Programat® P500

Operating Instructions

Valid as of Software Version 2.0

CE

ivoclar vivadent® technical

KONFORMITÄTSERKLÄRUNG
DECLARATION OF CONFORMITY
CERTIFICAT DE CONFORMITÉ
DICHIARAZIONE DI CONFORMITÀ
DECLARACIÓN DE CONFORMIDAD
DECLARAÇÃO DE CONFORMIDADE

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BENDERERSTR. 2
FL-9494 LIECHTENSTEIN
TEL ++423 / 235 35 35
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CE

Produkt / Product / Produit / Prodotto / Producto / Produto

Programat P500

DE Hiermit erklären wir in alleiniger Verantwortung, dass das oben aufgeführte Produkt den erwähnten Normen entspricht.
Gemäss den Bestimmungen der EU-Richtlinie(n):

GB We herewith declare that the product listed above complies with the mentioned standards.
Following the provisions of Directive(s):

FR Par la présente, nous déclarons que le produit ci-dessus indiqué est conforme aux normes énoncées.
Conformément aux dispositions de la (des) Directive(s) CE:

IT Con la presente dichiariamo sotto la nostra responsabilità, che il prodotto sopra menzionato corrisponde alle norme citate.
Secondo le disposizioni della/e Direttiva/e CEE:

ES Por la presente declaramos que el producto arriba indicado cumple con las normas citadas.
Siguiendo las indicaciones de la Directiva:

PT Declaramos que o produto citado cumpre as normas mencionadas.
De acordo com as especificações da(s) Diretriz(es):

73/23/EWG 89/336/EWG 93/68/EWG	EN 61010-1 EN 61010-2-010 EN 61326-1 EN 61326-1/A1 EN 61326-1/A2 EN 61000-3-2 EN 61000-3-3 EN 61000-3-3/A1	2001 2003 1997 1998 2001 2000 1995 2001

Bürs, 17.08.2005

Siegbert Koch

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Rev. 0.0

P500_RevV00_WE1_170805_wrc

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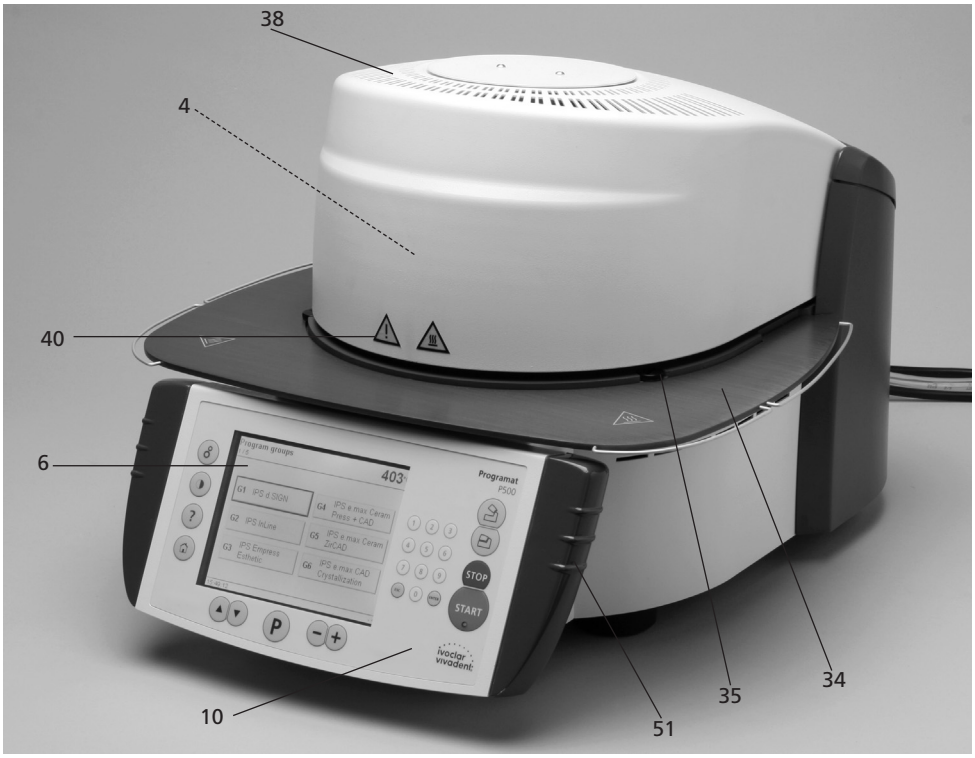
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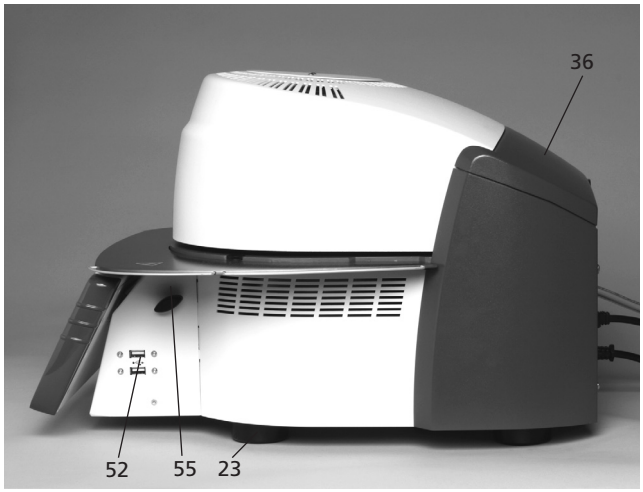
Programat
P500
STOP
START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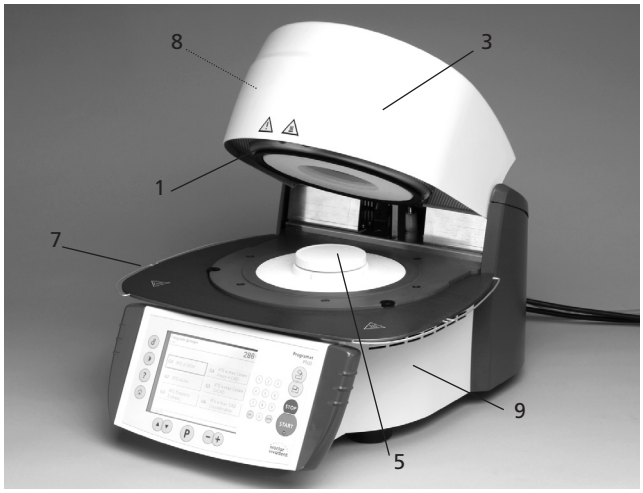
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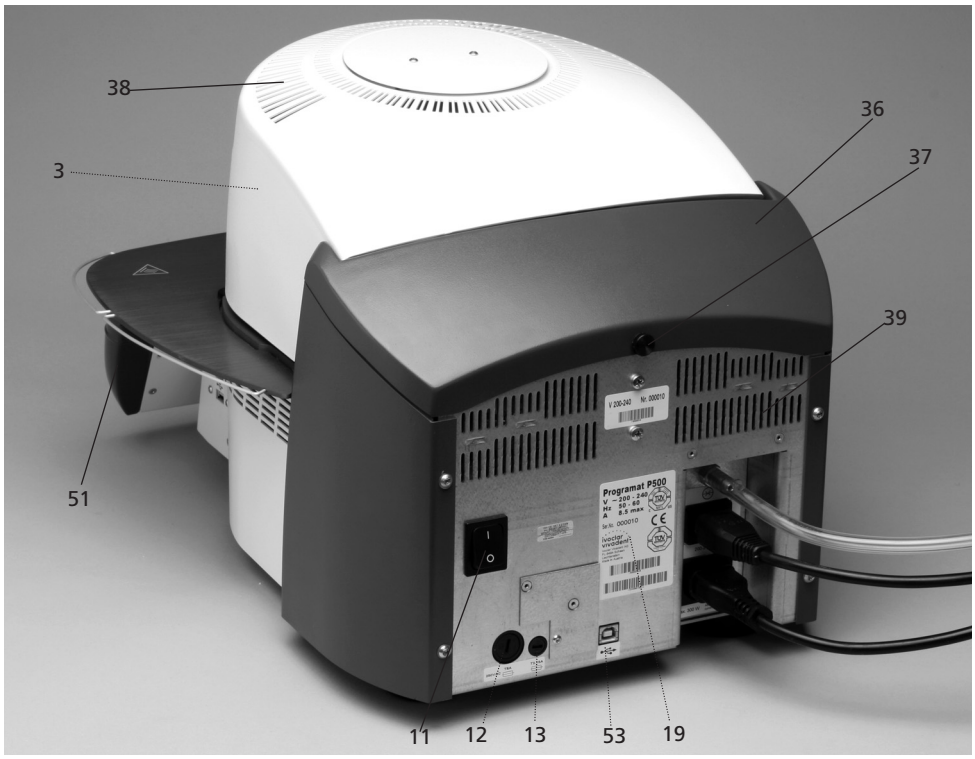
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Programat P500
V ~ 200 - 240
Hz 50 - 60
A 8.5 max
Ser.No. 000010
ivoclar vivadent
Ivoclar Vivadent AG
FL-9494 Schaan
Liechtenstein
Made in Austria
250VAC
T8A
T3.15A
200-240 V~
max. 300 W
Ableitstrom/Leakage current max. 0.75mA
21
46
17
16
18
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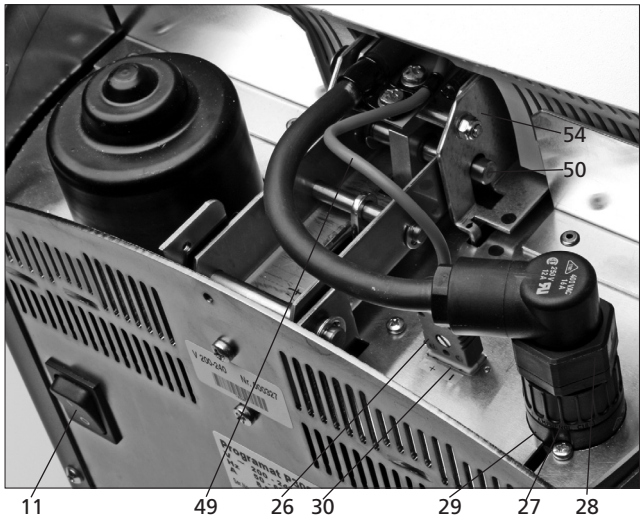
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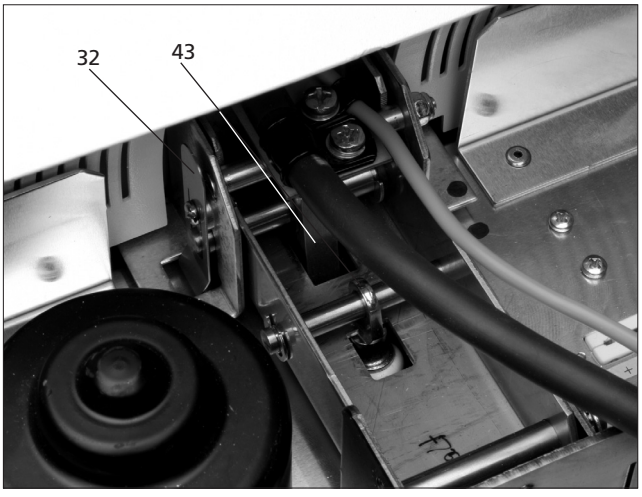
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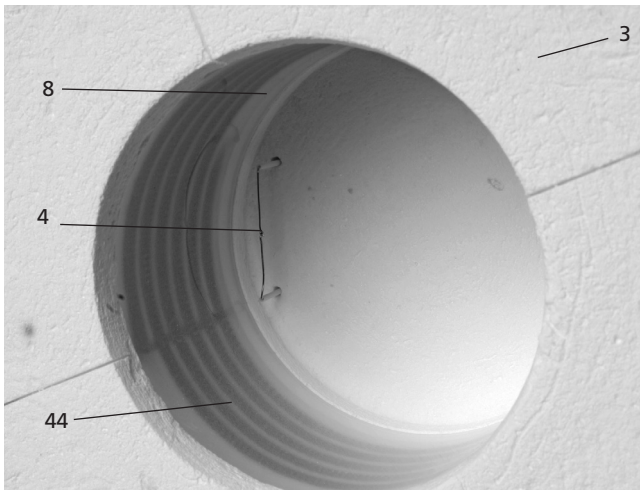

