried out by two people.

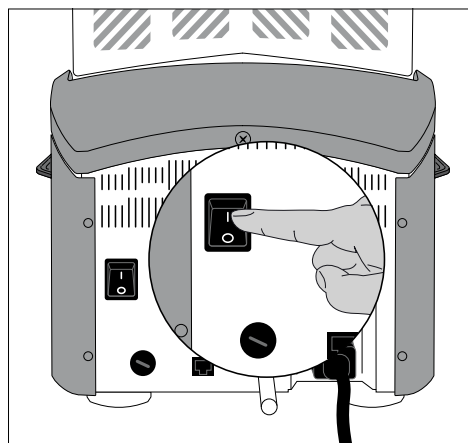


Make sure the furnace head has completely cooled down before it is removed (fire hazard).

2.1.5 Initial start-up

Please note that the furnace may require a certain acclimation time (up to 4 hours) after having been set-up. This is particularly true if the furnace was exposed to substantial temperature changes (water condensation).

1. Connect the power cord (8) with the wall socket.
2. Put the On-/Off switch (6) at the rear of the furnace on position I.



Basic settings upon initial start-up

Upon the initial start-up of the new furnace, a number of basic settings are required. These settings are saved and will not appear anymore upon following starting procedures. However, they can be edited in the settings menu at a later time.

Step 1:

Language selection

The first setting is the language selection. The touch buttons (display keys) can be operated by tapping the display.

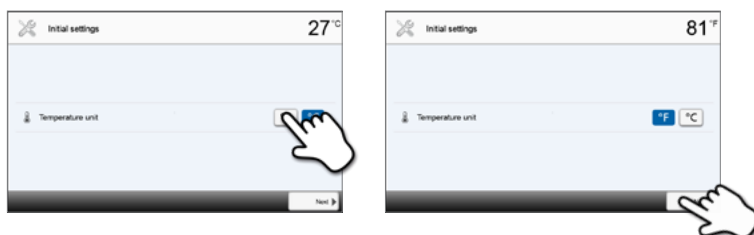


Select the desired language using the **[Arrow up/down]** buttons. Confirm the entry with the green button. By pressing the **[Continue]** button, you will reach the next entry screen.

Step 2:

Select the temperature unit

Select the desired temperature unit.

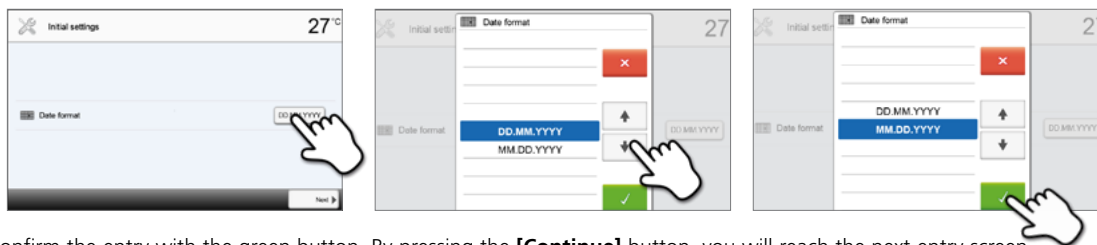


By pressing the **[Continue]** button, you will reach the next entry screen.

Step 3:

Select the date format

Select the date format.



Confirm the entry with the green button. By pressing the **[Continue]** button, you will reach the next entry screen.

2. Application

Step 4:

Enter the date

Set the date (day, month, year).



Confirm the entry with the green button. By pressing the **[Continue]** button, you will reach the next entry screen.

Step 5:

Enter the time

Set the time (hours, minutes, seconds).

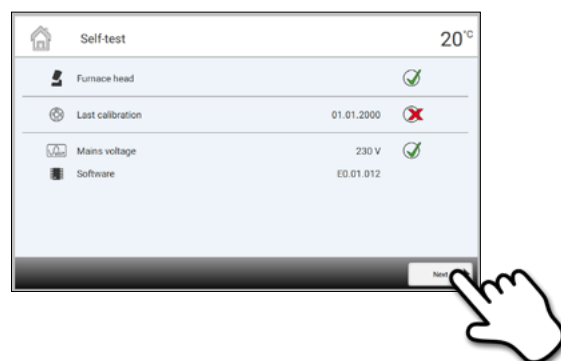


Confirm the entry with the green button. By pressing the **[Continue]** button, you will reach the next entry screen.




The initial start-up and entry of the basic settings are now complete. The furnace will now automatically conduct a self-test. The performance of all furnace components is automatically checked.

Start screen and self-test





Immediately after switching on, the display shows the start screen for a few seconds. Subsequently, the furnace conducts an automatic self-test. The performance of all furnace components is automatically checked.



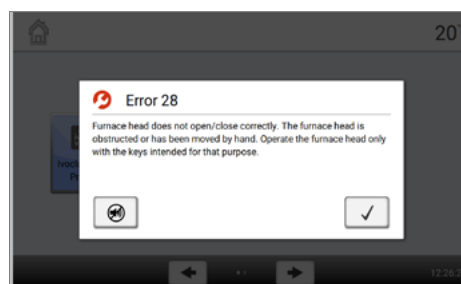
The following functions are checked:

Function		
		Furnace head test in progress
Furnace head test		The furnace head test was successful.
		The furnace head test failed. Please note the error message on the display.

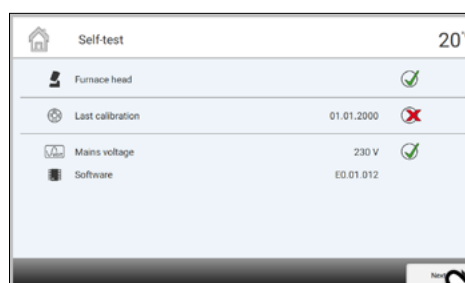
The following information is displayed:

Information		
Temperature calibration		Temperature calibration of the furnace is not required.
		Some time has passed since the last calibration. Conduct a calibration.
Power supply		The power supply voltage is in the acceptable range.
		The power supply is outside the acceptable range.
Software version		The currently installed software version is displayed.

If the self-test was successful, the home screen is displayed. If the program recognizes a malfunction during the test, an error message with the corresponding rectification information appears in the display. The acoustic signal and the error message can be acknowledged with the corresponding buttons.



Press the **[Continue]** button to acknowledge the self-test.



i Before the first sintering, the sintering chamber should be dehumidified using program P3 (IPS e.max ZirCAD Prime Speed – crown).

i The furnace should be regularly switched off and on again so that the automated tests can be performed during the self-test.

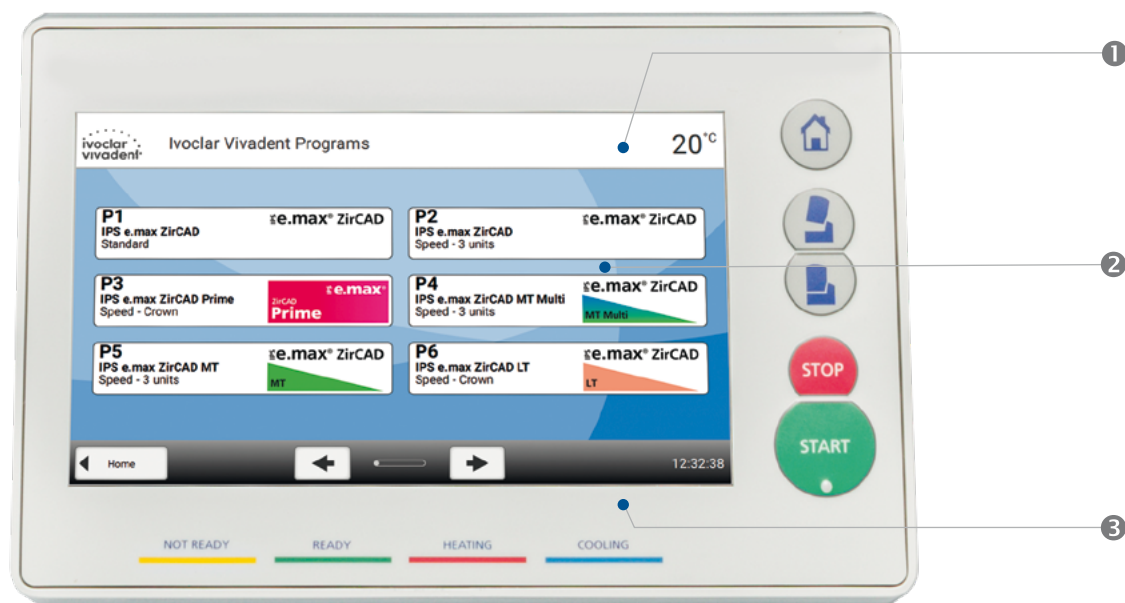
2. Application

2.2 Operation and configuration

2.2.1 Introduction to the operation

Control unit






The Programat S2 is equipped with a widescreen colour display. The furnace can be intuitively operated by means of the membrane-sealed keypad and the touch screen. The touch buttons can be activated by slightly tapping the display with the fingertip. Then the furnace runs the desired function.




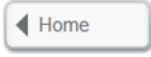
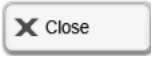



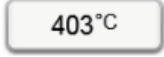
The user interface in the display is divided into three sections:

1. **Information bar** (e.g. indication of the current furnace temperature, the selected program, etc.)
2. **Main screen** (e.g. editing sintering programs, changing the settings, etc.)
3. **Navigation bar** (e.g. scrolling, switching to higher levels, etc.)

Description of the key functions

Key	Function
	HOME Switch to home screen (main menu)
	Open furnace head
	Close furnace head
	STOP A program in progress can be paused by pressing the [STOP] key and stopped by pressing [STOP] twice. The movement of the furnace head can be stopped at any time by pressing [STOP] . The acoustic signal can be confirmed by pressing the [STOP] key.
	START (Start LED) Starts the selected program. The green LED indicates that a program is active.

Description of the most important touch buttons

Button	Function
	Scroll left / Scroll right With these buttons, for example, you can scroll to the next page of the home screen.
	Back with note With this button, you can change to the next higher menu level. The button indicates to which screen you change, e.g. to the home screen.
	Close With this button, you can close sub-menus.
	Confirm entry This button is used to confirm an entry. If the button appears pale green, no entry has been made yet or the value entered is not in the acceptable range.
	Cancel entry This button is used to cancel an entry. Changed values are not saved.
	On/Off button This button is used to switch functions on or off.
	Parameter button On pressing these buttons, a selection list or numeric pad appears for entering the parameters.



As an alternative to the arrow buttons, you can also swipe to the left or right with your finger on the display to scroll to the next page.

Description of the numeric pad and selection list

Numeric pad

The numeric pad enables the entering and changing of parameters, e.g. in sintering programs or set-up menus. Additionally, the currently set value is indicated, as well as the minimum and maximum values.

An entry must be confirmed with the green button. As soon as the entry has been confirmed, the numeric pad is closed. If the button appears pale green, the value entered is not within the acceptable range.

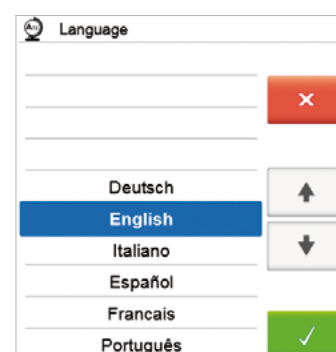
The numeric pad can be closed with the red button, without any parameters being changed.



Selection list

In the selection list, the desired parameter can be selected by using the **[Arrow up/down]** buttons. An entry must be confirmed with the green button. After that, the selection list is closed.

The selection list can be closed with the red button, without any parameters being changed.



2. Application

Description of the Home screen

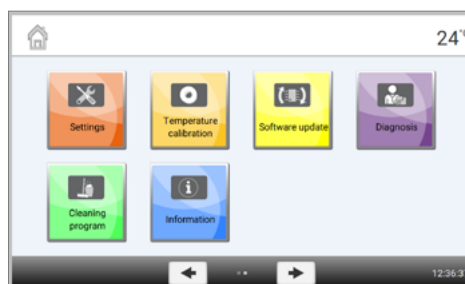
After the furnace has been switched on, the home screen is displayed. With the **[HOME]** key, you can change to the home screen from any menu item.

All functions of the Programat S2 can be selected from this screen. The first page will take you to the program view of the Ivoclar Vivadent programs or the individual programs.



The next page of the home screen can be accessed with the **[Arrow]** buttons or by swiping to the left or right, where additional functions are available.

By pressing a selection button, you will reach the corresponding menu (e.g. programs, settings, calibration, etc.).

