Programat® P300/G2

Operating Instructions

Valid as of software Version 5.0

CE

ivoclar vivadent®
technical

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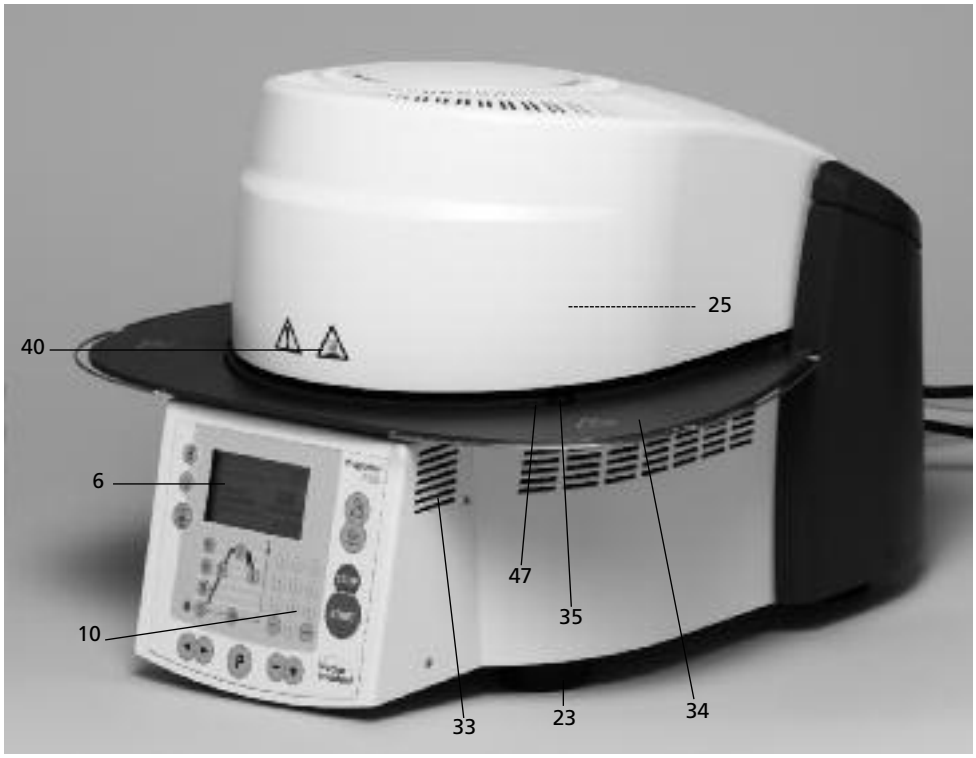
Please note that the list of parts applies to the entire Operating Instructions. These parts and their numbers are often referred to in later chapters.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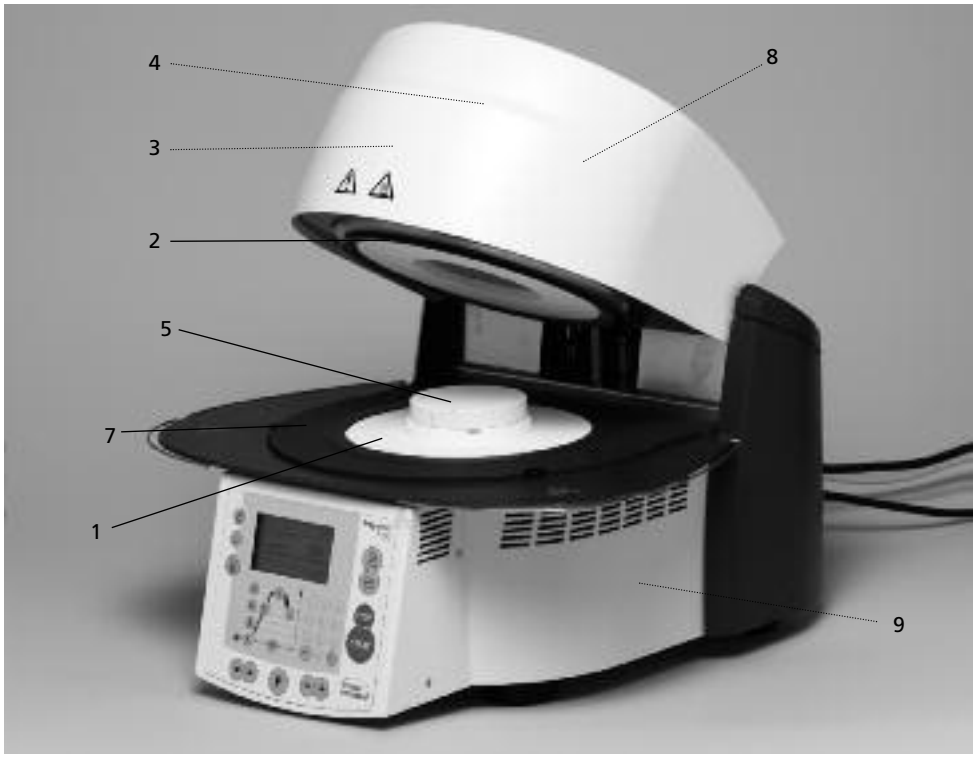
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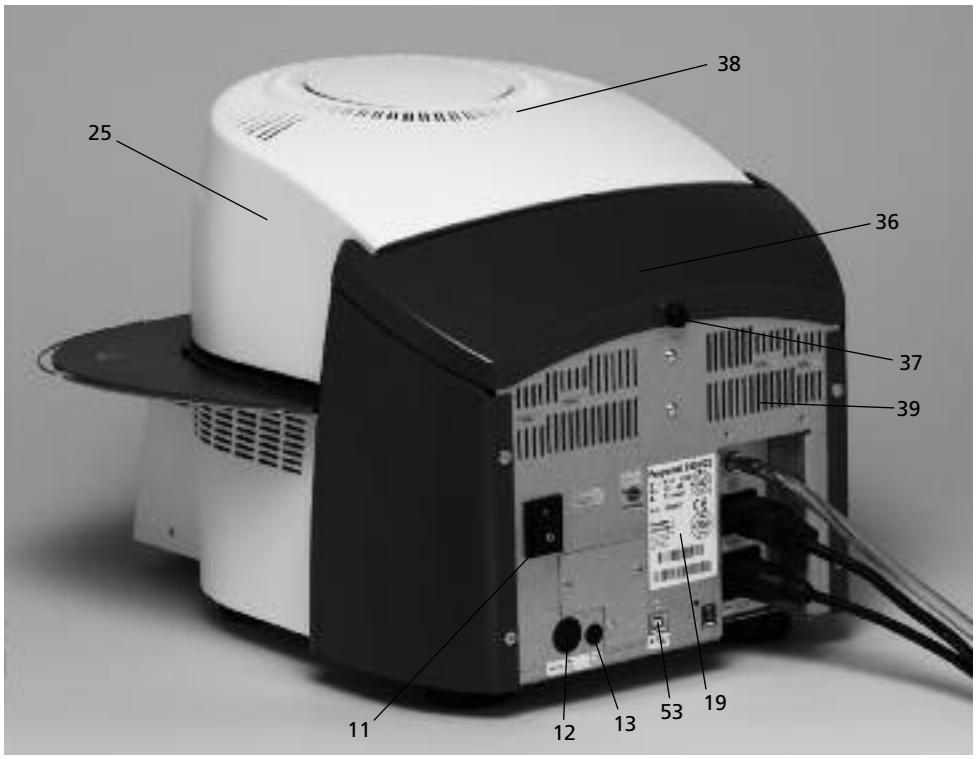
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Programat P300/G2
V ~ 110 - 120
Hz 50 - 60
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ivoclar vivadent
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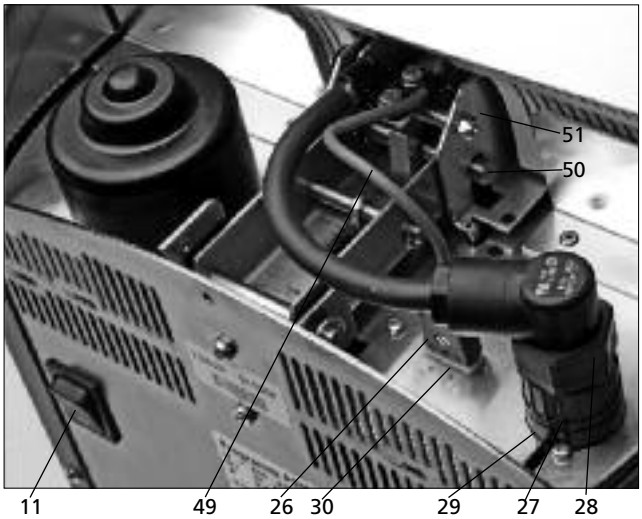
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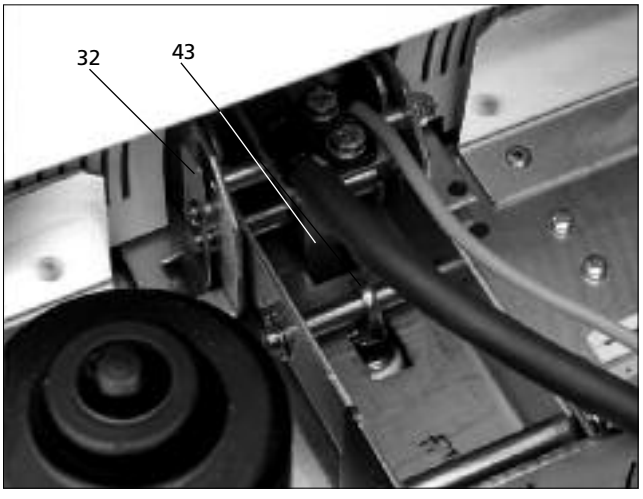
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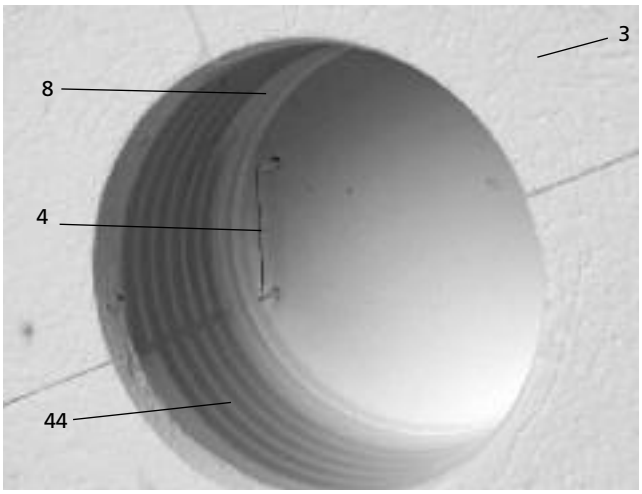
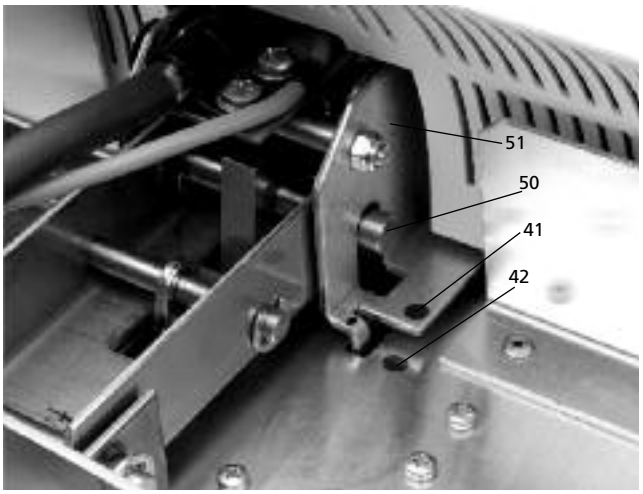
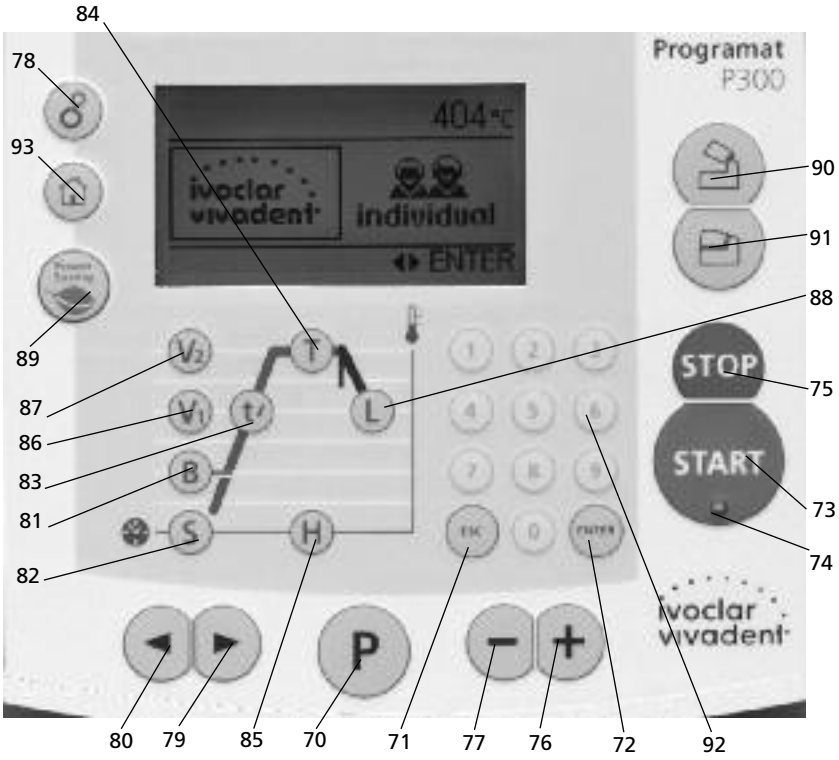


