Programat® P500/G2



Operating Instructions

Valid as of Software Version 5.0

CE

ivoclar vivadent® technical

Dental Servis
Serdar Ayısıt
0555 274 05 51


Dental
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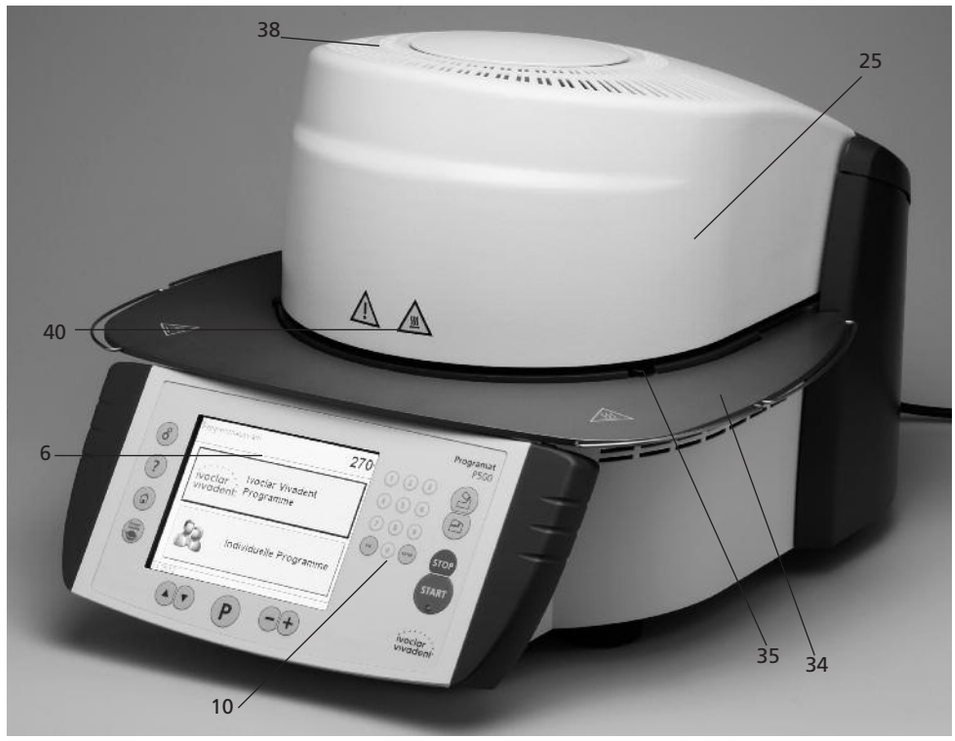
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List of Parts

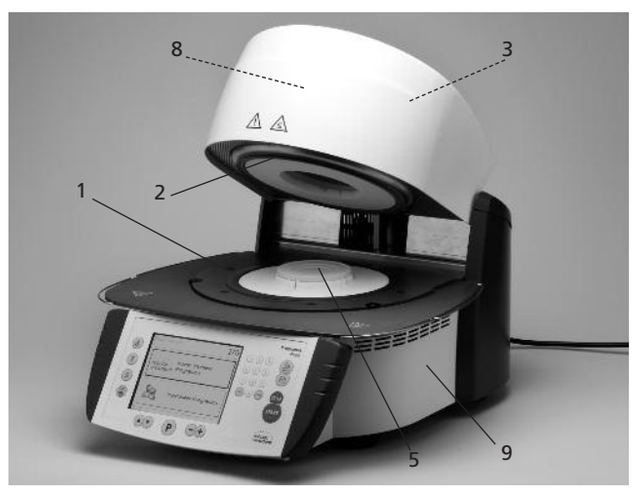
1 Sealing surface
2 Furnace head sealing ring
3 Insulation
4 Thermocouple
5 Firing plate
6 Touch screen
8 QTK heating muffle
9 Housing base
10 Keypad
11 On/Off switch
12 Heating element fuse
13 Vacuum pump fuse
15 Fuse holder
16 Power cord
17 Power socket
18 Vacuum pump socket
19 Rating plate
21 Vacuum hose connection
23 Rubber feet
25 Housing furnace head
26 Thermocouple plug
27 Plug fuse
28 Heater plug
29 Heater plug socket
30 Thermocouple plug socket
32 Leaf spring
33 Air vents (base)
34 Cooling tray
35 Screw for cooling tray
36 Hood
37 Knurled screw for hood
38 Air vents furnace head
39 Air vents rear panel
40 Warnings
41 Furnace head mounting mark
42 Furnace base mounting mark
43 Furnace head mounting
44 Quartz glass tube
46 Vacuum hose
47 Silicone washer
48 Firing plate holder
49 Thermocouple cable
50 Connecting rod axis
52 USB connection
53 USB interface
54 Plug-in console
55 Operating unit fixture

Please note that the list of parts applies to the entire Operating Instructions. These parts and their numbers are often referred to in later chapters.

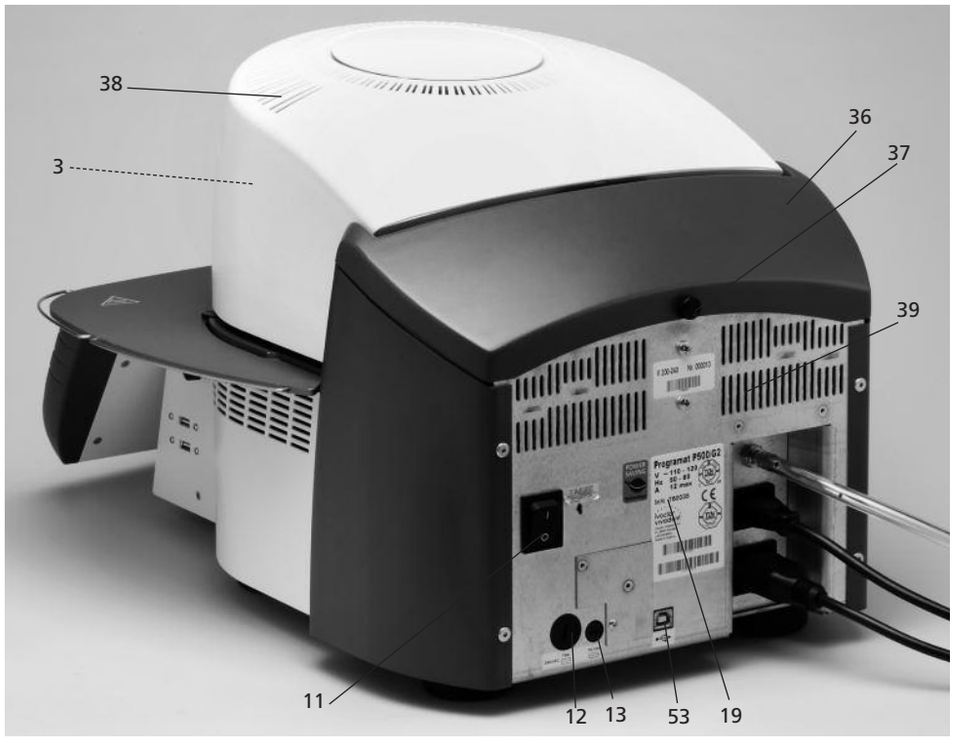
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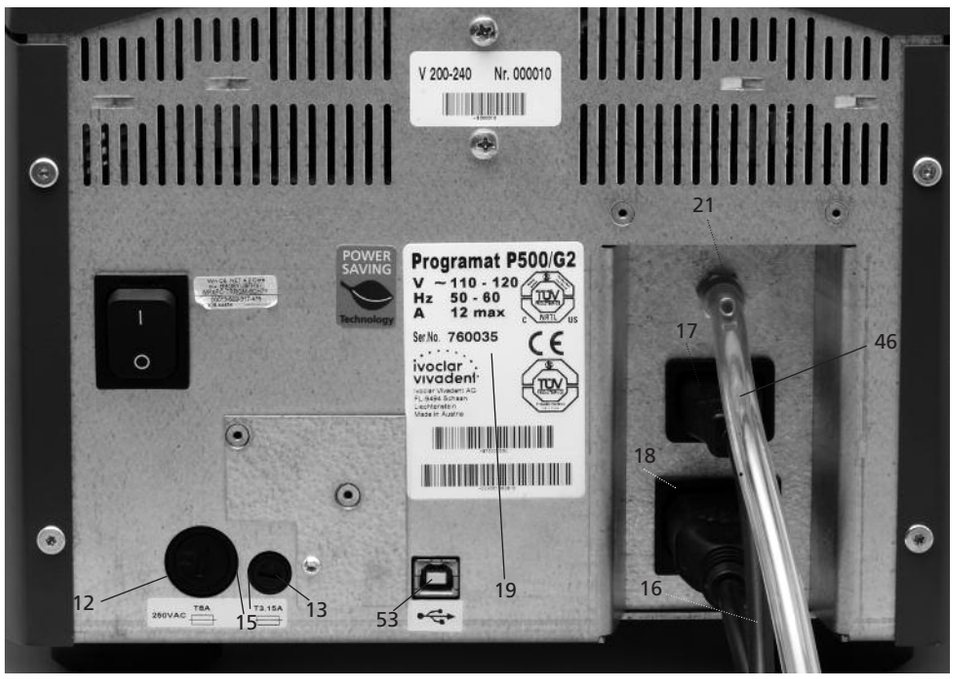


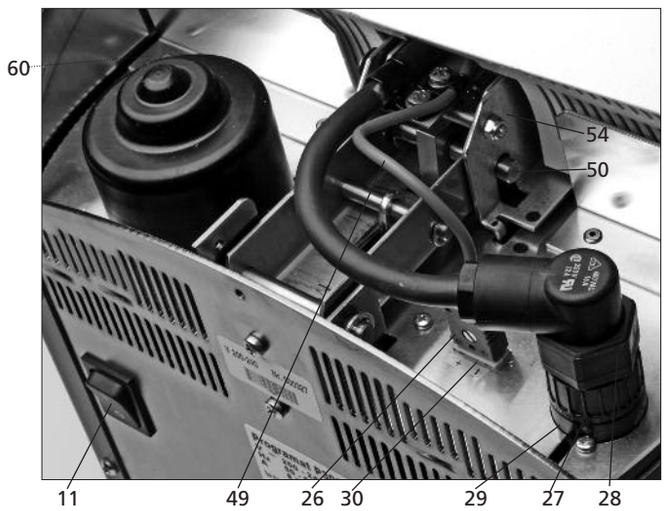


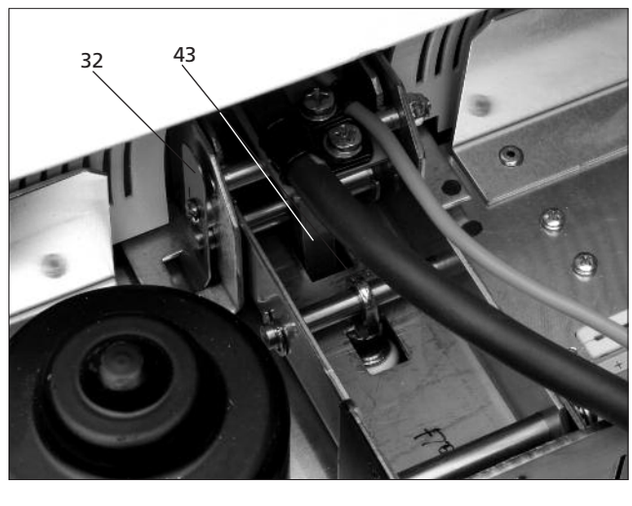


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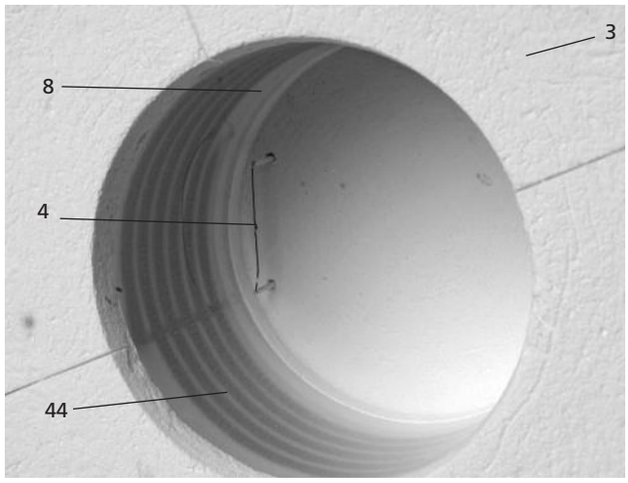