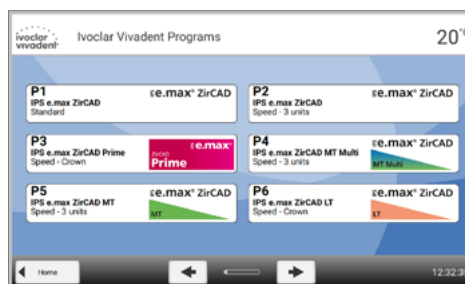


The circles between the arrows indicate the number of pages.
The current page is marked with a light dot.

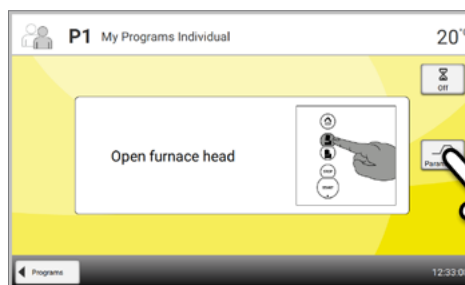
Explanation of the program screen

After having selected the Ivoclar Vivadent programs or the individual programs, the program screen appears. Programs can be selected, started, and edited from this screen.

The next page in the program screen can be accessed by pressing the **[Arrow]** buttons or by swiping to the left or right. The main screen indicates the program number, program name and a help text.



The **[Parameters]** button in the individual program section is used to switch to the program parameter screen. Programs can be edited in this screen.



Description of the speaker sounds

Basically, all the acoustic signals are played using the tune and volume selected by the user.

The acoustic signal can only be stopped by pressing the **[STOP]** key.

- **After the self-test is completed**

To inform the user that the automatic self-test has been successfully completed, the selected melody is played.

If playbacks are acknowledged with the **[STOP]** key, the signal transmitter is switched off and no further signals will be sounded.

- **For error messages**

Error messages are acoustically supported with the "error melody" (endless beep). The signal transmitter may be switched off with the **[STOP]** key, while the error message still remains visible. If the error message is acknowledged with the corresponding button, the signal transmitter is also switched off.

- **At the end of a program**

In order to inform the user that the sintering process has been completed, an acoustic signal is played.

Optical Status Display (OSD)

The Optical Status Display (OSD) (18) shows the most important statuses of the furnace. The following activities are indicated:

Shade	Activity
Yellow	The furnace is performing the self-test or is not ready for use.
Yellow (flashing)	Information, note or error message
Green	The furnace is ready for use; the currently selected program can be started.
Light orange	Program is closing the furnace head
Dark orange	Program is heating up or is in holding time mode
Blue	Program is in its cooling phase or opening the furnace head

**User code**

For safety reasons, a user code is required for certain settings.

The user code ex factory is as follows:

1234

The user code can be individually changed. See Chapter Settings 2.2.4.1. for details.

2. Application

2.2.2 Sintering programs and programming options

2.2.2.1 Program structure

The furnace offers two program types:

a. Programs for Ivoclar Vivadent materials

When the furnace is delivered ex works, the Ivoclar Vivadent programs already contain the recommended material parameter settings.



Ivoclar Vivadent programs cannot be edited.

b. 100 free, individually adjustable programs

The programs are designed in such a way that up to three heating and two cooling stages can be set. The programs can be individually named.

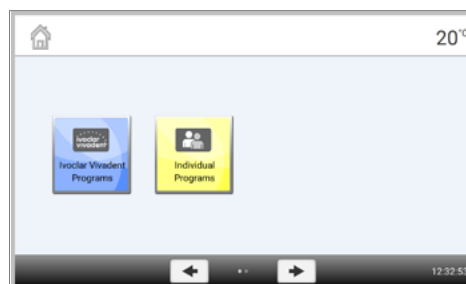


In case of software updates, individually changed parameters in free programs are not reset to the factory settings or changed!

All programs are equivalent and therefore full-fledged programs.

2.2.2.2 Program selection

After the furnace is switched on, the display shows the program screen.



In order to switch to an individual program, open the home screen by pressing the [HOME] key. The program selection requires only few steps:

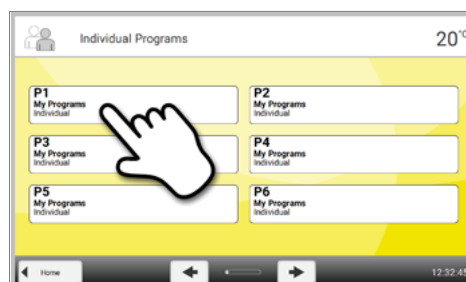
Step 1:

Select program type



Step 2:

Select the program

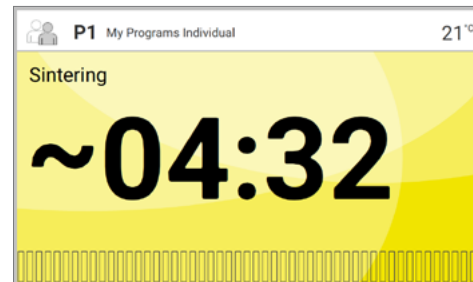


2.2.2.3 Starting and stopping programs / the operation indicator

Once the program is started by pressing **[START]**, the progress screen appears.

The following information is displayed:

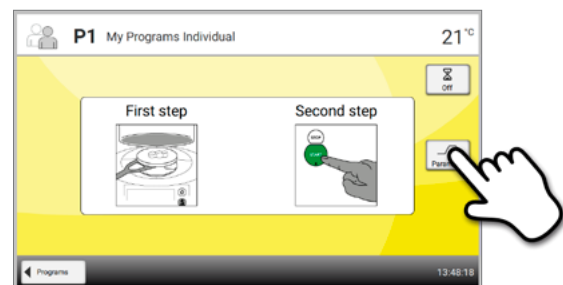
- **Information bar:**
In the information bar in the upper margin of the display, program number, material name, program name and the current furnace temperature are indicated.
- **Main area:**
The approximate remaining time and a program status bar are shown in the main area.



A program can only be started if the furnace head is open.

2.2.2.4 Editing programs

If the **[Parameters]** button is pressed while the program screen of an individual program is displayed, the program parameter screen opens. Individual programs can be edited in this screen.



Ivoclar Vivadent programs cannot be edited.

The program parameter screen is used for the visual, clearly arranged representation of the sintering curve. The following information is displayed:

1. Information bar:

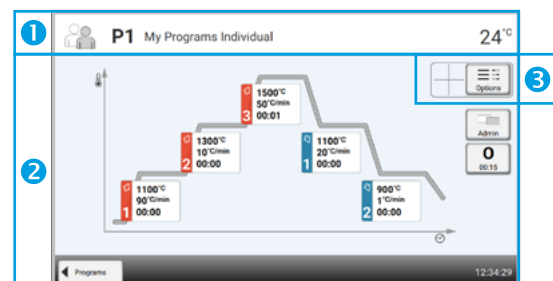
- Program designation
- Current furnace temperature

2. Sintering curve:

- Holding time
- Temperature increase, holding temperature
- Furnace head opening time

3. Program options:

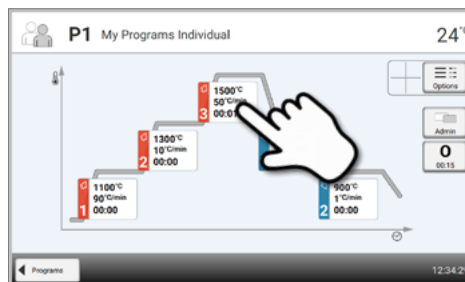
In addition to the parameters shown in the sintering curve, several other options are available that can be activated by pressing the **[Options]** button. The icons in the grid show the activated options.



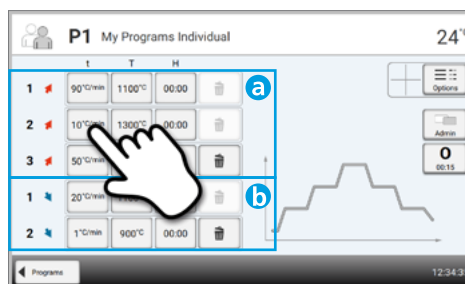
2. Application

Editing parameters

By pressing the sintering curve, you will reach the parameter view.



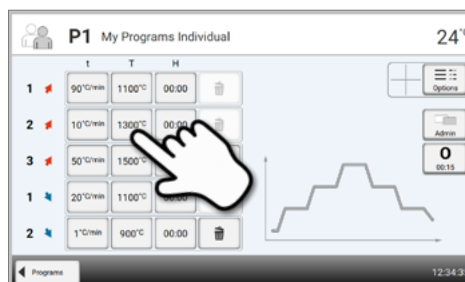
In the parameter view, the parameters can be changed. Up to three heating (a) and two cooling (b) stages are available.



Example 1: Setting the holding temperature:

Step 1:

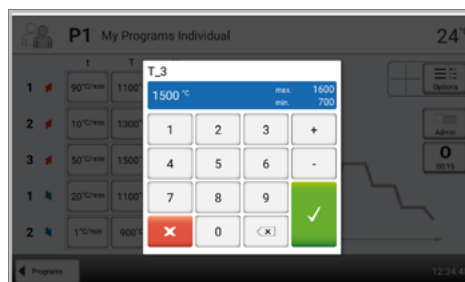
Press the [T] button



Step 2:

Enter the desired holding temperature and confirm with the green button

The holding temperature has been successfully changed. All other parameters shown in the sintering curve can be changed / edited in the same way.



Automatic plausibility check of the parameters

The furnace is equipped with an automatic plausibility check function. The parameters are checked upon each program start. In case of contradictory parameter combinations, the program stops automatically and the respective note is shown.

Example 2: Changing the number of heating/cooling stages

Step 1:

A heating or cooling stage can be added by pressing the button [+].



Step 2:

A heating or cooling stage can be removed by pressing the [Recycle bin] button.



Pressing the button **[Programs]** will take you back to the program parameter view.

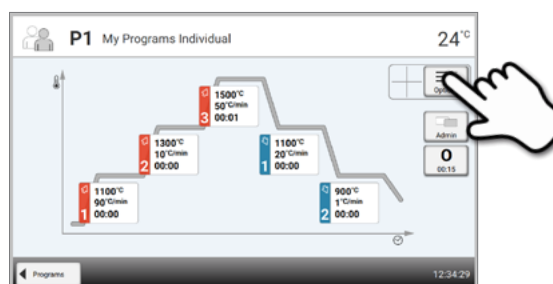
Changing program options

Pressing the **[Options]** button opens the menu for advanced program options:

Example 1: Activate the program write protection

Step 1:

Press the **[Options]** button.



Step 2:

Press the **[Activate write-protection]** button.



2. Application

Step 3:

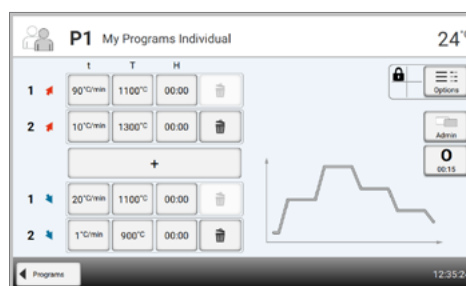
Press the [Close] button to leave the Options menu.



Step 4:

The write-protection was successfully activated.

The lock symbol is now shown in the display next to the Options button.



2.2.2.5 Adjustable parameters in the program screen



t – Temperature increase rate

The temperature increase rate defines by how many degrees per minute the furnace is to heat up / cool down.

In multi-stage programs t1, t2, t3, t4 or t5, depending on the stage.

Value range t1 in °C: 5–90 °C/min; t2–t5: 1–50 °C/min

Value range t1 in °F: 9–162 °F/min; t2–t5: 2–90 °F/min

If a maximum temperature of more than 1530 °C / 2786 °F is chosen, the temperature increase must be maximum 10 °C/min or 50 °F. Upon each program start, the parameters are checked and a corresponding error message may be displayed.



T – Holding temperature

The holding temperature defines the temperature at which a sintering process is conducted.

In multi-stage programs T1, T2, T3, T4 or T5, depending on the stage.

Value range in °C –

T1: 700–1200 °C;

T2: 700–1530 °C;

T3: 700–1600 °C;

in T4 and T5: 100–1100 °C

Value range in °F –

T1: 1292–2192 °F;

T2: 1292–2786 °F;

T3: 1292–2912 °F;

in T4 and T5: 212–2021 °F



H – Holding time

The holding time indicates how long an object is sintered at the holding temperature.

In multi-stage programs H1, H2, H3, H4 or H5, depending on the stage.

