Programat® P200

Operating Instructions

CE

ivoclar vivadent®
technical

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

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TEL ++423 / 235 35 35
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CE

Produkt / Product / Produit / Prodotto / Producto / Produto

Programat P200

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	EN 55011 EN 55022 EN 61000-3-2 EN 61000-3-3 EN 61000-6-3 EN 61010-1/A2 EN 61010-2-010/A1 EN 61326 EN 61326-1	1999 1998 + A1:2000 2000 2001 2001 1995 1996 2001 2001

Schaan, 12.02.2003

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Rev. 1.0

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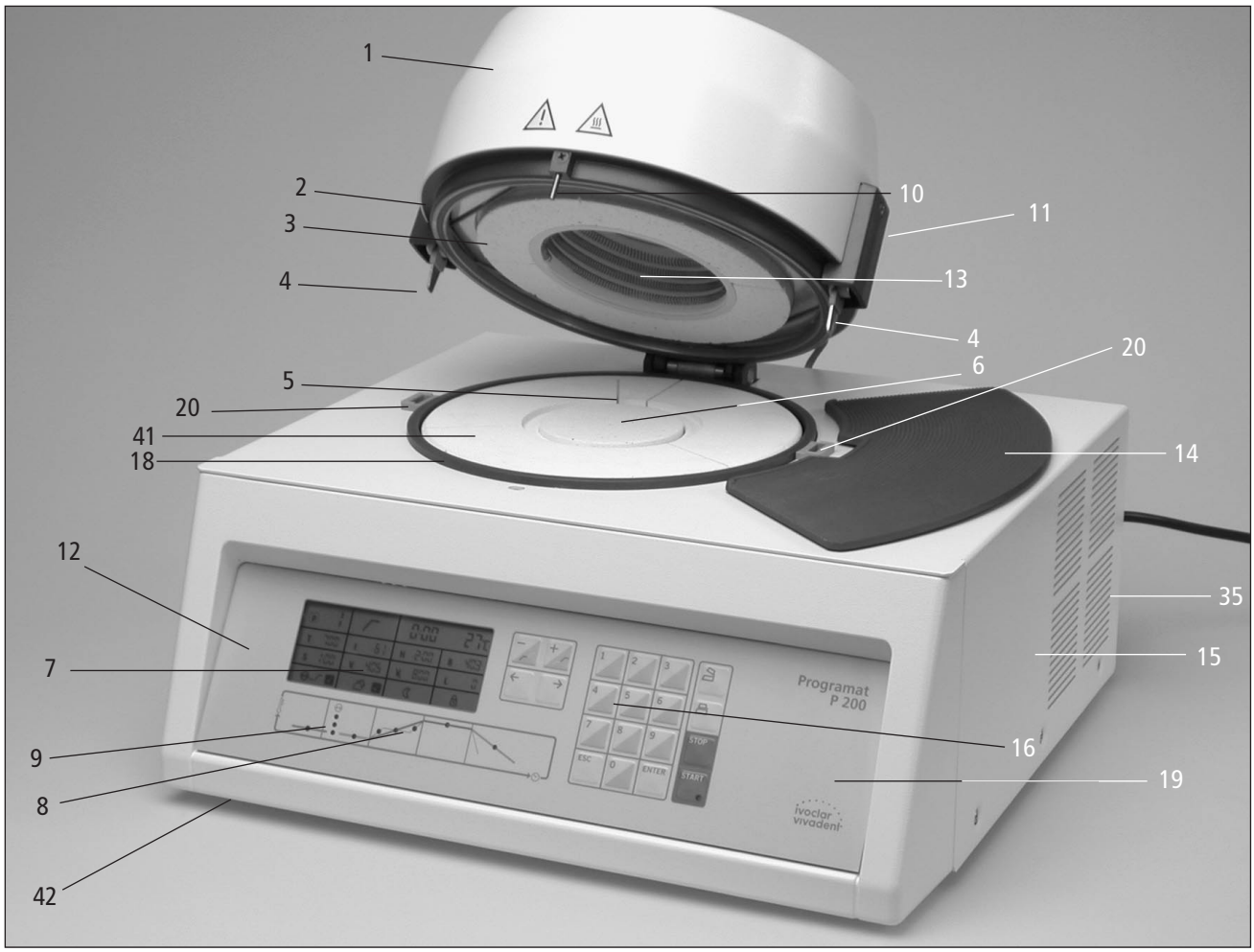
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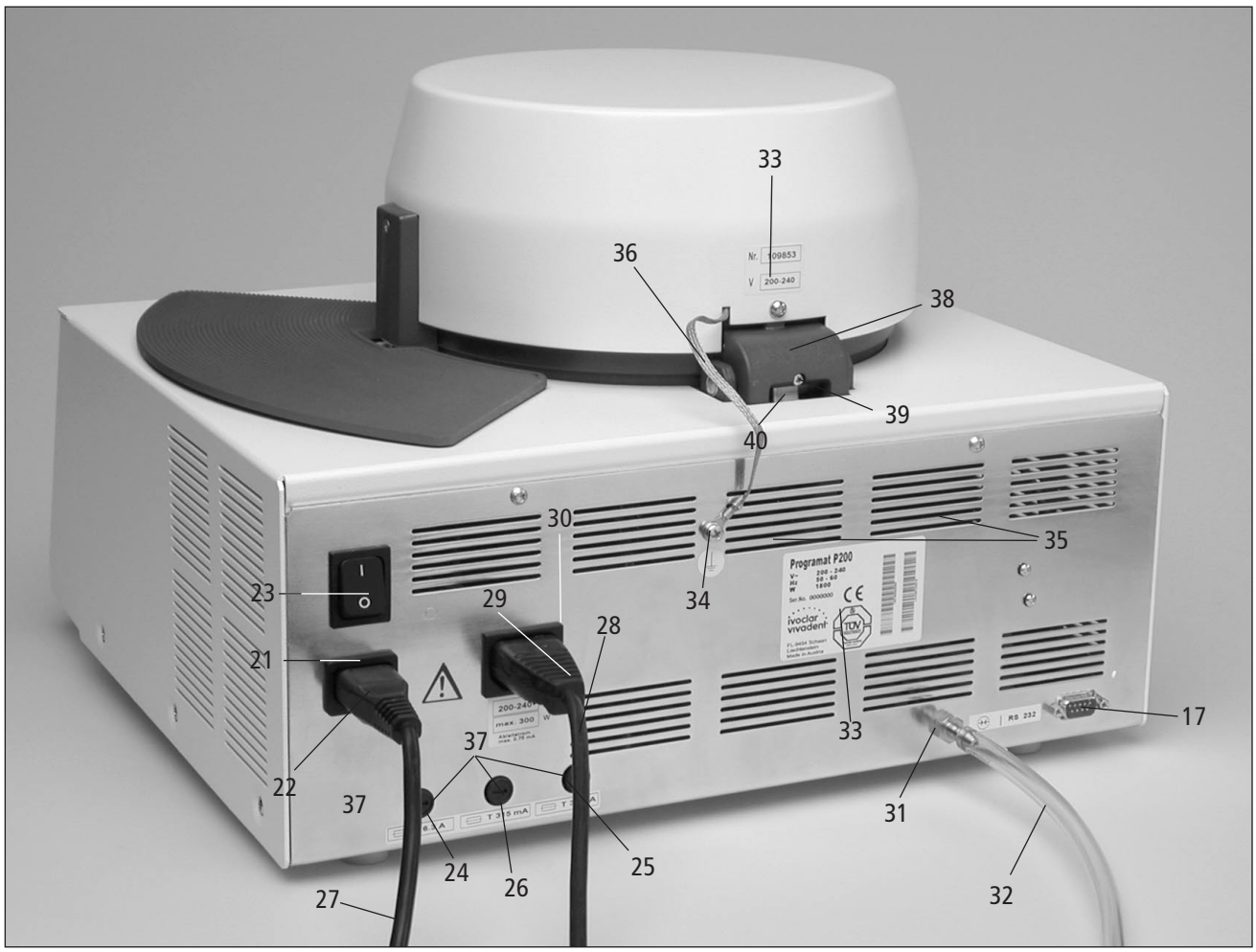
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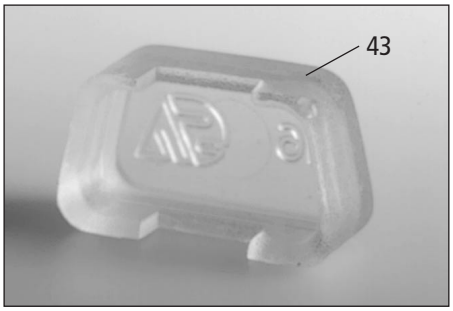
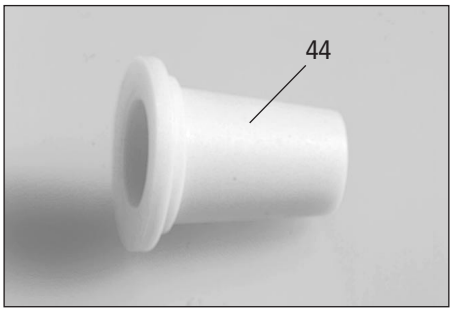
List of Parts