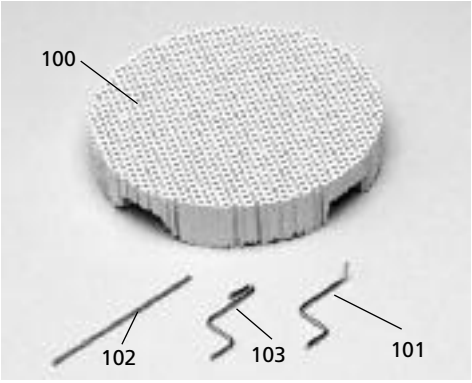


Control unit:

70 Program key
71 ESC key
72 ENTER key
73 START key
74 Start LED
75 STOP key
76 + key
77 – key
78 Information / Settings
79 Cursor key right
80 Cursor key left
81 Stand-by temperature
82 Closing time
83 Temperature increase
84 Holding temperature
85 Holding time
86 Vacuum on
87 Vacuum off
88 Long-term cooling
89 Power saving key
90 Open furnace head
91 Close furnace head
92 Numeric keys
93 Home key



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



1. Introduction / Signs and Symbols

1.1 Preface

Dear Customer

Thank you for having purchased the Programat P300/G2. It is a state-of-the-art furnace for dental applications.

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

Enjoy working with the P300/G2.

1.2 Introduction

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


Risks and dangers


Important information


Contraindication


Burn hazard


Risk of crushing


The Operating Instructions must be read.

1.3 Notes regarding the Operating Instructions

Furnace concerned:
Programat P300/G2
Target group:
Dental technologists

These Operating Instructions facilitate the correct, safe and economical use of the Programat P300/G2 furnace.

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

1.4 Notes on the different voltage versions

The furnace is available with different voltage versions.

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

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

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

2. Safety First

This chapter is especially important for personnel who work with the Programat P300/G2 or who have to carry out maintenance or repair work. This chapter must be read and the corresponding instructions followed.

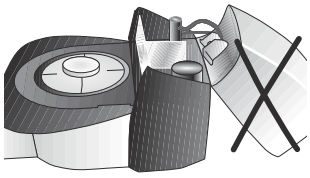
2.1 Indications

The Programat P300/G2 must only be used to fire dental ceramic materials and it should be used for this purpose only. Other uses than the ones stipulated, e.g. cooking of food, firing of other materials, etc. are contraindicated. The manufacturer does not assume any liability for damage resulting from misuse. The user is solely responsible for any risk resulting from failure to observe these Instructions.

Further instructions to assure proper use of the furnace:
- The instructions, 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 P300/G2 must be properly maintained.