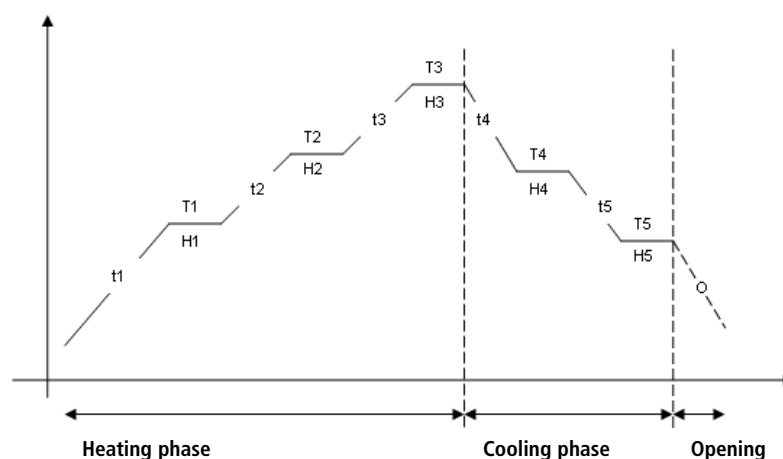
Value range: 00:00–05:00 (hh:mm)



O – Furnace head opening time

The furnace head opening time indicates how long the furnace head takes to open at the end of a program once the approved temperature range of 600 °C / 1112 °F is reached.

Value range: 00:15–05:00 (hh:mm)



2. Application

2.2.2.6 Adjustable parameters in the Options menu

In addition to the parameters shown in the sintering curve, several other options are available that can be activated by pressing the **[Options]** button. Active options are shown with icons in the grid next to the **[Options]** button.

The following program options are available:



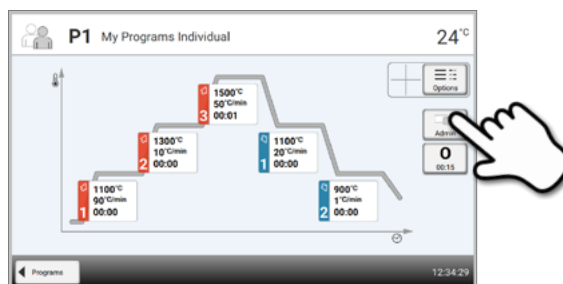
Program write-protection

If the program write-protection is activated, the program parameters and program options cannot be changed. This is to prevent accidental changes to the program.

Setting option: On/Off

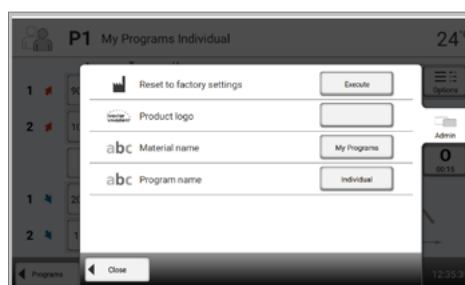
2.2.3 Managing programs

Press the button **[Manage]** in the program view to open the managing programs menu.



The following functions are available:

- Reset program to factory settings
- Select product logo
- Rename material
- Rename program

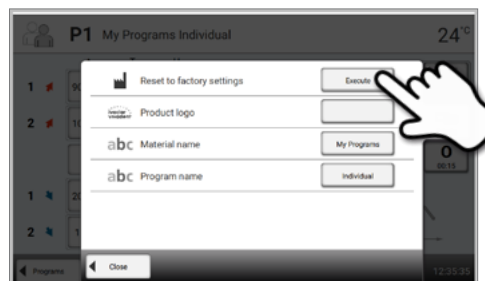


Reset program to factory settings

This function is used to reset a changed program to factory settings.

Step 1:

Press the [Execute] button in the Manage menu.



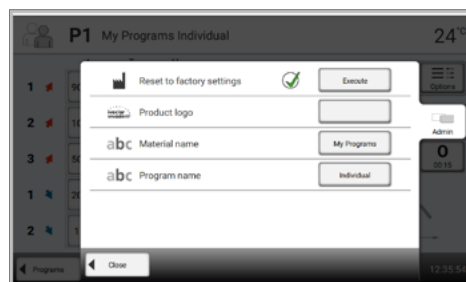
Step 2:

Enter the user code to confirm that the program is reset to factory settings.



Step 3:

The program has successfully been reset to factory settings.



2. Application

Select product logo

The product logo for the current group can be selected.

Step 1:

Press the [Product logo] button in the Manage menu.



Step 2:

Select the desired product logo and confirm the entry with the green button.

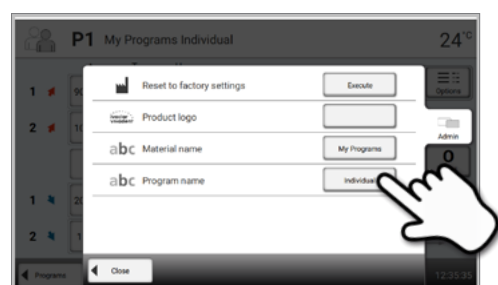


Rename program

The current program can be renamed.

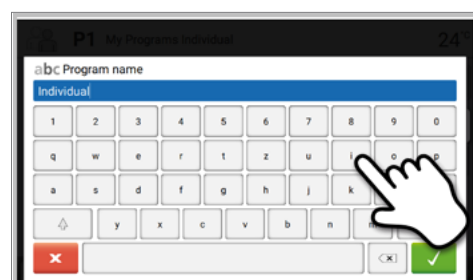
Step 1:

Press the [Product name] button in the Manage menu.



Step 2:

Enter the desired program name and confirm the entry with the green button.



2.2.4 Advanced functions of the furnace

2.2.4.1 Settings

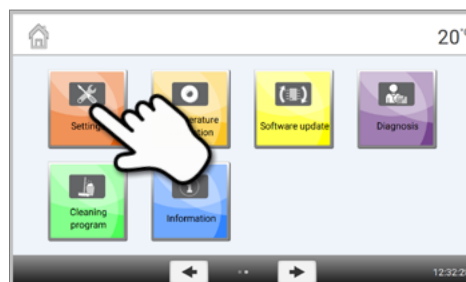
To reach the Settings menu, scroll to page 2 in the home screen and press the **[Settings]** touch button.

Example: Changing the brightness of the display

Step 1:

Open Settings

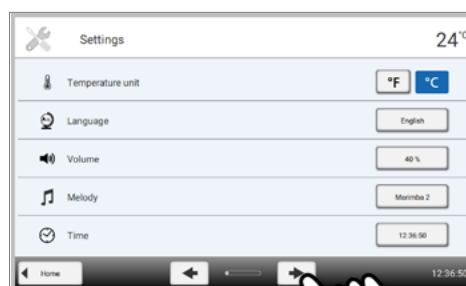
Scroll to page 2 in the home screen and press the **[Settings]** button.



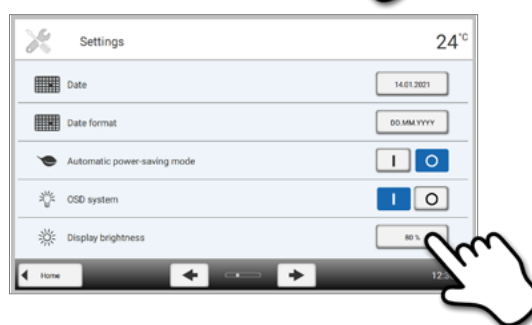
Step 2:

Display brightness

The **[Arrow]** buttons are used to scroll through the Settings menu. Press the button until the setting "Display brightness" appears in the display.



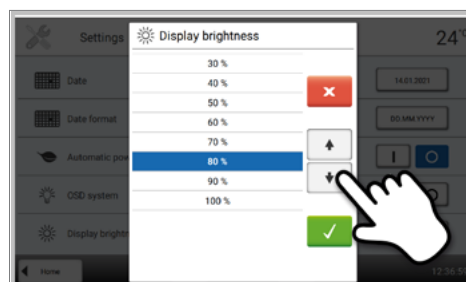
Press the touch button in the line "Display brightness".



Step 3:

Changing the brightness of the display













Select the desired display brightness in percent and confirm the entry with the green button or cancel the entry by pressing the red button. The setting was changed.



To return to the home screen, press either the touch button **[Home]** in the navigation bar or the **[HOME]** key on the membrane-sealed keypad.

2. Application

The following settings can be changed in the Settings menu:

Temperature unit 	You can choose between °C and °F. <i>Setting options: °C / °F</i>
Language 	Select the desired operating language. <i>Setting options: German, English, Italian, French, Spanish, Portuguese, Swedish, Dutch, Turkish, Russian, Polish, Croatian, Trad. Chinese, Mandarin Chinese, Finnish, Norwegian, Slovenian, Czech, Slovakian, Hungarian, Indian (Hindi), Japanese, Korean, Arabic, Iranian (Farsi), Serbian</i>
Volume 	Select the desired volume of the acoustic signals <i>Off / 10–100% in 10% steps</i>
Melody 	Select the desired melody for the acoustic signal. <i>Setting options: Melody 1 to 20</i>
Time 	Setting the current time <i>Setting options: hh:mm:ss</i>
Date 	Setting the current date <i>Setting options: according to the set date format</i>
Date format 	Setting the date format <i>Setting options: DD.MM.YYYY; MM.DD.YYYY</i>
Automatic power-saving mode 	Here, the automatic power-saving mode can be activated. If the automatic power-saving mode is activated and there is no action on the display during 15 minutes, the display brightness will be reduced to 20%. If the furnace is in stand-by mode, the OSD system will be switched off additionally and the Power Save Screen will be displayed. Tapping the display will make the Power Save Screen disappear, the OSD system will be switched on and the user-defined display brightness will be restored. <i>Setting options: On / Off</i>
OSD system 	Here, the OSD can be switched on or off <i>Setting options: On / Off</i>
Display brightness 	Setting the display brightness <i>Setting options: 20–100% in 10% steps</i>
User code 	The user code can be individually changed. <div> It is recommended to make a note of the changed user code and keep it separately. If forgotten, the user code may only be reset with the help of After Sales Service. <i>Setting options: 1000 to 9999</i></div>

Protocolling



If this function is activated, the program data are saved as a protocol entry after every firing procedure. The following protocol settings are available:

Inactive: Protocolling is not active.

PC: At the end of the program, the parameters used are logged and saved in the furnace. If the furnace is connected to the PrograBase software, the saved table entries are synchronized with the connected laptop/PC. Protocols can be edited, saved and printed by means of the PrograBase software.

Table: At the end of the program, the parameters used are logged and saved in the furnace. The data can be viewed via the Diagnosis menu. PrograBase X10 is required to transfer protocol data to the PC.

Setting options: Inactive / PC / Table

Laboratory name



The laboratory name can be entered here. It is automatically added to the protocols.

Setting option: Laboratory name entry

Calibration interval



Setting for the notification as to when the next calibration should be conducted.

Setting options: 1 / 3 / 6 / 12 months

Reset to factory settings



If this function is executed, all programs and settings are reset to the status before the initial start-up. This function can only be executed by entering the user code.

Setting option: Execute

WLAN



A WLAN connection can be set-up with this function.

→ See the next chapter for more details.

Keypad tone



Here, the keypad tone can be activated.

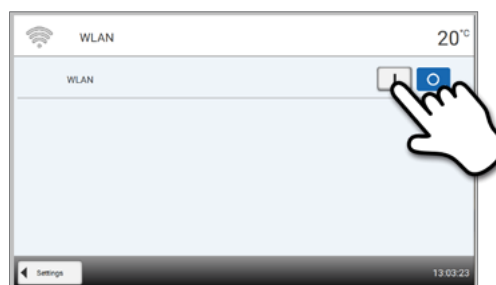
Setting options: On / Off

Setting up a WLAN connection

A WLAN connection can be set-up in the Settings menu. This function is only available if the Programat WLAN flash drive has been connected with the furnace. The set-up requires only a few steps:

Step 1:

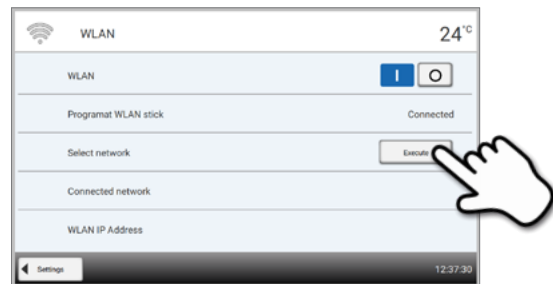
Turn the WLAN on.



2. Application

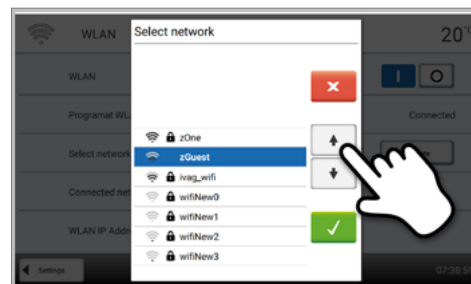
Step 2:

Press the [Execute] button to show available WLAN networks.