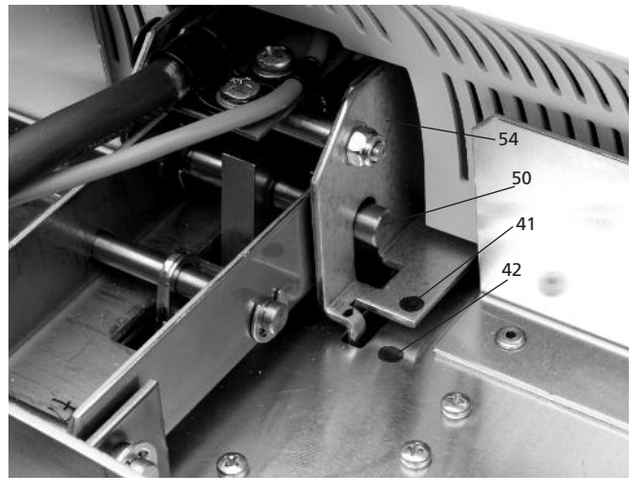






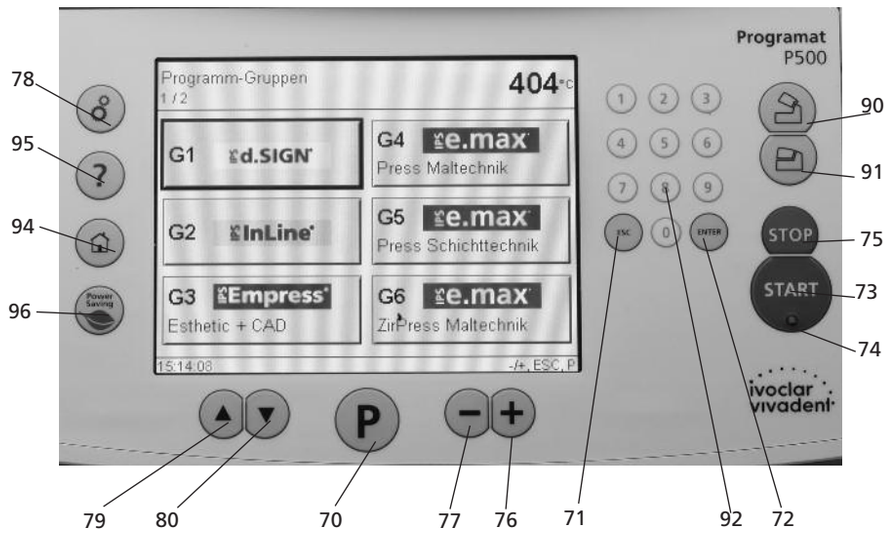
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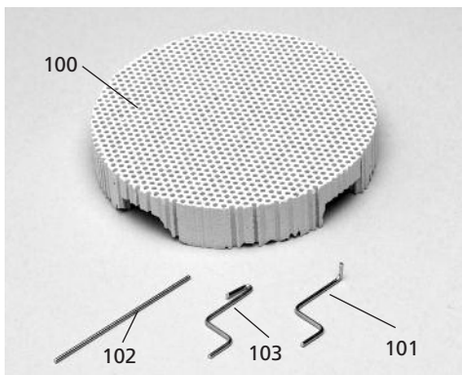


Control unit:

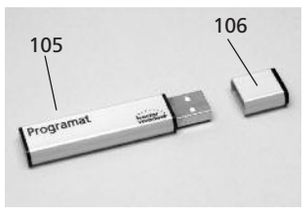
70 Program key
71 ESC key
72 ENTER key
73 START key
74 Start LED
75 STOP key
76 + key
77 - key
78 Settings / information
79 Cursor key up
80 Cursor key down
90 Open furnace head
91 Close furnace head
92 Numeric keys
94 Home key
95 Help key
96 Power saving key



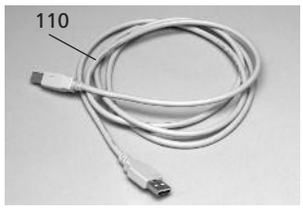
100 Programat firing tray
101 Metal pin A
102 Metal pin B
103 Metal pin C



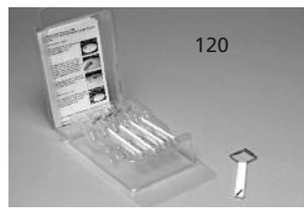
105 USB stick Programat
106 Protective cover



110 USB data cable



120 Automatic Temperature Control Set 2 – ATK 2



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1. Introduction / Signs and Symbols

1.1 Preface

Dear Customer

Thank you for having purchased the Programat P500/G2. It is a state-of-the-art furnace for dental applications.

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

Enjoy working with the Programat P500/G2.

1.2 Introduction

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


Risks and dangers


Important information


Contraindication


Burn hazard


Risk of crushing


The Operating Instructions must be read

1.3 Notes regarding the Operating Instructions



Furnace concerned:
Programat P500/G2
Target group:
Dental technologists

These Operating Instructions facilitate the correct, safe and economic use of the Programat P500/G2 furnace.

Should you lose the Operating Instructions, extra copies can be ordered at a nominal fee from your local Ivoclar Vivadent Service Center or downladed from www.ivoclarvivadent.com.

1.4 Notes on the different voltage versions

The furnace is available with different voltage versions.

– 110–120 V / 50–60 Hz
– 200–240 V / 50–60 Hz

In the Operating Instructions, the furnace is described in the 200-240 V voltage version.

Please note that the voltage range shown on the images (e.g. rating plate) may differ depending on the voltage version of your furnace.

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2. Safety first

This chapter is especially important for personnel who work with the Programat P500/G2 or who have to carry out maintenance or repair work. This chapter must be read and the corresponding instructions followed.

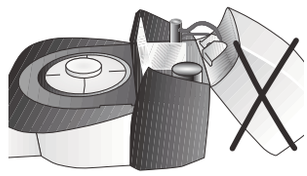
2.1 Indications

The Programat P500/G2 must only be used to fire dental ceramic materials and it should be used for this purpose only. 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, regulation 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 (Chapter 9).
- The Programat P500/G2 must be properly maintained.

2.1.1

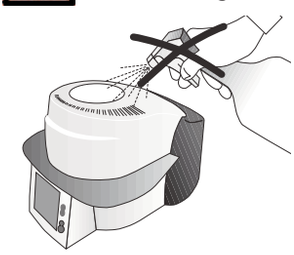
Risks and dangers



The furnace head should not be removed from the furnace base as long as the furnace head is connected by means of the heater cable.

2.1.2

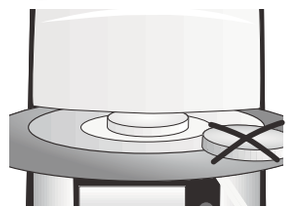
Risks and dangers



Make sure that no liquids or other foreign objects enter the furnace.

2.1.3

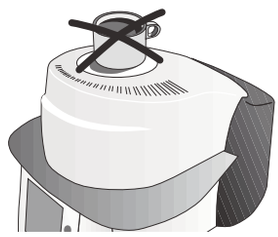
Contraindication



Firing trays must not be placed in the area surrounding the firing table, since this will obstruct the closing of the furnace head.

2.1.4

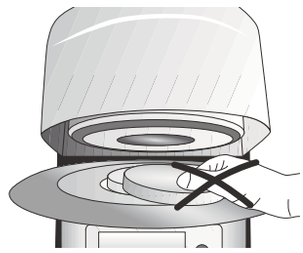
Contraindication



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

2.1.5

Risks and dangers

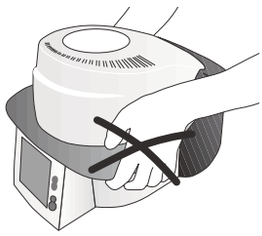


Never place objects in the firing chamber by hand, since there is a burn hazard. Always use the tongs (accessories) supplied for this purpose. Never touch the hot surface of the furnace head, as there is a burn hazard. Please also refer to the warnings on the furnace.

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2.1.6

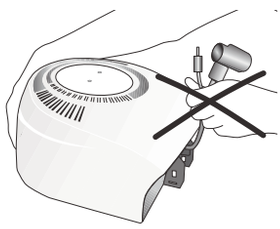
Risks and dangers



Do not carry the furnace by the cooling tray.

2.1.7

Risks and dangers



Do not carry the furnace head by the cables, since the cables and connections may be damaged.

2.1.8

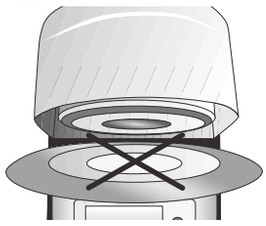
Risks and dangers



The furnace 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.

2.1.9

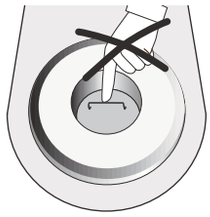
Contraindication



Never use the furnace without a firing table.

2.1.10

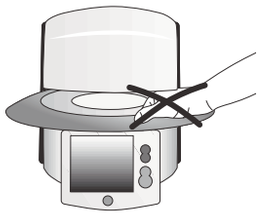
Contraindication



Do not touch the thermocouple or the quartz tube in the firing chamber. Avoid contact with the skin (grease contamination), as the parts may be damaged.

2.1.11

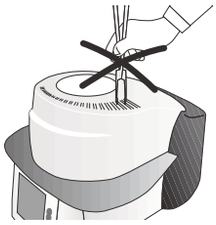
Risk of crushing and burn hazard



Never reach under the furnace head with the hand or other parts of the body during operation, since there is a risk of crushing and a burn hazard.

2.1.12

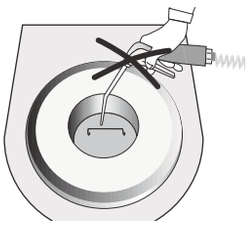
Contraindication



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

2.1.13

Contraindication



This product contains ceramic fibres and may release fibre dust. Do not use compressed air, or blow, on the furnace thus distributing the dust in the environment and observe the additional notes on page 11.

2.1.14

Risks and dangers

The furnace must not be operated if the quartz tube or the insulation in the firing chamber is damaged. There is a risk of electric shock upon contact with the heating wire.

Avoid damage of the insulation by contact with the investment tongs or firing tongs.

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2.2 Health and Safety Instructions

This furnace 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 assure 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 the operating conditions to prevent injury to personnel or damage to materials. The manufacturer is not liable 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 power socket must be equipped with a residual current circuit breaker.
- The furnace must be plugged into a socket with protected contacts.
- Place furnace on a fire-proof table (observe local regulations, e.g. distance to combustible substances or objects, etc.)
- Always keep the air vents at the rear and the side of the furnace free from obstruction.
- Do not touch any parts that become hot during the operation of the furnace. There is a burn hazard!
- Clean furnace only with a soft, dry cloth. Do not use solvents! Disconnect power before cleaning and allow the furnace to cool down!
- The furnace must be cool before it is packed for transportation purposes.
- Use original packaging for transportation purposes.
- Before calibration, maintenance, repair or exchange of parts, the furnace must be cooled down and the power disconnected if the furnace is to be opened.
- If calibration, maintenance or repair has to be carried out with the power connected and the furnace open, only qualified personnel from the field of electrical engineering who are familiar with the risks and dangers may perform these procedures.
- After maintenance, the required safety tests (high voltage resistance, protective conductor etc.) have to be carried out.
- Ensure that only fuses of the indicated type and rated current are used.
- If it is assumed that safe operation is no longer possible, the power must be disconnected to avoid accidental operation.
  Safe operation is no longer possible if
  - the furnace is visibly damaged
  - the furnace does not work
  - the furnace has been stored under unfavourable conditions over an extended period of time.
- Use only original spare parts.
- 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, the head has to be opened and the furnace dried or left to adjust to room temperature for approximately 4 hours (do not connect the power yet).
- The furnace has been tested for use at altitudes of up to 2000 m (6562 ft) 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 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 connection may lead to danger for the user in case of malfunction. Deliberate interruptions are not tolerated.



Materials developing harmful gases must not be fired.

Warning regarding the removal of the heating muffle



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

Warning

The insulation on this product contains refractory ceramic fibres (RCF), which pose a possible cancer hazard, if agitated and inhaled. May be irritating to the skin, eyes or respiratory tract if insulation is cracked or corrupted.

California Proposition 65
Warning: "This product contains Refractory Ceramic Fibres, a substance known to the State of California to cause cancer."



Disposal:
The furnaces must not be disposed of in the normal domestic waste. Please correctly dispose of old furnaces according to the corresponding EU council directive. Information on the correct disposal may also be found on your local Ivoclar Vivadent homepage.

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3. Product Description

3.1 Components

The Programat P500/G2 comprises the following components:

- Furnace base with electronic controls
- Furnace head with firing chamber
- Firing table
- Cooling tray
- Power cord and hose for vacuum pump
- Vacuum pump (accessory)

3.2 Hazardous areas and safety equipment

Description of the risk areas of the furnace:

Hazardous area	Type of risk
Firing chamber	Risk of burning
Opening/closing mechanism	Risk of crushing
Electrical components	Risk of electrical shock

Description of the safety equipment of the furnace:

Safety equipment	Protective effect
Protective conductor	Protection from electrical shock
Electrical fuses	Protection from electrical shock
Furnace housing and covering ends	Protection from electrical shock, burning and crushing

3.3 Functional description

The firing chamber may be heated up to max. 1200 °C (2192 °F) by means of a heating element. Furthermore, the firing chamber has been designed in such a way that a vacuum may be created with a vacuum pump. The firing process is controlled with the corresponding electronic controls and software. Moreover, the set and actual temperatures are continuously compared.

3.4 Accessories

(not part of the delivery form)

- Temperature Checking Set 2
- Programat Accessories Set (large and small firing trays, firing tongs, Temperature Checking Set)
- Vacuum pump

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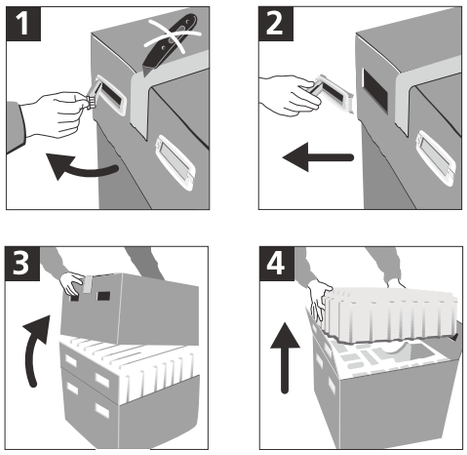
4. Installation and Initial Start-Up

4.1 Unpacking and checking the contents

The packaging provides the following advantages:
– Reusable packaging
– Closing mechanism with integrated transportation grips
– Ideal protection by Styrofoam inserts
– Easy handling / optimum unpacking
– The packaging may be used in several ways (modules)

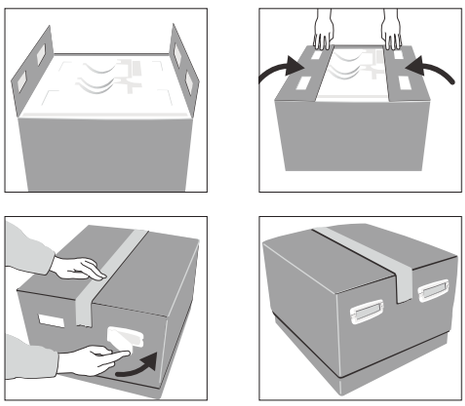
Remove the furnace components from their packaging and place them on a suitable table. Please observe the instructions on the outer packaging.