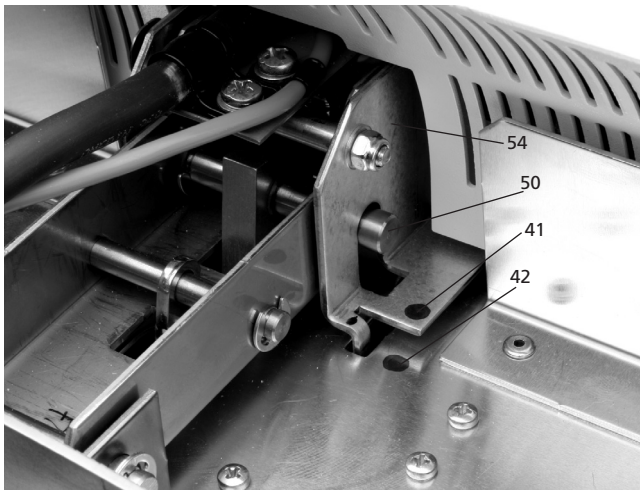

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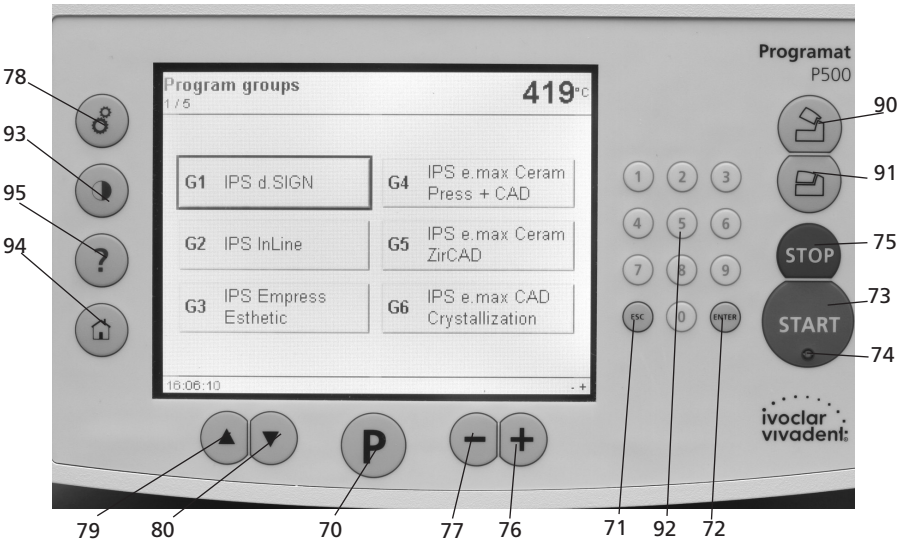
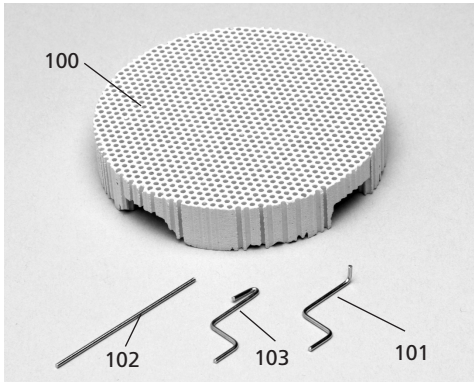
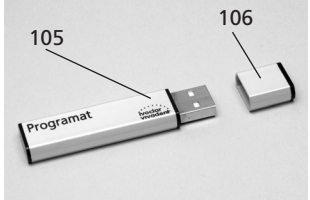
71 ESC key
72 ENTER key
73 START key
74 Start LED
75 STOP key
76 + key
77 - key
78 Settings / information
79 Cursor key up
80 Cursor key down
90 Open furnace head
91 Close furnace head
92 Numeric keys
93 Display contrast setting
94 Home key
95 Help key



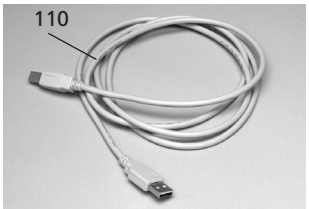
100 Programat firing tray
101 Metal pin A
102 Metal pin B
103 Metal pin C



105 Programat USB stick
106 Protective cover



110 USB data cable



1. Introduction / Signs and symbols

1.1 Preface

Dear Customer

Thank you for having purchased the Programat P500. 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.

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

1.3 Notes regarding the Operating Instructions

Furnace concerned:
Programat P500
Target group:
Dental technologists

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

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

2. Safety first

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

2.1 Indications

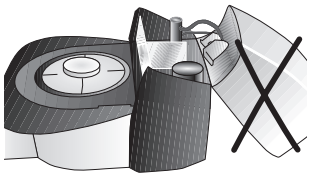
The Programat P500 must only be used to fire dental ceramic materials and it should be used for this purpose only. Other uses than the ones stipulated, e.g. cooking of food, firing of other materials, etc. are contraindicated. The manufacturer does not assume any liability for damage resulting from misuse. 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, regulations, and notes in these Operating Instructions must be observed.
- The instructions, regulations, and notes in the material's Instructions for Use must be observed.
- The furnace must be operated under the indicated environmental and operating conditions (Chapter 9).
- The Programat P500 must be properly maintained.

2.1.1

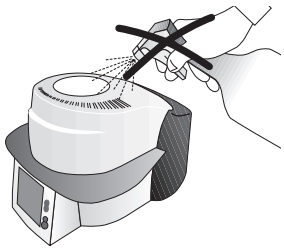
Risks and dangers



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

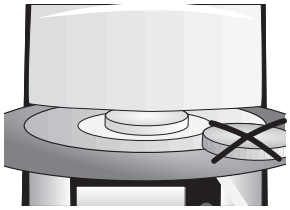
Risks and dangers



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

2.1.3

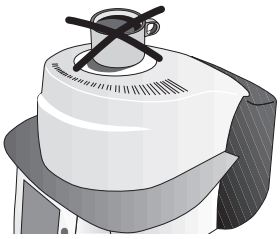
Contraindication



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

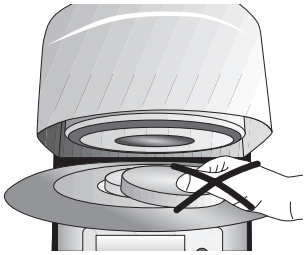
Contraindication



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

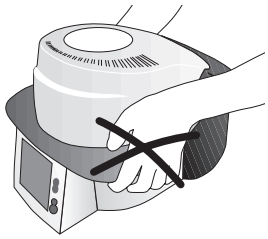
Risks and dangers



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.

2.1.6

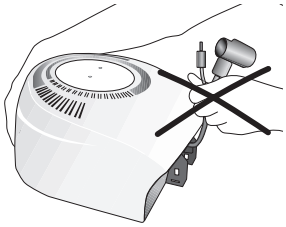
Risks and dangers



Do not carry the furnace by the cooling tray.

2.1.7

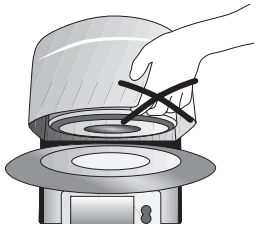
Risks and dangers



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

2.1.8

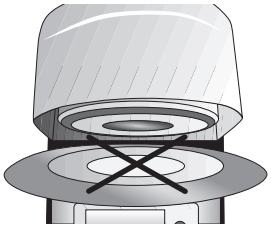
Risks and dangers



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

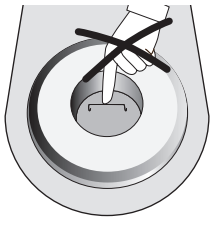
Contraindication



Never use the furnace without a firing table.

2.1.10

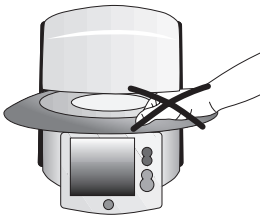
Contraindication



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

2.1.12

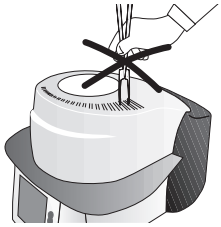
Risk of crushing and burn hazard



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.

2.1.13

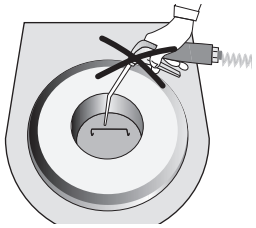
Contraindication



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

2.1.14

Contraindication



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

2.1.15

Risks and dangers

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

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.

- 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 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 dry or slightly moist cloth. Do not use any solvents! Disconnect power before cleaning.
- Use original packaging for transportation purposes.
- The furnace must be cool before it is packed for transportation purposes.
- 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 responsible for damage resulting from misuse or failure to observe the Operating Instructions. Warranty claims cannot be accepted in such cases.
- Before switching on the furnace, make sure that the voltage indicated on the rating plate complies with your local power supply.
- The power socket must be equipped with a residual current circuit breaker.
- The furnace must be plugged into a socket with protected contacts.
- Before calibration, maintenance, repair, or exchange of parts, the power must be 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, 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 unit dried or left to adjust to room temperature for approx. 1 hour (do not connect the power yet).
- The furnace has been tested for use at altitudes of up to 2000 m above sea level.
- The furnace may only be used indoors.