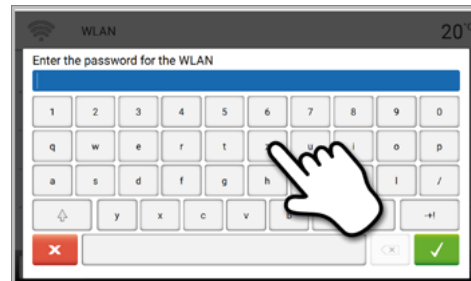
Step 3:

Select the desired network.



Step 4:

Enter the WLAN password and confirm with the green button or abort the entry with the red button.

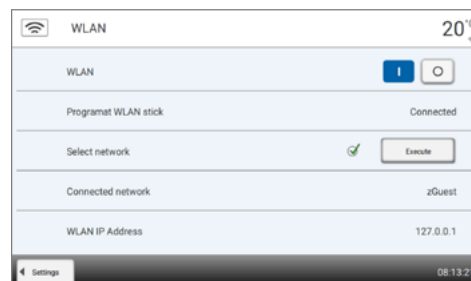


Step 5:

The WLAN connection was successfully set-up.

Only 2.4 GHz networks with the following security standards are supported:

- WEP 64-bit
- WEP 128-bit
- WPA-PSK TKIP
- WPA-PSK AES
- WPA2-PSK TKIP+AES
- WPA2-PSK AES



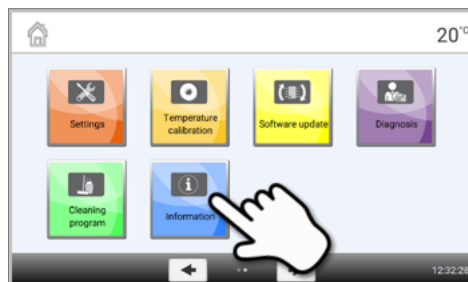
After the initial set-up of the WLAN connection, the furnace automatically connects with the network last used at every new start, provided the network is available.

2.2.4.2 Information

Step 1:

Opening information

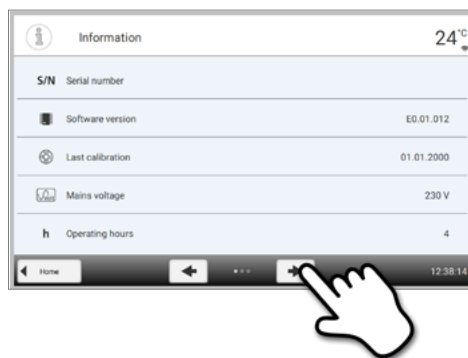
Scroll to page 2 in the home screen and press the **[Information]** button.



Step 2:




Reading the information

The information is displayed on several pages. The **[Arrow]** buttons are used to scroll to the next information page.



To return to the home screen, press either the touch button **[Home]** in the navigation bar or the **[HOME]** key on the membrane-sealed keypad.

The following information can be read off

Serial number S/N	Serial number of the furnace
Software version 	Currently installed software version of the furnace. Software updates are available from www.ivoclarvivadent.com/downloadcenter .
Last calibration 	Date of the last calibration
Mains voltage 	Currently measured mains voltage
Operating hours h	Number of operating hours
Firing hours h	Number of firing hours

2. Application

IP address IP	Indication of the IP address
WLAN IP address IP	Indication of the WLAN IP address
Internet connection IP	Indicates whether or not the furnace is connected to the internet
MAC address IP	Indication of the MAC address
WLAN MAC address IP	Indication of the WLAN MAC address
Frequency	Indication of the supply frequency in which the furnace is operated

2.2.4.3 Temperature calibration

The thermocouple of the furnace may be subject to changes which affect the furnace temperature, depending on the mode of operation and the frequency of use. Conduct the temperature calibration at least every six months.

Calibration with the temperature control rings permits the verification of the temperatures in the temperature range of 1500 °C / 2732 °F (MTH) required for sintering in the sintering chamber.

The temperature control ring changes its dimensions during calibration due to shrinkage. The shrinkage of the temperature control ring is decisive for the correction value of the furnace and can be found on the conversion table (enclosed in the Temperature Checking Set).

For calibration, you need temperature control rings, a measuring device (sliding calipers) and a conversion table (enclosed in the Temperature Checking Set).



Perform the temperature calibration only when the furnace is cold.

Temperature calibration requires only few steps:

Step 1:

Open temperature calibration

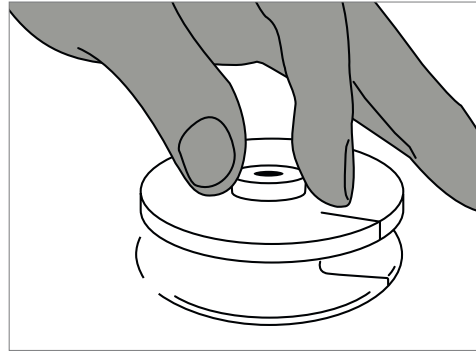
Scroll to page 2 in the home screen and press the **[Temperature calibration]** button.



Step 2:

Place temperature control ring

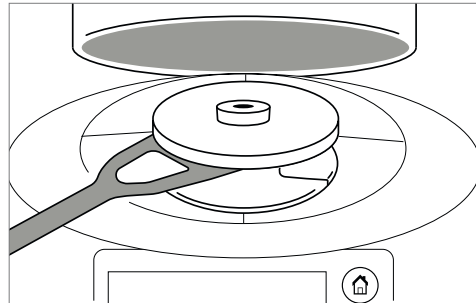
Open the furnace head by pressing the **[Open furnace head]** key and place the temperature control ring MTH in the centre of the sintering tray with the imprint facing up.



Step 3:

Place the sintering tray with the temperature control ring

The sintering tray is placed in the centre of the furnace by means of the sinter tray fork.



Always make sure that the correct temperature control ring MTH is used. The use of an incorrect temperature control ring results in damage to the sintering tray.

Step 4:

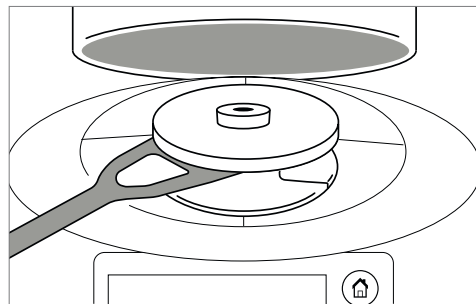
Start temperature calibration program

Press the **[Start]** button to start the calibration program. The remaining time is shown in the display.

Step 5:

Remove the sintering tray with the temperature control ring

After the end of the program, carefully remove the sintering tray with the sintered temperature control ring by means of the sinter tray fork and leave it on the cooling tray to cool to room temperature.



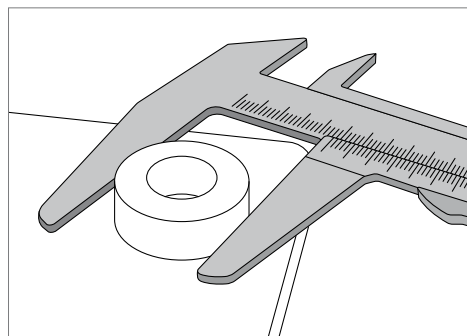
2. Application

Step 6:

Measure the diameter

Place the cool temperature control ring on an even surface with the imprint facing down. Measure the exact diameter near the bottom using sliding calipers. Make sure that the temperature control ring is exactly touching the two arms of the sliding calipers. Measure the diameter of the ring in three different places by turning it by approximately 120° between measurements. Use the smallest of the measured diameters for the calibration.

Optionally, the Programat Calibration Measuring Aid can be used. For more detailed information, see the packaging insert of the Programat Measuring Aid.



Step 7:

Find the diameter in the conversion table

Find the measured diameter in the conversion table and read off the necessary correction.

The calibration value is the difference between the measured current temperature and the desired set temperature.

Current table °C		Target at conversion °C	
Current diameter °C	Table diameter °C	Table diameter °C	More at conversion °C
1000	4.0	1000	0
1000	4.5	1000	0
1000	5.0	1000	0
1000	5.5	1000	0
1000	6.0	1000	0
1000	6.5	1000	0
1000	7.0	1000	0
1000	7.5	1000	0
1000	8.0	1000	0
1000	8.5	1000	0
1000	9.0	1000	0
1000	9.5	1000	0
1000	10.0	1000	0
1000	10.5	1000	0
1000	11.0	1000	0
1000	11.5	1000	0
1000	12.0	1000	0
1000	12.5	1000	0
1000	13.0	1000	0
1000	13.5	1000	0
1000	14.0	1000	0
1000	14.5	1000	0
1000	15.0	1000	0
1000	15.5	1000	0
1000	16.0	1000	0
1000	16.5	1000	0
1000	17.0	1000	0
1000	17.5	1000	0
1000	18.0	1000	0
1000	18.5	1000	0
1000	19.0	1000	0
1000	19.5	1000	0
1000	20.0	1000	0
1000	20.5	1000	0
1000	21.0	1000	0
1000	21.5	1000	0
1000	22.0	1000	0
1000	22.5	1000	0
1000	23.0	1000	0
1000	23.5	1000	0
1000	24.0	1000	0
1000	24.5	1000	0
1000	25.0	1000	0
1000	25.5	1000	0
1000	26.0	1000	0
1000	26.5	1000	0
1000	27.0	1000	0
1000	27.5	1000	0
1000	28.0	1000	0
1000	28.5	1000	0
1000	29.0	1000	0
1000	29.5	1000	0
1000	30.0	1000	0
1000	30.5	1000	0
1000	31.0	1000	0
1000	31.5	1000	0
1000	32.0	1000	0
1000	32.5	1000	0
1000	33.0	1000	0
1000	33.5	1000	0
1000	34.0	1000	0
1000	34.5	1000	0
1000	35.0	1000	0
1000	35.5	1000	0
1000	36.0	1000	0
1000	36.5	1000	0
1000	37.0	1000	0
1000	37.5	1000	0
1000	38.0	1000	0
1000	38.5	1000	0
1000	39.0	1000	0
1000	39.5	1000	0
1000	40.0	1000	0
1000	40.5	1000	0
1000	41.0	1000	0
1000	41.5	1000	0
1000	42.0	1000	0
1000	42.5	1000	0
1000	43.0	1000	0
1000	43.5	1000	0
1000	44.0	1000	0
1000	44.5	1000	0
1000	45.0	1000	0
1000	45.5	1000	0
1000	46.0	1000	0
1000	46.5	1000	0
1000	47.0	1000	0
1000	47.5	1000	0
1000	48.0	1000	0
1000	48.5	1000	0
1000	49.0	1000	0
1000	49.5	1000	0
1000	50.0	1000	0
1000	50.5	1000	0
1000	51.0	1000	0
1000	51.5	1000	0
1000	52.0	1000	0
1000	52.5	1000	0
1000	53.0	1000	0
1000	53.5	1000	0
1000	54.0	1000	0
1000	54.5	1000	0
1000	55.0	1000	0
1000	55.5	1000	0
1000	56.0	1000	0
1000	56.5	1000	0
1000	57.0	1000	0
1000	57.5	1000	0
1000	58.0	1000	0
1000	58.5	1000	0
1000	59.0	1000	0
1000	59.5	1000	0
1000	60.0	1000	0
1000	60.5	1000	0
1000	61.0	1000	0
1000	61.5	1000	0
1000	62.0	1000	0
1000	62.5	1000	0
1000	63.0	1000	0
1000	63.5	1000	0
1000	64.0	1000	0
1000	64.5	1000	0
1000	65.0	1000	0
1000	65.5	1000	0
1000	66.0	1000	0
1000	66.5	1000	0
1000	67.0	1000	0
1000	67.5	1000	0
1000	68.0	1000	0
1000	68.5	1000	0
1000	69.0	1000	0
1000	69.5	1000	0
1000	70.0	1000	0
1000	70.5	1000	0
1000	71.0	1000	0
1000	71.5	1000	0
1000	72.0	1000	0
1000	72.5	1000	0
1000	73.0	1000	0
1000	73.5	1000	0
1000	74.0	1000	0
1000	74.5	1000	0
1000	75.0	1000	0
1000	75.5	1000	0
1000	76.0	1000	0
1000	76.5	1000	0
1000	77.0	1000	0
1000	77.5	1000	0
1000	78.0	1000	0
1000	78.5	1000	0
1000	79.0	1000	0
1000	79.5	1000	0
1000	80.0	1000	0
1000	80.5	1000	0
1000	81.0	1000	0
1000	81.5	1000	0
1000	82.0	1000	0
1000	82.5	1000	0
1000	83.0	1000	0
1000	83.5	1000	0
1000	84.0	1000	0
1000	84.5	1000	0
1000	85.0	1000	0
1000	85.5	1000	0
1000	86.0	1000	0
1000	86.5	1000	0
1000	87.0	1000	0
1000	87.5	1000	0
1000	88.0	1000	0
1000	88.5	1000	0
1000	89.0	1000	0
1000	89.5	1000	0
1000	90.0	1000	0
1000	90.5	1000	0
1000	91.0	1000	0
1000	91.5	1000	0
1000	92.0	1000	0
1000	92.5	1000	0
1000	93.0	1000	0
1000	93.5	1000	0
1000	94.0	1000	0
1000	94.5	1000	0
1000	95.0	1000	0
1000	95.5	1000	0
1000	96.0	1000	0
1000	96.5	1000	0
1000	97.0	1000	0
1000	97.5	1000	0
1000	98.0	1000	0
1000	98.5	1000	0
1000	99.0	1000	0
1000	99.5	1000	0
1000	100.0	1000	0

Step 8:

Enter the calibration value

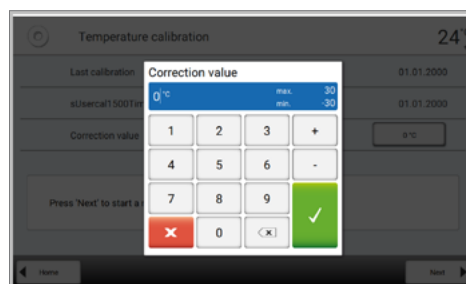
If the temperature difference is higher than 10 °C, the calibration value can now be entered into the furnace. The correction value must be added to the current value of the furnace. If the temperature difference is lower than 10 °C, no correction should be made.