2.1.1

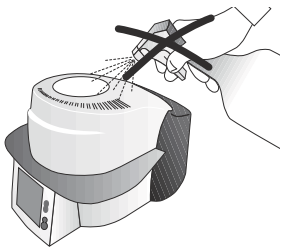
Risks and dangers



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

2.1.2

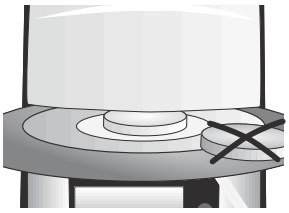
Risks and dangers



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

2.1.3

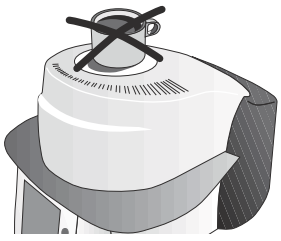
Contraindication



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

2.1.4

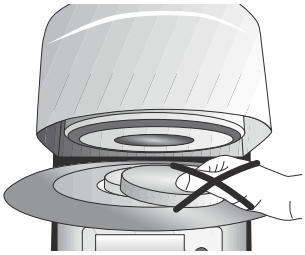
Contraindication



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

2.1.5

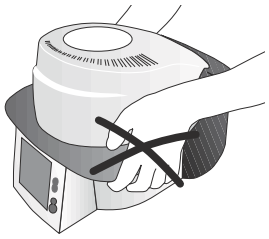
Risks and dangers



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

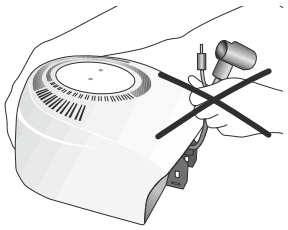
Risks and dangers



Do not carry the furnace by the cooling tray.

2.1.7

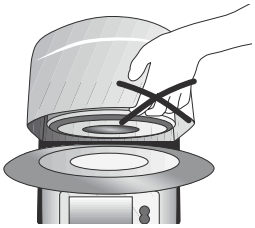
Risks and dangers



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

2.1.8

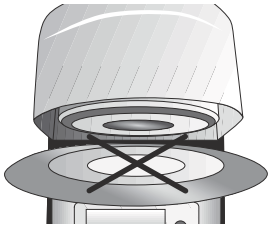
Risks and dangers



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

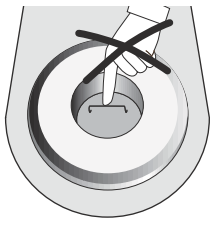
Contraindication



Never use the furnace without a firing table.

2.1.10

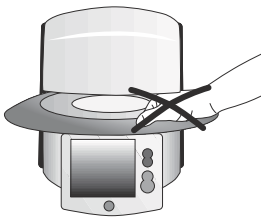
Contraindication



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.

2.1.11

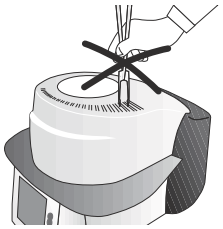
Risk of crushing and burn hazard



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

2.1.12

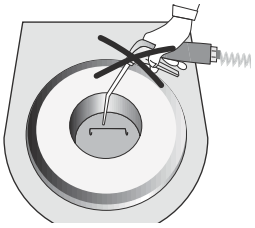
Contraindication



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

2.1.13

Contraindication



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

2.1.14

Risks and dangers

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

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

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 and the side of the furnace free from obstruction.
- Do not touch any parts that become hot during the operation of the furnace. There is a burn hazard!
- Clean furnace only with a 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/G2 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 of in the normal domestic waste. Please correctly dispose of old furnaces according to the corresponding EU council directive. Information on the correct disposal may also be found on your local Ivoclar Vivadent homepage.

3. Product Description

3.1 Components

The Programat P300/G2 comprises the following components:

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

3.2 Hazardous areas and safety equipment

Description of the risk areas of the furnace:

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

Description of the safety equipment of the furnace:

Safety equipment	Protective effect
Protective conductor	Protection from electrical shock
Electrical fuses	Protection from electrical shock

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)

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

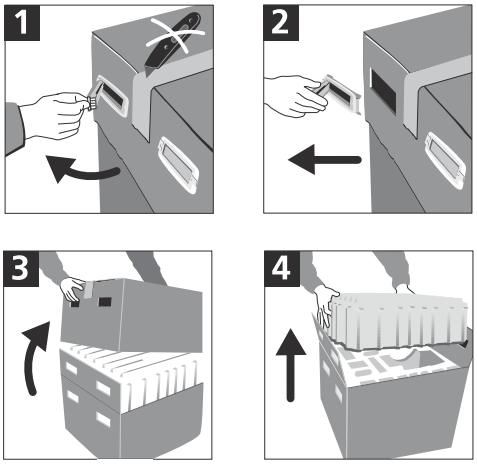
4. Installation and Initial Start-Up

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)

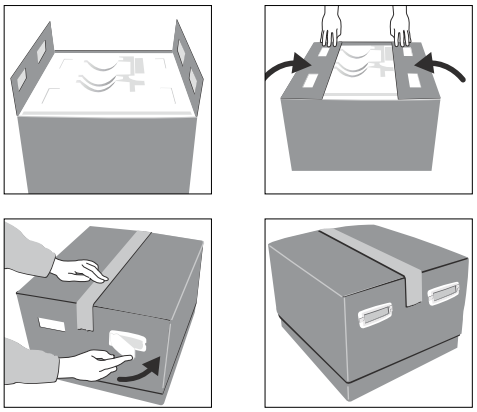
Remove the furnace components from their packaging and place them on a suitable table. Please observe the instructions on the outer packaging.

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



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

Packing and shipping of individual components:
The packaging of the P300/G2 permits simple and safe shipping of individual components. Simply use the corresponding inserts. Fold the side flaps (2) and combine the two packaging parts by means of the transportation flaps. The packaging may be disposed of with the regular household refuse.



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

4.2 Selecting the location

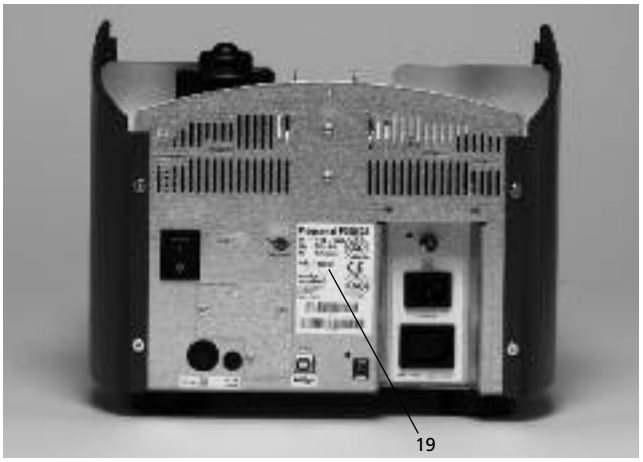
Place the furnace on a flat table using the rubber feet. Make sure that the furnace is not placed in the immediate vicinity of heaters or other sources of heat. Make sure that air may properly circulate between the wall and the furnace.

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

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

4.3 Assembly

Make sure 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).

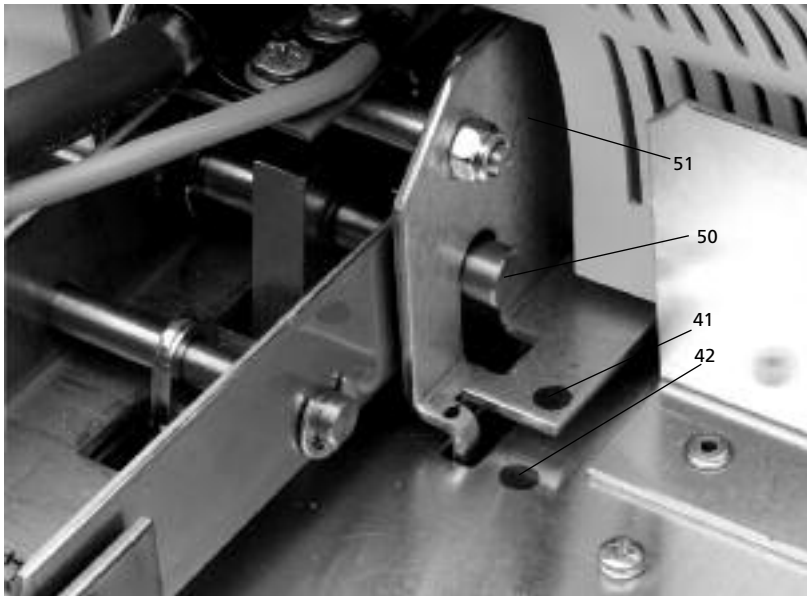
Secure the cooling tray (34) with the two screws (35) including the silicone washer (47).

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).