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.

Warnings regarding the dismounting 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 corresponding EU Safety Data Sheet must be observed.

The heat insulation of the firing chamber in the Programat P300 & P500 consists of ceramic fibres. After prolonged use of ceramic fibres at temperatures of over 900 °C (1652 °F), silicogenic substances (Cristobalite) may be produced. In certain cases, e.g. upon changing of the heating muffle, the possible resulting dust exposure may cause irritation of the skin, eyes, and respiratory organs. Therefore, proceed as follows when changing the heating muffle:

- Make sure the corresponding staff wears long-sleeved clothing, as well as headgear, goggles, and gloves.
- Place suction equipment at the source of the dust or, if not possible, provide the staff with FFP3 facemasks or similar items.
- Once the procedure has been completed, any dust possibly adhering to exposed skin must first be rinsed off with cold water. Only after that should soap and warm water be used.
- The corresponding work clothes should be washed separately.

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 in the normal domestic waste. Please correctly dispose of old furnaces according to the corresponding EU council directive.

3. Product description

3.1 Components

The Programat P500 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

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 a 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

4. Installation and initial start-up

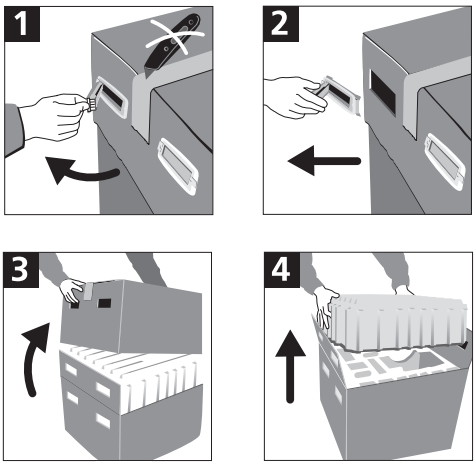
4.1 Unpacking and checking the contents

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)

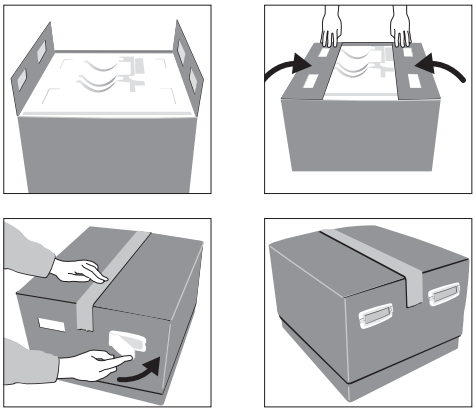
Check the delivery for completeness (see delivery form in Chapter 9) and transportation damage. If parts are damaged or missing, contact your local Ivoclar Vivadent Service Center.

Remove the furnace components from their packaging and place it 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.



Packing and shipping of individual components
The packaging of the P500 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 with the regular household refuse.



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

4.2 Selecting the location

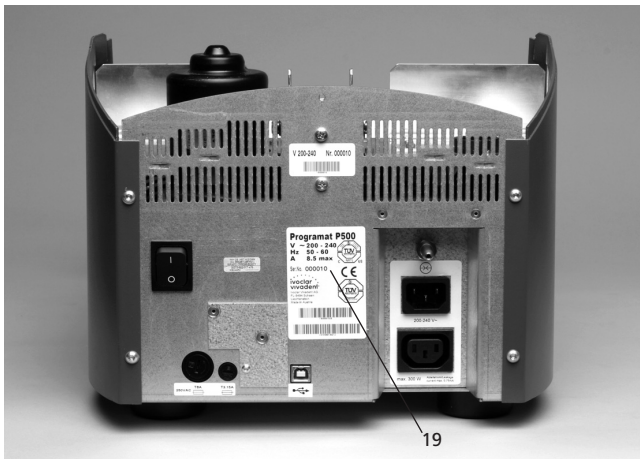
Place the furnace on a flat table using the rubber feet. Make sure that the furnace is not placed in the immediate vicinity of heaters or other sources of heat. Make sure that air may properly circulate between the wall and the furnace.

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.

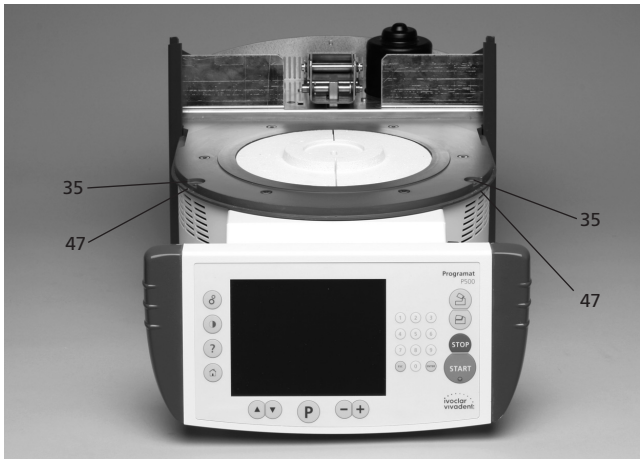
The furnace should neither be placed nor operated in areas where there is an explosion hazard.

4.3 Assembly

Make sure 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).



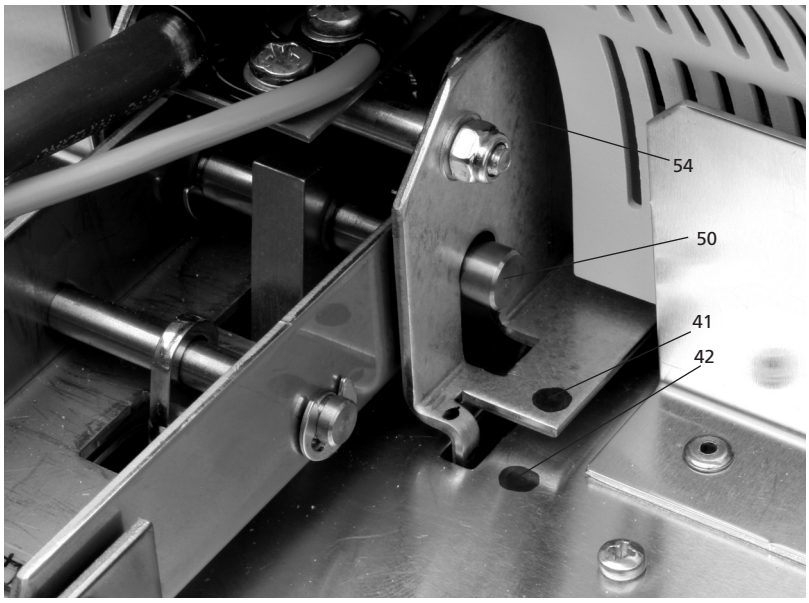
Place the cooling tray (34) on the frame plate (7). Make sure that the cooling tray (34) is correctly positioned on the frame plate (7).

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

Step 2:
Placing the firing plate (5)
Place the firing plate (5) on the firing plate holder (48).

Step 3:
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).

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

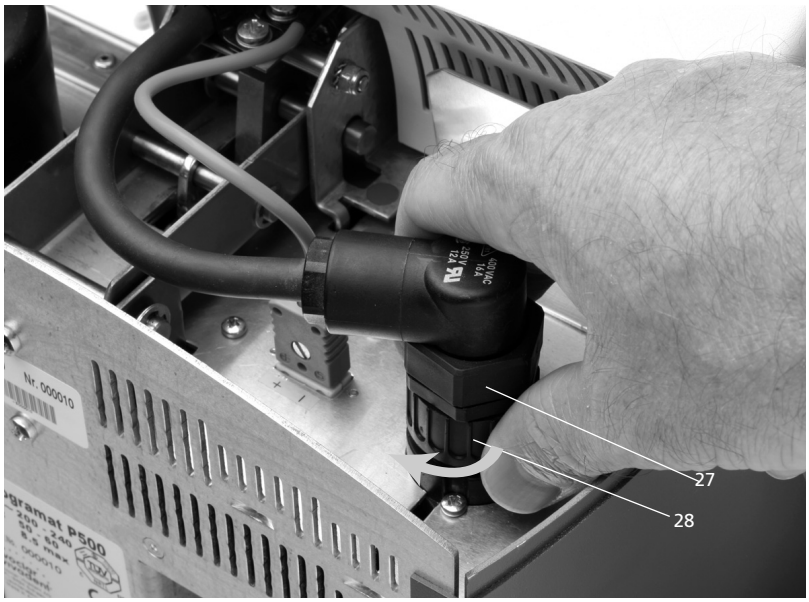


Make sure that the firing plate (5) is not damaged by mounting the furnace head.

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)

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).

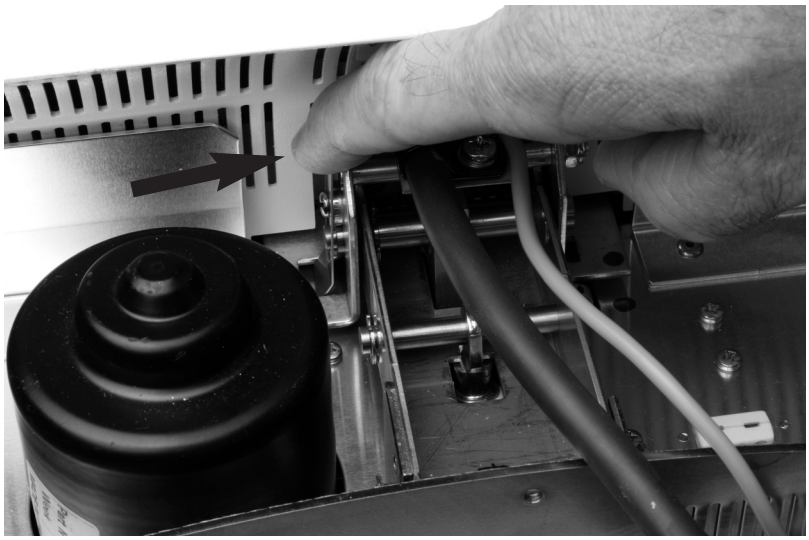
We recommend using only the VP3 easy or VP3 vacuum pumps from Ivoclar Vivadent, since these pumps are especially coordinated with the furnace. If other pumps are used, please observe and do not exceed the maximum power consumption.

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

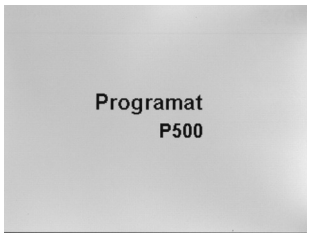
Make sure the furnace head has completely cooled down before it is removed (fire hazard).