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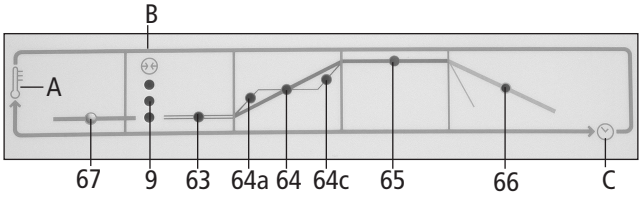
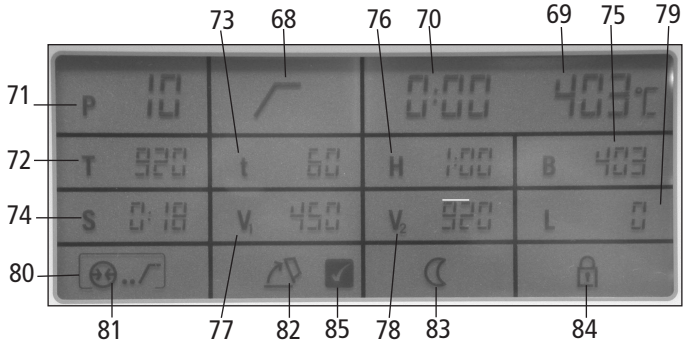


Parameter-Display



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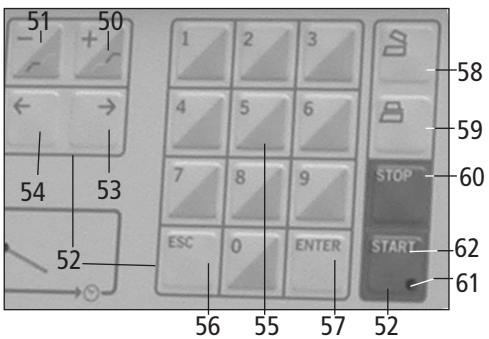


Front view

1 Furnace head with dome cover
2 Sealing ring
3 Stone lining segments
4 Blade contacts
5 Thermocouple
6 Firing plate
7 Display
8 Firing curve display
9 Vacuum indicator (LED)
10 Switch pin
11 Blade contact covers
12 Space for parameter sticker
13 Heating muffle
14 Cooling plate
15 Housing
16 Keys
17 PC-connection (RS232)
18 Sealing rim
19 Keypad front panel
20 Blade contact protection
21 Power socket
22 Power plug
23 On/Off switch
24 Heating element fuse
25 Vacuum pump fuse
26 Control unit fuse
27 Power cord
28 Vacuum pump cord
29 Vacuum pump plug
30 Pump socket
31 Vacuum hose connection
32 Vacuum hose
33 Rating plate
34 Grounding band screw (base)
35 Air vents
36 Grounding band
37 Fuse holder
38 Mounting lug
39 Furnace head screw
40 Hinge
41 Stone lining inserts (base)
42 Rubber feet
43 Protective cover RS232
44 Protective cover vacuum

Control unit keypad

50 + key / stage 2
51 – key / stage 1
52 Field definition
53 → arrow key right
54 ← arrow key left
55 0–9 Numeric keys
56 ESC key
57 ENTER key
58 Open furnace head
59 Close furnace head
60 STOP key
61 LED status indicator
62 START key

Firing curve display

63 Pre-vacuum
64 t↗ = Temperature increase
1st Holding time (H1)
64a t1 = 1st temperature increase
64c t2 = 2nd temperature increase
65 T = Holding temperature
66 L = Long-term cooling
67 B = Stand-by temperature

Symbols

A Temperature
B Vacuum
C Time

Parameters – Actual values

68 One- or two-stage program
69 Actual temperature in °C (+F)
70 Remaining time in min:s / error number

Display parameters

71 P = Program number
72 T = Holding temperature
73 t↗ = Temperature increase
74 S = Closing time
75 B = Stand-by temperature
76 H = Holding time
77 V_1 = Vacuum on
78 V_2 = Vacuum off
79 L = Long-term cooling
80 Cursor

Symbols

81 Prevacuum
82 Quick furnace head opening
83 Overnight program
84 Write protection
85 Program active

1. Introduction / Signs and Symbols

1.1 Preface

Dear Customer
Thank you for having purchased the Programat P200. It is a highly technical quality product. The Programat P200 has preset standard programs. The relevant firing data are shown on an illuminated LC-display.

The furnace has been designed according to EN 61010-1 and thus complies with the relevant EU regulations.

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 in Chapter 2.

You must read these Operating Instructions

1.2 Introduction

The Programat P200 is a high-tech product for dental lab technology. It is equipped with state-of-the-art electronic components.

These Operating Instructions are divided into several chapters to help you find specific topics quickly and easily.

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

Operating Instructions:

Risks and dangers
This symbol marks safety instructions that must be followed to prevent injury or death. Furthermore, damage to the furnace and/or laboratory may thus be avoided.

Important Information
This symbol marks additional information for correct and economic use of the P200 furnace.

Contraindication

Burn hazard

Furnace:

Alternating current

On

Off

Burn hazard

Risk of crushing
Warning from a hazardous area
– Note: observe documentation
– Objects may only be placed into the firing chamber by means of tongs

Grounding sign

1.3 Notes regarding the Operating Instructions

Furnace concerned:
Programat P200
Target group:
Dental technologists

These Operating Instructions facilitate the correct, safe, and economic use of the Programat P200 furnace.

The Operating Instructions are divided into several, clearly structured chapters. This should enable you to locate specific topics quickly and easily.

The vacuum pump (accessory to the furnace system) is not described in these Instructions. Please refer to the corresponding vacuum pump Operating Instructions.

To inform you about risks/ dangers, important information, and contraindications, these Instructions contain corresponding signs/symbols to mark important paragraphs.

We recommend keeping the Instructions in a safe place near the furnace to have immediate access to the information if necessary.