There are no special transportation grips on the furnace. Support the bottom of the furnace to carry it.



Check the delivery for completeness (see delivery form in Chapter 9) and transportation damage. If parts are damaged or missing, contact your local Ivoclar Vivadent Service Center.

Packing and shipping of individual components
The packaging of the furnace permits simple and safe shipping of individual components. Simply use the two corresponding inserts. Fold the side flaps (2) and combine the two packaging parts by means of the transportation flaps. The packaging may be disposed of with the regular household refuse.



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

4.2 Selecting the location

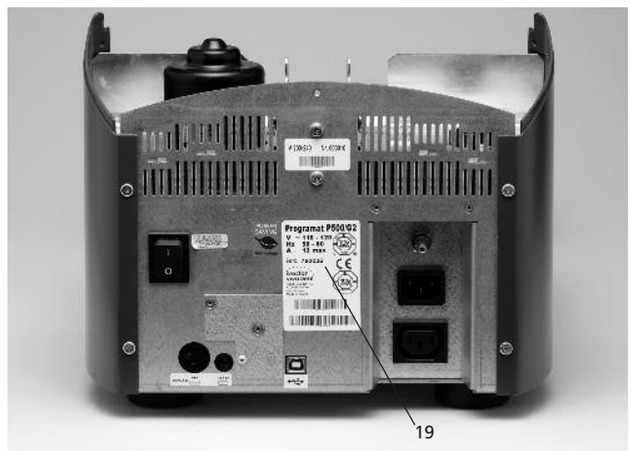
Place the furnace on a flat table using the rubber feet. Make sure that the furnace is not placed in the immediate vicinity of heaters or other sources of heat. Make sure that air may properly circulate between the wall and the furnace.

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.

4.3 Assembly

Make sure that the voltage indicated on the rating plate (19) complies with the local power supply. If this is not the case, the furnace must not be connected.



Step 1:
Assembling the cooling tray (34)
Remove both screws (35) including the silicone rest (47) for the cooling tray (34).



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Place the cooling tray (34) on the frame plate (7). Make sure that the cooling tray (34) is correctly positioned on the frame plate (7).



Secure the cooling tray (34) with the two screws (35) including the silicone washer (47).



Step 2:
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 (43).



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Ensure that the furnace head mounting mark (41) is aligned with the furnace base mounting mark (42).



Make sure that the firing plate holder (48) is not damaged by mounting the furnace head.

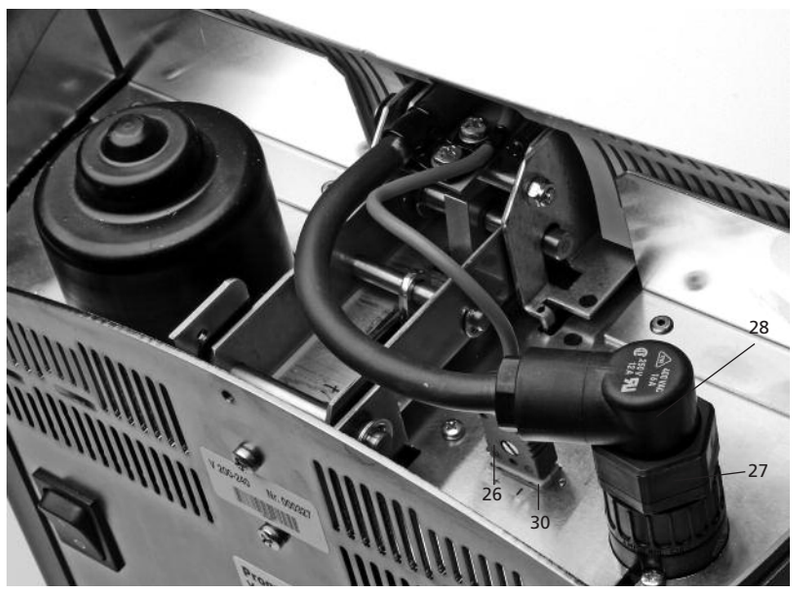


Step 3:
Placing the firing plate (5)
Place the firing plate (5) on the firing plate holder (48).



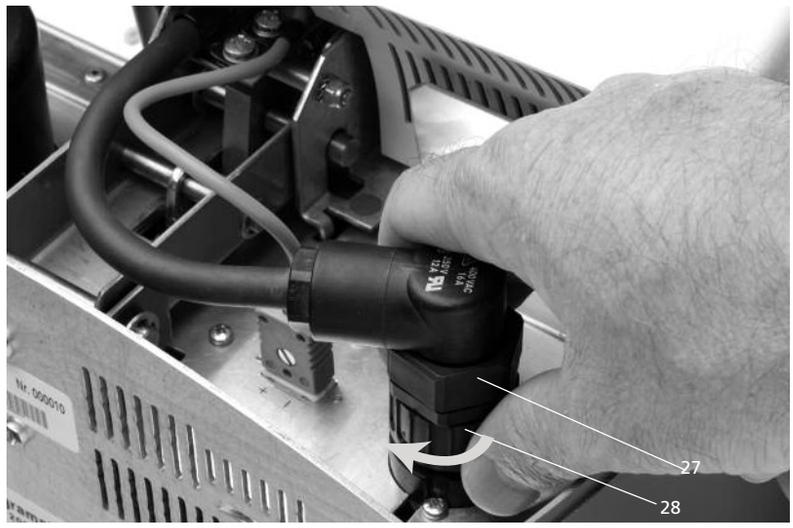
Step 4:
Connections
Connect the cables of the furnace head with the furnace base. Proceed as follows:

– Insert the thermocouple plug (26) (make sure that the polarity of the plug is correct)
– Insert the heater plug (28)



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Secure the heater plug (28) with the plug fuse (27) by turning it until the heater plug (28) has been secured.



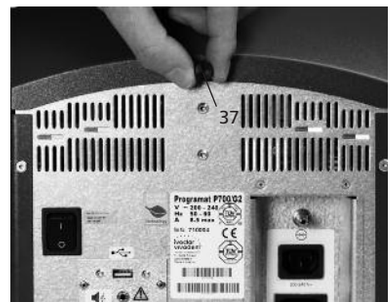
Step 5:
Mounting the hood (36)
Once all cables are properly connected to the furnace base, the hood (36) can be mounted.

Subsequently, secure the hood with the knurled screw (37).



The furnace may only be operated with the hood mounted.





Step 6:
Establishing additional connections

Power connection
Please make sure that the voltage indicated on the rating plate complies with the local power supply. Connect the power cord (16) with the power socket (17) of the furnace.

Vacuum pump connection
Connect the vacuum pump plug with the vacuum pump socket (18).

We recommend using only the VP4 vacuum pump from Ivoclar Vivadent, since this pump is especially coordinated with the furnace. If other pumps are used, please observe and do not exceed the maximum power consumption.



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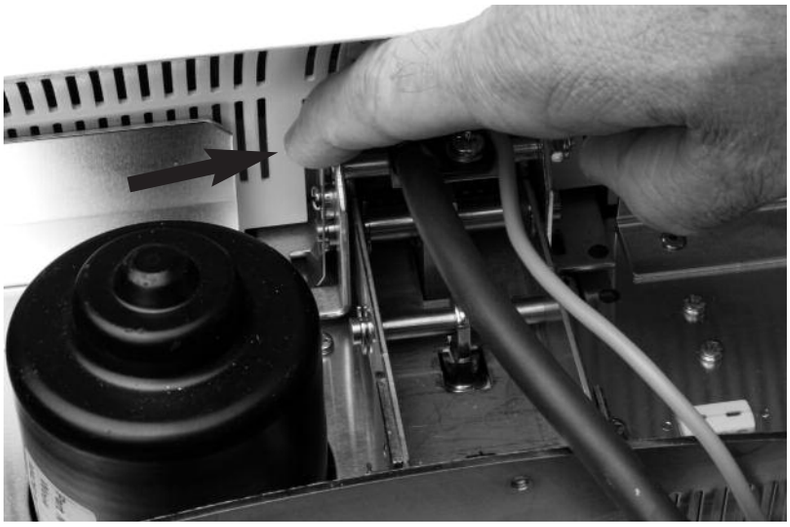
4.4 Removing the furnace head

Before the hood (36) is removed, the furnace has to be switched off and the power cord (16) disconnected from the power socket (17).

1. Loosen and remove the knurled screw (37) of the hood (36)
2. Remove the hood (36)
3. Disconnect the thermocouple plug (26)
4. Disconnect the heater plug (28)
5. Press the leaf spring (32) with a finger, lift off the furnace head at the same time and remove it



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



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4.5 Initial start-up

1. Connect the power cord (16) with the wall socket.
2. Put the On/Off switch (11) at the rear of the furnace on position "I" and connect the vacuum pump.

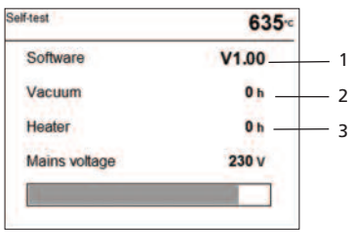
4.5.1 Start screen

Immediately after switching on, the display briefly shows the start screen.





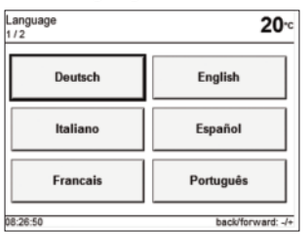
The furnace will now automatically conduct a self-test. The performance of all furnace components is automatically checked. The display shows the following indications during the self-test:



1 SW version
2 Indication of the vacuum pump hours
3 Indication of the heater firing hours

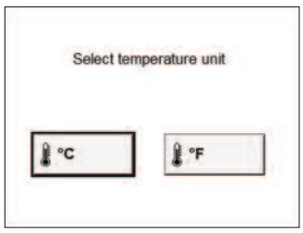
If any component is defective, the corresponding error number (ER xxx) will be indicated in the display.

4.5.2 Language selection



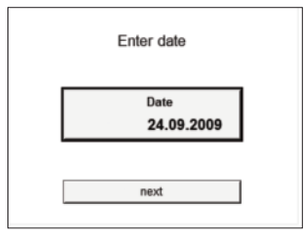
If a new furnace is switched on for the first time, the language selection screen will be displayed. The desired language is set by means of the respective touch button. After that, the next basic setting screen (temperature mode) appears. These settings are then saved and will no longer appear upon the subsequent start-ups. With the "+" key, you may select further languages.

4.5.3 Temperature mode



Select the desired temperature mode.

4.5.4 Setting the date



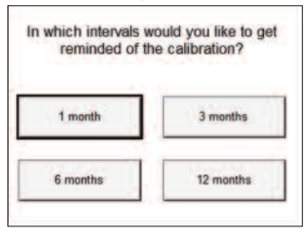
Enter the date (day/month/year).

4.5.5 Setting the time



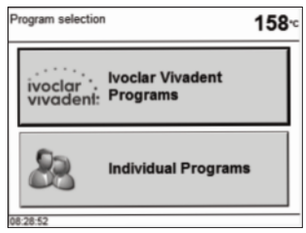
Enter the time (hours/minutes/seconds).

4.5.6 Selecting a reminder for the calibration interval



In this screen, you may define at what interval the furnace should remind you to conduct the next temperature calibration procedure. Additional modifications can be carried out according to the point "Extended settings" (see page 22).

4.5.7 Initial screen or first selection screen (program selection)



Once the language has been selected, the first selection screen (program selection) is displayed. Select here the desired type of firing programs.

4.6 Dehumidification

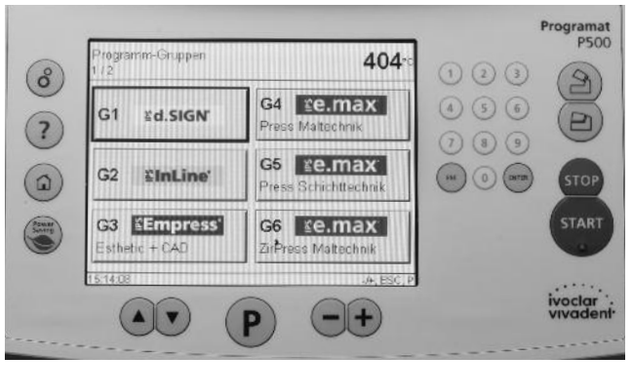
Before the first firing, the firing chamber should be dehumidified using the dehumidification program.

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5. Operation and Configuration

5.1 Introduction to the operation

The Programat P500/G2 is equipped with a colour graphic display. The furnace can be operated by means of the keypad or touch screen.
The numeric and command keys can be used to program and control the furnace.