4.5 Initial start-up

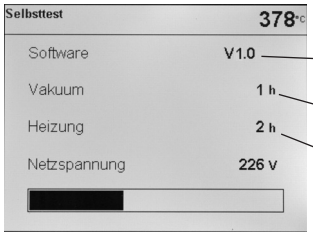
1. Connect the power cord (16) with the wall socket.
2. Put the On/Off switch (11) at the rear of the furnace on position "I".

4.5.1 Start screen



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

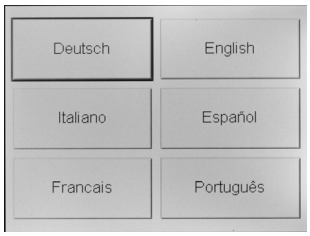
The furnace will now automatically conduct a self-test. The performance of all furnace components is automatically checked. The display shows the following indications during the self-test:



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

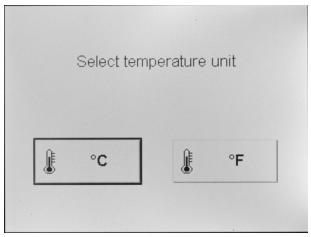
If any component is defective, the corresponding error number (ER xxx) will be indicated in the display. If all components work properly, the display shows the stand-by mode.

4.5.2 Language selection



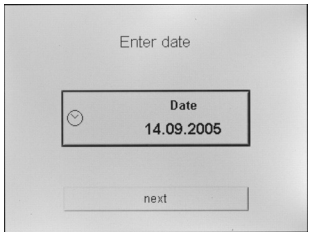
If a new furnace is switched on for the first time, the language selection screen is being displayed. The desired language is set by means of the respective touch button. After that, the next basic setting screen (temperature mode) appears. These settings are then saved and will no longer appear upon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

4.5.3 Temperature mode



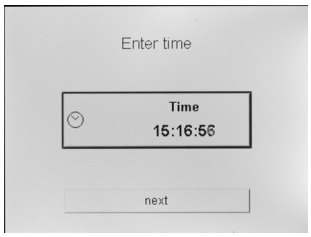
Select the desired temperature mode.

4.5.4 Setting the date



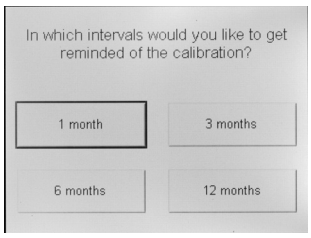
Enter the date (day/month/year).

4.5.5 Setting the time



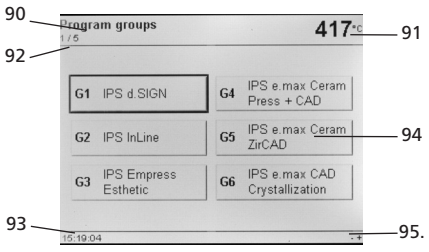
Enter the time (hours/minutes/seconds).

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).

Initial screen or first selection screen (program groups)
Once the language has been selected, the first selection screen (program groups) is displayed.



90 Current program group
91 Current temperature
92 Page number
93 Time
94 Program groups
95 Other navigation options

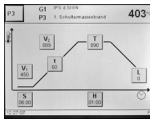
5. Operation and configuration

5.1 Introduction to the operation

The Programat P500 is equipped with a graphical display with back-lighting.
The furnace can be operated by means of the keypad or touch screen.

5.2 Explanation of 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 Settings** 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.
	Contrast Adjusting the display contrast.
?	**Help** Go to the help feature for the current screen.
	Home Return to "Program Group 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.

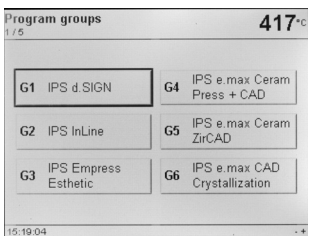
STOP	**STOP** A program in progress can be interrupted by pressing STOP once. Pressing STOP twice will abort the program. Movement of the furnace head can be stopped at any time by pressing STOP. The beeper can be confirmed by pressing STOP.
START	**START (Start LED)** Starts the selected program. The 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.

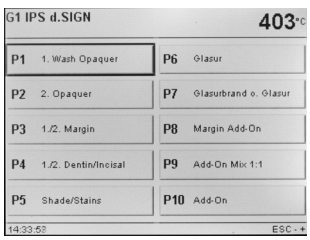
5.3 Program structure

The furnace is equipped with more than 300 firing programs. All the programs are equivalent and, therefore, full-fledged programs. In each program, all the parameters can be adjusted.

a. Standard programs for Ivoclar Vivadent materials
b. Free programs
c. Auxiliary programs

The corresponding program group is selected and displayed by tapping the touch button. After that, another touch button is used to select the desired program.





a) Standard programs for Ivoclar Vivadent materials (see chapter 10.1)

- IPS d.SIGN
- IPS InLine
- IPS Empress Esthetic
- IPS e.max Ceram
- Various Add-On materials

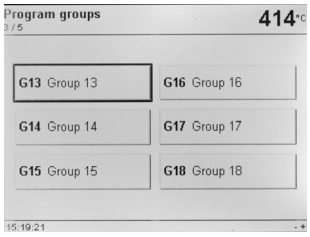
When the furnace is delivered ex works, the standard programs already contain the recommended material parameter settings. Moreover, the programs are write-protected. Please refer to the respective list of parameters in Chapter 10.

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 (see chapter 10.1)

- 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.



c) Special programs

Various test programs are available. Please refer to chapter 5.5 Settings / configuration and information.

5.4 Adjustable parameters and possible value ranges

Symbol	Parameter	Value range	Value range
P	Program number P	001–300	
B	Stand-by temperature	100–700 °C	212–1292 °F
S	Closing time (min : sec)	00:18–30:00	
	Pre-vaccum (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
VT	Pre-drying temp.	100–700 °C	212–1292 °F
VH	Pre-drying holding time (min : sec)	00:00–60:00	
Hv	Holding time Vacuum (min : sec)	00:01–60:00	

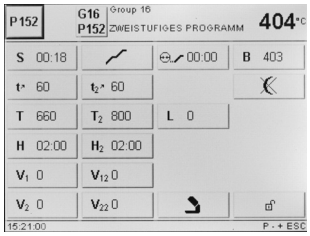
Automatic plausibility check

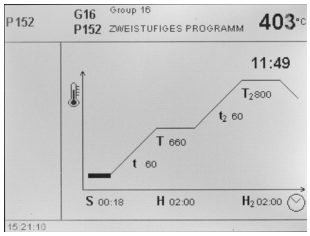
The furnace is equipped with an automatic plausibility check function. The parameters (e.g. T 960 but L 1000) are checked upon each program start. In case of contradictory parameter combinations, the program stops automatically and the respective error number is indicated.

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

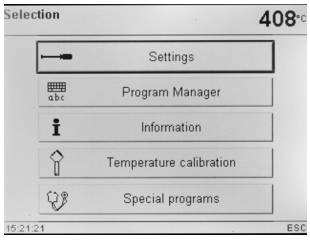




5.5 Settings and information

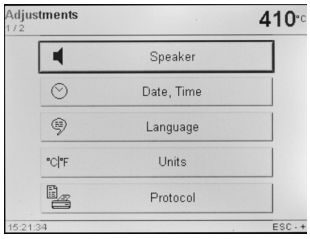
By pressing the "cogwheel" key, you will reach the "Selection" screen.

5.5.1 Selection



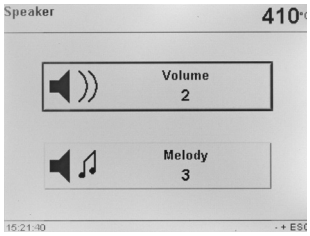
The desired screen is displayed by pressing the corresponding touch button.

5.5.2 Settings



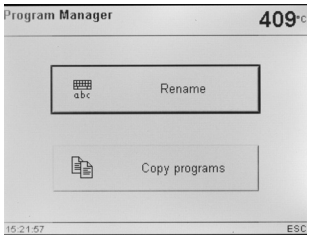
The desired group of settings is displayed by pressing the corresponding touch button. The – / + keys can be used to navigate within these two pages. The desired parameter field is activated by tapping the respective touch button and the settings can be edited using the "minus"/"plus" keys.

e.g. Speaker



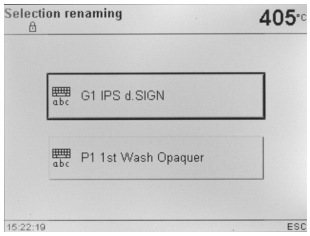
Pressing the corresponding touch button activates the respective parameter field. The settings may be edited using the "minus"/ "plus" keys.

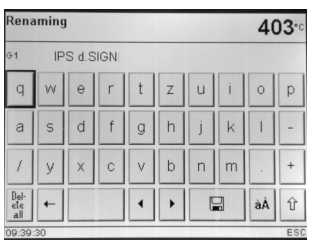
5.5.3 Program Manager



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

Renaming the current program or program group

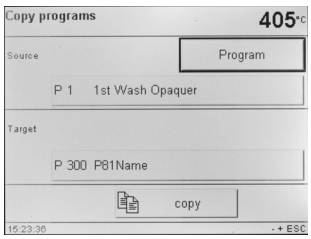




This screen is displayed by pressing the "Rename" touch button.
Now, the current program or the current program group can be renamed.
The keyboard is displayed by tapping the corresponding touch button.
The name of the current program or program group can now be edited using the available touch buttons 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.

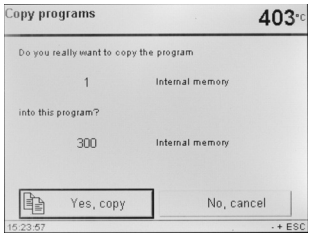
The changes must be confirmed by pressing the "Save" touch button. The "Shift" touch button can be used to change between capitals and lower case characters, while the "Symbol" touch button allows the change between symbols and standard characters.

Copying

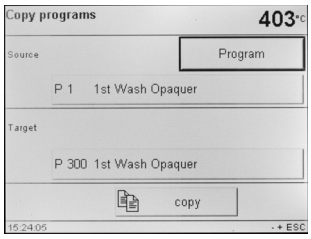


By pressing the "Copy programs" touch button, this screen is displayed.

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.

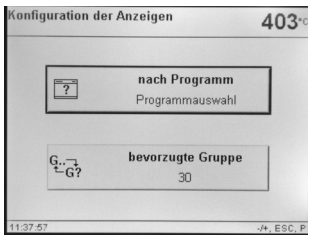


This screen is displayed by pressing the touch button "Copy".



The copy procedure is executed by pressing the touch button "Yes, copy".