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

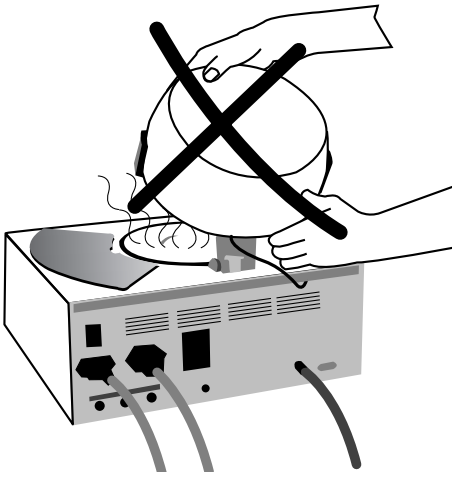
2. Safety First

This chapter is especially important for personnel who work with the Programat P200 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 P200 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.

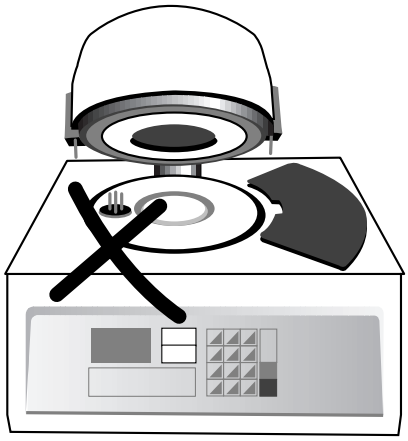
Further instructions to assure proper use of the furnace:
- The instructions, regulations, and notes in these Operating Instructions must be observed.
- The instructions, regulations, and notes in the vacuum pump Operating Instructions must be observed.
- The furnace must be operated under the indicated environmental and operating conditions (Chapter 9).
- The P200 must be properly maintained (Chapter 7).



2.1.1

Contraindication

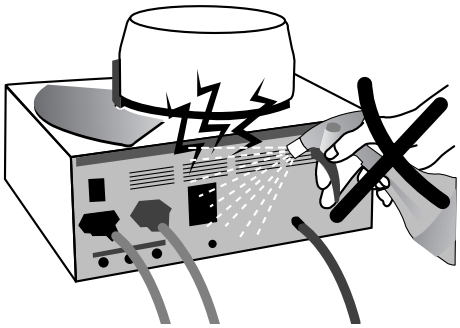
The furnace head should not be removed from the furnace base as long as it is still hot.



2.1.2

Contraindication

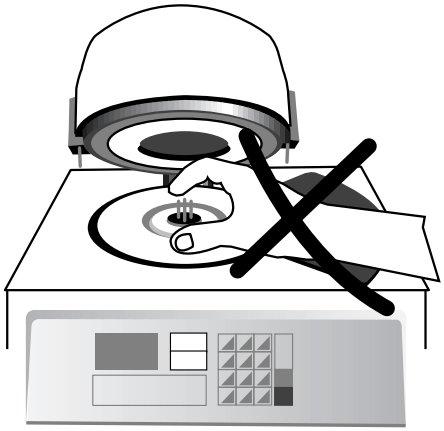
Firing trays must not be placed in the area surrounding the firing table, since this will obstruct the closing of the furnace head. Place the fired objects on the cooling plate designed for that purpose. Never reach under the furnace head during operation. There is a risk of crushing.



2.1.3

Risks and dangers

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



Never place objects in the firing chamber by hand, since there is a burn hazard. Always use the tongs from Ivoclar Vivadent supplied for this purpose.

2.1.4

Contraindication

Never touch the hot surface of the furnace head, as there is a burn hazard.

Burn hazard

Please also refer to section 3.2 in Chapter 3.

2.1.5

Risks and dangers

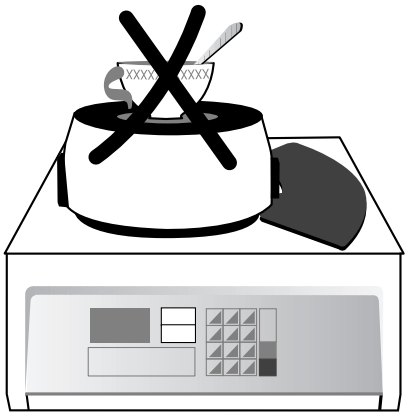
Foreign objects must not come into contact with the contact springs. Do not touch the contact springs. There is a risk of electrical shock.

2.1.6

Contraindication

Burn hazard

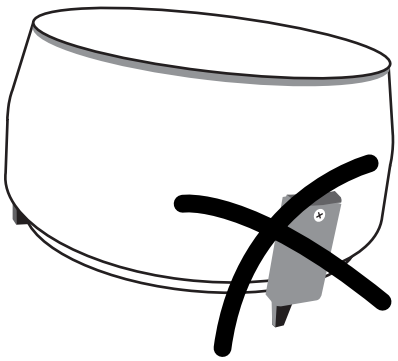
Do not place hot items on the housing surface. There is a burn hazard. Place all objects on the cooling plate (14) designed for that purpose.



2.1.7

Contraindication

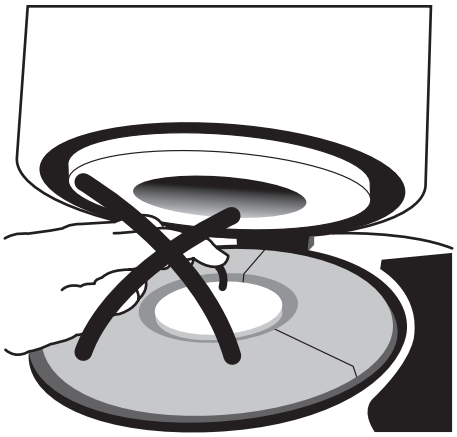
Do not place any foreign objects on the furnace head. The furnace head must not be obstructed during the opening sequence.



2.1.8

Contraindication

Do not place the furnace head on the blade contacts (4), since this may damage the contacts.



2.1.9

Contraindication

The thermocouple (5) must not be bent. Please avoid touching the thermocouple (5) with your hands (oily residue on the thermocouple).

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.

- Do not place furnace and pump in the immediate vicinity of heaters or other sources of heat.
- The furnace must neither be placed nor operated in areas where there is an explosion hazard.
- 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.
- Position vacuum pump in a well ventilated place. Make sure that no foreign objects enter the furnace base.
- Do not place any objects on the housing. Use the cooling plate for this purpose.
- Keep sealing ring of the furnace head and sealing rim of the furnace base clean and avoid damage.
- 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 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 plug may only be inserted into sockets with protected contacts.
- Do not damage the blade 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
- Maintenance work and changing of the heating muffle may only be carried out by qualified personnel.
- Use only original spare parts.
- The temperature range for faultless operation is +5 °C to +35 °C (+41 °F to +95 °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).
- Note: Do not work with liquids near the furnace. Should a liquid accidentally enter the furnace, disconnect power and consult the Customer Service. Do not operate the furnace.
- The furnace has been tested for use at altitudes of up to 2000 m above sea level.
- The furnace may only be used indoors.

Warning

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.

Do not place any flammable liquids or objects in the vicinity of the furnace. Observe the necessary safety distance to the furnace at all times.

Burn hazard/
Risk of crushing
Never reach under the open furnace head, even when it is cool. Always use tongs to remove objects from or place them into the furnace.

Hot surface. There is a burn hazard. Never touch the furnace head with bare hands when it is hot.

3. Product Description

3.1 Components

The Programat P200 furnace system comprises the following components:
– Furnace base with electronic controls
– Furnace head
– Vacuum pump with hose and power cord (accessories)

The electronic and mechanical components are located in the furnace base. The heating element (muffle) is embedded in the stone lining of the furnace head. Accurate temperature control is achieved with state-of-the-art electronic components.