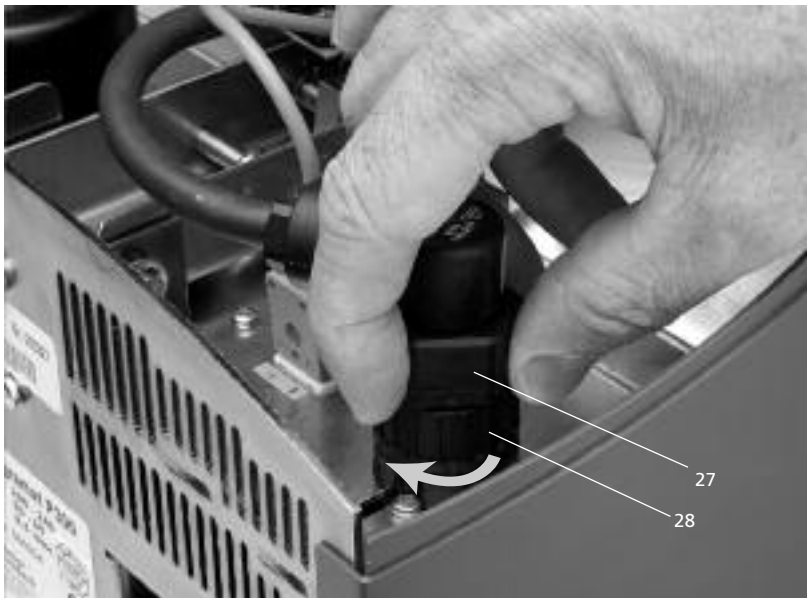
Make sure that the firing plate (5) is not damaged by mounting the furnace head.



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)

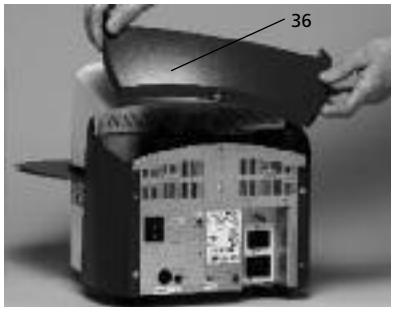
Secure the heater plug (28) with the plug fuse (27) by turning it until the heater plug (28) has been secured.



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).

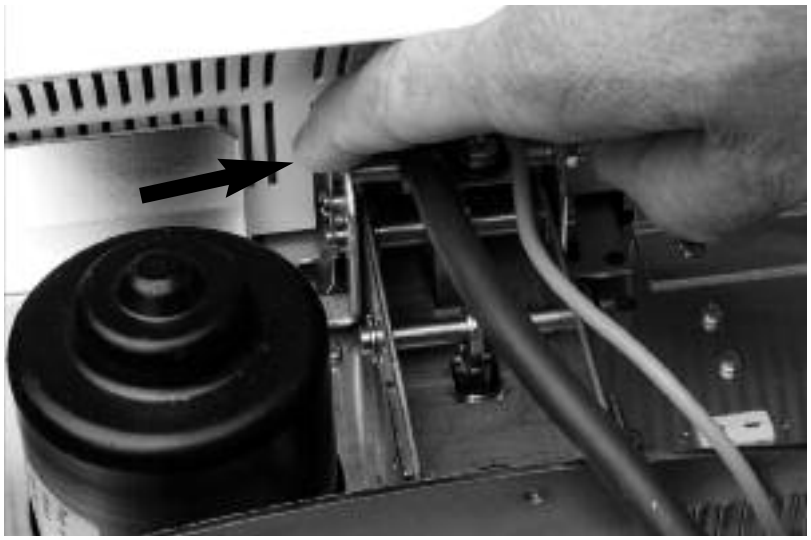
We recommend using only the VP3 easy or VP4 vacuum pumps from Ivoclar Vivadent, since these pumps are especially coordinated with the furnace. If other pumps are used, please observe and do not exceed the maximum power consumption.

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

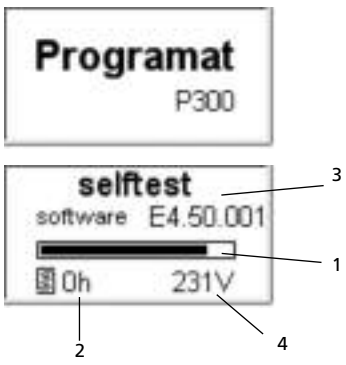
Make sure the furnace head has completely cooled down before it is removed (fire hazard).



4.5 Initial start-up

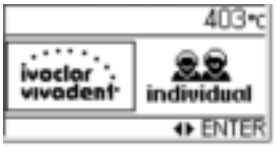
1. Connect the power cord (16) with the wall socket.
2. Put the On/Off switch (11) at the rear of the furnace on position "I".

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:

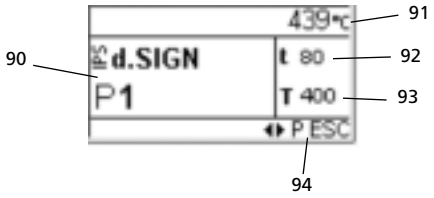


1 Status bar
2 Firing hours
3 SW version
4 Current supply voltage

If any component is defective, the corresponding error number (Error xxx) will be indicated in the display. If all components work properly, the display shows the program selection.



Stand-by mode
After program selection (Ivoclar Vivadent or individual programs), the stand-by display is shown.



90 Program number and program group
91 Current temperature
92 Temperature increase (t)
93 Holding temperature (T)
94 Possible key options

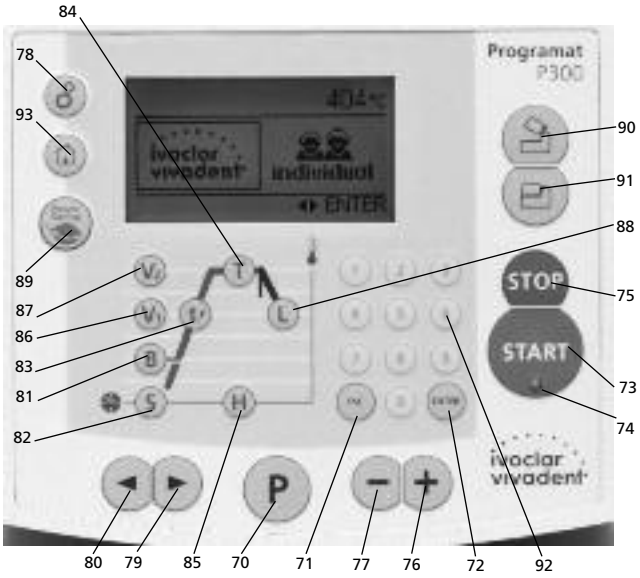
4.6 Dehumidification

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

5. Operation and Configuration

5.1 Introduction to the operation

The Programat P300/G2 is equipped with a graphic display with backlighting. Moreover, the keypad features a parameter firing curve with the parameter keys, where the parameters can be selected. The enter keys and the command keys can be used to program and control the furnace.



5.2 Explanation of key functions

(see page 7 "Control unit")

– **T** = Holding temperature (84)
Indicates the holding temperature (actual firing temperature).

– **H** = Holding time (85)
Indicates the holding time (actual firing time).

– **S** = Closing time (82)
Indicates the closing time of the furnace head (pre-drying time).

– **B** = Stand-by temperature (81)
Indicates the stand-by temperature.

– **t↗** = Temperature increase (83)
Indicates the temperature increase per minute for heating up.

– **V1** Vacuum on temperature (86)
Indicates the temperature level at which the vacuum is switched on.

– **V2** Vacuum off temperature (87)
Indicates the temperature level at which the vacuum is switched off.

If this temperature equals the holding temperature T, the vacuum is maintained during the entire holding time.

Specific case: If the temperature V2 is exactly 1 °C (or 1 °F) higher than the holding temperature T during activated long-term cooling, the vacuum is maintained during the entire long-term cooling (e.g. recommended for the cleaning program).

– **L** = Long-term cooling temperature (88)
Indicates the temperature level at which the furnace head starts to open after the end of the holding time and free or controlled (tL) cooling.

– **tL** = Controlled cooling temperature gradient (°C or °F / min)

– **Information / Settings (78)**
After pressing the key (78) (2 cogwheels), a selection (information/ settings) is displayed. You can then toggle between Information and Settings by means of the cursor keys. The selection is confirmed by pressing the Enter key

– **Cursor keys (79, 80)**
The current cursor position is indicated by means of a fix (non-blinking) frame around the value.

– **Enter keys (76, 77, 92)**
The values can be entered by using the + / – keys or the numeric keys.

Each value entered by means of the + or – key will be immediately accepted (as long as the value ranges are observed) without separately confirming the entered value (pressing the key once will adjust the value by + or – 1). An active entry by means of the numeric keys will blink until the value has been confirmed or the process aborted.