Configuration of the displays

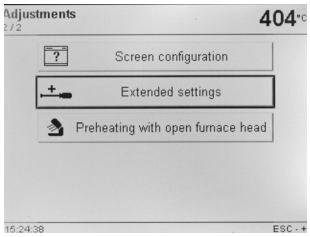


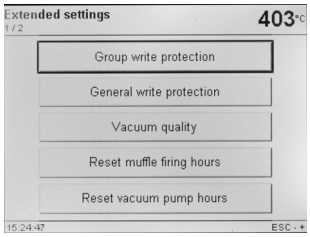
Scroll to page 2/2 in the "Settings" display by means of the "+" key and select "Configuration of the displays".

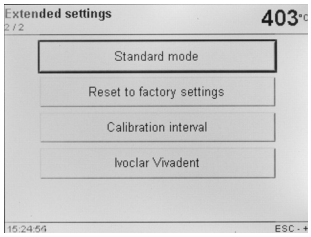
After pressing the upper touch button, the "-"/"+" keys can be used to determine which screen should be displayed after a firing program. The user may select either the parameter display of the current program or the program selection display of the corresponding group.

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.

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

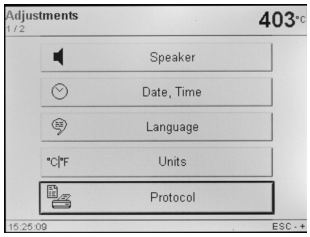




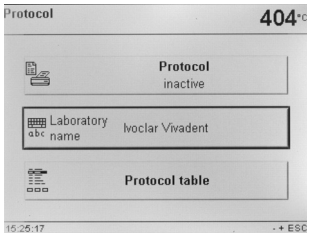


Important information
For most of the "extended settings", the user code (6725) is required.

Protocol



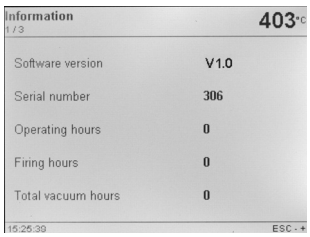
Mark the touch button "Protocol" by pressing it. It can now be edited using the +/- keys. With "Active (table)", the program parameters used are entered into the protocol at the end of a firing program. With "Active (table and printer)", the protocol is also printed with the printer connected to the furnace.



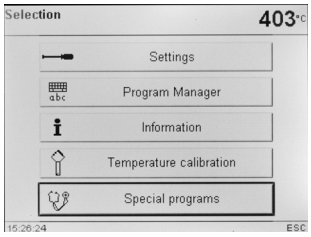
By pressing the touch button "Laboratory name", the keypad is displayed and the name of the laboratory can be entered.

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.

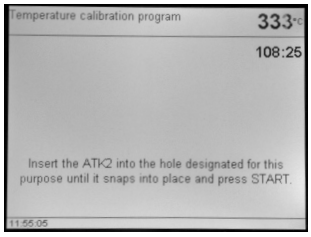
5.5.4 Information



5.5.5 Calibration

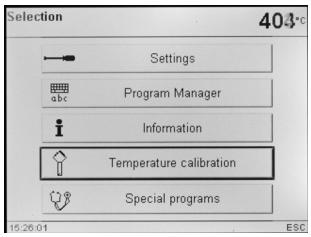


By pressing the "Start calibration program" touch button, the program is automatically started.



Please see the notes in Chapter 7.4.

5.5.7 Special programs



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

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, 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: 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.

Cleaning program
The cleaning program is used to "clean" the heating muffle (duration: approximately 17 minutes).

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).

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.

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)	
Open lock	"Individual write-protection inactive"	
Closed lock	"Individual write-protection active"	
Crossed-out "crescent moon"	"Overnight program inactive"	
"Crescent moon"	"Overnight program active"	
Open furnace head with heat rays	"Pre-drying active"	
"Individual group write-protection active"	All 10 programs of this group are write-protected	
"General write-protection active"	All programs are write-protected	

5.7 Explanation of the speaker signals

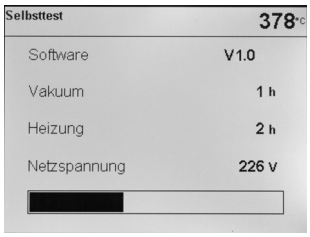
The speaker signal can only be ended by pressing the STOP key.

No.	Description of the occasion	Description of the speaker signal
1	Self-test successfully completed	Short "self-test melody"
2	Furnace head completely open and the furnace temperature having dropped below 320 °C/608 °F	Speaker is switched on and plays the melody selected by the user for 10 seconds. If the signal is not confirmed by pressing the STOP key during this time, the melody is played again after 5 minutes for 5 minutes. After that, no further acoustic signal will be played. If the STOP key is pressed while the signal is played (for 10 seconds or 5 minutes), the speaker is switched off immediately. No further acoustic signal will be played.
3	Error messages	The speaker is switched on and plays the "error melody". The speaker can only be switched off by pressing the STOP key.
4	Keyboard test active	Each keystroke is confirmed with a short beep (approximately 0.5 s. ON)
6	Test or calibration program successfully completed	Short "completion melody"

6. Practical use

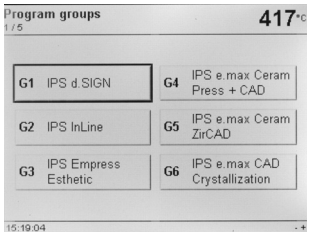
The operating procedure for the Programat P500 will be explained with the help of two examples: one standard and one individual program.

6.1 Switching on/off



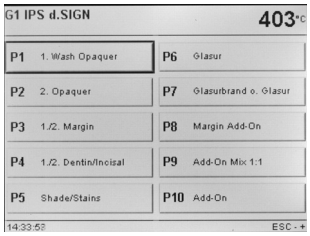
Put ON/OFF switch (11) on position "I". The furnace conducts an automatic self-test, which will be indicated in the beginning. Subsequently, a status bar shows how many % of the self-test have been completed. Make sure that the furnace is not manipulated during this time.

6.1.1 Main menu



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

If the cursor is positioned in the program display, the desired program can be selected by using the + and – keys. The desired program can also be selected by means of the numeric keys.

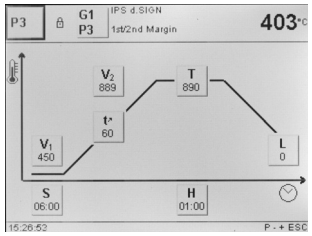


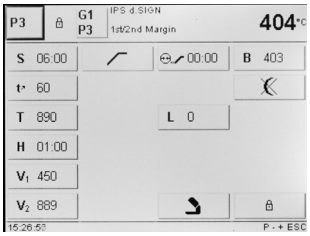
6.1.2 List of parameters

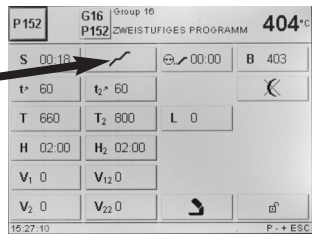
The cursor (black frame) shoes the button which is currently active. It can be moved by means of the arrow keys. If the cursor is positioned on the program button, the desired program can be selected using the + or - keys. As an alternative, the program number can also be entered by means of the numeric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

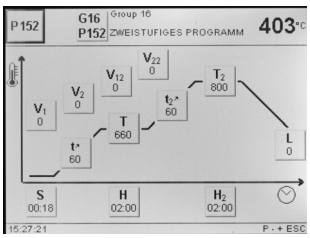
One-stage program

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







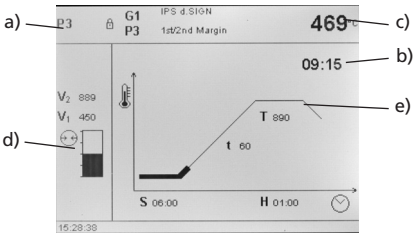


If the cursor is positioned on the "one-stage symbol" and the symbol is switched to the "two-stage symbol" by pressing the + or – key, the program has been set to "two-stage".

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".

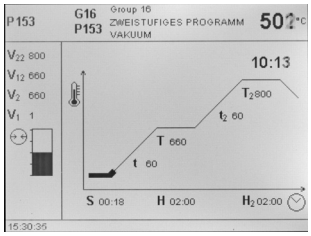
6.1.3 Description of the firing curve display

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

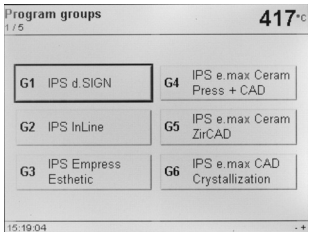


If a two-stage program is selected, two stages are shown.

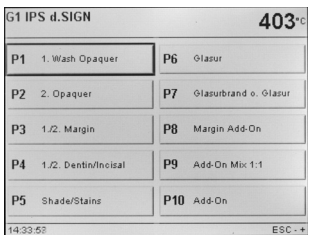
During a firing program in progress, the parameter firing curve may be displayed at any time for information purposes by pressing the "P" key. However, the parameters may only be changed with the program stopped or the furnace in stand-by mode.
The vacuum indication and all the corresponding parameters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

6.2 Firing using a standard program

Step 1:



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

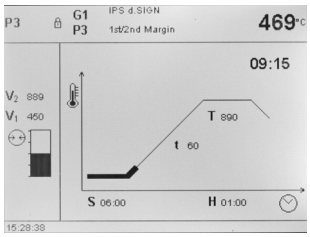


Now, select the desired program (e.g. 1st opaquer).

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 process is indicated in the firing curve display.

6.3 Firing with an individual program

Step 1:
Select a free program.

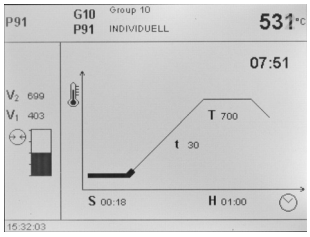
Step 2:
To change a parameter, press the corresponding touch button. In this way, the cursor (black frame) is positioned there. Now, the value can be edited either with the +/- keys or the numeric keypad.

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).

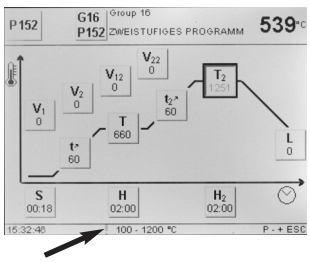
Step 3:



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 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.

6.4.2 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 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.

6.4.3 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.

6.4.4 Changing the parameters while the program is running

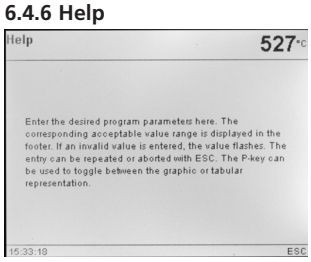
All parameters of the program, which have not yet been executed, can be changed while the program is stopped (green LED blinks).