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
Rim of the cooling plate	Limits the usable area
Grooves in the cooling plate	Permit improved cooling
Furnace head screw	Prevents accidental removal of the furnace head
Grounding band	Protection from electrical shock
Power limited motor	Protection from crushing

Also refer to Chapter 2.

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 is designed so that a vacuum may be created with a vacuum pump. The firing process is controlled with the corresponding electronic controls.

3.4 Accessories

– Temperature Checking Set 2
– Programat accessories assortment (large and small firing trays, tongs, Temperature Checking Set)
– Vacuum pump VP3
– Programat firing cards

4. Installation and Initial Start-Up

4.1 Unpacking and checking the contents

Remove furnace components from their packaging and place the unit on a suitable table. There are no special transportation grips on the unit. Support the bottom of the furnace to carry it.

Check the delivery for completeness (see delivery form in Chapter 9) and transportation damage. If certain parts are missing or damaged, contact your local Ivoclar Vivadent Customer Service. We recommend keeping the original packaging for future transportation purposes.

4.2 Selecting the location

Place the furnace on a flat surface using the rubber feet (42). Make sure the furnace is not placed in the immediate vicinity of heaters or other sources of heat. Furthermore, protect the furnace from direct sunlight. 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 opening of the furnace head, The furnace should neither be placed nor operated in areas where there is an explosion hazard.

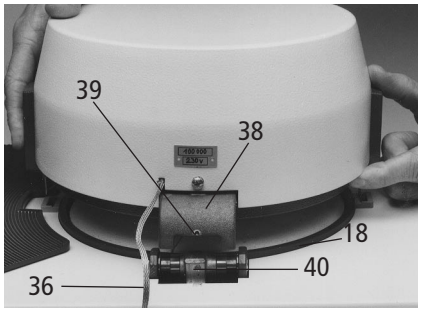
Check rating plate (33)
Make sure that the voltage indicated on the rating plate (33) complies with the local power supply (see rear panel of furnace base and furnace head).

Important
The sheathed thermocouple (5) must be set perpendicular and must be neither damaged nor bent.

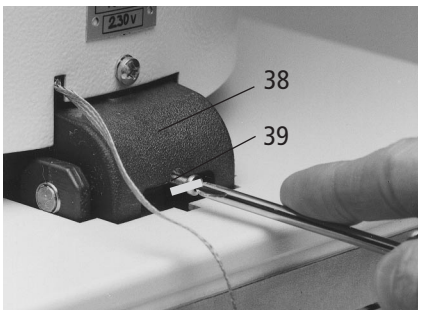
4.3 Assembly

Step 1
Mounting the furnace head, completing the furnace base

- Remove protective paper from the firing plate (6) and position it in the stone lining insert (41).
- Clean sealing rim (18).
- Blow out the heating muffle (13) and the surface of the stone lining segment (3) with moderately low pressure or clean carefully with a soft brush. Do not touch the heating element.
- Clean the sealing ring (2) of the furnace head. Do not touch the heating element.
- Hold the furnace head and slide it with the mounting lug (38) onto the hinge (40)
- Keeping the furnace head level, push down in a parallel direction until the sealing ring of the furnace head (2) rests evenly on the sealing rim (18) of the furnace base.

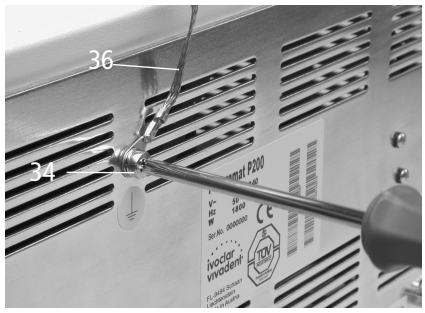


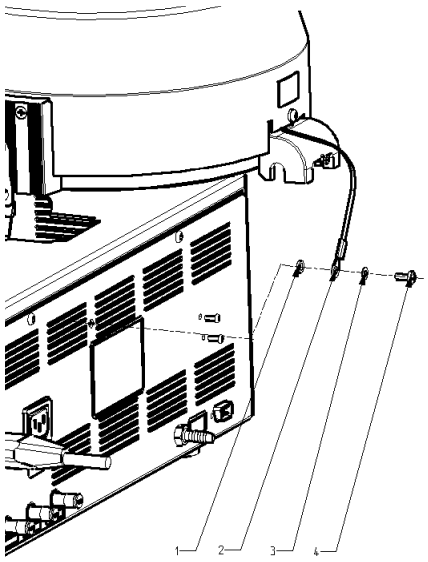
- Tighten the premounted furnace head screw (39) with a screwdriver to secure the furnace head.



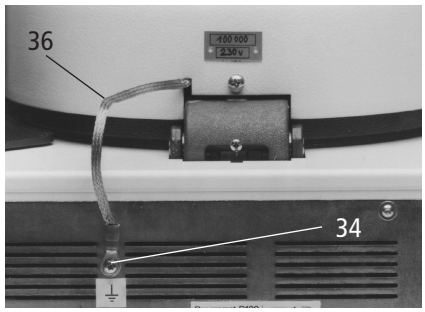
Important
The premounted furnace head screw (39) must be cinched before the furnace is set into operation for the first time.

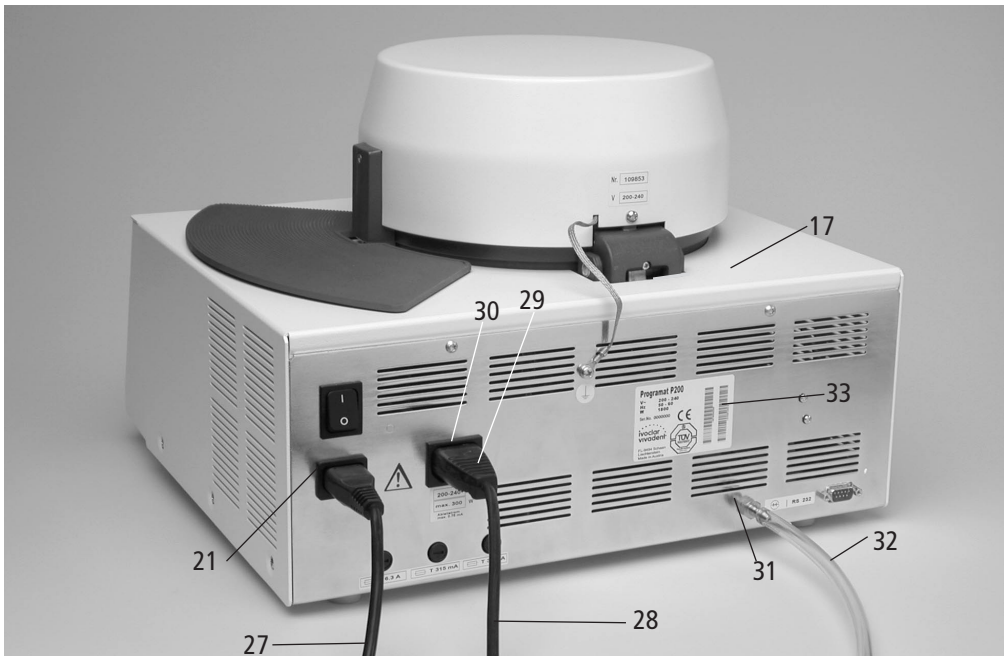
- Connect the grounding band (36) of the furnace head with the grounding band screw (34) of the furnace base.