Each entry via the numeric keys can be confirmed with the Enter key. However, the Program key, the START key or the parameter keys can be used to confirm an entry by means of the numeric keys. Therefore, a program can be edited considerably faster (less keystrokes required).

If an invalid entry is made (outside the current value range), the invalid entry continues to blink after confirmation.
As an error message (Entry error: entry outside the value range) an exclamation mark will blink in the bottom line until a new value is entered and the entry is either confirmed or the process aborted with the ESC key. If the process is aborted with ESC, the old valid value will reappear. Please refer to the respective parameter details for the value range.

– **START key (73)**
The program is started by pressing this key.

– **STOP key (75)**
Pressing this key once (program paused)
Pressing this key twice (program will be interrupted and vacuum flooded).

– **Power-saving key (89)**
Power-saving function activated (only possible with the furnace head closed and the furnace on idle). The display shows the power-saving icon. Pressing any key ends the power-saving function.

– **Open furnace head key (90)**
The furnace head is opened (not possible during a program in progress).

– **Close furnace head key (91)**
The furnace head is closed (not possible during a program in progress).

– **P = Program and parameter key (70) with triple function**
It is possible to switch from the stand-by mode (or firing curve display) to the parameter list and remaining time display.

– **Home key (93)**
Return to "Program selection Indication".

5.3 Program structure

The furnace offers two types of programs:

a. Ivoclar Vivadent programs for Ivoclar Vivadent materials
b. Individual programs

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

a) Ivoclar Vivadent programs for Ivoclar Vivadent materials (see chapter 10.1)
Refer to enclosed Program table

b) Individual programs
Free, individually adjustable programs

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

However, the parameters can be changed and overwritten at any time, if required, if the programs are to be used for other purposes. Therefore, the 50 programs are also available as individual programs.

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

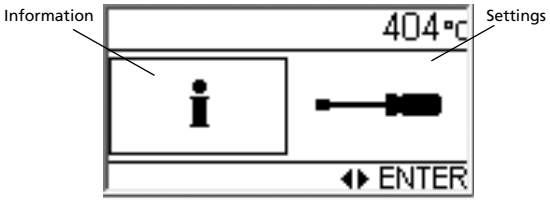
5.4 Adjustable parameters and possible value ranges

Symbol	Parameter	Value range	Value range
P	Program number P	1–300	
B	Stand-by temperature	100–700 °C	212–1292 °F
S	Closing time (min : sec)	00:18–30:00	
t↗	Temperature increase rate	30–140 °C/min	54–252 °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
t↗	Temperature increase rate		
t2↗	2nd stage	30–140 °C/min	54–252 °F/min
T	Holding temperature		
	2nd stage	100–1200 °C	212–2192 °F
H	Holding time		
	2nd stage (min : sec)	00.01–60:00	
V1 (V1 2)	Vacuum on		
	2nd stage	0 or 1–1200 °C	0 or 34–2192 °F
V2 (V2 2)	Vacuum off		
	2nd stage	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	0 or 32–90

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.

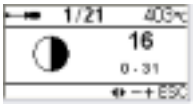
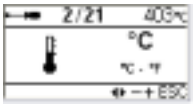
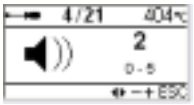
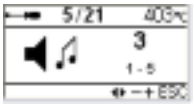
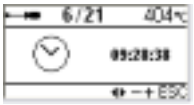
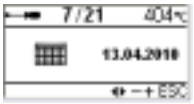
5.5 Settings / configuration and information

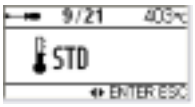
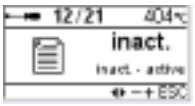
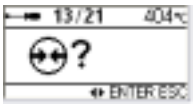
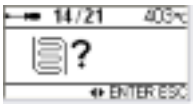
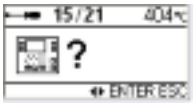
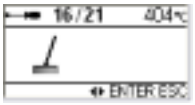
By pressing the "Information / Settings" key (78), the following menu is displayed:

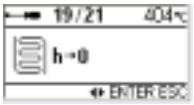
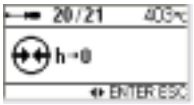


The cursor position (frame around the symbol) can be changed by means of the cursor keys. To view the required Settings or Information, press the Enter key.

5.5.1 Settings / Configuration

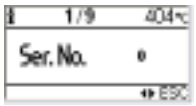
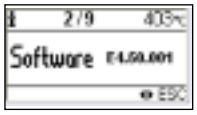
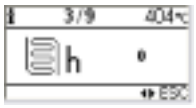
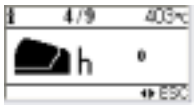
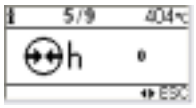
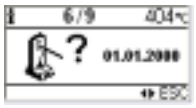
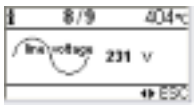
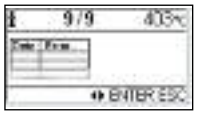
Settings	Display	Short description
Contrast		The contrast can be set by means of the + or – keys
Temperature mode		The + and – keys can be used to switch from °C to °F
User calibration value		This program is suitable to conduct the temperature calibration by means of the Temperature Checking Set Type 2. The furnace head opens automatically if the Enter key is pressed. Place the test into the firing chamber and start the program by means of the START key.
Volume		The desired volume can be set by means of the + or – keys
Beeper tune		The tune can be set by means of the + or – keys
Time		The time can be entered by using the numeric keys
Date		The date can be selected by using the numeric keys

Settings	Display	Short description
Write protection		After entry of the user code (6725) the + and – keys can be used to switch on the write protection. (For further information see chapter 6.4.2)
"Ivoclar Vivadent optimized temperature control function"		Only after entry of the STD code.
Power-saving mode		The automatic power-saving mode can be activated and deactivated with the + or – key (for additional information, see section 6.4.7)
Service interval		Here you can set the interval for the service notes to be displayed (Hint 1700).
Protocolling		The automatic protocol function can be activated or deactivated with the + or – key.
Vacuum test program		Allows to check the vacuum quality of the system
Heating muffle test program		Allows to check the heating muffle. The result is shown in graphical form after the end of the program
Key test		Allows to check the keypad
Cleaning program		The program is used to clean the heating muffle and the insulation materials by a heat process.
Dehumidification program		Permits the dehumidification of the furnace

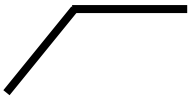
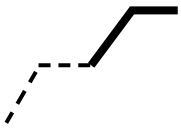
Settings	Display	Short description
Selection of factory settings		With this setting, all values and parameters can be reset to the factory settings. **Attention**: All individual programs which have been created and saved will be deleted with this function. Only after entry of the user code.
Reset firing hours		The firing hour count can be reset to 0. Only after entry of the user code.
Reset vacuum pump hours		The operating hour count of the vacuum pump can be reset to 0. Only after entry of the user code.

Important information
The user code (6725) is required for some settings.

5.5.2 Information

Settings	Display	Short description
Serial number		Serial number of the furnace
Software version		
Furnace head firing hours		
Operating hours furnace		
Operating hours vacuum pump		
Latest start of calibration program		
Calibration value		
Supply voltage		Shows the current supply voltage
Error table		

5.6 Symbols in the display

Symbol name	Meaning	Symbol
"One-stage program"	Indicates that a conventional, one-stage program is used	
"Two-stage program"	Indicates that a specific, two-stage program is used. The bold line indicates the values for the **first** stage	
"Two-stage program"	Indicates that a specific, two-stage program is used. The bold line indicates the values for the **second** stage	
"Standard opening of the furnace head" (can be switched with the + / – key)	Indicates that the furnace head is opened at normal speed after firing.	
"Quick opening of the furnace head" (can be switched with the + / – key)	Indicates that the furnace head is quickly opened after firing.	
Pre-drying	Indicates that the option "Pre-drying" has been activated	
"Thermo Shock Protection"	Thermo Shock Protection active	TSP
"Standard closing of the furnace head"	Pre-drying/TSP inactive	

5.7 Explanation of the speaker signals

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

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

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

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

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

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

The operating procedure for the Programat P300/G2 will be explained with the help of two examples: one Ivoclar Vivadent and one individual program.

6.1 Switching on/off

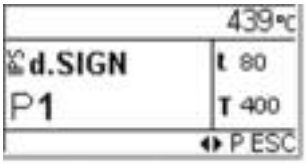
Put ON/OFF switch (11) on position "I". The furnace conducts an automatic self-test, which will be indicated in the beginning. Subsequently, a status bar shows that the self-test is being conducted. Make sure that the furnace is not manipulated during this time.