6.4.5 Standard / quick opening of the furnace head

The operator may select the furnace head opening mode by changing the symbol:

– "Standard furnace head opening" symbol visible: (the furnace head opens within 60 seconds at the end of the program).
– Toggle to "Quick furnace head opening" by means of the – / + key
– "Quick furnace head opening" symbol visible: (furnace head opens within 18 seconds at the end of the program).
– Toggle to "Standard furnace head opening" by means of the – / + key.

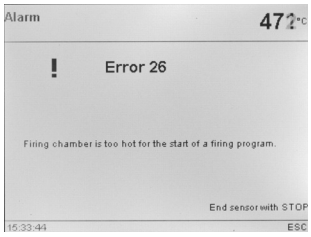
6.4.6 Help



Help text for the current screen

.

6.4.7 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.

6.4.8 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".

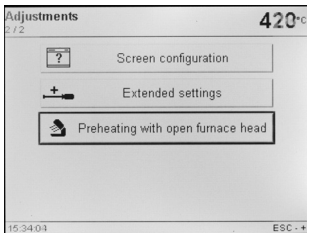
6.4.9 Program status indication

The current program status is indicated in the firing curve display:
pre-drying, closing, pre-vacuum, firing, long-term cooling, opening

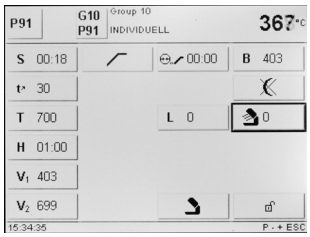
If the program is interrupted, "*Pause*" starts flashing as an indicator. If a program is prematurely stopped, "*Vacuum release*" is flashing while the firing chamber is flooded.

6.4.10 Pre-drying

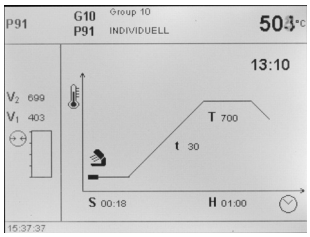
Displaying the touch button "Pre-Drying Temperature":



Change to page 2/2 in the "Settings" screen using the + key. Then, select the touch button "Preheating with the furnace head open" and use the +/- keys to switch on the "pre-heating" setting.

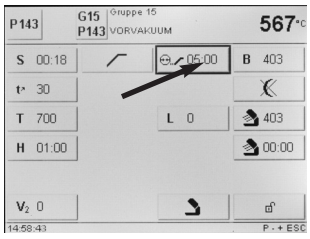


In this way, the touch button "Pre-drying temperature" is displayed in the parameter list. The function "pre-heating", however, is not yet activated (temperature = 0).



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.

6.4.11 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.

6.4.12 Overnight program

a. At the end of an "overnight" program (overnight program symbol active), the heater is switched off and the furnace head opens.
b. When the temperature drops between a certain level, no melody is being played.
c. Once the temperature is lower than 100 °C /212 °F, the furnace head closes, the heater remains switched off, and the furnace cools down to room temperature.
d. The green Start LED starts flashing when the furnace head is opened.
e. After a power failure during an overnight program in progress, the furnace no longer heats up, but remains at room temperature.

6.4.13 "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.

6.4.14 Software Update

The user should be able to conduct a software update by CD, 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).

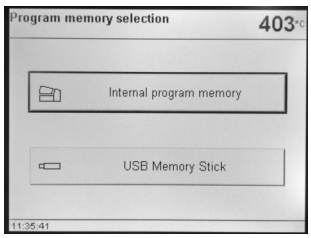
6.4.15 USB printer

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.

6.4.16 USB memory stick

Most USB memory sticks may be used to store programs.



Once the USB memory key has been recognized, "Select program memory" is displayed. In this screen, either the internal programs or the programs on the USB memory key can be activated. If the USB memory is used for the first time with a P500, 300 free programs are saved in this 'empty' memory. After that, the USB memory stick is immediately ready for use.

– The active status of the USB memory stick is shown in the "Information" menu item.
- In the Program Manager, 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 be made at any time.
Once a USB memory stick is ready for use, the screen connected to the "Home" key (usually "Program Groups") is changed to "Program memory selection".

7. Maintenance, Cleaning, and Diagnosis

This chapter describes the user maintenance and cleaning procedures for the Programat P500. 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 in a production enterprise, for industrial applications, and 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

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.

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

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, 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: 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 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 heating muffle (duration: approximately 17 minutes).

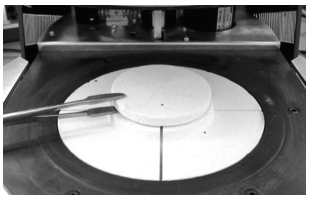
Dehumidification program
The condensation of water in the insulation of the firing chamber and the vacuum pump will result in a lower vacuum and thus to impaired firing results. For that reason, the furnace head should be kept closed when the furnace is switched off, in order to prevent the absorption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

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

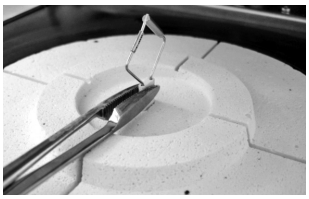
Display test (page 2 / 2)
Two different "chequer-board patterns" are alternately shown on the entire display. This allows the visual check of each individual pixel. The display test can be ended by pressing ESC.

7.4 Temperature calibration

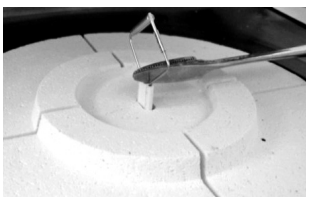
1. Select the calibration program.
2. Remove the firing plate from the furnace using the furnace tongues and place it on the cooling tray.



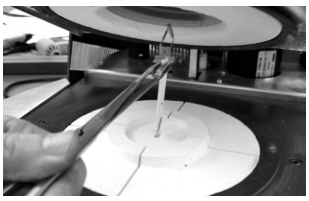
3. Carefully grip the upper part of the ATK 2 using the furnace tongs (Caution: Fracture risk of the ceramic) and insert it into the holes designated for this purpose until it snaps into place. The orientation of the calibration sample (left or right) is not important.



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.

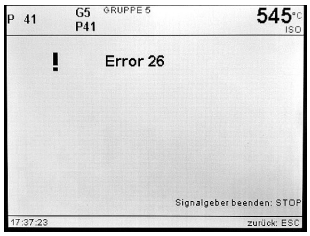
7.5 Stand-by

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

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:

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 + 50 °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. If the fuse is O.K., contact your local Ivoclar Vivadent Service Center.
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.
15	System	Temperature in the furnace base is higher than 65 °C	25		The furnace base is too hot! Make sure that the air vents of the furnace are clean and unobstructed. Maximum temperature 65 °C
16	Entry	T is > B + 200 °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 **, ***		The furnace head cannot be moved to the final position. It might be blocked by an external mechanical source! If this is not the case, please contact your local Ivoclar Vivadent Service Center!
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!
19	System	Temperature > 1225°C (SW) or > 1300°C (HW) (8) EXCESS TEMPERATURE	29 *, **, ***	no	Excess temperature! The temperature in the furnace head by far exceeds the acceptable temperature range (maximum temperature 1200 °C).
20	System	The vacuum is not released	32 **	nein	The vacuum cannot be released. The vacuum valve might be dirty or stuck. Please contact your service technicians.
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.
22	System	Write error in the firing program memory	43		Error while saving firing program data to the internal memory.
23	System	Read error in the firing program memory	44		Error while reading firing program data from the internal memory.
24	System	Checksum error in the firing program memory	45		Invalid checksum of the memory for firing program data - the firing program data are written to the internal memory using the original values.
25	System	Write error in the firing group memory	46		Error while writing firing group data to the internal memory.
26	System	Read error in the firing group memory	47		Error while reading the firing group data from the internal memory.

Index	Category	Error	ERR No.	Conti-nuation possible	Error Message Text
27	System	Checksum error in the firing group memory	48		Invalid checksum of the memory for firing group data - the firing group data are written to the internal memory using the original values.
28	System	OT1 <> OT2 plausibility check: OT1 = OT2 +/- 10°C	54 **,***	nein	Error in the temperature measuring circuit! Contact your local Ivoclar Vivadent Service Center.
29	System	Temperature in the furnace base is lower than 1 °C	56		Temperature in the furnace base is lower than 1 °C. Bring the furnace base to a higher operating temperature.
30	System	Program start blocked	103		Starting a program is not possible due to a technical malfunction.
31	System	Incorrect time settings (date / time)	107		The clock settings are incorrect. Please set a correct date and a correct time!
32	System	Print error	108		An error occurred during printing.
33	Entry	HV > H (H2)	110		Enter a lower value for HV or a higher value for H (H2)
34	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.
35	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..
36	System	Supply voltage outside the acceptable range	700		The supply voltage is outside the acceptable range. Check the supply voltage.
37	System	Start-up aborted due to an error	701 ***		The self-test of the furnace was interrupted by an error. It is not possible to work with the furnace! Switch the furnace off and on again, once the error has been rectified.
38	System	Brief power failure during a firing program in progress	702		A firing program in progress was interrupted by a brief power failure. The program is continued!
39	System	Power failure during a firing program from the memory stick in progress – memory stick no longer present.	703		A firing program in progress (started from the USB memory stick) was interrupted by a power failure. The program could not be continued, since the USB memory stick is no longer present!
40	System	Prolonged power failure during an onvernight program in progress	704		An overnight program (firing program) in progress was interrupted by a prolonged power failure. The overnight program is continued!
41	System	Reading and processing supply voltage	705 **,***	no	Error during measuring the supply voltage. Contact your local Ivoclar Vivadent Service Center.
42	System	Reading the power frequency	706		Error during measuring the supply voltage. Contact your local Ivoclar Vivadent Service Center.
43	System	Incorrect supply voltage	707		The furnace is operated with the incorrect supply voltage. Make sure that the furnace is operated with the supply voltage indicated on the rating plate.
44	System	Final vacuum value not reached	800		The required final vacuum value cannot be reached. Check the vacuum pump.
45	System	Vacuum drop	801		An unacceptable vacuum drop has occurred.
46	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 o.k.?
47	System	Temp. EXTERNAL T-SENSOR excess temperature (> 1225°C)	1010		Temperature channel EXTERNAL T-sensor excess temperature
48	System	Write error in the furnace configuration data memory	1011		Error while saving furnace configuration data to the internal memory.
49	System	Read error in the furnace configuration data memory	1012		Error while reading the furnace configuration data from the internal memory.
50	System	Checksum error in the furnace configuration data memory	1013		Invalid checksum of the memory - furnace configuration data are written into the internal memory using the original values.
51	System	Write error in the furnace operational data memory	1014		Error while saving the furnace operational data to the internal memory.
52	System	Read error in the furnace operational data memory	1015		Error while reading the furnace operational data from the internal memory.
53	System	Checksum error in the furnace operational data memory	1016		Invalid checksum of the memory – furnace operational data are written into the internal memory using the original values.
54	System	Write error in the firing protocol data memory	1017		Error while saving the firing program protocol data.