1 = Tooth lock washer
2 = Grounding band
3 = Washer
4 = Grounding band screw (34)





Step 2
Connections

Power connection
Please make sure that the voltage indicated on the rating plate (33) complies with the local power supply. Should this not be the case, you must not connect the furnace. Connect the power cord (27) with the power socket (21) of the furnace.

Vacuum pump connection
Connect the power plug of the vacuum pump (29) with the vacuum pump socket (30), and connect the vacuum hose (32) with the vacuum hose connection (31).

For this furnace, we recommend using only the VP3 vacuum pump from Ivoclar Vivadent (accessory), since this pump is especially coordinated with the furnace. If other pumps are used, please observe and do not exceed the maximum power consumption (see Chapter 9.2).

PC or printer
Use a null modem cable to connect the furnace with a PC or a printer. Connect the cable with the corresponding PC connection (17).

Null modem cables are available from computer stores.

Cable configuration
(D-SUB, 9-pin)

P 200	2	3	5
	I	I	I
PC	3	2	5

Parameter sticker
The parameter sticker in the desired language may now be attached to the designated space (12).

4.4 Initial start-up

Switching on
The furnace may only be switched on with the On/Off switch at the rear of the furnace.

I = On

O = Off

During operation, the lamp for the stand-by temperature on the firing curve display is illuminated (only if the stand-by temperature has been reached).

Approximately 1 second after switching on, the furnace starts its automatic performance check (self-diagnosis). During this check, the field (70) in the display (7) shows the word 'SELF' for approx. 45 seconds (furnace head already closed). At the beginning the performance check, all 11 diodes blink. The head is automatically closed if it is still open. During the performance check, the keys do not function. The test checks the function of the individual components. If all components work properly, the furnace heats up to the stand-by temperature of the last program used. If any component is defective, the corresponding error number (Err No.) will be indicated in the display (7).

5. Menu Operation and Standard Settings

5.1 Introduction to the operation

The P200 is equipped with a display showing the parameters.
The parameters are selected with the 'right'/ 'left' cursor keys. The current cursor position is indicated with a frame, in which the parameter or the corresponding symbol is blinking. By entering the desired digits, the parameters may be changed. Another option is to reduce/increase the values with the '+'/'–' keys, provided the write protection is not activated. The setting of the values is confirmed with ENTER (see Firing Tables in Chapter 10 for possible values).
If the START key is pressed immediately after entering a value, the value will also be confirmed. Should the desired value not be possible for the selected program or firing parameter, the framed symbol or numerical value starts blinking, and an error message (Err) will be indicated. ESC may be used to delete undesired values before they have been confirmed with ENTER (the 'old' value reappears).
After starting the program, the LED of the respective parameter will be shown in the firing curve (8). If a program with vacuum is in progress, the first LED (9) starts blinking. After reaching the first vacuum level, the blinking stops and the LED is permanently illuminated. The second LED starts blinking. This process continues over a second and a third pressure level until all three LEDs are illuminated indicating that the maximum vacuum has been reached.
The P200 furnace is equipped with an electronic vacuum control system (EVCS), which stops the program in progress if the vacuum has not been appropriately built up during the first minute.

ENTER KEY

Please note that the values entered have to be confirmed with ENTER.

5.2 Parameter selection in the display

Parameters in the menu can be selected with the left and right arrow keys (53, 54).

The remaining time indicator and the current temperature value (highlighted in green) may not be reached during navigation.

Remaining time indicator
When a program is selected, the estimated time is indicated. Once a program is started, this time starts to elapse. If a program is stopped, the remaining time indicator also stops.

Current temperature
Indicates the current temperature in the firing chamber. Depending on the set mode, the temperature is indicated in °C or °F.

Program number P
Current program

Holding temperature T
Indicates the holding temperature

Temperature increase rate t
Indicates the temperature increase rate

Holding time H
Indicates the holding time

Stand-by temperature B
Indicates the stand-by temperature

Closing time S
Indicates the closing time

Vacuum On V_1
Indicates the temperature level at which the vacuum is switched on

V1 is not accessible if the pre-vacuum function has been selected.

Vacuum Off V_2
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.

Long-term cooling L
Indicates the temperature level at which the furnace head starts to open after the end of the holding time and free cooling.

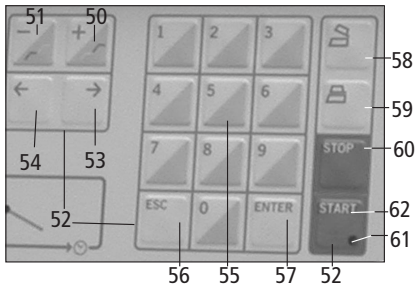
Acceptable value ranges

Parameter	°C value range	°F value range
Program number P	001–199	001–199
Holding temperature T	100–1200	212–2192
Temperature increase rate t	30–140	54–252
Holding time H or start of a program	00:01–60:00	00:01–60:00
Stand-by temperature B	100–700	212–1292
Closing time S	00:18–10:00	00:18–10:00
Vacuum On V_1	0–1200	34–2192
Vacuum Off V_2	0–1200	34–2192
Long-term cooling L	0–1200	34–2192

Symbols used in the display

Symbol name	Description	Symbol
One-stage or two-stage program	Indicates whether it is a one-stage or two-stage program	
Quick opening of the furnace head	At the end of the program, the furnace head is opened quickly	
Overnight program	Indicates if the program should be conducted as an overnight program	
Write protection	Indicates whether or not the program parameters can be changed	
Pre-vacuum	Indicates if the program should produce a vacuum prior to heating up.	

5.3 Operating the menu / key functions



+/– keys (50, 51)
- The set parameter may be altered with the '+'/'-' keys.
- During the 'Silver Test', the temperature within the firing chamber may be altered with the '+'/'–' keys.
- Shifting the indication
- Parameters for the first or second stage
- As long as the cursor is positioned on the program number, the '+'/'–' keys allow convenient leafing through the programs. The marked program is accepted by pressing ENTER or START.

Numeric keys (55)
- Numeric keys for entering the values: See Firing Tables in Chapter 10 for possible values.
- Wrong values entered result in an error message being displayed.
- Impossible values are not accepted once ENTER is pressed or the program started. The 'old' value reappears.

Open furnace head (symbol) (58)
- Pressing this key results in the furnace head being opened. Once the furnace head is completely open and the actual temperature has dropped below 320 °C (608 °F), the buzzer sounds.
- The furnace head cannot be opened when a program is in progress, during the self-diagnosis or the vacuum test program P193, and as long as a vacuum is present.

Close furnace head (symbol) (59)
– Pressing this key results in the furnace head being closed.
– During the self-diagnosis and during program P193, the furnace head cannot be closed manually.

STOP key (60)
Pressing this key once has the following effects:
– Interruption of the program (LED in the START key blinks)
– Movement of the furnace head stops
– Heating process stops (temperature is maintained at a constant level)
– Buzzer stops
– Error messages are deleted

Interrupting a program in progress at high temperatures over a prolonged period of time may damage the furnace.

Pressing this key twice has the following effects:
– Heater stops
– Vacuum stops
– Program is stopped (LED in the START key is dark)

START key (62)
– The program P is started by pressing this key. The LED in the key is illuminated.
– As an option, Start may also be pressed to confirm a value entered and immediately start the program.

ENTER key (57)
– Each value entered has to be confirmed with ENTER.

ESC key (56)
– Undesired values may be deleted with this key before ENTER is pressed. The old value reappears.
– Error message is deleted.