5.2 Explanation of the key functions

Key	Function
P	**Program key** Shows the currently selected program. Pressing the key several times: graphical representation of the program and table-type view with details.
▲ ▼	**Up, down** In the parameter list (pressing P two times), these keys can be used to move the cursor.
− +	**Minus, Plus, or changing pages** These keys can be used to change the numeric values. Changing between different pages if a view consists of several pages.
	Settings (selection) Go to the settings menu for: settings, information, special programs and calibration.
?	**Help** Go to the help feature for the current screen.
	Home Return to "Program selection Indication" (main menu).
	Open furnace head Opening of the furnace head in 5 seconds.
	Close furnace head Closing of the furnace head in 5 seconds.
STOP	**STOP** A program in progress can be interrupted by pressing STOP once. Pressing STOP twice will abort the program. Movement of the furnace head can be stopped at any time by pressing STOP. The beeper can be confirmed by pressing STOP.
START	**START (Start LED)** Starts the selected program. The fact that a program is running is indicated by the green LED. If the program is interrupted (1 x STOP), the Start LED flashes until renewed pressing of START results in the program being resumed.
ESC	**ESC** Ends an entry without accepting the value. Return from the current to the previous menu. Confirmation of error messages.
ENTER	**Enter** Confirmation of entered value.
1 2 3 4 5 6 7 8 9	**Numeric keypad, 1–9 and 0** Used to enter numeric values.
	Touch Screen The display is touch-sensitive. Slightly tapping it with the fingertip will result in the desired button being marked with a thick, black frame. After that, the corresponding function is immediately executed (e.g. the display changes) or the touch button is now ready for an entry by means of the numeric keypad or the +/- keys.
Power Saving	**Power-saving** Power-saving function activated (only possible with the furnace head closed and the furnace on idle). The display shows the power-saving icon. Pressing any key ends the power-saving function.

5.3 Program structure

The furnace is equipped with two program levels.

a) Programs for Ivoclar Vivadent materials
b) 500 free programs for individual settings

All the programs are equivalent and, therefore, full-fledged programs. In each program, all the parameters can be adjusted.

By tapping a touch button, the desired program type is selected and displayed. In the next screen, the program group can be selected (Fig. a). After that, another touch button is used to select the desired program (Fig. b).

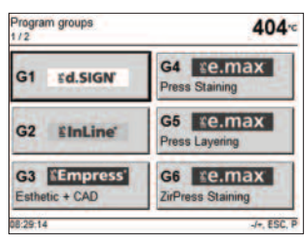


Fig. a

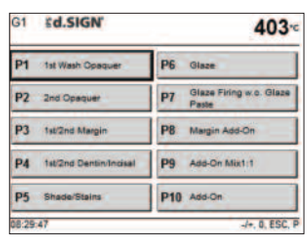


Fig. b

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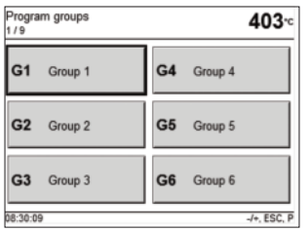
a) Programs for Ivoclar Vivadent materials
Refer to enclosed Program table

When the furnace is delivered ex works, the Ivoclar Vivadent programs already contain the recommended material parameter settings. Moreover, the programs are write-protected. Please refer to the respective list of parameters in Chapter 10.

However, the parameters can be changed and overwritten at any time, if the programs are to be used for other purposes. Therefore, these programs are also available as free programs.

b) Free programs
Free, individually adjustable programs

The programs are designed in such a way that they can be either used as conventional, one-stage programs or as two-stage programs, if required. The mode can be changed via the symbol (one- or two-stage program) by using the + or – key.



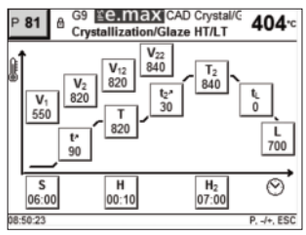
5.4 Adjustable parameters and possible value ranges

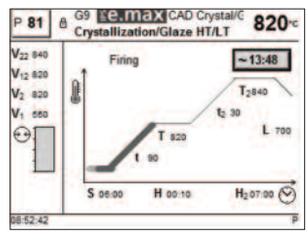
Symbol	Parameter	Value range	Value range
P	Program number P	001–500	
B	Stand-by temperature	100–700 °C	212–1292 °F
S	Closing time (min : sec)	00:18–30:00	
	Pre-vacuum (min : sec)	01:00–05:00	
t↗	Temperature increase rate	10–140 °C/min	18–252 °F/min
T	Holding temperature	100–1200 °C	212–2192 °F
H	Holding time (min : sec)	00:01–60:00	
V1	Vacuum on	0 or 1–1200 °C	0 or 34–2192 °F
V2	Vacuum off	0 or 1–1200 °C	0 or 34–2192 °F
L	Long-term cooling	0 or 50–1200 °C	0 or 122–2192 °F
tL	Cooling temperature rate	0 or 1–50 °C	0 or 2–90 °F/min
t2↗	Temperature increase rate 2nd stage	10–140 °C/min	18–252 °F/min
T2	Holding temperature 2nd stage	100–1200 °C	212–2192 °F
H2	Holding time 2nd stage (min : sec)	00.01–60:00	
V1 2	Vacuum on temp. 2nd stage	0 or 1–1200 °C	0 or 34–2192 °F
V2 2	Vacuum off temp. 2nd stage	0 or 1–1200 °C	0 or 34–2192 °F
Hv	Holding time Vacuum (min : sec)	00:01–60:00	
	Pre-drying temperature	0 or 100–700 °C	0 or 212–1292 °F
	Pre-drying time	00:00-60:00	

Automatic plausibility check
The furnace is equipped with an automatic plausibility check function. The parameters (e.g. T 960 but L 1000) are checked upon each program start. In case of contradictory parameter combinations, the program stops automatically and the respective error number is indicated.

List of parameters
In this screen, the arrow keys can be used to navigate within the list (including program number). An active numeric value can be edited using the –/+ keys or the numeric keypad.
An active symbol parameter can only be changed using the –/+ keys.

List of parameters – Two-stage program





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TSP – Thermo Shock Protection

TSP

Dynamic closing of the furnace head

The TSP function prevents the object from too high of temperatures during the closing process. For this purpose, the TSP function gauges the temperature of the firing chamber in the furnace head upon start of the firing program. If required, the closing path within the set closing time S is adjusted. TSP is only active if no active predrying has been selected or if the temperature in the firing chamber is too high when the program is started. In addition, TSP works only if the stand-by temperature of B = 403 °C / 757 °F required for Ivoclar Vivadent materials is used. The active TSP function is shown on the display by means of the symbol "TSP". If programs are started with a temperature of more than 680 °C / 1256 °F, an error message is produced.

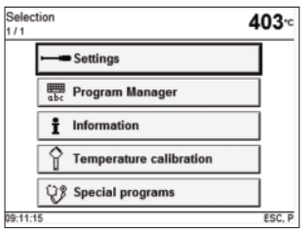
CSP – Cooling Shock Protection

CSP

Careful opening of the furnace head

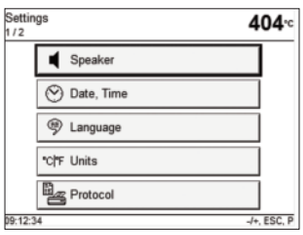
The CPS function protects the dental lab work during the opening process from cooling too quickly.
This is achieved by opening the furnace head in a special procedure. In this way, tensions within the object can be largely prevented. The selection of the CSP function is indicated by the symbol "CSP" in the firing curve screen.
During the opening process with the CPS active, the symbol is blue and flashing.

5.5 Settings and information

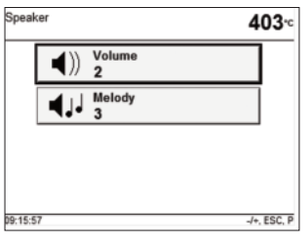


By pressing the "cogwheel" key, you will reach the "Selection" screen. The desired screen is displayed by pressing the corresponding touch button.

5.5.1 Settings

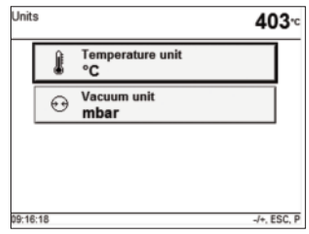


The desired group of settings is displayed by pressing the corresponding touch button. The – / + keys can be used to navigate within these two pages. The desired parameter field is activated by tapping the respective touch button and the settings can be edited using the "-/+" keys.



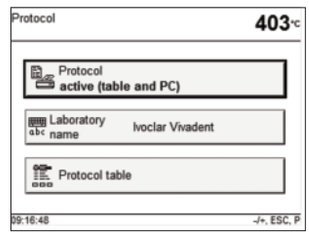
e.g. Speaker
Pressing the corresponding touch button activates the respective parameter field. The settings may be edited using the "-/+" keys.

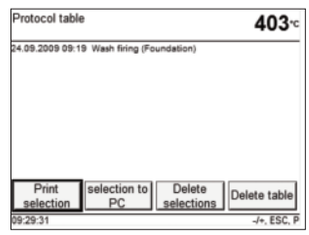
5.5.1.1 Setting the mode



The temperature mode (°C/°F) and the vacuum mode (mbar/hPa) can be changed via *Selection – Settings – Mode*.

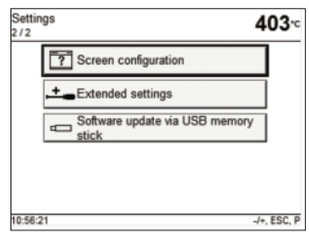
5.5.1.2 Protocol

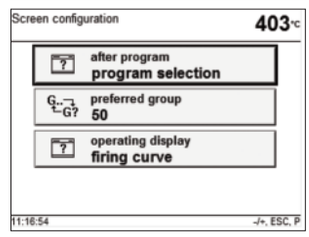




Mark the touch button "Protocol" by pressing it. It can now be edited using the +/- keys. With "Active (table)", the program parameters used are entered into the protocol at the end of a firing program. With "Active (table and printer)", the protocol is also automatically printed with the printer connected to the furnace.
By pressing the touch button "Laboratory name", the keypad is displayed and the name of the laboratory can be entered.
With "Active (table and PC)", the protocol can be sent to the connected PC software instead of being printed after each firing program.
Pressing the touch button "Protocol table" results in the corresponding screen being displayed. The desired protocol can now be selected using the +/- keys. The selected protocol may either be printed or deleted.

5.5.1.3 Configuration of the displays



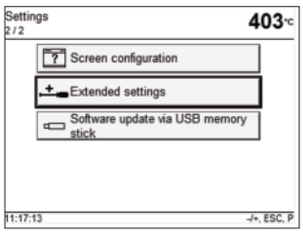


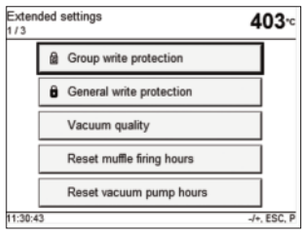
Scroll to page 2/2 in the "Settings" display by means of the "+" key and select "Screen configuration".
After pressing the upper touch button, the "-/+" keys can be used to determine which screen should be displayed after a firing program. The user may select either the parameter display of the current program or the program selection display of the corresponding group.
By using the lower touch button, a preferred group number can be entered. In this way, the "0" can be used in the program selection display to toggle between the current group and this preferred group.
With the touch button "preferred operating indicator", you can select whether the firing curve display or the remaining time indicator is shown after the start of the program (see Chapter 6.1.3 and 6.1.4).

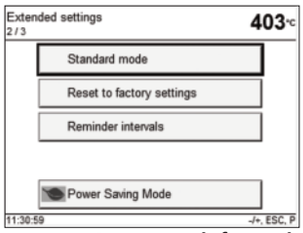
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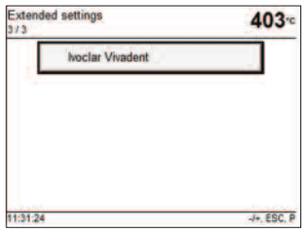
5.5.1.4 Extended settings

Change to page 2/2 in the "Settings" screen using the "+" key and select "Extended settings".





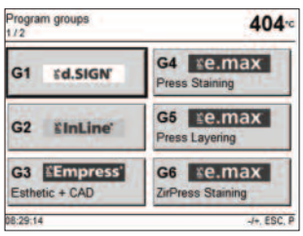




Important information
For most of the "extended settings", the user code (6725) is required.

The most important settings which can be changed under Extended settings are described below:

Group write-protection
Enables the user to lock an entire group (10 programs and group name). The respective group write-protection is activated and deactivated using an individually selected code (1-4 digits). If a group write-protection is active, the write-protection symbol shows the corresponding group.



By deactivating the general write-protection (see next sub-chapter), the write-protection of all groups is deactivated. This function can also be used if the user has forgotten an individual group write-protection.

General write-protection
Enables to release or lock the change of the individual firing programs (name and parameters).

Set the firing hours of the muffle to "0"
If the (heating) muffle is replaced, the firing hours counter can be reset.

Set the vacuum pump hours to "0"
If the vacuum pump is replaced, the operating hours counter of the vacuum pump can also be reset.

Standard mode
Temperature control according to standard: DIN 13905-1 "Dentistry – Dental furnaces – Part 1: Dynamic test method for temperature measurement with separate thermocouple".

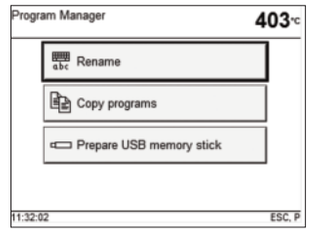
Load factory settings
Resets all settings to original factory settings (see Chapter 8.4).