Index	Category	Error	ERR No.	Conti-nuation possible	Error Message Text
55	System	Read error in the firing protocol data memory	1018		Error while reading the firing program protocol data.
56	System	Checksum error in the firing protocol data memory	1019		Invalid checksum of the memory – firing program protocol data are deleted.
57	System	Technical error of the furnace head	1024 **,***	no	Error while reading the stop switch for the furnace head.
58	System	Technical error of the furnace head	1025 **, ***	no	Read/write CPLD
59	System	Technical error of the vacuum driver	1026	no	Error in the vacuum driver
60	System	Technical error in the SBS driver	1028		Error while reading/writing the SRAM.
61	System	Write error in the firing program memory	1143		Error while saving firing program data to the USB memory stick.
62	System	Read error in the firing program memory	1144		Error while reading firing program data from the USB memory stick.
63	System	Checksum error in the firing program memory	1145		Invalid checksum of the memory for firing program data – the firing program data are written to the USB memory stick using original values.
64	System	Write error in the firing group memory	1146		Error while saving firing group data to the USB memory stick.
65	System	Read error in the firing group memory	1147		Error while reading the firing group data from the USB memory stick.
66	System	Checksum error in the firing group memory	1148		Invalid checksum in the memory for firing group data - the firing group data are written to the USB memory stick using original values.
67	System	Reading, calculating the ambient temperature	1202 **,***	no	Error while measuring the ambient temperature
68	System	Reading, calculating the furnace temperature	1203 **,***	no	Error while measuring the furnace temperature
69	System	Reading, calculating the furnace control temperature	1204 **,***	no	Error while measuring the furnace control temperature
70	System	Reading, caluclating the resistance value	1205		Error while measuring the resistance value for the ATK2 calibration.
71	System	Reading, calculating, EXTERNAL T-sensor	1206		Error while measuring the temperature for the EXTERNAL T-sensor.
72	System	Temperature regulator	1207 **,***	no	Error in the temperature regulator.
73	System	ATK2 calibration: Pre-heating to 660 °C	1300 **		Error during calibration.
74	System	ATK2 calibration: Calibration of 660 °C	1301 **		Error during calibration.
75	System	ATK2 calibration: Pre-heating to 963 °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.
76	System	ATK2 calibration: Calibration of 963 °C	1303 **		Error during calibration.
77	System	ATK2 calibration: Difference in the calibration values	1304 **		Error during calibration.
78	System	ATK2 calibration: Calibration value range	1305 **		Error during calibration.
79	Note	Calibration reminder	1310		Some time has passed since the last calibration procedure. Calibrate the furance soon.
80	System	Access Board Descriptor: Writing the version number	1400		Error while writing the new version number to the BoardDescriptor (E2Prom).
81	System	Access Board Descriptor: Writing the serial number	1401		Error while writing the new serial number to the BoardDescriptor (E2Prom).
82	System	Access Board Descriptor: Reading the serial number	1402		Error while reading the serial number from the BoardDescriptor (E2Prom).
83	System	Loading of the drivers failed	1500 ***		Failure during loading the necessary drivers. The furnace is not ready. Contact your Ivoclar Vivadent Service Center.
84	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.

Behaviour of the furnace in case of error

* 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 Technical malfunctions

These malfunctions may occur without an error message being displayed:

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. If it still does not work properly, contact your local Ivoclar Vivadent Service Center.
Indication on display incomplete.		Activate the display test program and, if necessary, contact your local Ivoclar Vivadent Service Center
Writing in the display is very hard to read.	Is the contrast properly set?	Adjust contrast.
Display not illuminated	Is the furnace properly connected according to the Operating Instructions and switched on?	Correctly connect the furnace and switch it on.
Buzzer does not sound.	Is the buzzer 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. If it still does not work properly, contact your local Ivoclar Vivadent Service Center.
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? or fractured?	Contact your local Ivoclar Vivadent Service Center.
	Is the thermocouple correctly connected?	Correctly connect thermocouple.
	Is the thermocouple plug defective?	Contact your local Ivoclar Vivadent Service Center.
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?	Contact your local Ivoclar Vivadent Service Center.
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?	Contact your local Ivoclar Vivadent Service Center.
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 and contact your local Ivoclar Vivadent Service Center.

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.

9. Product Specifications

9.1 Delivery form

– Programat P500
– Power cord
– Vacuum hose
– Calibration test set
– Operating Instructions
– Programat Firing Tray Kit
– Programat USB stick
– USB data cable

9.1.2 Recommended accessories

– Programat Accessories Set
– Temperature Checking Set 2
– Vacuum Pump VP3 / VP3 easy

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: Final vacuum:	250 W / max. leakage current 0.75 mA < 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: 368 mm / width: 303 mm / 398 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: 12.3 kg Furnace head: 4.5 kg

Safety information

The P500 complies with the following guidelines:
– IEC 1010-1/EN 61010, Part 1
– UL and cUL standards

Radio protection / electromagnetic compatibility	EMC 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 together with the respective foam material for shipping purposes.

10. Appendix

10.1 Program table

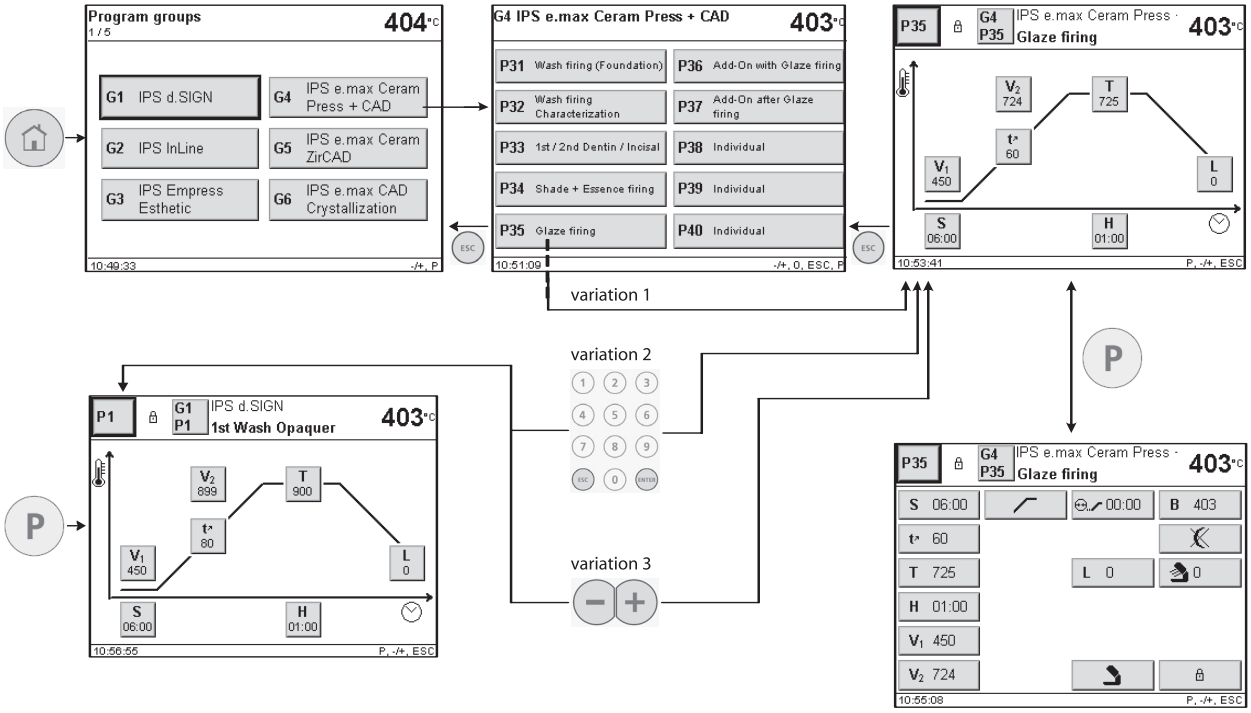
Two program tables (°C / °F) are enclosed to these Operating Instructions. If not, please contact your local Service Center.

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

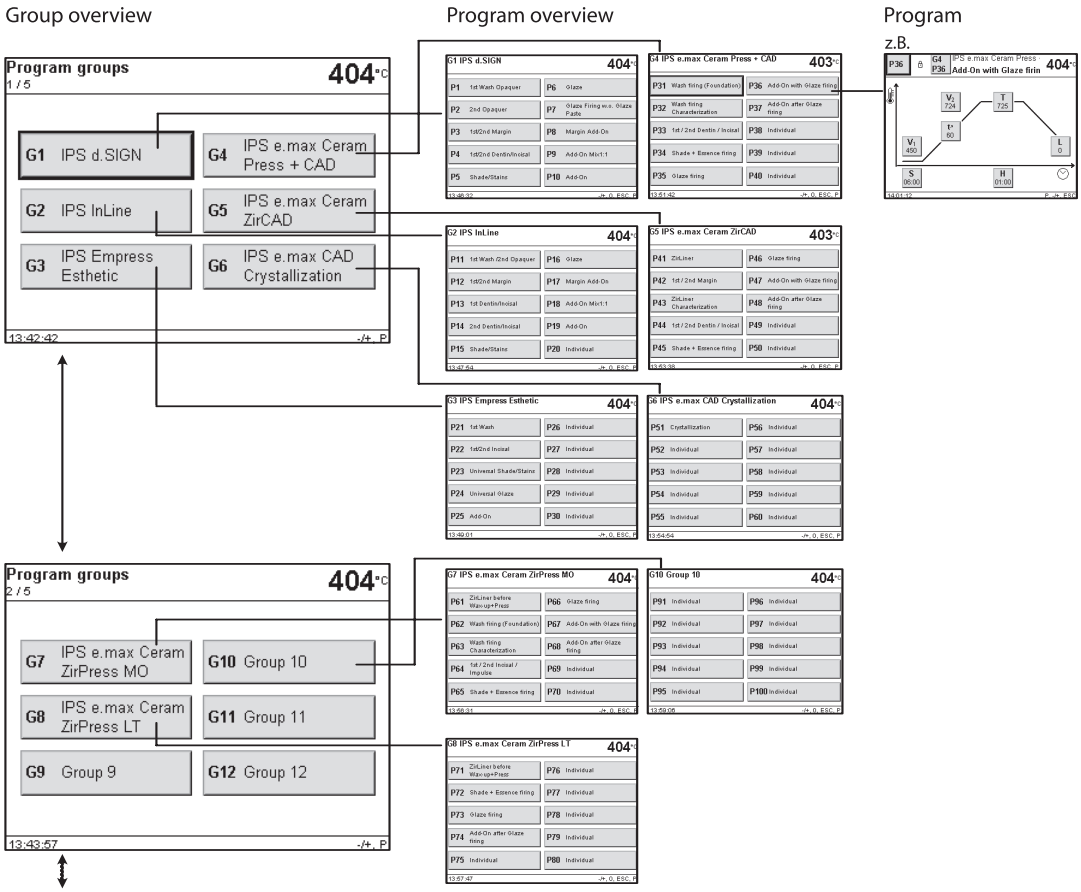
The program tables can be downloaded from the Internet as PDF files. Please make sure that your program table complies with the software version you use, as the table is coordinated with the respective software version.