6.1.1 Stand-by mode

The stand-by display is shown after the successful self-test and the program selection (see section 4.5).

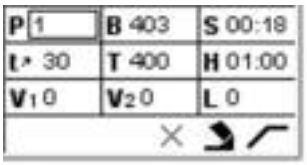
A program can be selected by pressing the + or - key or by entering the required program number using the numeric keys.

The parameter list is displayed by pressing the P key.



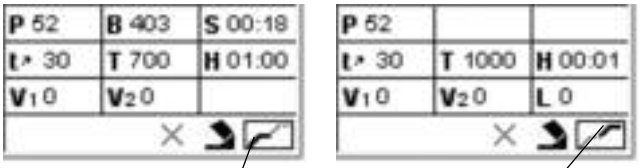
6.1.2 List of parameters

The list shows all the parameters.



One-stage program

If a two-stage program is used, the parameters are displayed for the first and the second stage in a separate screen. The P key is used to switch back and forth between the two screens. Please note the appropriate symbol (first or second stage).



Two-stage program

stage 1 is shown

stage 2 is shown

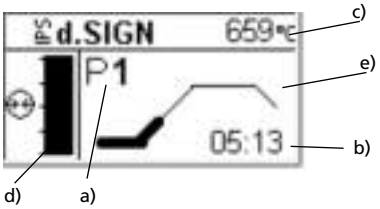
If the cursor is on the symbol for the program stage, you can toggle between a one- and a two-stage program by means of the + or – key.

Starting a program is possible at any time, even if the input screen for the second stage is still being displayed.

Special variant: Conducting a one-stage program in which only part of the holding time is fired with a vacuum (requirement: holding temperature 1 = holding temperature 2).

6.1.3 Operating indicator: Firing curve

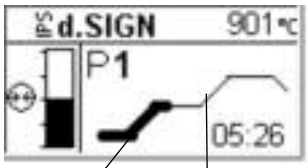
If the program is started with the START key, the firing curve display with the vacuum status is shown.



The following information is always displayed:

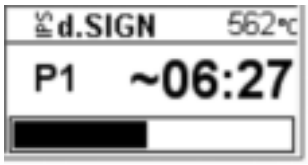
a) Program number and program group
b) Remaining time
c) Current temperature
d) Status of vacuum
e) Status bar

If a two-stage program is selected, two stages are shown.
The remaining time can be displayed or the parameter list accessed for information purposes at any time during a firing cycle by pressing the P key. The parameters can be modified only if the program is stopped or in the stand-by mode.



6.1.4 Operating indicator: Remaining time

If the P key is pressed while the firing curve is being displayed, the remaining time will be shown. The remaining time indicator informs the user about the time that is left until the process is completed even from a distance. The remaining time is displayed in the centre of the screen in large characters.

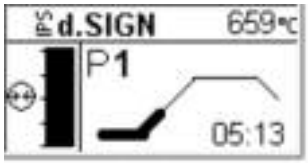


6.2 Firing using an Ivoclar Vivadent program

Step 1:
Select the desired program (1 to 50) according to the firing table (Chapter 10).

Step 2:
Open the furnace head with the "Open furnace head" key (90) and place the object on the firing tray in the furnace.

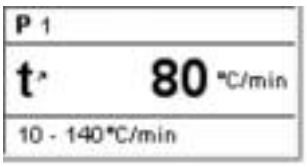
Step 3:
Press the START key (73) to start the program. The green Start LED starts flashing. The process is indicated in the firing curve display.



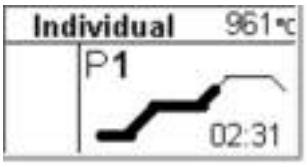
6.3 Firing using an individual program

Step 1:
Switch to the program selection by pressing the Home key (93). Select Individual programs with the right cursor key. Select a free program.

Step 2:
Press the desired parameter (e.g. temperature increase). The input mask appears. In the lower field, you will find information about the acceptable temperature range (min. and max.). This will facilitate the entry and prevents input errors.



Step 3:
Press the START key (73) to start the program. The process is indicated in the firing curve display.

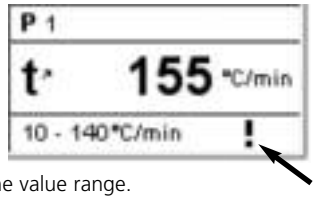


6.4 Further possibilities and special features of the furnace

6.4.1 Illogical values or incorrect entry

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

If the program write-protection is activated in the Settings, all Ivoclar Vivadent programs are write-protected. This is indicated by a closed-lock icon in the stand-by display and the parameter list.

Only Ivoclar Vivadent programs can be protected with the program write-protection. This function is not available for individual programs.

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. The current temperature is maintained.

6.4.4 Changing the parameters while the program is running

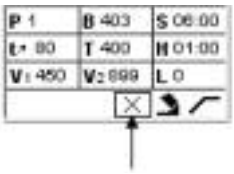
All parameters of the program which have not yet been executed, can be changed while the program is stopped (green LED blinks).

6.4.5 Quick opening of the furnace head

By switching the symbol "standard opening of the furnace head" for the currently loaded program, the user may activate a "quick opening of the furnace head" at the end of the program.

6.4.6 Closing of the furnace head

Various functions are available for the closing of the furnace head. If the cursor is on the spot in the parameter list shown in the figure, you can toggle between the following functions by using the + or – key:



– TSP Thermo Shock Protection

– Pre-drying

– no function activated

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

– Pre-drying
If the pre-drying function is activated, the furnace heats to the specified stand-by temperature.

6.4.7 Power-save mode

If the power-save mode is activated and the furnace head closed, this function is automatically activated after 30 minutes if the furnace is idle and no key is pressed during this time. The Power Saving icon appears on the display. The power-save mode is terminated by pressing any key.

6.4.8 Protocolling

If the protocol function is activated (see section 5.5.1), a firing protocol can be copied to a PC at the end of the firing program by means of the included software. Subsequently, the protocols can be edited and managed on the PC.

The furnace saves the 15 firing programs that were last conducted for protocolling. Copying the protocols to a PC will automatically erase the saved entries on the furnace.

6.4.9 Software update

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

Please note that the individual programs are being erased upon a software update. We therefore recommend that you carry out a data backup (e.g. using the Programat PrograBase 2 PC software).

7. Maintenance, Cleaning and Diagnosis

This chapter describes the user maintenance and cleaning procedures for the Programat P300/G2. All the other tasks must be performed by qualified service personnel at a certified Ivoclar Vivadent Service Centre.

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 Centre.	Keypad (10)	weekly
Check temperature. Use the temperature checking set to check and adjust the temperature in the furnace.	Firing chamber	twice a year
Check the quartz glass cylinder to make sure the quartz glass is not defective.	Firing chamber	daily
Check if there is condensate in the vacuum hose or firing chamber.	Vacuum hose Firing chamber	monthly

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

7.2 Cleaning

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

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

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

*Never clean with compressed air!

7.3 Special programs

Press the "cogwheel" key (Settings/Information).

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

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

Heating muffle test program
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.

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).

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

7.4 Calibration

Furnace calibration (Silver Test)

The sheathed thermocouple may be subject to changes with affect the furnace temperature, depending on the mode of operation. Check furnace temperature with the "Silver Test" at least once a year and adjust if necessary. For that purpose, the furnace features a special calibration program.

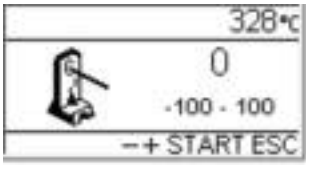
Procedure:

a) The Furnace must be at operating temperature (switched on for at least 60 minutes) and have a stand-by temperature of 403 °C (757 °F).

b) You can access the Settings menu by pressing the "Information / Settings" key.

Subsequently, press and hold the right cursor key (79) until the following display appears.

To select the calibration program press the ENTER key. The following is displayed:



c) Insert silver wire into the Ivoclar Vivadent sample holder.

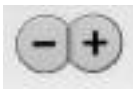
d) Place the sample holder with the silver strip in the centre of the firing plate (6).

e) Press START (if error message Error 14 appears, the furnace temperature is still too high fort he "Silver Test" (>410 °C/770 °F)). The furnace closes automatically at the correct temperature and the program starts.

If the silver wire has started to melt (and has a "pitted" appearance) at the end of the program, the furnace temperature is correctly calibrated (Figure B). If not, recalibration is necessary.

Recalibration
A change in temperature of "+/-" 100 °C (180 °F) is possible in the Programat P300/G2. Select the calibration program to activate the calibration keys + and –. The program must not be started for this purpose. The latest calibration value is indicated on the display.