Reminder intervals
Interval settings to remind you when the next calibration or dehumidification has to be conducted (see also Chapter 7.3, 7.4 and 7.5).

Power-saving mode
With the power-saving mode active and the furnace closed, this function is automatically started after 30 minutes if the furnace is idle and no key is pressed during that time.
The power-saving icon is shown in the display. Pressing any key will end the automatically activated power-saving function.

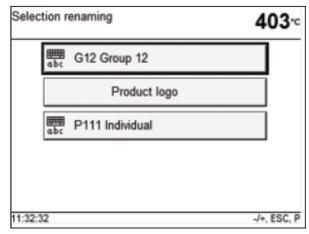
Ivoclar Vivadent
Only used by the Service Center.

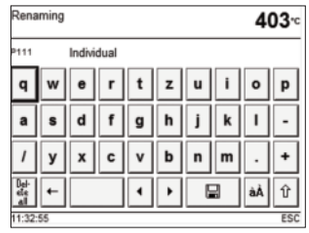
5.5.2 Program Manager



This screen is displayed by pressing the "Program Manager" touch button.

5.5.2.1 Renaming the current program or program group

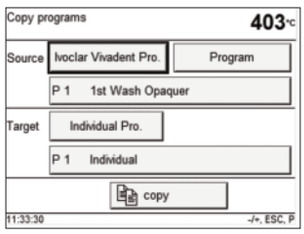


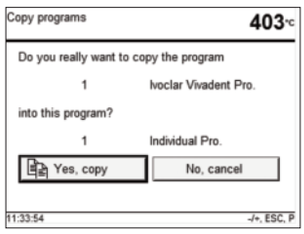


This screen is displayed by pressing the "Rename" touch button. Now, the current program or the current program group can be renamed.
If required, the write protection has to be unlocked under Settings – Settings – Extended settings.
The keyboard is displayed by tapping the corresponding touch button. The name of the current program or program group can now be edited using the available touch buttons or numeric keypad.
If the process is aborted by pressing the Esc key, the old name is retained.
The blinking cursor can be moved by means of the "arrow" touch buttons. The "Delete" touch button can be used to delete an individual character to the left of the cursor. The entire description can be deleted by pressing the "Delete all" touch button.
The chanages must be confirmed by pressing the "Save" touch button. The "Shift" touch button can be used to switch between upper and lower case letters. The "Symbol" touch button is used to switch between symbols and regular letters.

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5.5.2.2. Copying programs

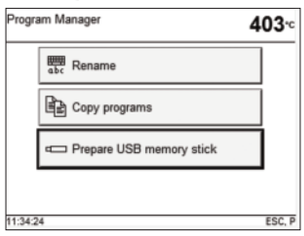




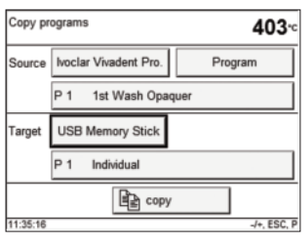
By pressing the "Copy programs" touch button, this screen is displayed.
Here you can set the source and the target of the copy procedure. The desired touch button can be selected (black frame) by slightly tapping on it. Subsequently, the button can be edited using the +/- keys or the numeric keypad. If a memory stick is used, an additional touch button is displayed.

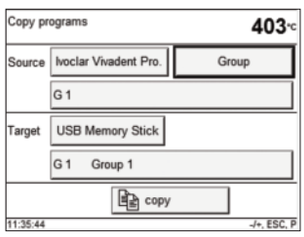
This screen is displayed by pressing the touch button "Copy". The copy procedure is executed by pressing the touch button "Yes, copy".

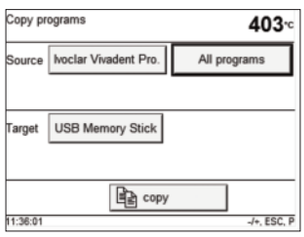
5.5.2.3 Save the firing program / firing group on the USB memory stick



The majority of USB memory sticks can be used as program memory. In order to use the USB memory stick as external program memory, it has to be first prepared as a storage medium. For this purpose, connect the USB memory stick to the furnace. Subsequently, select "Prepare USB memory stick as external program memory" in the program manager. Select \Hard Disk…\ and start the procedure with Open. The process is completed when the message for the successful preparation of the USB memory stick is shown on the display.





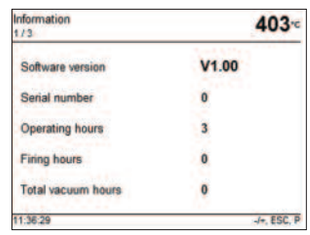


All the existing firing programs (Ivoclar Vivadent or individual programs) of the furnace can be saved on a prepared memory stick. Select Selection – Program Manager – Copy programs and make a choice using the +/- keys:

- Program (copy a single program)
- Group (copy a single group)
- All programs

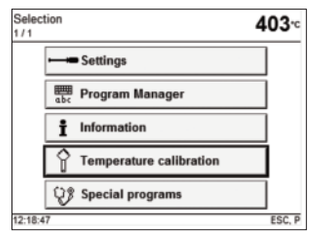
After a USB memory stick is ready for use, pressing the Home key results in the program selection screen being shown with another touch button for the selection of the USB memory stick.

5.5.3 Information

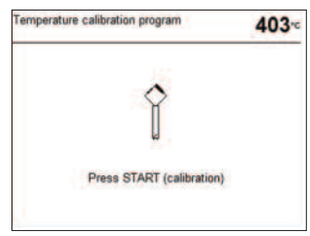


The information pages 1 to 3 provide information on the current software version, operating hours, calibration settings and status of the identified USB devices, such as printer and USB memory stick. The information display also serves to check whether the Programat furnace has identified a USB device.

5.5.4 Calibration

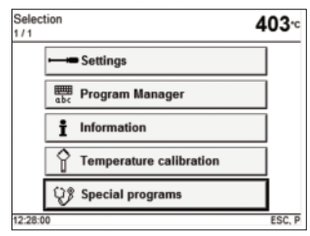


By pressing the "Start calibration program" touch button, the program is automatically started.



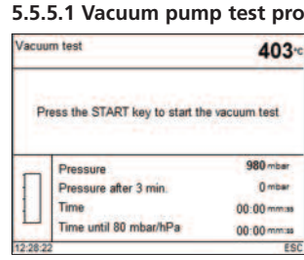
Please see the notes in Chapter 7.4.

5.5.5 Special programs



Press touch button "Special programs" to select special programs.

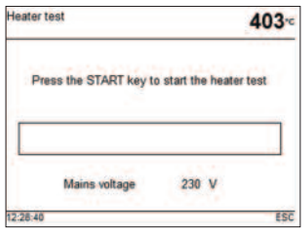
5.5.5.1 Vacuum pump test program



With this program, the vacuum performance of the furnace vacuum system can be automatically tested. For that purpose, the achieved (minimum) pressure in mbar is measured and indicated. If the pressure value is below 80 mbar (hPa), the vacuum performance of the system is adequate.

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5.5.5.2 Heater test



The quality of the heating muffle may be automatically checked by means of the heater test (duration: approximately 7 minutes). The heater test should only be conducted with the empty firing chamber, since an object in the chamber (e.g. firing tray) may influence the test result. Conduct the heater test immediately after switching on the furnace and before any actual firing procedures. If the furnace is too hot, an incorrect heating muffle quality will be indicated. If the heating element quality falls below 50 %, replacing the heating element is recommended.

5.5.5.3 Cleaning program

The cleaning program is used to "clean" the heating muffle (duration: approx. 17 minutes). After a cleaning program, it is recommended to calibrate the furnace. In case of problems with discolouration of the ceramic, we recommend replacing the firing table or the firing tray material.

5.5.5.4 Dehumidification program

The condensation of water in the insulation of the firing chamber and the vacuum pump will result in a lower vacuum and thus to impaired firing results. For that reason, the furnace head should be kept closed when the furnace is switched off, in order to prevent the absorption of humidity. Start the dehumidification program if required (humidity in the insulation).

5.5.5.5 Keypad test

Each time the keypad is pressed, a short beep sounds. The keypad test can be ended by pressing ESC.

5.5.5.6 Display test (page 2/2)

Two different "chequer-board patterns" are alternately shown on the entire display. This allows the visual check of each individual pixel. The display test can be ended by pressing ESC.

5.6 Description of the symbols in the display

Symbol Name	Meaning	Symbol
Pre-vacuum	Vacuum generation starts before the heating begins.	
One-stage program	Abstract firing curve of a one-stage program	
Two-stage program	Abstract firing curve of a two-stage program	
Standard opening of the furnace head	Furnace head opens in the standard period of time	
Quick opening of the furnace head	Furnace head opens in a short period of time, i.e. quicker (arrow)	
Cooling Shock Protection	Cooling Shock Protection is selected or active	
Crossed-out Cooling Shock Protection	Cooling Shock Protection is inactive	
Open lock	Individual write-protection inactive	
Closed lock	Individual write-protection active	
Crossed-out "crescent moon"	Overnight program function inactive	
"Crescent moon"	Overnight program function only active for the next program sequence	
Individual group write-protection active	All 10 programs of this group are write-protected	
General write-protection active	All programs are write-protected	
Half open furnace head with heat rays	Pre-drying with completely open furnace head active	
Thermo Shock Protection	Thermo Shock Protection active	TSP
Crossed-out Thermo Shock Protection	Thermo Shock Protection inactive	

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5.7 Explanation of the speaker signals

Basically, all the acoustic signals are played in the melody and at the volume selected by the user.

The signal transmitter can only be ended with the STOP key.

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

2 **Furnace head open and temperature below 550 °C / 1022 °F**
To inform the user that the temperature in the open furnace head has dropped below 550 °C / 1022 °F, the selected melody is played (5 seconds). In other words, the furnace head is basically cool enough for the next program start.

3 **Furnace head open and temperature below 320 °C / 608 °F**
To inform the user that the temperature in the open furnace head has dropped below 320 °C / 608 °F, the selected melody is played. If the first playback (10 seconds) is not acknowledged with the STOP key, a second playback sounds after 5 minutes (for 5 minutes). After that, no further signal is played.
If one of the two playbacks is acknowledged with the STOP key, the signal transmitter is switched off immediately and no further signals indicating the cooled furnace head will be sounded.

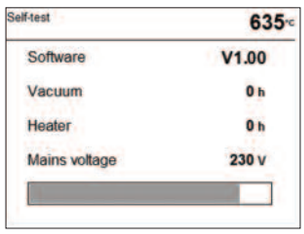
4 **For error messages**
Error messages are acoustically supported with the 'error melody' (endless beep). The signal transmitter may be switched off with the STOP key, while the error message still remains visible. If the error message is acknowledge with the ESC key, the signal transmitter is also switched off.

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6. Practical Use

The operating procedure for the Programat P500/G2 will be explained with the help of two examples: one standard and one individual program.

6.1 Switching on/off



Put ON/OFF switch (11) on position "I". The furnace conducts an automatic self-test, which will be indicated in the beginning. Subsequently, a status bar shows how many % of the self-test have been completed. Make sure that the furnace is not manipulated during this time.

6.1.1 Main menu

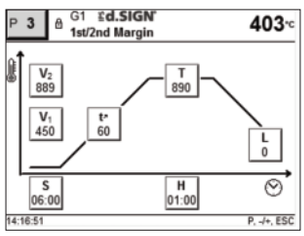
After successful completion of the self-test, the main menu is shown in the display.

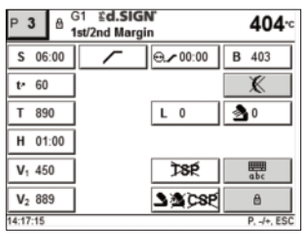
6.1.2 List of parameters

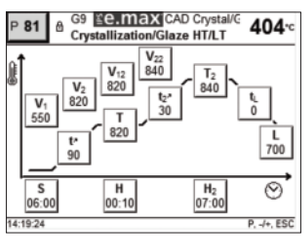
The cursor (black frame) shows the button which is currently active. It can be moved by means of the arrow keys. If the cursor is positioned on the program button, the desired program can be selected using the + or - keys. As an alternative, the program number can also be entered by means of the numeric keypad.

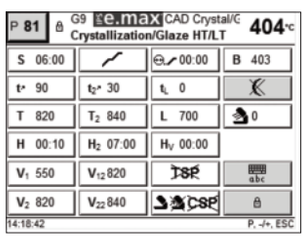
One-stage program

The list of parameters is accessed by pressing the Program key (70). The list shows all the parameters.







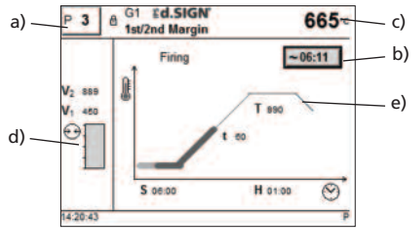


If the cursor is positioned on the "one-stage symbol" and the symbol is switched to the "two-stage symbol" by pressing the + or – key, the program has been set to "two-stage".

If the cursor is set on the "two-stage symbol" and the symbol is switched to the "one-stage symbol" by pressing the + or – key, the program has been set to "one-stage".

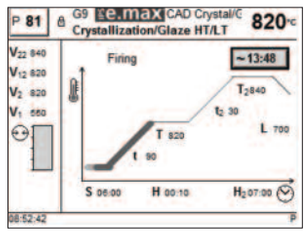
6.1.3 Operating indicator: Firing curve

If the program is started with the START key, the firing curve display with the vacuum status is shown.