Cursor or arrow keys (53, 54)
• Pressing these keys moves the cursor (80) on the display.
← left
→ right

5.4 Adjusting the intensity of the background illumination

In program P190, the brightness of the display may be adjusted.
0 = no background illumination
4 = maximum illumination
The values may be edited with the '+'/'–' keys. The value is confirmed by pressing ENTER.

Protect the display from direct sunlight.

Description of the green LED (61) in the START key (62)
– LED lights up after the start
– LED blinks during program interruption (1 x STOP)
– LED is dark after the program has bee stopped; the furnace heats to stand-by temperature.

5.5 Selecting the °C or °F mode

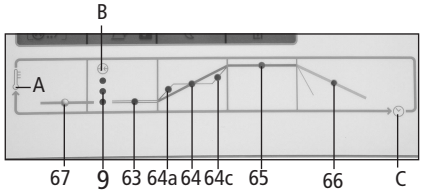
The temperature mode can be selected by means of Program 197. This is generally done on the occasion of the initial start-up. Pressing ENTER sets °C or °F.

5.6 Selecting the buzzer signal

By selecting Program 191, the current buzzer tune is activated. There are 9 different buzzer tunes. Ø means that the buzzer is not activated. Pressing '+/–' results in the corresponding tune being played. ENTER activates the marked buzzer tune. Now select another program number and confirm with ENTER to leave P191.

5.7 Description of the firing curve display

The firing curve display (8) informs users about the status of the vacuum and that of the current program (firing stage).



Vacuum status:

Three green LEDs (9):

1st	LED blinking -> vacuum inadequate
1st	LED illuminated -> 25 % vacuum
1st + 2nd	LED illuminated -> 50 % vacuum
1st + 2nd + 3rd	LED illuminated -> 100 % vacuum

The 1st LED is the bottom one. The LEDs remain extinguished if a program is run without vacuum.

Program status (firing phase)
Orange LED (67)
The LED is illuminated if the temperature in the firing chamber = B minus 30 °C or B minus 54 °F, independent of the position of the furnace head. The LED is blinking if no program has been started and the temperature is 30 °C and more below the stand-by temperature.

Orange LED (64)
– The LED is illuminated if the program in progress is in its temperature increase stage. The duration of this stage depends on the temperature increase parameter t (73). The holding temperature T is not yet reached. The furnace head is closed (one-stage program).
– The LED is illuminated if the program is in the first temperature holding stage (H1) (two-stage programs).

Orange LED (64a)
This LED is illuminated if the program in progress is in its first temperature increase stage (t1) (two-stage programs).

Orange LED (64c)
This LED is illuminated if the program in progress is in its second temperature increase stage (t2) (two-stage programs).

Orange LED (65)
This LED is illuminated if the program in progress is in its holding temperature stage. The duration of this stage depends on the holding time parameter H (76). The furnace head is closed.

Orange LED (66)
This LED is illuminated if the program in progress is in its long-term cooling stage. The duration of this stage depends on the long-term cooling parameter L (79) and on the current cooling behaviour of the furnace. If the value for long-term cooling has been set to 0, this stage is omitted.

Green LED (63)
This LED is illuminated if the program in progress is in its pre-vacuum stage. The duration of this stage can be changed in Program P195.

6. Practical Use / Program Description

The operating procedure for the Programat P200 will be explained with the help of two examples: one standard and one individual program.
All programs are equal, i.e. P1 to P189 are fully functional firing programs for the user. P190 to P199 are auxiliary programs.

6.1 Switching on/off

Switching on:
Put On/Off switch (23) at the rear of the furnace on position 'I'. After approx. 1 second, the unit conducts an automatic self-diagnosis of the individual components (SELF appears in the display). Once the self test has been completed, the furnace is ready for use.

Switching off:
Put the On/Off switch on position '0' to switch off the furnace.

If the furnace is switched off, the furnace head should always be closed in order to prevent the stone lining inserts from absorbing moisture.

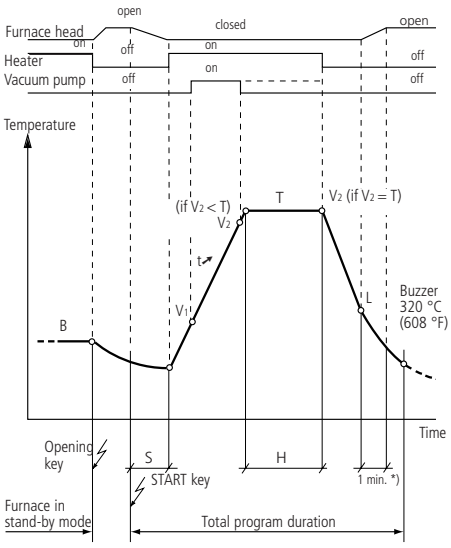
6.2 Firing with standard programs

Trial run
Step 1
Select the desired standard program (P3-P10) with the P-parameter and confirm with ENTER. The standard programs may also be changed, once the write protection is deactivated.

e.g. P3
This program contains the following values:

Program	°C mode	°F mode
T *	900 (°C)	1652 (°F)
t↗	80 (°C/min.)	144 (°F/min.)
S *	6:00 (min.)	6:00 (min.)
B	403 (°C)	757 (°F)
H *	1:00 (min.)	1:00 (min.)
V_1	450 (°C)	842 (°F)
V_2	899 (°C)	1650 (°F)
L (*)	0 (no)	0 (no)

Typical program sequence



* Depending on the program, 18 s possible.

Step 2
Press key (58) (furnace opens)

Step 3
Press START after the buzzer has sounded. The display indicates the remaining time according to the program sequence.
The program runs automatically.
Opening the furnace head: 1 min.

Step 4
The buzzer indicates the end of the program.

Close furnace with this key (59)

Note: The outside of the furnace becomes hot when the head is open

Should something not work properly, please refer to Chapter 8.

6.2.1 Firing with individual oxidation programs (P1, P2)
Observe and set the values stipulated in the instructions of the corresponding alloy manufacturer. The values can be changed, once the write protection has been deactivated.

6.3 Firing with special functions

The special functions may be used for all the programs.

Cursor
The current cursor position is shown as usual by means of a frame and the blinking parameter letter/symbol. The cursor is navigated using the [➔] or [➔] keys. Set values have to be confirmed with Enter. If a symbol is activated, an arrow is displayed on the right of the symbol. If the corresponding function is deactivated, only the symbol is visible. Once the start key is pressed, the cursor jumps back to the program number position (71) and stops blinking.

Programming of two-stage programs
Two-stage programs feature two different holding temperatures, holding times, temperature increase rates, vacuum on, and vacuum off points.

If the cursor is located on the'one-stage/ two-stage' symbol, pressing Enter results in alternating between the one-stage and two-stage indications.

For one-stage programs (standard for most users), the symbol consists of one part, which represents the firing curve diagram of a one-stage program.

For two-stage programs, the symbol consists of two parts with the first part (Part 1) immediately blinking. This indicates that the parameters of the first stage are shown, which may then be edited.

If the cursor is set on the 'one-stage/ two-stage' symbol, pressing [–] or [+] results in alternating between the parameters for the first stage and those for the second stage.

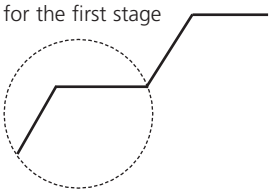
[–] … changes to the parameters for the first stage
[+] … changes to the parameters for the second stage

If the parameters for the first stage are shown, the parameter field 'Long-term cooling' and the symbols 'Quick furnace head opening' and 'Overnight program' are blank.

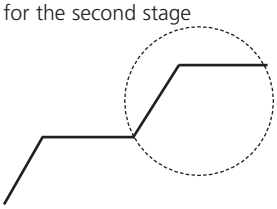
If the parameters for the second stage are shown, the parameter fields 'Closing time' and 'Stand-by temperature' and the symbol 'Pre-vacuum' are blank.