Example 1:

Current calibration value of the furnace is 7
Value according to the conversion table is 6
New calibration value of the furnace is 13 (7+6)

Example 2:

Current calibration value of the furnace is -8
Value according to the conversion table is 7
New calibration value of the furnace is -1 (-8+7)



Step 9:

Complete the calibration

Calibration is now complete. Close the furnace head or select a program.



To return to the home screen, press either the **[Home]** button in the navigation bar or the **[HOME]** key on the membrane-sealed keypad.

2.2.4.4 Software update

Software updates can be easily installed on the furnace by means of a USB flash drive. A USB flash drive, which contains a current software file is required. The software version on the USB flash drive must be higher than the one installed on the furnace (see Information menu).

Free software updates for Programat furnaces are available from www.ivoclarvivadent.com/downloadcenter.



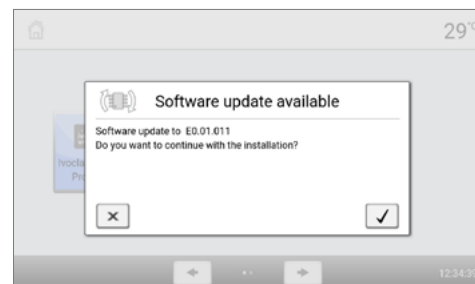
If you would like to conduct a data backup before installing a software update you can do so with the help of the PrograBase X10 computer software.



Only USB / WLAN flash drives from Ivoclar Vivadent may be connected to the USB interface (no hubs, extension cables or similar).

If a USB flash drive with a new software version is connected, a pop-up window will appear on the screen that will guide you through the update.

As an alternative, the software update can be installed with the following steps:



Step 1:

Open Software update

Scroll to page 2 in the home screen and press the button **[Software update]**.

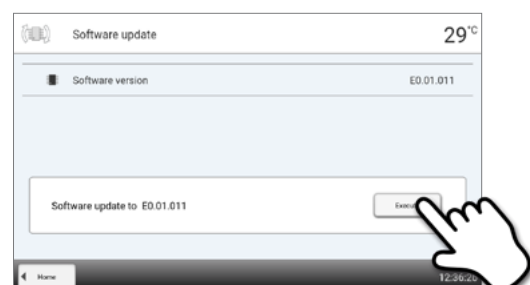


Step 2:

Conduct Software update

If the USB flash drive with the software file is already connected, the furnace automatically searches for a valid software file. If the USB flash drive has not yet been connected with the furnace, do so now.

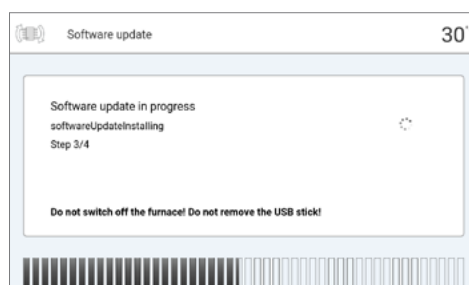
Press the **[Execute]** button.



2. Application

Step 3:


The status bar shows the progress of the update.




Step 4:

End Software update

The following messages are displayed:

 Software update successful

 Software update failed



The furnace has to be switched off by means of the mains switch at the rear of the furnace and switched on again after a waiting time of five seconds to complete the software update.

Important information



Please note that modified Ivoclar Vivadent programs may be overwritten during a software update. Individual programs are not affected and will not be overwritten.

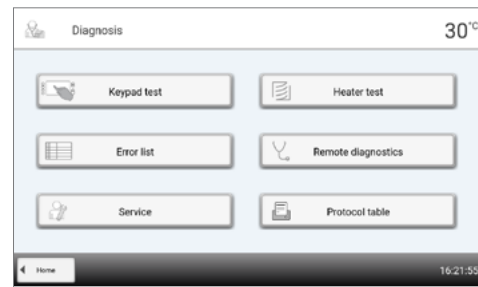
2.2.4.5 Diagnosis

Scroll to page 2 in the home screen and press the **[Diagnosis]** button.



The following functions are available in the Diagnosis menu:

- Keypad test
- Error list (saved error messages)
- Service
- Heater test
- Remote diagnostics
- Protocol table



Tests (test programs)

– Heater test

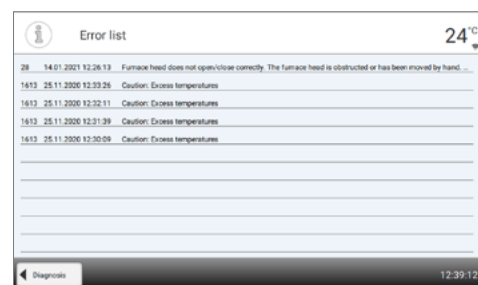
The heater test automatically checks the heating system (duration: approximately 10 minutes). The test should only be conducted with the empty sintering chamber, since an object in the chamber (e.g. sintering tray) may influence the test result.

– Keypad / touch test

Each time the keypad or the touch buttons are pressed, a short acoustic signal sounds to confirm its function.

Error list

Every error message is saved in an error table after it occurred. The **[Arrow]** buttons are used to scroll through the list. The last 22 error messages are displayed.



Remote diagnostics

The remote diagnostics function helps you in case of a possible problem with your Programat furnace and facilitates the communication between users and the Ivoclar Vivadent After Sales Service.

If the diagnostics function is executed, the furnace generates a diagnostic file, which is automatically saved on the USB flash drive. The file can be forwarded by e-mail or analyzed by means of PrograBase X10 on a laptop computer / PC.

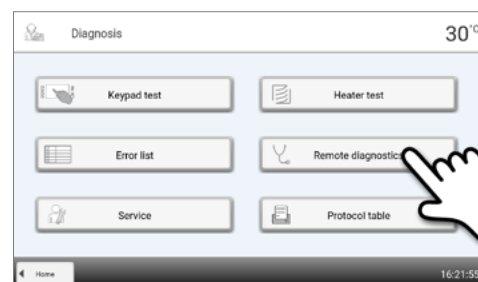
The diagnostic file provides furnace information (e.g. installed software version, set modes, etc.), operating data (e.g. operating hours, firing hours, etc.), calibration data (e.g. calibration values, date of the last calibration, etc.), test results and saved error messages.

The diagnostic file can be generated in only a few steps:

Step 1:

Open the diagnostics function

Press the **[Remote diagnostics]** button in the Diagnosis menu

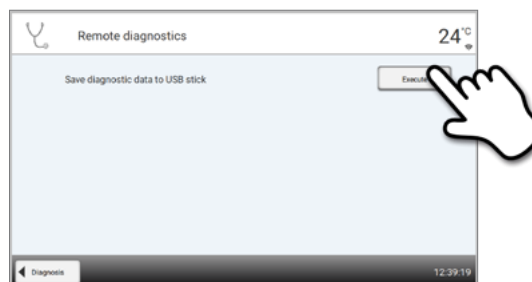


2. Application

Step 2:



Generate a diagnostic file

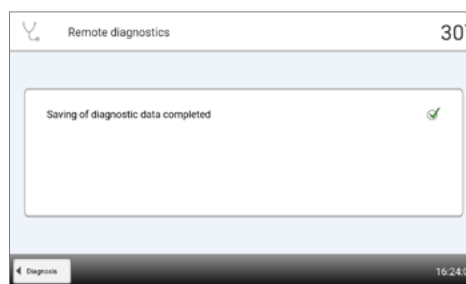
Connect a USB flash drive with the furnace. Press the **[Execute]** button.



Step 3:

Once the diagnostic file has been generated, one of the following messages is displayed:

-  Diagnostic data backup complete
-  Diagnostic data backup failed



Step 4:

Forward or analyze the diagnostic file

Connect the USB flash drive with a PC. The file can now be analyzed by means of the PrograBase X10 software or sent to any e-mail address.

If the furnace is connected with a PC via Ethernet, the file can also be directly opened, forwarded or analyzed by the PrograBase X10 software.



The furnace may only be used with the supplied Ethernet cable or an equivalent replacement ethernet cable!

Protocol table

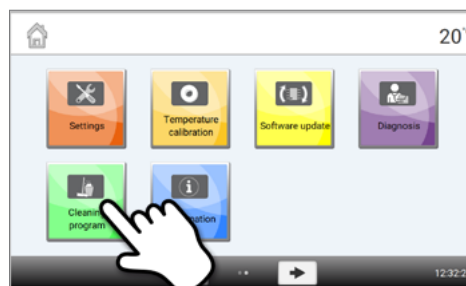
If the protocolling function has been activated in the Settings menu (see Chapter 2.2.4.1), the last 20 programs are saved in the protocol table. The saved protocols can be printed from this table, sent to a PC, or deleted.

Service

This menu is code-protected and is only used by Ivoclar Vivadent After Sales Service.

2.2.4.6 Cleaning program

Scroll to page 2 in the home screen and press the **[Cleaning program]** button.



Cleaning program

The cleaning program is used to clean the heating elements (duration: approx. 325 min.).

After a cleaning program, it is recommended to calibrate the furnace.

In case of problems with discolouration of the ceramic, we recommend cleaning the sinter tray rest (21).

2.3 Practical use

The operating procedure will be explained with the help of two examples: one Ivoclar Vivadent program and one individual program. The correct loading of the sintering chamber is described beforehand.


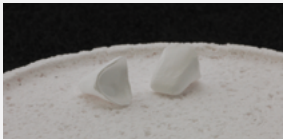
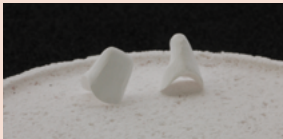


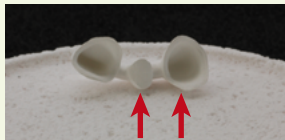


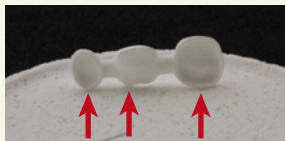
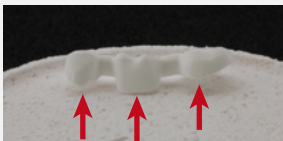
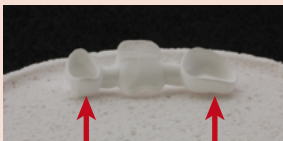
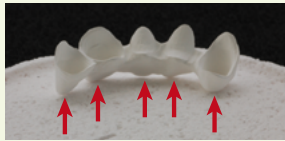
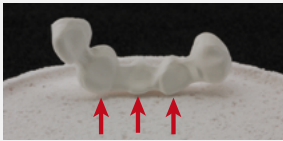
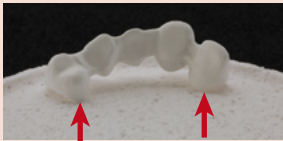
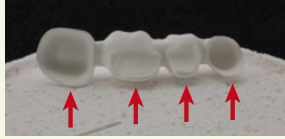
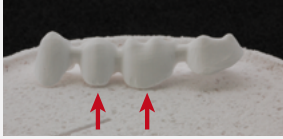


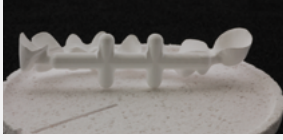
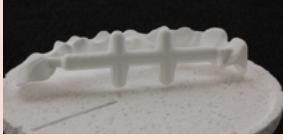
2.3.1 Correctly loading the furnace

Sintering is one of the most important processes during the fabrication of zirconium oxide restorations. During this process, the porous white body is turned into a densely sintered restoration by the effect of high temperatures. Only this fabrication step creates the final properties, such as the high strength and translucency. To achieve optimum mechanical and optical properties, it is absolutely mandatory that the defined sintering temperatures and times are observed at all times. Too low or too high sintering temperatures and/or too short or too long sintering times negatively affect the above properties. The sintering programs of the Programat S2 sintering furnace from Ivoclar Vivadent are ideally coordinated with the optical and mechanical properties of IPS e.max ZirCAD restorations and lead to the best possible results.