– If the silver wire has not started to melt after the Silver Test, recalibrate using the + key (Figure A)
– If the silver wire has melted down to a ball after the Silver Test, recalibrate using the – key (Figure C).



Every time a calibration key is pressed, the set temperature changes by 1 °C (1.8 °F) Experience has shown that a recalibration of 5 °C (9 °F) is appropriate, which means pressing the relevant key five times.

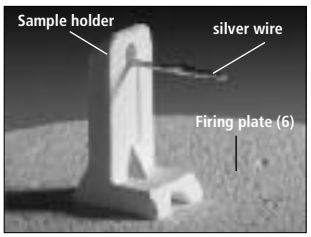


Fig. A Temperature too low


Fig. B Temperature just right


Fig. C Temperature too high

While the calibration keys are in use, the calibration value in °C (°F) is shown in the Display. Entering the calibration value does not have to be confirmed with ENTER. We recommend that you do not recalibrate the furnace immediately before it reached the holding temperature or during the holding time of the Silver Test program. Repeat the Silver Test until the silver wire starts to melt correctly (Figure B).

7.5 Service note

When the service note (Hint 1700) appears for the first time, two years have passed or the heating muffle has more than 1200 firing hours. For that reason, Ivoclar Vivadent recommends to have the furnace serviced. Please see your Equipment Service Pass for further information. The interval until the next service note can be selected once in the advanced settings (see Chapter 5.5.1).

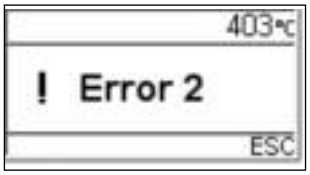
7.6 Stand-by

We recommend keeping the furnace head closed, especially 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.

In case of an error, the heater switches off for safety reasons.

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

Error Hint No.	Conti-nuation possible	Error	Error Message Text
2		T < B	Enter a logical value for T
8		L > T	Enter a logical value for long-term cooling L
9		V2x <= V1x	Enter a logical value for the vacuum-on temperature Vx1 or the vacuum-off temperature Vx2
10		V2x > Tx + 1°C	Change either the vacuum values or the holding time T
11		Incorrect values for V1x, V2x	Enter a logical value for V1x, V2x
13 *, **		Current temperature after Start > Tx + 80 °C	Excess temperature! Program aborted, furnace head opens to allow the furnace to cool down.
14 *		Temperature in the firing chamber > 410 °C at the start of the calibration program, i.e. too high	Temperature too high for calibration; the furnace cools down! Start the program again later!
16		T2 < T1	Enter a lower value for T1 or a higher value for T2.
17		Power failure > 10 s during a firing program in progress	A firing program in progress was interrupted for more than 10 s. The program cannot be continued!
18		T1 > V12	Enter a lower value for T1 or a higher value for V12
20 **	no	Error in the heating system	Check the heater fuse. If the fuse is i.o. contact your Service Centre.
23		Heating muffle very old	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.
24		Heating muffle defective	The condition of the muffle is so poor that is has to be replaced immediately.
26		T is > B + 160 °C at the start of a firing program	Firing chamber too hot to start a firing program.
27 **, ***	no	Furnace head cannot be initialized	The furnace head cannot be moved to the final position. It might be blocked by an external mechanical source! If not, contact your Service Centre.
28 **		The furnace head does not reach the target position	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!
32 **	no	The vacuum is not released	The vacuum cannot be released. The vacuum valve might be dirty or stuck. Contact your Service Center.
33		Necessary vacuum (xxxmbar) is not reached within 1 min.	The vacuum cannot be established. Check the seal of the firing chamber, vacuum hose, vacuum pump, pump fuse.
110		HV > H (H2)	Enter a lower value for HV or a higher value for H (H2)
702		Brief power failure during a program in progress	A program in progress was interrupted by a brief power failure. The program is continued!
800		Final vacuum value not reached	The required final vacuum value cannot be reached. Check the vacuum pump.
801		Vacuum drop	An unacceptable vacuum drop has occurred.
802		The vacuum does not increase (self-test)	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.?
1510		Temperature > VT at the start of a firing program	The temperature in the firing chamber is higher than the pre-drying temperature. Press START to continue the program despite the error message.
1700		Service note	Two years have passed or the heating muffle has been in use for more than 1200 firing hours since the last inspection of the furnace. Ivoclar Vivadent therefore recommends that your furnace should be inspected. Please refer to the Equipment Service Passport or the Operating Instructions for further information. The interval until the next appearance of the note can be set in the Settings.

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

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

25, 29

43, 44, 45, 46, 47, 48

54, 56

103, 107

143, 144, 145, 146, 147, 148

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

1010, 1011, 1012, 1013, 1014, 1015, 1016

1024, 1025, 1026, 1028

1143, 1144, 1145, 1146, 1147, 1148

1202, 1203, 1204, 1205, 1206, 1207

1400, 1401, 1402

1500

8.2 Technical malfunctions

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

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

8.3 Repair

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

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

9. Product Specifications

9.1 Delivery form

– Programat P300/G2
– Power cord
– USB data cable
– Vacuum hose
– Calibration Test Pack
– Programat Firing Tray Kit
– Operating Instructions
– Service Passport Equipment

9.1.2 Recommended accessories

– Programat Accessories Set
– Temperature Checking Set 2
– Vacuum Pump VP4 / 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:	250 W / max. leakage current 0.75 mA
Final vacuum:	< 50 mbar Use only tested pumps
Electrical fuses:	110–120 V: 250 V / T 15 A (heating circuit) 250 V / T 5 A (vacuum pump)
	200–240 V: 250 V / T 8 A (heating circuit) 250 V / T 3.15 A (vacuum pump)
Dimensions of electrical fuses	110–120 V: Diameter 6.3 x 32 mm 200–240 V: Diameter 5 x 20 mm
Dimensions of the closed furnace Depth: 430 mm / width: 305 mm / 410 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: 12.0 kg Furnace head: 4.5 kg

Safety information

The P300/G2 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 °C 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 P300/G2 together with the respective foam material for shipping purposes.

10. Appendix

10.1 Program table

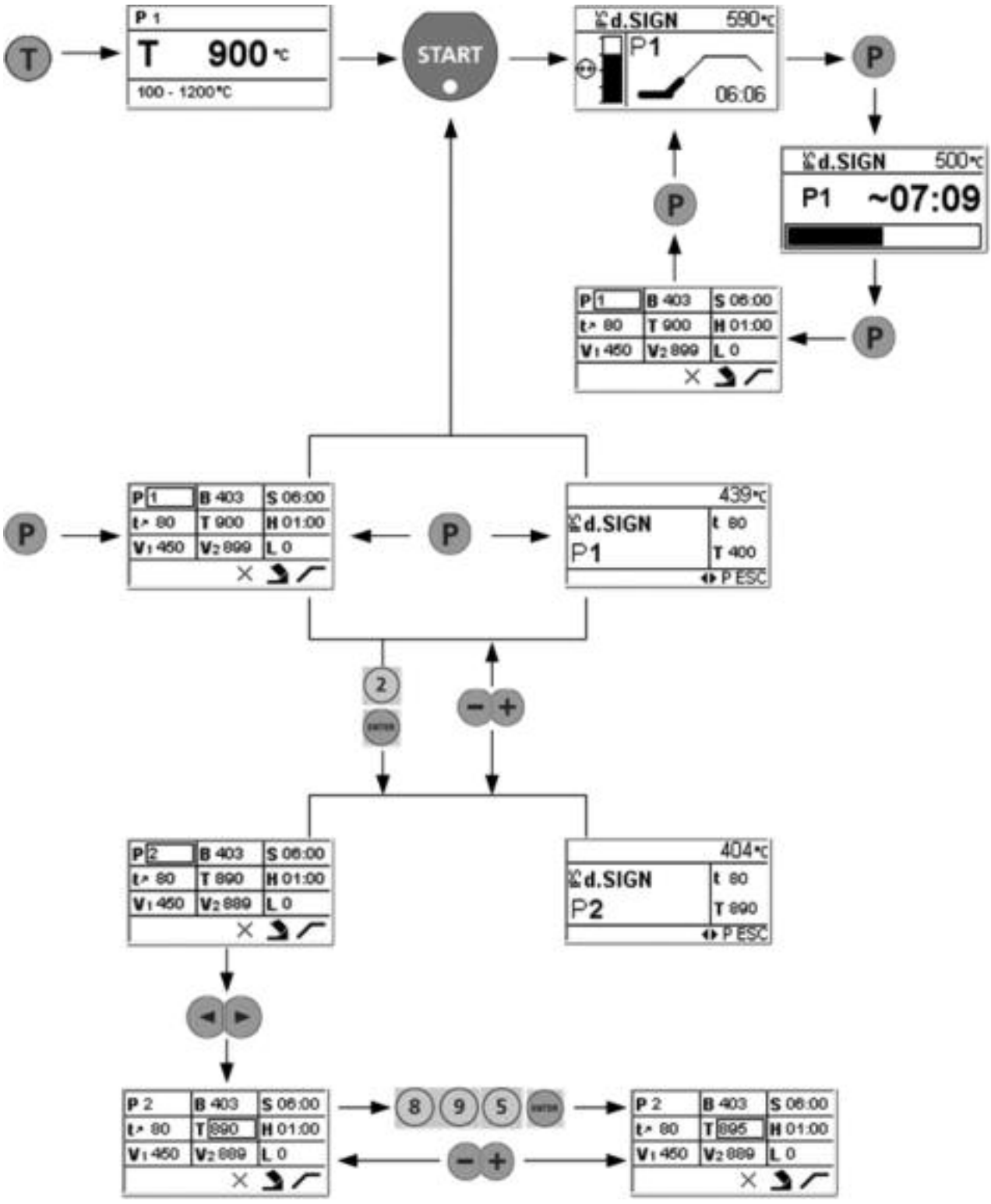
Two program tables (°C / °F) are enclosed to these Operating Instructions. If not, please contact your local Service Centre.