The following information is always displayed:

a) Program number
b) Remaining time
c) Current temperature
d) Status of vacuum
e) Status bar



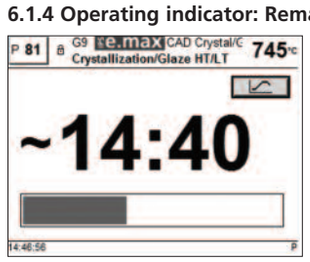
If a two-stage program is selected, two stages are shown.

During a firing program in progress, the parameter firing curve may be displayed at any time for information purposes by pressing the "P" key. However, the parameters may only be changed with the program stopped or the furnace in stand-by mode.
The vacuum indication and all the corresponding parameters are faded out if no vacuum is needed. Basically, only the necessary values are displayed.

The process status is displayed in colour in the firing curve:
– Orange: Program is in its close-head or preheating mode
– Red: Program is in its heating mode
– Magenta: Program is in its holding time
– Blue: Program is in its long-term cooling, CSP, or open-head mode

If the vacuum quality (see parameter VG1 or VG2 in percent) is reached during the vacuum build-up, the vacuum status bar is shown in green.

6.1.4 Operating indicator: Remaining time



Pressing the "Time" touch button in the firing curve display switches the view to the remaining time indicator.

The remaining time indicator informs the user about the remaining processing time, even from large distances. The time is shown in large numbers in the center of the screen. Furthermore, the status bar changes its colour, depending on the current process status:
– Orange: Program is in its close-head or preheating mode
– Red: Program is in its heating mode
– Magenta: Program is in its holding time
– Blue: Program is in its long-term cooling, CSP, or open-head mode



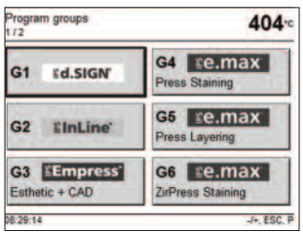
Pressing the touch button "Firing curve" returns the view to the firing curve operating indicator.

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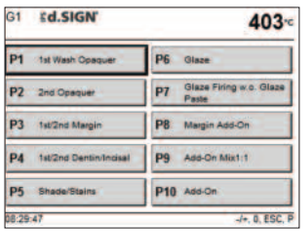
The furnace has been programmed in the factory in such a way that the firing curve display is automatically shown upon the start of the program. If the user prefers the remaining time indicator, this can be set in the correspond-ing settings menu (see Chapter 5.5.1.3).

6.2 Firing using an Ivoclar Vivadent program

Step 1:



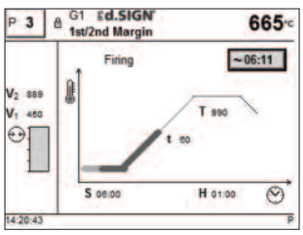
Select the desired material (e.g. IPS d.SIGN) in the program group of your choice.



Now, select the desired program (e.g. 1st opaquer).

Step 2:
Now, open the furnace head by pressing the "Open furnace head" key (90) and place the firing tray with the object to be fired in the furnace.

Step 3:



Press the START key (73) to start the program. The green Start LED starts flashing. The process is indicated in the firing curve display.

6.3 Firing using an individual program

Step 1:
Select a free program.

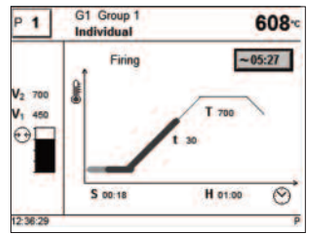
Step 2:
To change a parameter, press the corresponding touch button. In this way, the cursor (black frame) is positioned there. Now, the value can be edited either with the +/- keys or the numeric keypad.

Changes made with the +/- keys are accepted immediately and do not have to be confirmed.

If the changes are made by means of the numeric keypad, the value range of the parameter is displayed in the bottom line. An entry made with the numeric keypad is confirmed and completed with the ENTER key (or the P or START keys).

If the cursor is located on one of the parameters V1, V2, pre-vacuum, or L and the set value is 0, a note to the deactivated function is shown in the last line 0 = Off (e.g. L = 0 means that long-term cooling is not activated).

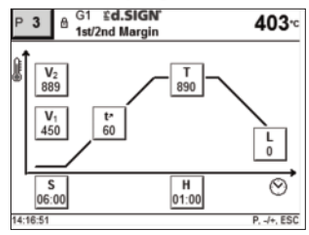
Step 3:



Press the START key (73) to start the program. The process is indicated in the firing curve display.

6.4 Further possibilities and special features of the furnace

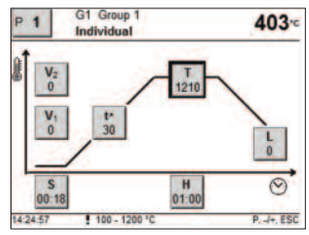
6.4.1 Quick program selection



Each program can be directly selected by its program number. The program number is shown in the upper left area of the program display (e.g. P95). To quickly select a program, press the P key and enter the program number. Confirm with the Enter key.

After pressing the P key, the individual programs can be additionally run through using the +/- keys.

6.4.2 Illogical values or incorrect entries



If an illogical value is entered by means of the numeric keys (outside the current value range), the invalid entry still blinks after confirmation.

As error message (entry error: entry outside the value range), an exclamation mark blinks in the bottom line until the next value is entered and successfully confirmed or the process is aborted with ESC. The old, valid value reappears. Please refer to the parameter details for the value range.

6.4.3 Program write protection

– *Individual program write-protection active*
Activate/deactivate with the corresponding touch button in the parameter list and the +/- keys.
– *Individual group write-protection active*
Change to page 2/2 in the "Settings" screen using the + key. Then, select "Extended settings", followed by "Group write-protection". An individual group write-protection can be activated using a random (user-defined) code and deactivated with the same code.
– *General write-protection active*
Change to page 2/2 in the "Settings" screen using the + key. Then, select "Extended settings", followed by "General write-protection". The general write-protection can only be activated or deactivated with the user code. Each time the general write-protection is deactivated, all the individual group write-protections are also deactivated. The individual program write-protections, however, will be maintained.

6.4.4 Stopping the running program

Press the STOP key once to pause a running program.The green LED in the START key blinks. Press the STOP key twice to completely stop the program or press START to continue.

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6.4.5 Changing the parameters while the program is running

All parameters of the program which have not yet been executed can be changed while the program is stopped (green LED blinks).

6.4.6 Standard / quick opening of the furnace head / CSP

The operator may select the furnace head opening mode by changing the symbol. The "minus" or "plus" keys can be used to toggle back and forth.

– "Standard furnace head opening" symbol visible (the furnace head opens within 60 seconds at the end of the program).



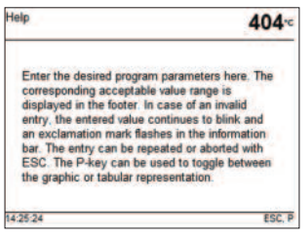
– "Quick furnace head opening" symbol visible (furnace head opens within 18 seconds at the end of the program).



– If the "CSP" symbol is visible, the Cooling Shock Protection function (CSP) has been activated (see Chapter 5.4.)

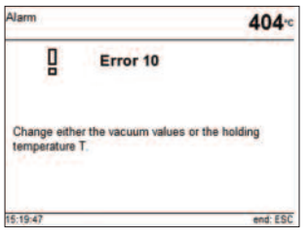


6.4.7 Help



Help text for the current screen.

6.4.8 Error message



The error group symbol should supply a first indication of the type of error (entry error = exclamation mark; technical error = fork wrench; Note = "i" symbol) without the user having to consult the Operating Instructions.

6.4.9 One-stage / two-stage programs

If the cursor is on the "one-stage program" symbol, pressing the – / + key results in the symbol to change to the "two-stage program" symbol. At the same time, the program was also changed to become a "two-stage program".

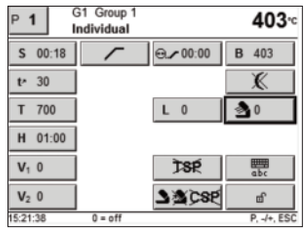
If the cursor is on the "two-stage program" symbol, pressing the – / + key results in the symbol to change to the "one-stage program" symbol. At the same time, the program was also changed to become a "one-stage program".

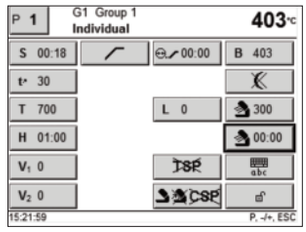
6.4.10 Program status indication

The current program status is indicated in the firing curve display: *pre-drying, closing, pre-vacuum, firing, long-term cooling, opening.* Furthermore, the operating indicator is shown in the firing curve with the coloured background (see Chapter 6.1.3),

If the program is interrupted, "*Pause*" starts flashing as an indicator. If a program is prematurely stopped, "*Vacuum release*" is flashing while the firing chamber is flooded.
In the operating indicator "remaining time", the program status is shown with the help of the coloured status bar (see Chapter 6.1.4).

6.4.11 Pre-drying (one-stage or two-stage program)





For a program with individually activated pre-drying, the desired "pre-drying temperature" is set after the program start with the furnace head open (heating or cooling). Once this temperature is reached, pre-drying is carried out during the "pre-drying holding time" Once the holding time has elapsed, the furnace head is closed within the desired closing time.

6.4.12 Pre-vacuum

If a firing program with pre-vacuum is conducted, the vacuum pump is switched on at the end of the closing time (as soon as the furnace head is closed). Once the pre-vacuum time has elapsed, the heating phase begins. Upon the start of a program with an individually activated pre-vacuum (value between 1:00 and 5:00), the V1 value is ignored. The vacuum is maintained until V2 is reached. V2 must be higher than the stand-by temperature B.

6.4.13 Overnight program

The overnight program function can be activated for the next program sequence in the parameter list (touch button with the "crescent moon" symbol).
If the overnight program function has been activated, the furnace head remains open after the firing process, the heater is switched off, and the green START LED flashes.
No melody is played if the temperature drops below a certain level. Once the temperature has dropped below 100 °C / 212 °F, the furnace head closes, the heater remains switched off, and the furnace cools to room temperature.

Advantages of the overnight program function:
In case of a power failure, the overnight program is always continued. The program resumes at the point at which the power failure has occurred.

6.4.14 "Quick cooling"

If the "Open furnace head" key is pressed again with the furnace head already completely open, the "Quick cooling" function is started. This means that the vacuum pump is switched on for 5 minutes. This function can be stopped early by pressing STOP, "Close furnace head", or START. This function can be activated anytime with the furnace head open.

6.4.15 Software Update

The user should be able to conduct a software update by PC and download cable. For that purpose, the software download mode of the furnace is activated by pressing two special keys simultaneously while the power supply is switched on. For further details, please refer to the Software Update Instructions (www.ivoclarvivadent.com).

A further method for updating the software is to use the USB memory stick. This item is available in the Settings menu on page 2. To update the software, a USB memory stick is required with a current software image in the form of a *.gz file. The software version on the USB memory stick must be newer than the one on the furnace (see Selection – Information).

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Step 1: Connect the USB memory stick with the current software version to the furnace
Step 2: Select the menu item “Software Update”
Step 3: Select the software image file (the file name has to start with P500)
Step 4: Start the software update with the “Open” key
Step 5: Wait until the furnace indicates a successful update process
Step 6: Re-start the furnace

Important
Please note that the individual programs will be over-written in the software update process. Therefore, we recommend a data back-up (e.g. on a USB stick or with software PrograBase 2).

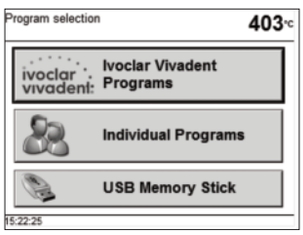
6.4.16 USB printer

Each USB-PCL printer can be used to printout the protocol. If a USB-PCL printer is connected to the furnace, the necessary software driver is loaded. After that, the USB printer is immediately ready for use.

– The status of the USB-PCL printer is shown in the "Information" menu item
– The desired protocol to be printed can be selected in the protocol table.

6.4.17 USB memory stick

Most USB memory sticks may be used to store programs. For that purpose, the USB memory stick must be prepared as an external program memory.



Once a prepared USB memory stick is ready for use, the program selection screen will show another touch button for the selection of the UBS memory stick.

– The active status of the USB memory stick is shown in the "Information" menu item (page 3/3).
– In the Program Manager "Copy programs", the USB memory stick may now be selected as either the source and/or the target.

In this way, a backup copy of all the programs can now be made at any time.

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7. Maintenance, Cleaning, and Diagnosis

This chapter describes the user maintenance and cleaning procedures for the Programat P500/G2. All the other tasks must be performed by qualified service personnel at a certified Ivoclar Vivadent Service Center.

7.1 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.

This furnace has been developed for typical use in dental laboratories. If the product is used for continuous use, premature ageing of the expendable parts has to be expected.

The expendable parts are as follows:
- Heating muffle
- Insulation material

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

What	Part	When
Check all plug-in connections for correct fit	Var. external connections	weekly
Check if the furnace head opens smoothly and without excessive noise.	Opening mechanism	monthly
Check if the thermocouple is straight and in the right place.	Thermocouple (4)	weekly
Check the insulation for cracks and damages. If the insulation is worn down it has to be replaced by a certified Ivoclar Vivadent Service Center. Fine hairline cracks on the surface of the insulation are harmless and do not influence the function of the furnace in a negative fashion.	Insulation (3)	monthly
Check if the sealing rims of the furnace head and the furnace base are clean and undamaged.	Sealing rims of the furnace head (2) and the furnace base (1)	weekly
Check the keypad for visible damage. If the keypad is damaged, it has to be replaced by a certified Ivoclar Vivadent Service Center.	Keypad (10)	weekly
Check temperature. Use the temperature checking set to check and adjust the temperature in the furnace.	Firing chamber	twice a year
Check the quartz glass cylinder to make sure the quartz glass is not defective.	Firing chamber	daily
Check if there is condensate in the vacuum hose or firing chamber.	Vacuum hose Firing chamber	monthly

In general, the furnace head should not be replaced since the components (furnace head and furnace base) have been coordinated with each other. However, if the furnace head must be replaced for maintenance reasons, subsequent temperature calibration is required.