- Restorations infiltrated with Colouring Liquids must be completely dry to prevent damage to the furnace and/or the object.
- In principle, sintering beads are not recommended for the Programat S2 sintering furnace from Ivoclar Vivadent.
- The restorations must not come into contact with each other during sintering.
- The correct program selection must be observed.
- Always keep the sintering accessories clean and free of dust so that no contamination of the sintered restorations occurs.
- Make sure that the appropriate sintering support structure is selected for the respective furnace system.

In general, the following aspects should be taken into consideration when sintering in the Programat S2:

- The sintering tray can be fully loaded with restorations.
- Simultaneous sintering of crown and bridge frameworks as well as restorations with a sintering support structure is possible.
- For sintering without distortions, the restorations must be evenly supported.
- Bridge constructions should not be exclusively supported by the final abutment crowns. Preferably provide support to the pontics. The abutment crowns do not necessarily have to come into contact with the sintering tray.
- Ideally, bridge constructions should be positioned in concentric circles on the sintering tray.
Note: Do not place any restorations over the groove in the sintering tray!
- Place the loaded sintering tray in the intended position in the centre of the Programat S2 using the sinter tray fork.

	✓ correct	o.k.	✗ incorrect
Single-tooth anterior restorations	 Place the restorations on their labial surface.	 Place the restorations on their oral surface.	 Do not place the restorations on the crown margins.
Single-tooth posterior restorations	 Place the restorations on their occlusal surface.		 Do not place the restorations on the crown margins.
Three-unit anterior restorations	 Place the restorations on their labial surface and provide support to the pontic. If the restoration "tilts", select an alternative position.	 Position the restorations on the incisal edges. The pontic must also rest on the sintering tray.	 Do not support the restorations exclusively at the marginal edges.
Three-unit posterior restorations	 Place the restorations on the buccal or oral surfaces depending on the curvature. Abutment crowns do not have to come into contact with the sintering tray. The pontic must be supported.	 Do not support the restorations exclusively at the crown margins. The pontic must be supported on the basal side.	 If the pontic does not support the restoration, the restoration must not be positioned on the occlusal surface.
Anterior restorations with 4 units and more	 Place the restorations on their incisal surfaces. Make sure the pontics are supported.	 Depending on the curvature, the framework can be placed on its labial surfaces. All the pontics must come into contact with the sintering tray. Abutment crowns do not have to come into contact with the sintering tray.	 Do not support the restorations exclusively at the marginal edges on the sintering tray.
Posterior restorations with 4 units and more	 Depending on the curvature, the restorations can be placed on their buccal surfaces. All the pontics must come into contact with the sintering tray. Abutment crowns do not have to be supported on the sintering tray.	 Do not support the restorations exclusively at the crown margins. The pontics must be supported on the basal side.	 If the pontics do not support the restoration, the restoration must not be positioned on the occlusal surface.
Restoration with sintering support structure	 Place the restoration upright on the sintering tray with the sintering support structures resting on the tray.	 The restoration can also be placed on the sintering support structure and/or the incisal or occlusal surfaces of the pontics. Align the sintering support structure with the centre of the sintering tray.	 Do not support the restoration at the crown margins.

↑ Points of contact of the restoration with the sintering tray.

i Please observe the different pre-drying times of ZrO₂ objects. They depend on the size of the restoration and the pre-drying temperature. For more detailed information, please refer to the Instructions for Use of the corresponding material.

2. Application



If the colouring liquids are used, several points must be observed:

- The restorations stained with Colouring Liquid must be adequately pre-dried in a pre-drying furnace. Air drying is not sufficient in these cases and may result in cracks in the object during the sintering process.
- After the sintering process, clean contaminated areas of the furnace with a soft cloth.
- In case of severe contamination of the sintering chamber or the insulation, conduct a cleaning firing.



Programat Dosto Tray

With the Programat Dosto Tray (103), the sintering capacity can be increased by up to 40% compared with the standard sintering tray. In this way, the sintering furnace is even more efficient in the dental laboratory.

Once the sintering process is completed, the sintering tray is removed from the furnace using the sinter tray fork. If the tray is placed on the cooling tray, make sure that it is securely positioned.



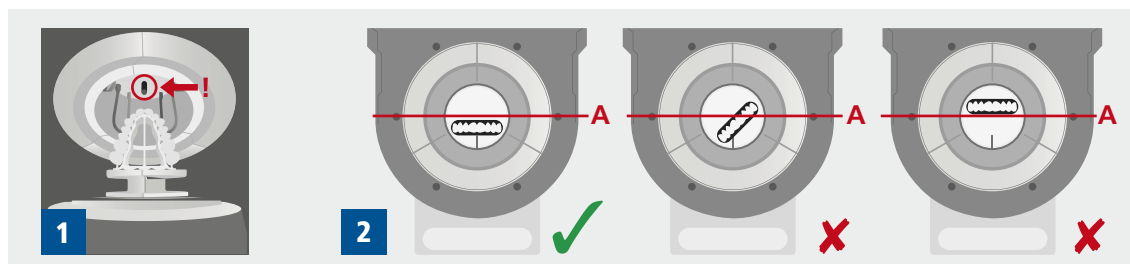
For safety reasons, always use the sinter tray fork when placing the sintering tray in or removing it from the furnace.

Important information to avoid any damage of the thermocouple (temperature sensor in the furnace head)

Please observe that for large bridge restorations with sintering support structures it is very important to ensure proper positioning in the Programat S2 sintering chamber to prevent damage to the thermocouple. Any damage to the thermocouple makes a precise firing impossible and may lead to device failure. Therefore, please observe the following points when loading the sintering chamber.

1. Use the standard sintering tray for larger restorations with support structures. Do not use the Programat Dosto Tray for these restorations.
2. Only restorations with a maximum height of 75 mm in upright position (image 1) should be placed in the sintering chamber with the standard sintering tray.
3. Align the restoration parallel to the red reference line (A) as shown in the picture. Please observe that the restoration is not placed above this reference line (A) (image 2).

Please observe these points to prevent damage to the thermocouple.

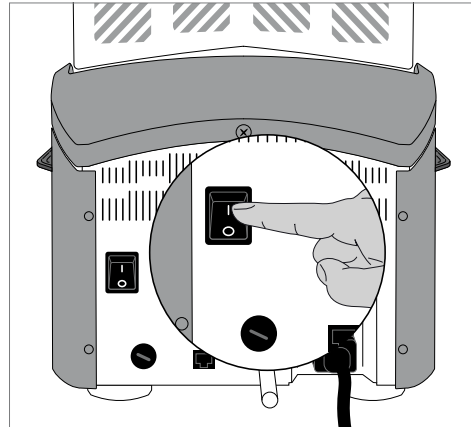


2.3.2 Sintering with an Ivoclar Vivadent program

Step 1:

Switch the furnace on

Switch on the furnace with the mains switch at the rear of the furnace. The furnace conducts an automatic self-test.



Step 2:

Select program type

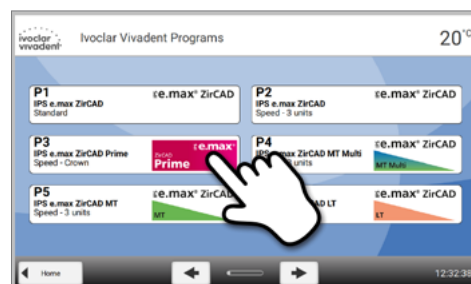
The program screen appears after the self-test has been completed. Select the program type Ivoclar Vivadent Programs.



Step 3:

Select the program

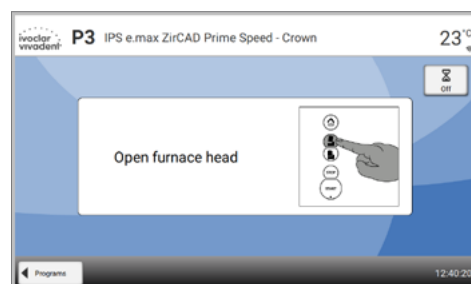
The program view of all Ivoclar Vivadent programs is shown. Select the desired program.



Step 4:

Open the furnace head

Open the furnace head by pressing the **[Open furnace head]** key.



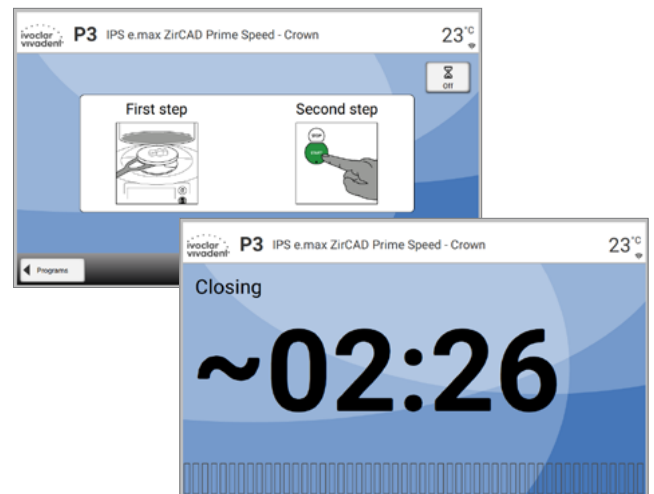
A program can only be started if the furnace head is open.

2. Application

Step 5:

Load the furnace and start the program

Place the loaded sintering tray in the furnace using the sinter tray fork and press the **[START]** key. The program is started and the LED lights up in green. The remaining time of the program is shown in the display.



Step 6:

Program end

The furnace head opens automatically at the end of the program.

The sintering tray is removed from the furnace using the sinter tray fork and placed on the cooling tray.

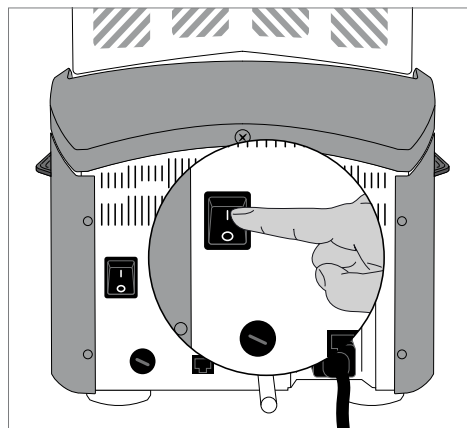
Allow the restoration to cool before further processing. If the Optical Status Display (OSD) lights up green, the furnace is ready for the next program start.

2.3.3 Sintering using an individual program

Step 1:

Switch the furnace on

Switch on the furnace with the mains switch at the rear of the furnace. The furnace conducts an automatic self-test.



Step 2:

Select program type

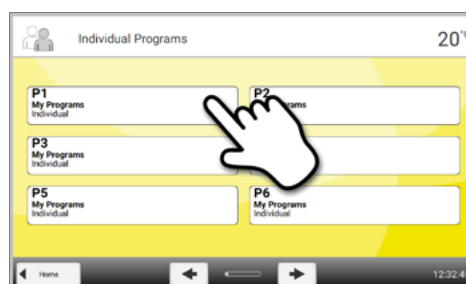
Select the program type for Individual Programs.



Step 3:

Select the program

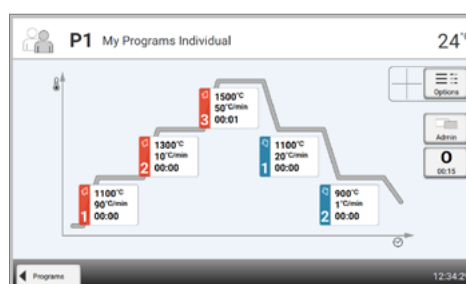
Select the desired individual program using the **[Arrow]** button.



Step 4:

Enter the parameters

Enter the individual parameters and create the desired program (see Chapter 2.2.2.4 for details).



2. Application

Step 5:

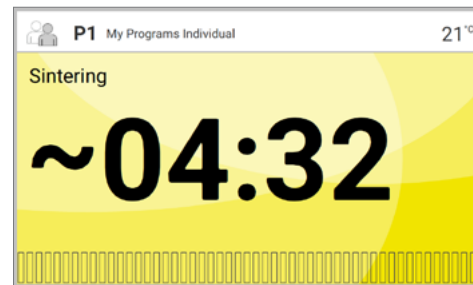
Load the furnace

Open the furnace head by pressing the **[Open furnace head]** key and place the loaded sintering tray in the furnace.