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

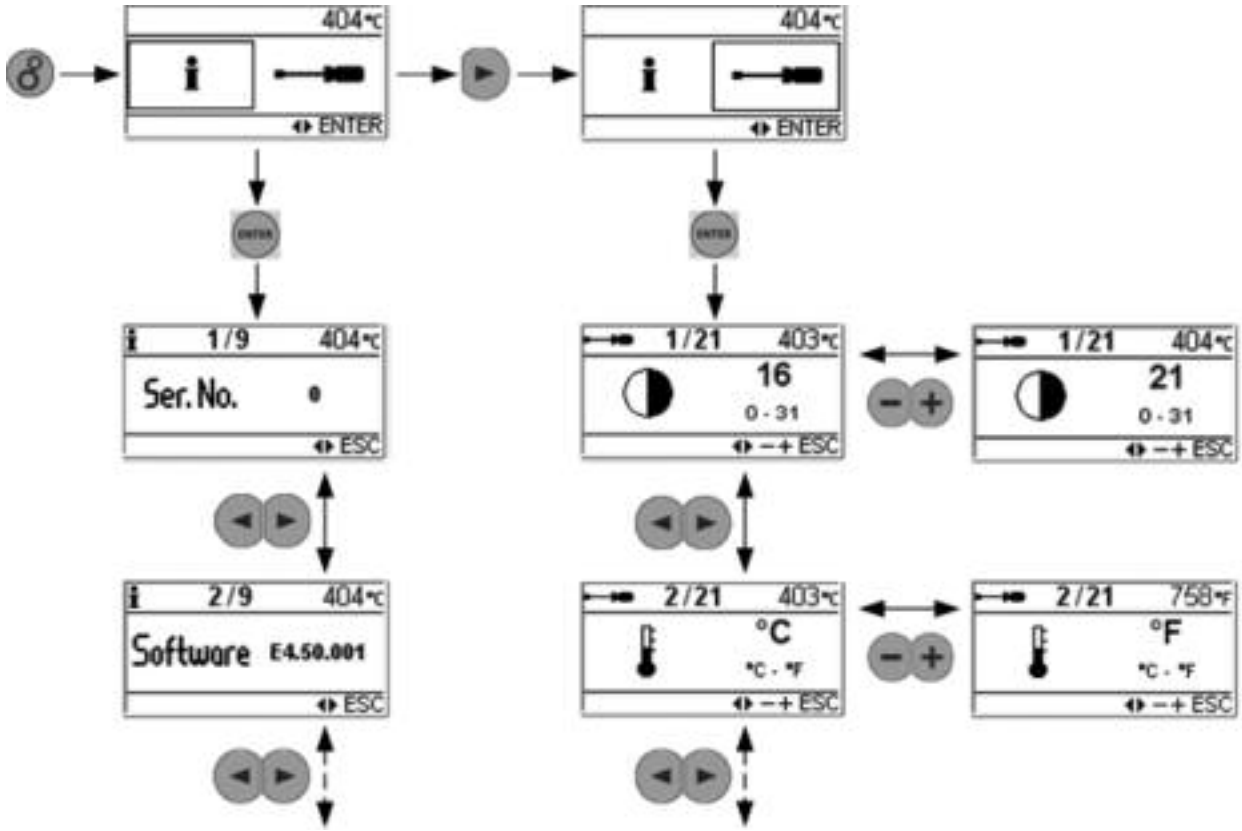
The program tables can be downloaded from the internet as PDF files. Please make sure that your program table complies with the software version you use, as the table is coordinated with the respective software version.

10.2 Menu structure

10.2.1 Possibilities of the program selection

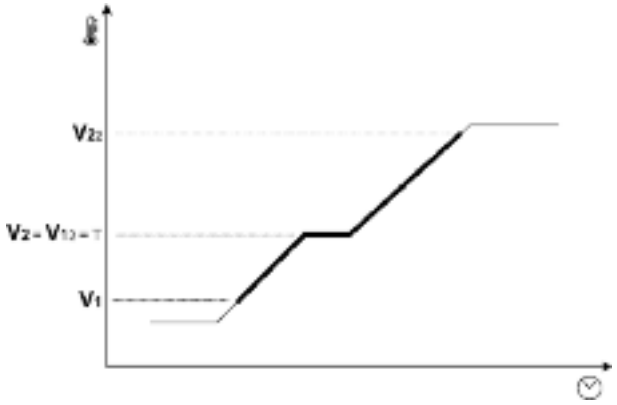


10.2.2 Information / Settings

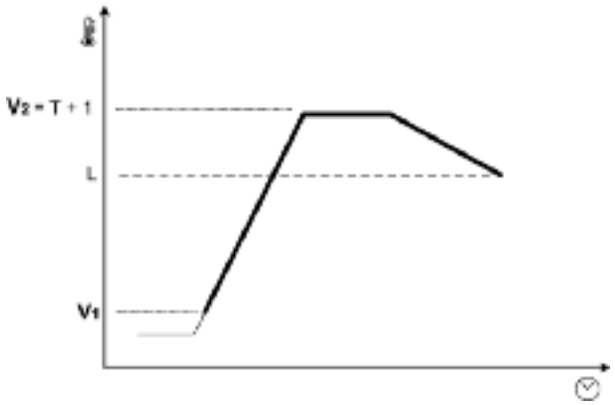


10.3 Firing curves

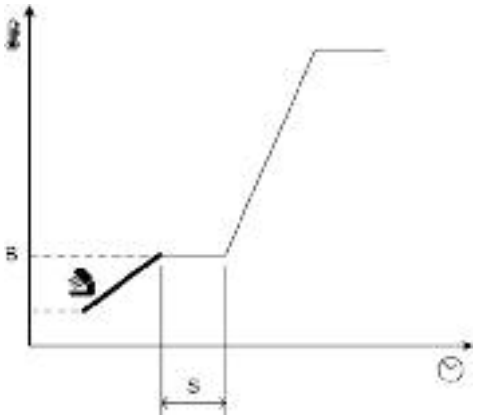
10.3.1 Vacuum during both stages



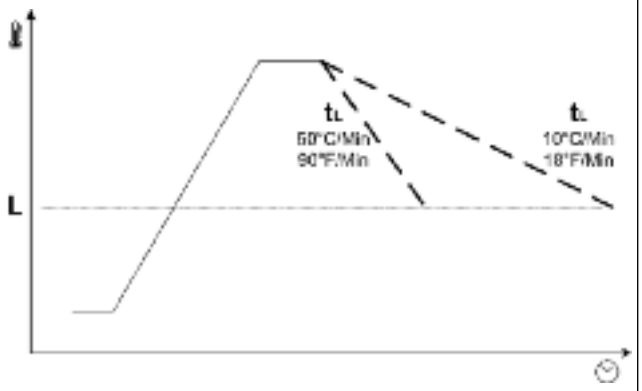
10.3.2 Vacuum during long-term cooling



10.3.3 Pre-drying



10.3.4 Controlled long-term cooling



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Version: 1
Date information prepared: 10/2010
Valid as of Software V5.0

Printed in Austria

635578/1010/e

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