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7.2 Cleaning

The furnace may only be cleaned when it is cool, since there is a burn hazard. Do not use any cleaning solutions.
The following parts have to be cleaned from time to time:

Item	Frequency:	Cleaning material:
Housing (9) and furnace head (25)	if required	soft, dry cloth
Keypad (10)	weekly	soft, dry cloth
Cooling tray (34)	daily	cleaning brush *
Insulation (3)	daily	cleaning brush *
Sealing rim of the furnace head (2) and sealing surface (1)	daily	cleaning brush and a soft cloth

*Never clean with compressed air!

7.3 Special programs

Press the "cogwheel" key, followed by the touch button "Special Programs".

Vacuum pump test program
With the program, the vacuum performance of the furnace vacuum system can be automatically tested. For that purpose, the achieved (minimum) pressure in mbar is measured and indicated. If the pressure value is below 80 mbar (hPa), the vacuum performance of the system is adequate.

Heater test
The quality of the heating muffle may be automatically checked by means of the heater test (duration: approx. 7 minutes).

The heater test should only be conducted with the empty firing chamber, since an object in the chamber (e.g. firing tray) may influence the test result. Conduct the heater test immediately after switching on the furnace and before any actual firing procedures are conducted. If the furnace is too hot, an incorrect heating muffle quality will be indicated. If the heating element quality falls below 50 %, replacing the heating element is recommended.

Cleaning Program
The cleaning program is used to "clean" the firing chamber (duration: approx. 17 minutes). After a cleaning program, it is recommended to calibrate the furnace. In case of problems with discolouration of the ceramic, we recommend replacing the firing table or the firing tray material.

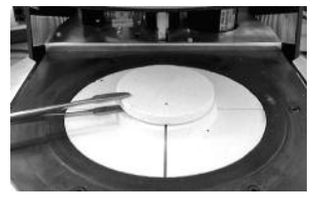
Dehumidification program
The condensation of water in the insulation of the firing chamber and the vacuum pump will result in a lower vacuum and thus to impaired firing results. For that reason, the furnace head should be kept closed when the furnace is switched off, in order to prevent the absorption of humidity (condensate in the vacuum hose). Start the dehumidification program if required (humidity in the insulation).

Keypad test
Each time the keypad is pressed, a short beep sounds. The keypad test can be ended by pressing ESC.

Display test (page 2/2)
Two different "chequer-board patterns" are alternately shown on the entire display. This allows the visual check of each individual pixel. The display test can be ended by pressing ESC.

7.4 Temperature calibration

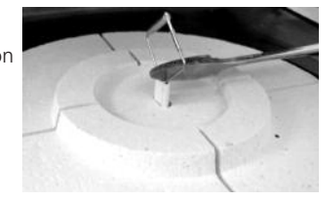
1. Select the calibration program.
2. Remove the firing plate from the furnace using the furnace tongs and place it on the cooling tray.



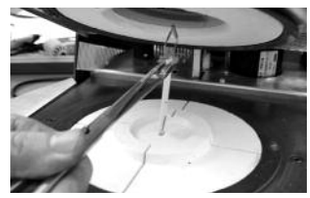
3. Carefully grip the upper part of the ATK 2 using the furnace tongs (Caution: Fracture risk of the ceramic) and insert it into the holes designated for this purpose until it snaps into place.



4. If necessary, use the furnace tongs to apply slight pressure to the center of the calibration base until the calibration sample clicks into place. Observe the corresponding markings.



5. Start the calibration program
6. At the end of the program, open the furnace head and carefully remove the ATK 2 using the furnace tongs and place it on the cooling tray to allow it to cool.



7. Replace the firing plate using the furnace tongs.
8. Close the furnace head and select a firing program.
9. The ATK 2 can only be used once. Use a new calibration set for the next calibration procedure.

7.5 Service note

When the service note (Hint 1700) appears for the first time, two years have passed or the heating muffle has more than 1200 firing hours. For that reason, Ivoclar Vivadent recommends to have the furnace serviced. Please see your Equipment Service Pass for further information. The interval until the next service note can be selected once in the advanced settings (see Chapter 5.5.1.5).

7.6 Stand-by

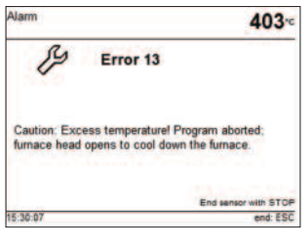
We recommend keeping the furnace head closed, particularly if the temperature drops below 150 °C / 302 °F.

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8. What if ...

This chapter will help you to recognize malfunctions and take appropriate measures or, if possible and acceptable, to perform some simple repairs.

8.1 Error messages



The furnace continuously checks all functions during operation. If an error is detected, the respective error message is displayed.

The following error messages may be displayed. If there are any questions, please contact the Ivoclar Vivadent After Sales Service.

Index	Category	Error	ERR No.	Conti-nuation possible	Error Message Text
1	Entry	T < B	2		Enter a logical value for T
2	Entry	L > T	8		Enter a logical value for long-term cooling L
3	Entry	V2x <= V1x	9		Enter a logical value for the vacuum-on temperature Vx1 or the vacuum-off temperature Vx2
4	Entry	V2x > Tx + 1°C	10		Change either the vacuum values or the holding time T
5	Entry	Incorrect values for V1x, V2x	11		Enter a logical value for V1x, V2x
6	System	Current temperature after Start > Tx + 80 °C	13 *,**		Excess temperature! Program aborted, furnace head opens to allow the furnace to cool down.
8	Entry	T2 < T1	16		Enter a lower value for T1 or a higher value for T2.
9	System	Power failure > 10 s during a firing program in progress	17		A firing program in progress was interrupted for more than 10 s. The program cannot be continued!
10	Entry	T1 > V12	18		Enter a lower value for T1 or a higher value for V12
11	Entry	vV set, but V2 is missing or invalid	19		Pre-vacuum activated! V2 must be higher than B.
12	System	Error in the heating system	20 **	no	Check the heater fuse.
13	System	Heating muffle very old	23		The heating muffle is very old. It is recommended to replace it. After the error message has been acknowledged, a firing program may still be started.
14	System	Heating muffle defective	24		The condition of the muffle is so poor that is has to be replaced immediately.
16	Entry	T is > B + 160 °C at the start of a firing program	26		Firing chamber too hot to start a firing program.
17	System	Furnace head cannot be initialized	27 **,***	no	The furnace head cannot be moved to the final position. It might be blocked by an external mechanical source!
18	System	The furnace head does not reach the target position	28 **		The furnace head does not open/close correctly. The furnace head was manually moved or is obstructed. The furnace head must only be moved using the keys intended for this purpose!
20	System	The vacuum is not released	32 **	no	The vacuum cannot be released. The vacuum valve might be dirty or stuck.
21	System	Necessary vacuum (xxxmbar) is not reached within 1 min.	33		The vacuum cannot be established. Check the seal of the firing chamber, vacuum hose, vacuum pump, pump fuse.
31	Entry	Timer activated – unit into stand-by mode	106		The program cannot be started, because the unit was put into stand-by mode by the timer (heating turned off). Deactivate the timer or extend the time frame to be able to execute programs.
33	System	Print error	108		An error occurred during printing.
34	Entry	HV > H (H2)	110		Enter a lower value for HV or a higher value for H (H2)
35	Note	Maximum number of firing program protocol entries reached	111		The maximum number of firing program protocol entries has been reached. For the next protocol, an existing entry will be deleted / overwritten.
36	Entry	"Share of the holding time with vacuum" is activated, but Vx2 does not correspond to Tx or Tx+1	120		Activate the vacuum during the holding time Tx or deactivate HV..
52	System	Brief power failure during a program in progress	702		A program in progress was interrupted by a brief power failure. The program is continued!

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Index	Category	Error	ERR No.	Continuation possible	Error Message Text
58	System	Final vacuum value not reached	800		The required final vacuum value cannot be reached. Check the vacuum pump.
59	System	Vacuum drop	801		An unacceptable vacuum drop has occurred.
60	System	The vacuum does not increase (self-test)	802		No vacuum increase could be measured. Check the following points: Is the firing chamber tight (no contamination on the sealing surfaces)? Is the vacuum hose connected? Is the vacuum pump connected? Is the fuse F1 ok?
89	System	ATK2 calibration: Pre-heating to 962 °C	1302 **		Error during calibration. Sample may not be correctly inserted. Try again with a new sample and make sure the sample makes ample contact.
93	Note	Calibration reminder	1310		Some time has passed since the last calibration procedure. Calibrate the furance soon.
95	Note	Dehumidification reminder	1312		Some time has passed since the last dehumidification. Conduct a dehumidification in the near future.
100	Note	Temperature > VT at the start of a firing program	1510		The temperature in the firing chamber is higher than the pre-drying temperature. Press START to continue the program despite the error message.
101	Entry	Software update: Invalid file	1520		The file selected for the software update is invalid. The update cannot be conducted.
102	Entry	Software update: Invalid version	1521		The software to be installed is older or the same as the one installed on the furnace. The update cannot be conducted.
103	System	Software update: Error during update	1522		An error has occurred during the software update. Do NOT switch off the furnace and try again. If the error reoccurs, try conducting the update via the USB interface.

* Furnace head opens when this error occurs.
** A program in progress is stopped.
*** The error cannot be acknowledged; the programs cannot be started.

8.2 Other error messages

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

25, 29

43, 44, 45, 46, 47, 48

54, 56

103, 107

143, 144, 145, 146, 147, 148

700, 701, 703, 704, 705, 706, 707

1010, 1011, 1012, 1013, 1014, 1015, 1016, 1017, 1018, 1019

1024, 1025, 1026, 1028

1143, 1144, 1145, 1146, 1147, 1148

1202, 1203, 1204, 1205, 1206, 1207

1300, 1301, 1303, 1304, 1305

1400, 1401, 1402

1500, 1530, 1540

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8.2 Technical malfunctions

These malfunctions may occur without an error message being displayed.
* If there are any questions, please contact the Ivoclar Vivadent After Sales Service.

Description	Double-check	Action
Vacuum is not released or only very slowly	Is the vacuum released within approximately 30 seconds?	Wait until the vacuum is released, remove object. Switch the furnace on and off again. *
Indication on display incomplete		Activate the display test program and *
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 (Tune 0)?	Select tune 1–5.
Furnace head does not open	Was the furnace head moved manually?	Open the furnace head only by using the corresponding keys. Switch the furnace on and off again.
	Has the vacuum already been released?	Is the program still running? Wait until the program is complete. Switch furnace off and on again. *
Vacuum pump does not start working	Is the vacuum pump fuse defective?	Check fuse and replace if necessary.
	Was the maximum power consumption exceeded?	Use only the vacuum pump recommended by Ivoclar Vivadent.
	Is the vacuum pump plug correctly connected?	Correctly connect the vacuum pump to the furnace base.
Final vacuum is not reached	Is the vacuum hose OK?	Check vacuum hose and hose connection.
	Is the pump output OK?	Start the vacuum test program.
	Humidity/condensation in the vacuum hose?	Start dehumidification program.
Incorrect or illogical temperature indication	Is the thermocouple bent or fractured?	*
	Is the thermocouple correctly connected?	Correctly connect thermocouple.
	Is the thermocouple plug defective?	*
Hairline cracks in the heating muffle	Are the cracks very small and insignificant (hairline cracks)?	Small cracks in the muffle are normal and do not negatively influence the function of the furnace.
	Are the cracks large or have parts of the heating muffle broken off?	*
Cracks in the insulation	Are the cracks very small and insignificant (hairline cracks)?	Small cracks in the insulation do not negatively influence the furnace.
	Are the cracks large or have parts of the insulation broken off?	*
Cracks in the quartz glass / heating element	Are there cracks in the quartz glass or is the quartz glass sheathing the heating wire broken?	Switch off the furnace. *

8.3 Repair

Repairs may only be carried out by a certified Ivoclar Vivadent Service Center. 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 Center, the warranty will expire immediately. Please also refer to the corresponding warranty regulations.

8.4 Load factory settings

If you want to reset the furnace to its original settings, choose *Selection - Settings - Extended settings - Factory settings*. All programs, melodies, navigation settings and volume control settings will be irrevocably reset to the factory settings.