The blanking of the non-relevant parameters for the shown stage is another hint to recognize that the currently selected program is a two-stage program.

Indication/setting of the parameters for the first stage



Indication/setting of the parameters for the second stage



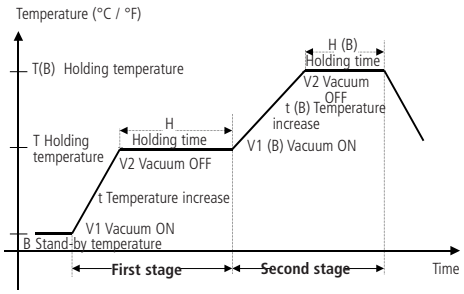
The program may be started at any time, even if the input screen for the second stage is still being displayed. After the start, the parameters of the first stage are shown, as long as the program in progress is in its first stage (part one of the symbol blinks). As soon as the second stage of the program is reached, the parameters for the second stage are shown (part two of the symbol blinks).

One the two-stage program has been completed, the display immediately shows the parameters of the first stage.

If an interrupted two-stage program is continued, the parameters of the current stage are immediately shown.

The two vacuum levels are allocated to the temperature levels. Please note that the on and off points of the two vacuum levels V1 and V2 or second-stage V1 and V2 must not exceed T or second-stage T. If this is not observed, a corresponding error message will be displayed after the start of the program.

Allocation of temperature stages – vacuum stages



Your Example

S Min	=
B °C(°F)	=
L °C(°F)	=

FIRST stage

t °C(°F)/Min	=
T °C(°F)	=
H Min	=
V1 °C(°F)	=
V2 °C(°F)	=

SECOND stage:

t °C(°F)/Min	=
T °C(°F)	=
H Min	=
V1 °C(°F)	=
V2 °C(°F)	=

In order to maintain the vacuum between the first-stage vacuum on V_1 and the second-stage vacuum off V_2, the values for the first-stage vacuum off V_2 and the second-stage vacuum on V_1 must be exactly the same.

Special variant
Two-stage program, in which the first half of the individually set holding time is fired with vacuum and the second half without vacuum. All the values can be freely set. Holding temperature 1 = Holding temperature 2.

Example
1st stage:
With vacuum, e.g. Holding time 1 min.

2nd stage:
Without vacuum, e.g. Holding time 1 min.

Pre-vacuum

This value is set for each program individually. If a firing program is conducted with pre-vacuum, the set pre-vacuum time will pass at the end of the closing time (as soon as the furnace head is closed), i.e. the vacuum pump is in operation during this pre-vacuum time. Once the pre-vacuum time has elapsed, the heating phase will begin. If a program with activated pre-vacuum is started, the value in the parameter field V_1 is ignored. The vacuum is maintained until V_2 is reached. V_2 must be higher than the stand-by temperature B. If V_2 is lower than B or 0 and the pre-vacuum is activated, error message Er19 is indicated.
The pre-vacuum time can be set in the auxiliary program P195 in the range of 01:00 to 05:00 minutes.

If the pre-vacuum is selected, field V1 is highlighted.

Quick opening the furnace head

The furnace head opens quickly (18 seconds) at the end of a program.

Overnight program

Once the 'Overnight' program has been completed, the furnace head opens without the buzzer sounding. As soon as the temperature has dropped below 80 °C (176 °F), the furnace head closes automatically and the furnace cools to room temperature. The green LED in the START key blinks. In the event of a power failure during the night, the furnace will no longer heat up, but remains at room temperature.

The overnight program may also be changed once the program has already started.

Write protection

This function is used to activate or deactivate the write protection of the currently loaded program. The program parameters can only be changed if the write protection is not activated.
To activate / deactivate the write protection, the ENTER key has to be pressed for at least 2–3 seconds. This prevents accidental deactivation of the write protection.

The write protection field can only be selected if the furnace has not been completely locked by means of a code (see description of the auxiliary program P196).

Auxiliary programs (P190 to P199)
For the auxiliary programs (P194, P195, P196, P198), the input fields (e.g. T, S, B, L) are shown in a different manner, depending on the editing mode of the selected program. This means that only those input fields are shown, which may actually be changed in the selected program.

Program P190
With this program, the intensity of the background illumination of the display may be adjusted in 5 stages (0 = no background illumination). The corresponding value is indicated in the remaining time field (70). The values can only be edited using the [–] and [+] keys. The set value has to be confirmed with ENTER. All the other parameters are not visible. P190 can be left by entering another program number followed by Enter. (Cursor is not activated.)

Program P191
Setting the acoustic signal. The frequency can be altered with the '+'/'–' keys. The set value has to be confirmed with ENTER. The value is indicated in the remaining time field (70) of the display (range of values 0–9; 0 = no buzzer). (Cursor is not activated.)

Program P192
Cleaning program for the heating muffle. These parameters may be changed, if required. The write protection is activated for the default settings. This cleaning program also offers the possibility to maintain the vacuum during cooling. For that purpose, V_2 > T and L >= 50 and L < T.

Program P93
Vacuum pump test program.
With this test program, the performance of the vacuum system of the Programat P200 can be tested. The (minimum) pressure reached is indicated in mbar. If the value reached is below 50 mbar, the vacuum performance is excellent. If the value is clearly higher (e.g. above 80 mbar), refer to Chapter 8.2.
The test program is started by selecting Program P193 and pressing START. The program can be stopped by pressing STOP. The maximum duration of the test is 5 minutes. After reaching a pressure of 40 mbar, the evacuation procedure continues for another 2 minutes. After 5 minutes, the flooding process begins automatically. The display shows that last mbar value.
To leave this program, enter the desired new program number and confirm with ENTER (the cursor is not activated).

Program P194
Settings for printing a firing protocol via the PC connection (17)=(RS232). If this program is activated, the firing protocol is printed once the firing program is completed.

Parameters to be set with the '+'/'–' keys:
T: Information about the kind of device connected to the interface – PC or printer.
0 = protocol
1 = printer
2 = PC *
* Data format for Prograsoft (www.ivoclarvivadent.com)

The language is selected in field L.
D … German
E … English
I … Italian
S … Spanish
F … French
(P) … Portuguese
All other fields are blank.

Transfer parameters of the interface:
The data transfer parameters of the interface are preset and cannot be changed:
(Connection see Chapter 4.3)
Baud Rate: 9600
Data bits: 8
Parity: none
Stop bits: 1

NOTE
These parameters also need to be set for the printer or the PC in order to ensure optimum data transfer.

Program P195
The pre-vacuum time can be set in the parameter field H in the range of 01:00 to 05:00 minutes in one-minute increments using the [–] and [+] keys. All other fields are blank.

Program P196
Special program for Service Technicians and to lock the entire furnace. By entering a three-digit code in field L, all the firing programs of the furnace are protected from unauthorized access. The procedure to lock and unlock the furnace is as follows:

Locking the furnace:
1) Select parameter field L.
2) Enter a three-digit code and confirm with ENTER (the write protection symbol is shown)
3) Repeat the same three-digit code and confirm with ENTER (the write protection symbol is activated, i.e. a check is shown).

Now, none of the firing programs P1 to 189 may be changed. The settings of the auxiliary programs may be changed even if the lock is activated.

Should you forget the code, only an Ivoclar Vivadent Service Center is able to unlock the furnace.

Unlocking the furnace:
1) Select parameter field L
2) Enter the correct three-digit code and confirm with ENTER (the write protection symbol and the check are blanked)
Now the programs may be changed, except the ones for which write protection has been specifically activated.