Step 6:

Start the program

Press the **[START]** button. The program is started and the LED lights up in green. The remaining time of the program is shown in the display.



A program can only be started if the furnace head is open.

Step 7:

Program end

The furnace head opens automatically at the end of the program. The sintering tray is removed from the furnace using the sinter tray fork and placed on the cooling tray.

Allow the restoration to cool before further processing. If the Optical Status Display (OSD) lights up green, the furnace is ready for the next program start.

3 Maintenance, Cleaning, Diagnosis

This chapter describes the user maintenance and cleaning procedures for the Programat S2. Only the tasks listed may be carried out by qualified dental technicians. All other tasks must be performed by qualified service personnel at a certified Ivoclar Vivadent Service Centre.

3.1 Monitoring and maintenance

The time for these maintenance procedures depends on the frequency of use and the working habits of the users. For that reason, the recommended times are only approximations.

Hazardous area	Part	When
Check all plug-in connections for correct fit.	Various external connections	weekly
Visually make sure that the thermocouple is straight. Do not touch the thermocouple in the process.	Thermocouple	weekly
Check the membrane-sealed keypad for visible damage. If the keypad is damaged, it has to be replaced by a certified Ivoclar Vivadent Service Centre.	Membrane-sealed keypad	monthly
Check if the furnace head opens smoothly and without excessive noise.	Furnace head opening mechanism	monthly
Check the insulation for cracks and damages. If the insulation is worn down, it has to be replaced by a certified Ivoclar Vivadent Service Centre. Fine hairline cracks on the surface of the insulation are harmless and do not negatively affect the function of the furnace.	Insulation	monthly
Conduct temperature check: Use the Temperature Checking Set to check and adjust the temperature in the furnace.	Sintering chamber	every six months



This furnace has been developed for typical use in dental laboratories. If the product is used in continuous operation, premature ageing of the expendable parts is to be expected. Expendable parts include the heater and the gas pressure spring.

Expendable parts are not covered by the warranty. Please also observe the shorter service and maintenance intervals.

3. Maintenance, Cleaning, Diagnosis

3.2 Cleaning

The furnace may only be cleaned when it is cool, since there is a burn hazard. Do not use any cleaning solutions.



Disconnect power before cleaning.



Never clean with compressed air!

The following parts have to be cleaned from time to time:

Item	Frequency	Cleaning material
Cooling tray	Daily	Cleaning brush*
Sinter tray rest	Daily	Cleaning brush*
Membrane-sealed keypad and display	Weekly	Soft, dry cloth
Air vents	If required	Cleaning brush*
Furnace housing and furnace head	If required	Soft, dry cloth

*Never clean with compressed air!

Visual inspection of the sintering chamber

Inspect the sintering chamber visually prior to every sintering procedure. No foreign objects or dirt particles must be present in the sintering chamber during the sintering procedure. Contamination can occur, among other reasons, due to chipping of the oxide layer and/or protective layer of the heating element surface. This type of contamination may have an effect on the optical properties (discolouration) of the restoration. Contaminations resulting from chipping-off of the oxide layer can be classified as follows:

Type of contamination	Indicator	
Glass particles	The insulation of the lower part of the furnace / the sinter tray rest shows residue of clearly visible, glassy transparent particles.	
Fine glass dust	The insulation of the lower part of the furnace and the cooling tray show residue of fine glass dust. This type of contamination is more difficult to discern.	

If glass particles or fine glass dust are noticed during the visual inspection, the sintering chamber needs to be cleaned and a firing cycle with Program 1 (IPS e.max ZirCAD standard) must be conducted with an empty sintering chamber. For this cycle, no ZrO₂ objects must be placed in the furnace.

Cleaning of the sintering chamber

Use the enclosed cleaning brush for cleaning (102). Do not use compressed air under any circumstances. After cleaning, conduct a cycle with Program 1 (IPS e.max ZirCAD standard) with the sintering chamber empty. In case of severe contamination it is recommended to conduct the cleaning program. The sintering chamber must be empty for this purpose.

Cleaning of the heating elements

The cleaning program restores the chipped off oxide / protective layer on the heating elements. If no even protective layer on the heating elements is noticeable after the cleaning firing, it may be necessary to run the cleaning program several times in a row. The sintering chamber must be empty for this purpose. Clean the sintering chamber before running the cleaning program.

Large parts of the protective layer of the left heating element have chipped off. The heating element on the right side is in a sound, stable condition and shows an intact oxide / protective layer. The cleaning program must be repeated until the surface is free from contamination and appears glassy.



Error / Hint Nr.	Work can continue after the error	Error	Error message text
17		Power failure >10 s during a program in progress.	A program in progress was interrupted for more than 10 s. The program cannot be continued.
20**	No	Error in the heating system.	Check the heater fuse. If the fuse is O.K., contact your local Ivoclar Vivadent Service Centre.
27 **,***	No	Furnace head cannot be initialized.	Furnace head cannot reach its end position. The furnace head might be blocked by external mechanical influences! If this is not the case, contact your local Ivoclar Vivadent Service Centre.
28**		Furnace head does not reach the target position.	Furnace head does not open/close properly. The furnace head is obstructed or has been moved by hand. Operate the furnace head only with the keys intended for that purpose.
103		Program start blocked	Starting a program is not possible due to a technical malfunction.
107		Incorrect time settings (date / time)	The clock settings are incorrect. Please set a correct date and a correct time!

3. Maintenance, Cleaning, Diagnosis

700		Supply voltage outside the acceptable range	The supply voltage is outside the acceptable range. Check the supply voltage.
701 ***	No	Start-up aborted due to an error	The self-test of the furnace was interrupted by an error. It is not possible to work with the furnace! Switch the furnace off and on again, once the error has been rectified.
702		Short power failure during a program in progress.	A program in progress is interrupted by a short power failure. The program is being continued.
707		Incorrect supply voltage	The furnace is operated with the incorrect supply voltage. Make sure that the furnace is operated with the supply voltage indicated on the rating plate.
1310		Calibration reminder	Some time has passed since the last calibration. Conduct a calibration procedure soon.
1520		Software update: Invalid file	The file selected for the software update is invalid. The update cannot be conducted.
1522		Software update: Error during update	An error occurred during the software update. Do not turn off the device. Copy the update file to the USB flash drive again. Then retry to perform the update. If the error persists, please contact your local Ivoclar Vivadent Service Centre.
1600		T1 is invalid	Enter an acceptable value for T.
1601		$T2 < T1$	Enter an acceptable value for T.
1602		$T3 < T2$ for $T2 > 0$, $T3 > 0$ for $T2=0$	Enter an acceptable value for T.
1603		$T4 > T_x$ ($T1, T2, T3$)	Enter an acceptable value for T.
1604		$T5 > T4$	Enter an acceptable value for T.
1605		Gradient 3 too large	If the holding temperature T3 is higher than 1530 °C, the gradient t3 must not exceed 10 °C/min.
1613**		Actual temperature after Start $> T_x + 80\text{ °C} / 176\text{ °F}$	Caution excess temperature!
1626		Current temperature $> 700\text{ °C} / 1292\text{ °F}$ upon Start	The sintering chamber is too hot for the start of a program.
1659		Error Power Unit	Power Unit communication error! Check the fuse and the plug-in connections to the furnace head. Then switch the furnace off and on again. If the error persists, contact your local Ivoclar Vivadent Service Centre.

1660		Opening furnace head is not possible	The temperature is too high to open the furnace head. Wait until the sintering chamber has cooled down further.
1661		Power outage >10 s with the sintering program started and in the heating stage	A long power failure occurred during the heating phase. The program cannot be continued. Please restart the program.
1662		Power out >10 s with the sintering program started and in the critical heating stage	A long power failure occurred during a critical process phase. The program cannot be continued. The restoration is possibly damaged.

* = Furnace head opens if this error occurs!

** = A running program will be aborted

*** = Error cannot be acknowledged – programs cannot be started

3.3 Stand-by

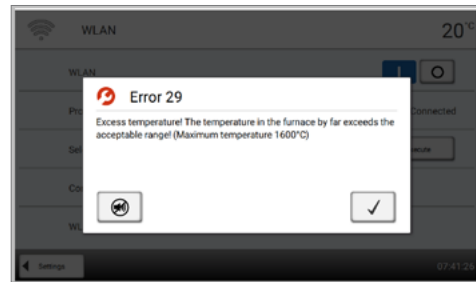
We recommend keeping the furnace head closed at all times to prevent damage.

Please contact the Ivoclar Vivadent After Sales Service Centre, if one of the following error numbers is being displayed:

25	29	43	44	45	54	56	143	144
145	530	531	532	705	706	1011	1012	1013
1014	1015	1016	1017	1018	1019	1024	1028	1202
1203	1204	1207	1500	1640	1641	1645	1647	1650
1651	1652	1653	1654	1655	1656	1657	1658	

4. What If....

This chapter will help you to recognize malfunctions and take appropriate measures.



4.1 Error messages

During operation, the furnace continuously monitors all the functions. If an error is detected, the respective error message is displayed.

The acoustic signal and the error message can be acknowledged with the corresponding buttons. The following error messages may be displayed. If there are any questions, please contact the Ivoclar Vivadent After Sales Service.

4.2 Technical malfunctions

These malfunctions may occur without an error message being displayed.

Error	Double-Check	Action
Display not illuminated	Is the furnace properly connected according to the Operating Instructions and switched on?	Correctly connect the furnace and switch it on.
Signal transmitter does not sound	Is the signal transmitter switched off (Volume = 0)?	Adjust volume
Incorrect or illogical temperature indication	Is the thermocouple properly connected?	Correctly connect the thermocouple.
Incorrect or illogical temperature indication	Is the thermocouple damaged?	*
Cracks in the insulation	Are the cracks small and insignificant (hairline cracks)?	Small cracks in the insulation do not negatively affect the performance of the furnace.
	Are the cracks large or have parts broken off?	*
Cracks in the heating element or heating element fractured	Are there cracks in the heating element or is the heating element fractured?	Switch off the furnace. *
Sintering result does not meet the expectations	Are the sintering parameters correct?	Set the parameters in accordance with the instructions by the material manufacturer.
	Was the furnace calibrated?	Conduct a furnace calibration.
	Is the thermocouple damaged?	*

* If there are any questions, please contact the Ivoclar Vivadent After Sales Service.

4.3 Repairs



Repairs may only be carried out by a certified Ivoclar Vivadent Service Centre. Please refer to the addresses on the last page of these Operating Instructions.

If repairs during the warranty period are not carried out by a certified Ivoclar Vivadent Service Centre, the warranty will expire immediately. Please also refer to the corresponding warranty regulations.



Unauthorized opening and removal of components can expose voltage-carrying components. The plugs may also be under voltage. There is a risk of electric shock!

4.3.1 Changing the fuse

Fuses may only be changed if the furnace is switched off and the power disconnected:

- Put the mains switch on Position 0 and disconnect the power cord.
- Disconnect the power cord from the furnace. Open the fuse holder using a slotted screwdriver.
- Replace the fuse in accordance with the indications on the rating plate. Use only original or equivalent fuses!
- Secure the fuse holder with the screw.
- Reconnect the power cord.

4.4 Reset to factory settings

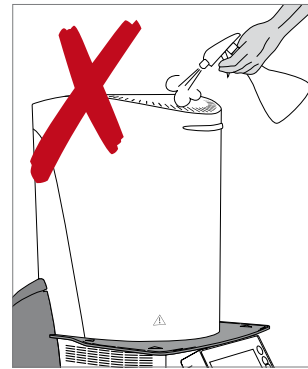
See Chapter 2.2.3

5 Safety Notes

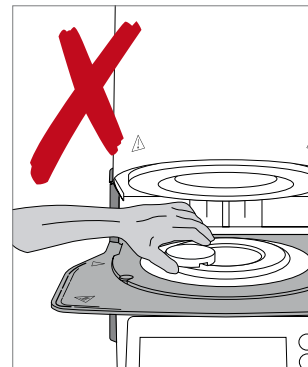


Risks and dangers

Make sure that no liquids or other foreign substances enter the furnace, since this may result in an electrical shock.



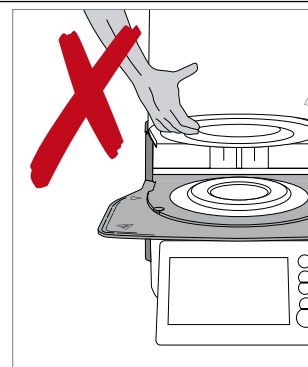
Never place objects in the sintering chamber by hand, since there is a burn hazard. Always use the sinter tray fork (accessories) supplied for this purpose.
Never touch the hot surface of the furnace head, as there is a burn hazard.