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9. Product Specifications

9.1 Delivery form

– Programat P500/G2
– Power cord
– Vacuum hose
– Calibration test set
– Operating Instructions
– Programat Firing Tray Kit
– Programat USB stick
– USB data cable
– Service passport equipment

9.1.1 Recommended accessories

– Programat Accessories Set
– Temperature Checking Set 2
– Vacuum Pump VP4

9.2 Technical data

Power supply:	110–120 V / 50–60 Hz 200–240 V / 50–60 Hz
Overvoltage category II Contamination level 2	
Tolerated voltage fluctuations:	+/- 10%
Max. power consumption:	12 A at 110–120 V 8.5 A at 200–240 V
Acceptable data for vacuum pump of other manufacturers:	
Max. output:	250 W / max. leakage current 0.75 mA
Final vacuum:	< 50 mbar Use only tested pumps
Electrical fuses:	110–120 V: 250 V / T 15 A (heating circuit) 250 V / T 5 A (vacuum pump)
	200–240 V: 250 V / T 8 A (heating circuit) 250 V / T 3.15 A (vacuum pump)
Dimensions of electrical fuses:	110–120 V: Diameter 6.3 x 32 mm 200–240 V: Diameter 5 x 20 mm
Dimensions of the closed furnace:	
Depth: 470 mm / width: 305 mm / 400 mm (with cooling tray) Height: 320 mm	
Usable size of the firing chamber:	Diameter 80 mm Height 48 mm
Max. firing temperature:	1200 °C (2192 °F)
Weight:	Furnace base: 13.5 kg Furnace head: 4.5 kg

Safety information

The sinter furnace complies with the following guidelines:
– IEC 61010-1:2001
– EN 61010-1:2001
– UL 61010-1:2004
– CAN/CSA-C22.2 No. 61010-1:2004
– IEC 61010-2-010:2003
– EN 61010-2-010:2003
– CAN/CSA-C22.2 No. 61010-2-010:2004

Radio protections / electromagnetic compatibility	EMV tested

9.3 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 ambient pressure:
The furnace is tested for use at altitudes of up to 2000 m above sea level.

9.4 Acceptable transportation and storage conditions

Acceptable temperature range	-20 to +65 °C (-4 °F to +149 °F)
Acceptable humidity range	Max. 80 % relative humidity
Acceptable ambient pressure	500 mbar to 1060 mbar

Use only original packaging of the Programat P500/G2 together with the respective foam material for shipping purposes.

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10. Appendix

10.1 Program table

Two program tables (°C / °F) are enclosed to these Operating Instructions. If not, please contact your local Ivoclar Vivadent Service Center.

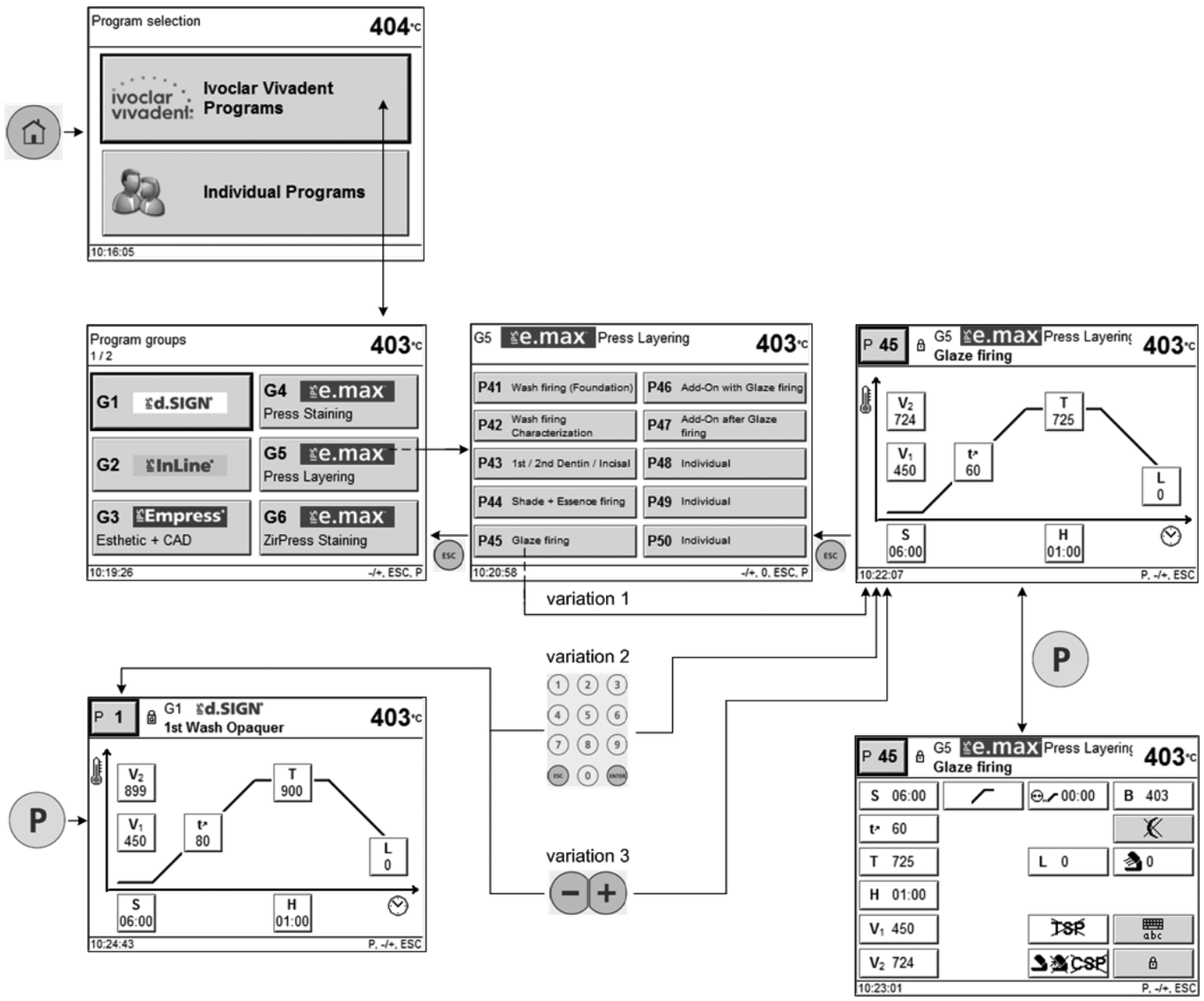
Important information
The current program table is also available at:
www.ivoclarvivadent.com

The program tables can be downloaded from the Internet as PDF files. Please make sure that your program table complies with the software version you use, as the table is coordinated with the respective software version.

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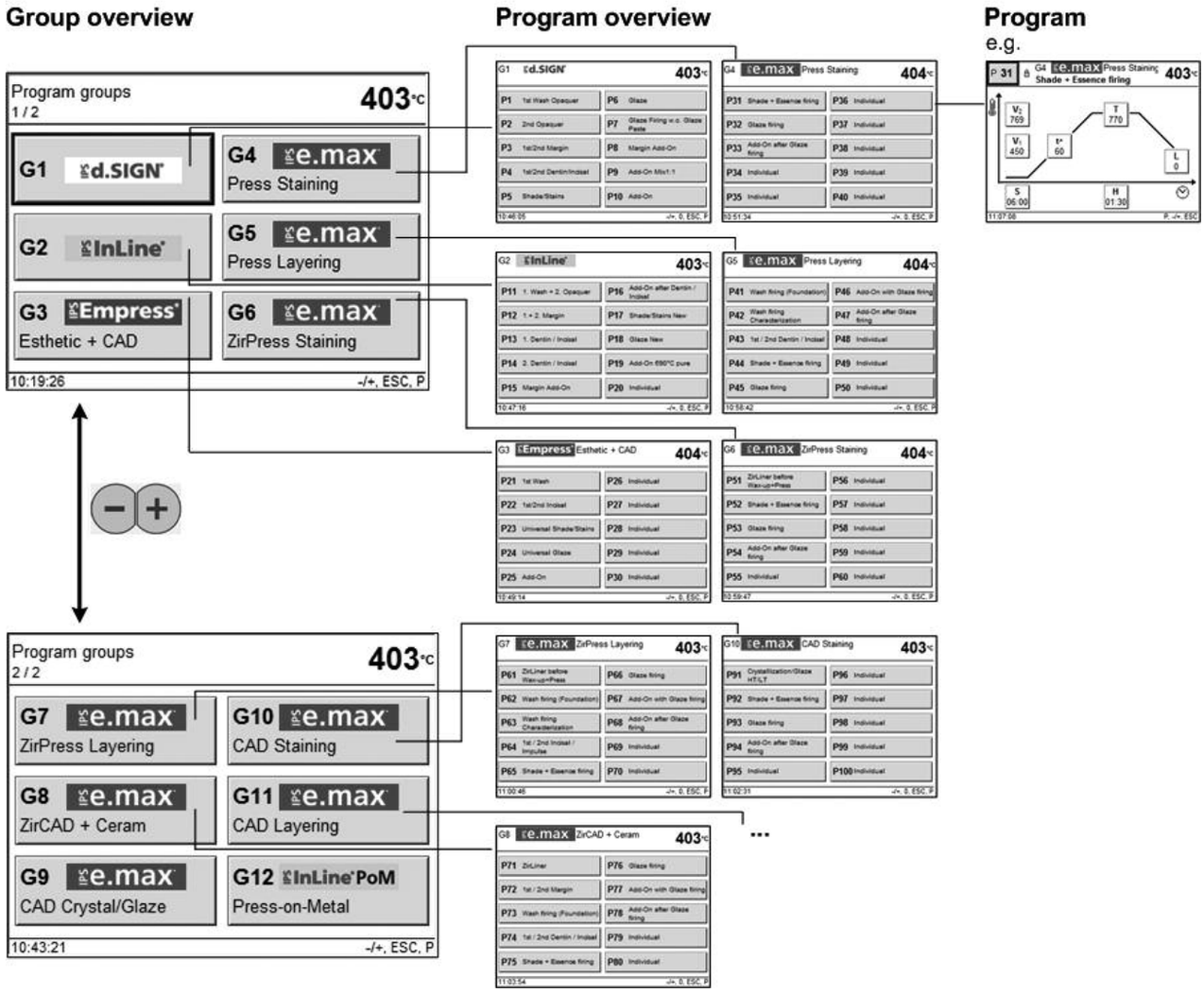
10.2 Menu structure

10.2.1 Possibilities of the program selection



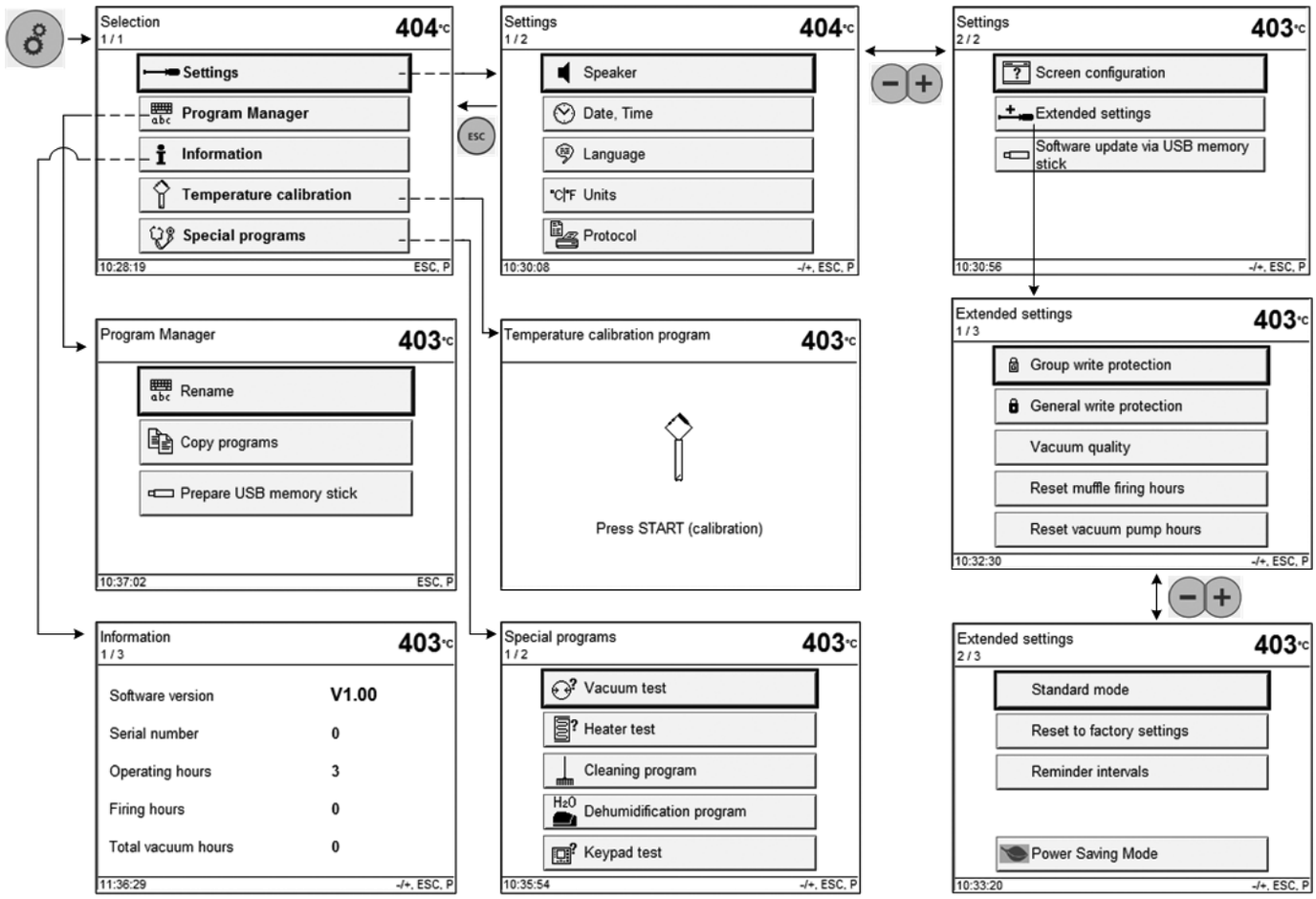
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10.2.2 Overview of program groups



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10.2.3 Settings/information



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