10.2 Menu structure

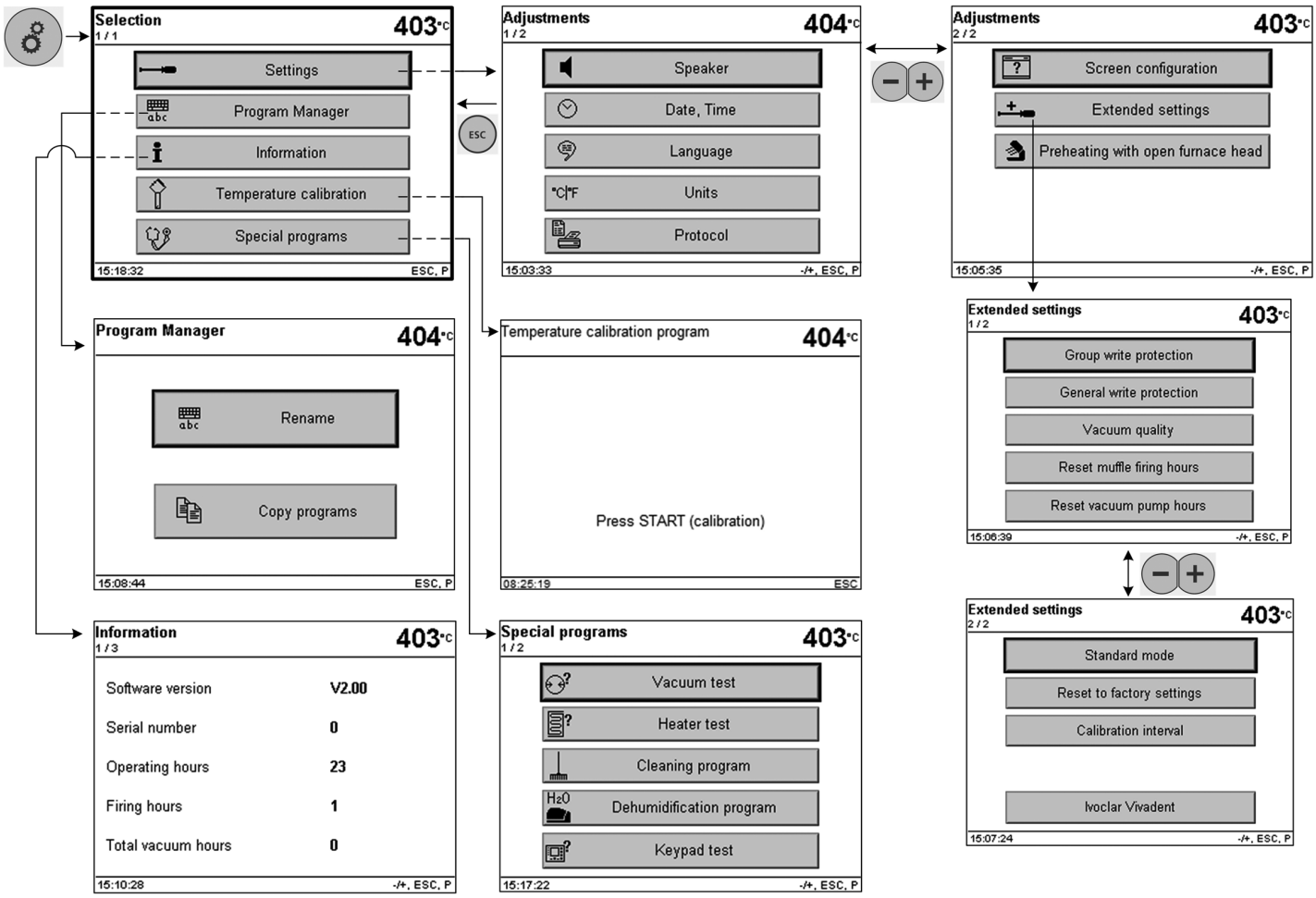
10.2.1 Possibilities of the program selection



10.2.2 Overview of program groups

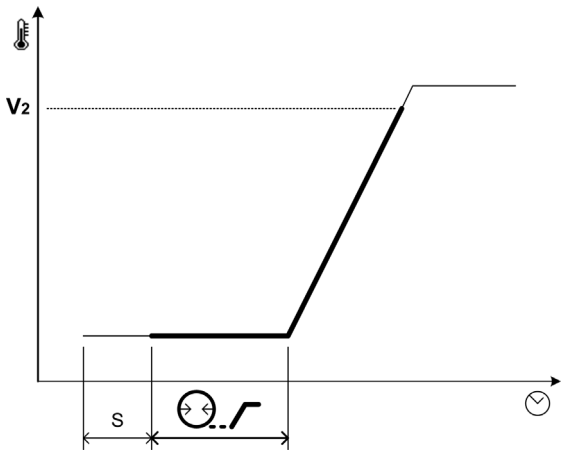


10.2.3 Adjustments / Information

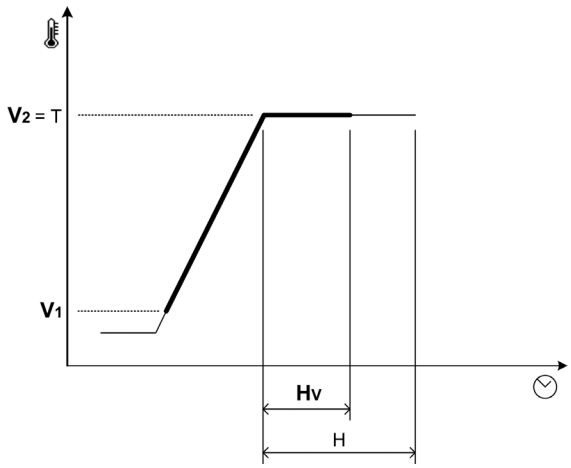


10.3 Firing curves

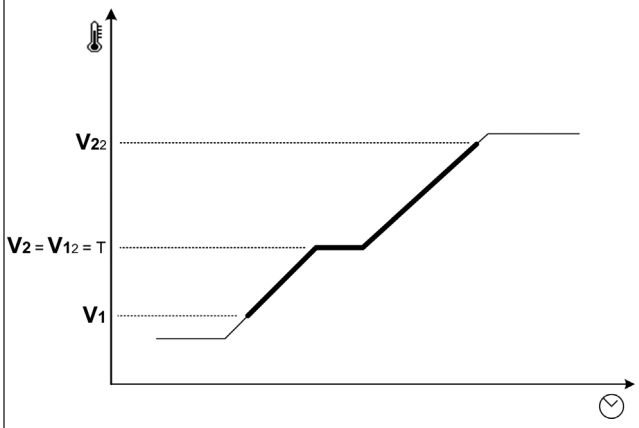
10.3.1 Pre-vacuum



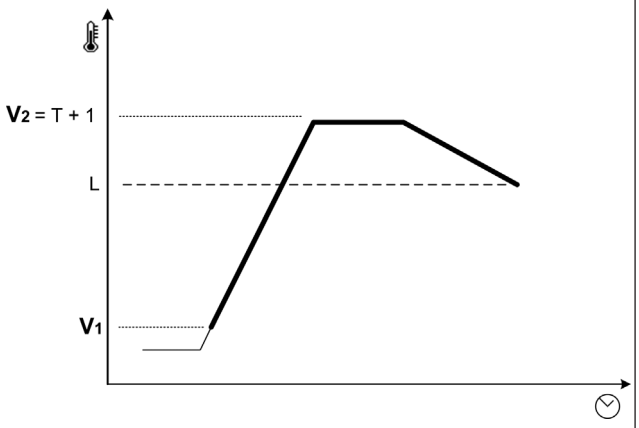
10.3.2 Holding time with vacuum



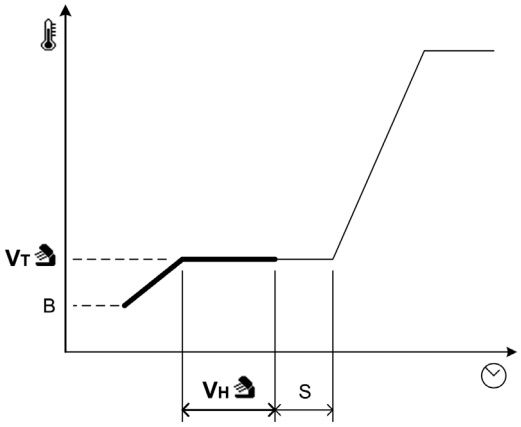
10.3.3 Vacuum during both stages



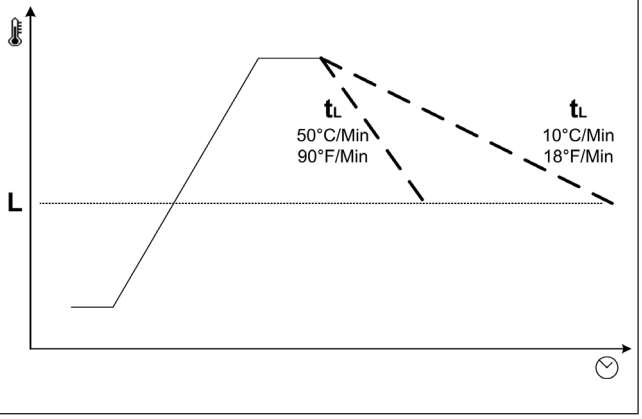
10.3.4 Vacuum during long-term cooling



10.3.5 Pre-drying



10.3.6 Controlled long-term cooling



Programat P500 firing protocol

Laboratory or practice: Ivoclar Vivadent

Name of dental technician: .....

Order No.: .....

Date/Time: 22.05.2006 11:44

Furnace serial number: 0

Program name		ZirLiner Characterization
P	Program number	43
B	Stand-by temperature	403 °C
VT	Predrying temperature	0 °C
VH	Predrying time	00:00 mm:ss
S	Closing time	04:00 mm:ss
	Prevacuum	00:00 mm:ss
t1	Temperature increase 1	50 °C/min
T1	Holding temperature 1	750 °C
H1	Holding time 1	01:00 mm:ss
V1	Vacuum 1 on	450 °C
V2	Vacuum 1 off	749 °C
HV	Share of holding time with vacuum	00:00 mm:ss
tL	Cool down gradient	0 °C/min
L	Long-term cooling	0 °C
	Quick opening	off
NP	Night program	off

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