Do not carry the furnace by the cooling tray.



The furnace head has an electric drive and must be operated by means of the electronic controls. Never open the furnace head by hand, since the mechanism will be damaged.



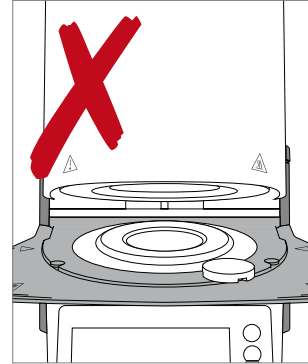
The furnace must not be operated if the heating element is damaged.
There is a risk of electric shock upon contact with the heating element!



Contraindications



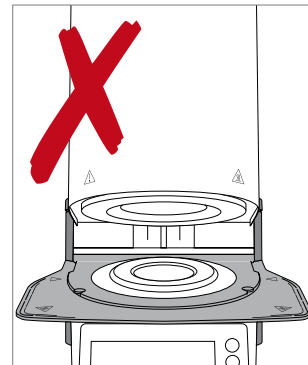
The sintering tray must not be placed in the area surrounding the sinter tray rest, since this will obstruct the closing of the furnace head.



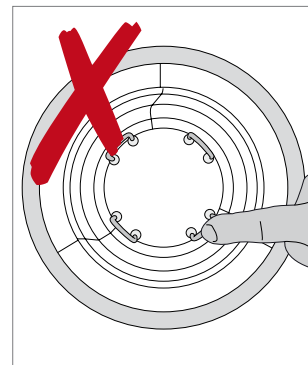
Foreign objects must not be placed on the furnace head or the air vents. Make sure that no liquids or other foreign objects enter the air vents, since this may result in an electrical shock.



Never use the furnace without a sintering tray.



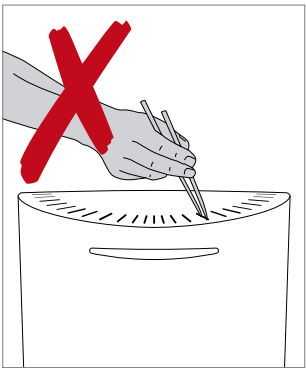
Do not touch the thermocouple. Avoid contact with the skin (grease contamination), as the parts may be prematurely damaged.



5. Safety Notes



Do not insert any foreign objects into the air vents. There is a risk of electrical shock.



This product contains ceramic fibres and may release fibre dust. Do not use compressed air, as this will distribute the dust in the environment, and observe the additional notes on page 56.



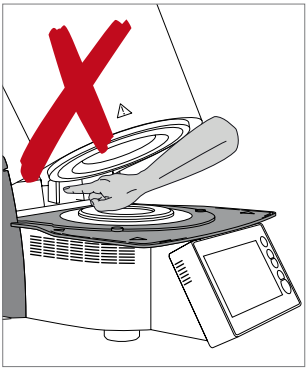
**Risk of crushing /
burn hazard**



Never reach under the furnace head with the hand or other parts of the body. There is a risk of crushing and a burn hazard.



Never reach inside the rear cover with the hand or particularly with the fingers. There is a risk of crushing.



Hazardous areas and safety equipment.

Description of the hazardous areas of the furnace:

Hazardous area	Type of risk
Sintering chamber	Burn hazard
Opening/closing mechanism	Risk of crushing
Electrical components (cables and connections)	Risk of electrical shock

Description of the safety equipment of the furnace:

Safety equipment	Protective effect
Protective conductor	Protection from fire and electrical shock in case of a malfunction
Electrical fuses	Protection from fire and electrical shock
Furnace housing and end caps	Protection from fire, electrical shock, burning and crushing



Do not block or touch movable parts. There is a risk of damaging the furnace or causing personal injury.

Safety information for the operation

The device may only be operated by authorized and trained technical personnel.

- Keep unauthorized persons, such as patients, children and animals, away from the device.
- In all cases of doubt regarding the safety of the device, switch off the device and take suitable measures to prevent further use.
- Prior to connecting the power or operation, check the device, the accessories and protective equipment for any damage.
- Do not use damaged, non-functioning equipment or accessories. Inform your authorized service partner.
- In order to ensure the product reliability and warranty services, the device must be exclusively operated with the original accessories, in particular the original power cord, from Ivoclar Vivadent.
- The user bears the risk when using non-approved accessories.
- To prevent damage to the device and a reduction of the device performance, observe the cleaning requirements and cycles.
- Only operate the device unsupervised if the operating conditions for unsupervised operation described below are fulfilled.

Unsupervised operation

The device may be operated unsupervised, provided the national and local laws and provisions allow for such action and provided that they are observed. Furthermore, the requirements of the respective insurance company must be met.

- Never use the device if the work environment is heavily soiled.
- Protect the device against unauthorized access.

5. Safety Notes

Safety notes

This device has been designed according to EN 61010-1 and has been shipped from the manufacturer in excellent condition as far as safety regulations are concerned. To maintain this condition and to ensure risk-free operation, the user must observe the notes and warnings contained in these Operating Instructions.

- The user must especially become familiar with the warnings and operating conditions to prevent injury to personnel or damage to materials. The manufacturer is not responsible for damage resulting from misuse or failure to observe the Operating Instructions. Warranty claims cannot be accepted in such cases.
- Before switching on the furnace, make sure that the voltage indicated on the rating plate complies with your local power supply.
- The mains socket must be equipped with a residual current operated device (FI).
- The power plug acts as a circuit breaker and may only be connected with an easy-to-access power socket with protective contact.
- Use only the supplied power cord.
- Place the furnace on a fire-proof table. Observe local regulations, (e.g. distance to combustible substances or objects).
- Always keep the air vents on the sides and at the rear of the furnace free from obstruction.
- Do not touch any parts that become hot during operation of the furnace. Burn hazard!
- When removing hot components from the sintering chamber (e.g. sintering tray), make sure to place them on a fire-proof surface.
- Clean the furnace only with a dry, soft cloth. Do not use any solvents! Disconnect power before cleaning and allow the furnace to cool down!
- The furnace must be cool before it is packed for transportation.
- Use original packaging for transportation purposes.
- Before calibration, maintenance, repair or change of parts, the power must be disconnected and the furnace must be cool if it needs to be opened.
- If calibration, maintenance or repair has to be carried out with the power connected and the furnace open, only qualified personnel who are familiar with the risks and dangers may perform the procedures.
- After maintenance, the required safety tests (high voltage resistance, protective conductor, etc.) must be carried out.
- Make sure that only fuses of the indicated type and rated current are used.
- Use only original spare parts.
- If it is assumed that safe operation is no longer possible, the power must be disconnected to avoid accidental operation.
- If the furnace is visibly damaged, the power must be disconnected to avoid accidental operation.
- Check the correct function of the device after storage under unfavourable conditions over an extended period of time.
- If the furnace does not work properly, the power must be disconnected to avoid accidental operation.
- The temperature range for faultless operation is +5 °C to + 40 °C (41 °F to 104 °F).
- If the furnace has been stored at very low temperatures or high atmospheric humidity, it must be left to dry or to adjust to room temperature for approx. 4 hours before it is operated (do not connect the power yet).
- The furnace is tested for use at altitudes of up to 2000 m above sea level.
- The furnace may only be used indoors.
- Before leaving the factory, the furnace functions were tested for several hours. It is therefore possible that these tests have caused slight discolouration of the insulation. Nevertheless, your Programat S2 is still a brand new furnace.



Any disruption of the protective conductor either inside or outside the furnace or any loosening of the protective conductor may lead to danger for the user in case of malfunction. Deliberate interruptions are not tolerated.



Materials developing harmful gases must not be fired!



This product contains ceramic fibres and may release fibre dust. Fibre dust has proved to be carcinogenic in animal experiments. The heating muffle may only be dismantled by a qualified After Sales Service Centre. Information regarding the Safety Data Sheet is also available from your After Sales Service Centre.

In the case of serious incidents related to the product, please contact
Ivoclar Vivadent AG, Bendererstrasse 2, 9494 Schaan/Liechtenstein
website: www.ivoclarvivadent.com,
and your responsible competent authority.

The current Operating Instructions are available in the download section of the Ivoclar Vivadent AG website
(www.ivoclarvivadent.com).

Disposal information

The product must be disposed of according to the corresponding national legal requirements.

6 Notes on Storage and Transportation

The furnace may only be transported as described in these Operating Instructions.

In order to avoid corrosion on the device and subsequent damage to the device, transport and store the device only within the permissible temperature range and ambient conditions.

Acceptable operating conditions	
Acceptable ambient temperature range	+5 °C to +40 °C (41 °F to 104 °F)
Acceptable humidity range	80% maximum relative humidity for temperatures up to 31 °C (87.8 °F), gradually decreasing to 50% relative humidity at 40 °C (104 °F); condensation excluded.
Acceptable altitude	The furnace is tested for use at altitudes of up to 2000 m above sea level.

Acceptable transportation and storage conditions	
Acceptable temperature range	-20 °C to +65 °C (41 °F to 104 °F)
Acceptable humidity range	Max. 80% relative humidity
Acceptable ambient pressure	500 mbar to 1060 mbar

Use only the original packaging together with the corresponding foam material for shipping purposes.

7 Technical Data

Power supply	118 – 240 V / 50 – 60 Hz
Overvoltage category	II
Contamination level	2
Acceptable voltage fluctuations	± 10%
Max. power consumption	16 A at 118 V 8 A at 240 V
Values of electrical fuses	118 – 240 V: T16 AH
Dimensions of electrical fuses	5 x 20 mm
Dimensions of the closed furnace Usable size of the sintering chamber	Depth: 490 mm Width: 303 mm / 380 mm (with cooling tray) Height: 570 mm ----- Diameter: 80 mm Height: 80 mm
Max. firing temperature	1600 °C
Weight	29 kg
Power supply	118 – 240 V / 50 – 60 Hz
Overvoltage category	II

7.1 Applied standards

The sintering furnace was tested in accordance with the following standards:

Device safety	IEC 61010-1:2010 IEC 61010-1:2010/AMD1:2016 EN 61010-1:2010/A1:2019 UL 61010-1:2012/R:2018-11 CAN/CSA-C22.2 No. 61010-1:2012/A1:2018-11
Electromagnetic compatibility	EN 61010-2-010:2020 IEC 61010-2-010:2019 UL 61010-2-010:2019 CAN/CSA-C22.2 No. 61010-2-010:2019
Radio protection / electromagnetic compatibility	EMC tested

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules and with Industry Canada's licence-exempt RSSs.

Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation.

This device is equipped with GPLv2 and GPLv3 components.

The complete list can be obtained from Ivoclar Vivadent.

8 Delivery Form

- Programat S2
- Power cord
- Sintering tray
- Sinter tray fork
- Operating Instructions
- WLAN Kit
- USB flash drive
- Spacer
- Programat Dosto Tray
- Cleaning brush
- Set of fuses
- Temperature Checking Set – Starter Kit
- Various accessories and information material

Accessories

627398 Sintering Furnace Temperature Checking Set MTH (1500 °C)
(refill package)

9 CE Declaration of Conformity



Declaration of conformity

Manufacturer Address Ivoclar Vivadent AG
Bendererstrasse 2
LI – 9494 Schaan
Liechtenstein

Product **Programat S2**

Type of material **Dental Laboratory Equipment**

Classification **Technical Device**

We herewith declare under our exclusive responsibility that the above mentioned products meet the provisions of the following EC Council Directives and its implementation in national law. All supporting documentation is retained on the premises of the manufacturer and, where applicable, the notified body.

Directives **2014/35/EU Low voltage directive**
2014/30/EU Electromagnetic compatibility
2011/65/EU RoHS

Standards EN 61010-1:2010/A1:2019
EN IEC 61010-2-010:2020

EN 61326-1:2013 (Group 1, Class B)
EN 61000-3-2:2019
EN 61000-3-3:2013+A1:2019

EN 50581:2012

Notified Body Address not applicable

Place, Valid from Schaan, 16.04.2021

Valid until 16.04.2026

Signature

Name

Position

Date

Markus Heinz

CPO Production & Logistics

16.04.2021

Gottfried Rohner

Director Equipment Development

16.04.2021

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Manufacturer:

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Bendererstrasse 2, 9494 Schaan/Liechtenstein
www.ivoclarvivadent.com

Version: 1

Date of issue: 2021-01

The device has been developed solely for use in dentistry. Start-up and operation should be carried out strictly according to the Operating Instructions. Liability cannot be accepted for damages resulting from misuse or failure to observe the Instructions. The user is solely responsible for testing the apparatus for its suitability for any purpose not explicitly stated in the Instructions.

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EN