Program P197
This program is used to change from Celsius mode (°C) to Fahrenheit mode (°F). When entering P197, the mode is changed automatically.

Program P198
Display of software version, number of operating hours and firing hours:
– The current software version is indicated in holding temperature T field (72), e.g. 60 = version 6.0.
– The number of operating hours is indicated in the remaining time field (70)
– The number of firing hours is indicated in the input field (76).
– The number of vacuum pump hours is indicated in the V_1 input field (78)

Program P199
'Silver Test'
With the '+'/'–' keys, the temperature in the firing chamber can be recalibrated. The value is indicated in the input field (79).

6.4 Programming / changing the program

– Program cards are available for noting the program data.
– As long as no program is running, data may be entered or modified as follows:
• Select the parameter with the arrow key
• Enter the value and confirm with ENTER.

– Important for the input of V2 (vacuum off)
– Firing with vacuum off during holding time H, enter V_2 as follows:
Celsius mode: V_2 = T – 1 °C
(e.g. T = 1050 °C, V_2 = 1049 °C)
Fahrenheit mode: V_2 = T – 2 °F
(e.g. T = 1922 °F, V_2 = 1920 °F)
(Vacuum is switched off at the start of the holding time H)

– Firing with vacuum on during holding time H, enter V_2 as follows:
V2 = T (e.g. T = 1050 C, V2 = 1050 °C
or T = 1922 °F, V2 = 1922 °F)
(Vacuum is not switched off until the end of the holding time H)

– If 32 °F is set for V_2 and confirmed with ENTER, V_2 is automatically O. O means firing without V_2. The same is valid for the L and V_1 parameters.

– Once the program has been completed, the program is automatically stored.

– In standard programs (P3–P10), the values can altered once the write protection has been deactivated.

– Changeover from one program to another:
The program cannot be changed while it is in progress (green LED in the START key is illuminated).
• Press STOP twice
• Select the parameter 'Program Number' with the arrow keys and enter the new program number
• Confirm with ENTER
• Press START

– Changing the preselected data while a program is in progress is only possible if the actual temperature has not yet reached the set T value (if it is too late to change the parameter, the value is not accepted):

1. Values for S, H, and L can be changed without interrupting the program sequence:
– Select the desired parameter with the arrow keys and enter the new value. Confirm with ENTER.

2. To change set data for B, t↗, V_1, and V_2:
– Press STOP
– Select the desired parameter with the arrow keys and enter the new value.
– Confirm with ENTER.
– Press START

Interrupting a program
Press STOP once.
The program is interrupted.

Stopping a program
Press STOP twice. The program is completely stopped and the vacuum released.

6.5 Controlling the CTE

The CTE (coefficient of thermal expansion) of the ceramic material can be controlled as follows:
1. Immediate removal of the object after firing causes a reduction of the CTE (minus)
2. Slow cooling of the object in the furnace after firing (long-term cooling) causes an increase in the CTE (plus)

Long-term cooling can be influenced by adjusting the parameter L (79).

Set the desired cooling value in °C/°F. This temperature determines when the furnace head is opened (e.g. at 700 °C).

6.6 Additional practical information

– Always keep the furnace closed between firings.
– Optimum results can be obtained with Ivoclar silicon nitride firing trays.
– Objects to be pre-dried should be placed on the firing plate only after the buzzer has sounded (<320 °C / <608 °F)
– A power failure (> approx. 10 s) during a program in progress will interrupt the program and cause Err 17 to appear. Press STOP and restart the program. The program starts at the beginning (any adverse effect on the object depends on how long the power failure lasted).
– Check the furnace temperature with the 'Silver Test'.
– Do not open the furnace head manually when the furnace is switched on. Err 28 will otherwise be indicated.
– Note: Altering the parameters during a program in progress may result in the program being stopped (with an error message being displayed).
– If the furnace is switched on with the furnace head closed and the actual temperature in the furnace higher than 600 °C (1112 °F), the furnace head completely opens and closes again during the self-diagnosis.
– Remaining time indicator (70):
After the program has been started, the remaining time indicator (70) displays the estimated remaining time until the program is completed.
The remaining time appearing on the display is continuously updated during the program sequence (every 5 s.).
The indicated time, however, is only an approximate value. It is not possible to determine the exact remaining time, for example, during long-term cooling, during vacuum build-up, or if the set temperature increase is not achieved.

The remaining time indicated is only an approximate value that is continuously updated during the program sequence.

7. Maintenance, Cleaning, and Diagnosis

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.

Disconnect power before maintenance and cleaning, since there is a risk of electrical shock.

This apparatus has been developed for typical use in the dental laboratory.

If the product is used in a production facility, for industrial applications, or in continuous firing operation, premature ageing of certain spare parts have to be expected.

These spare parts are e.g.:
– Heating muffle
– Insulation material
– Lamps

These spare 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 (5)	weekly
Check the stone lining inserts for cracks and damages. If the stone linings are worn down they have to be replaced by a certified Ivoclar Vivadent Service Centre.	Stone lining inserts (3, 6, 41)	monthly
Check if the sealing rims of the furnace head and the furnace base are cleaned and undamaged.	Sealing rims of the furnace head (2) and the furnace base (18)	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 (16, 19)	weekly
Check temperature. Use the temperature checking set to check and adjust the temperature in the furnace.	Firing chamber	twice a year
Check if all windings (13) of the heating muffle are correctly embedded.	Heating muffle	weekly

The blade contacts of the P200 must not be manipulated. There is a risk of electrical shock.

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 (15)	if required	soft, dry cloth
Keypad front panel (19)	weekly	soft, dry cloth
Cooling plate (14)	daily	cleaning brush
Stone lining inserts (3, 6, 41)	daily	cleaning brush
Sealing rim of the furnace head (2) and the furnace base (18)	daily	cleaning brush and a soft cloth

7.3 Furnace calibration with 'Silver Test'

The sheathed thermocouple may be subject to changes which affect the furnace temperature, depending on the mode and period of operation. Check furnace temperature with the 'Silver Test' at least twice a year and adjust if necessary.
For that purpose, the furnace features P199, a special calibration program.

Material required
(in the Temperature Checking Set 2)
(Article No. 544 903)

- Ivoclar Vivadent sample holder
- Silver wire, purity 99.99%

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) (e.g. in P199).
b) Insert silver wire into the Ivoclar Vivadent sample holder (see also notice enclosed in the Temperature Checking Set 2).
c) Select P199 (Silver Test program)
d)  Press this key and place the firing tray with the silver strip in the centre of the firing plate (6).
e) Press START (if error message Err 14 appears, the furnace temperature is still too high for the '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.

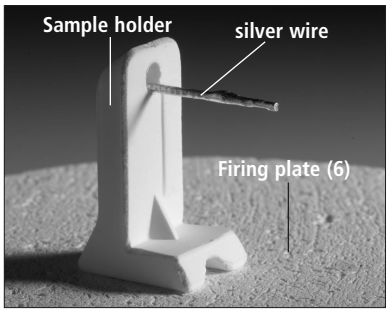


Figure A Temperature too low

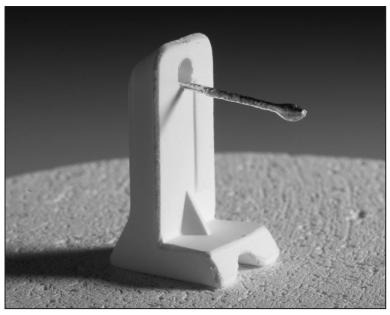


Figure B Temperature just right

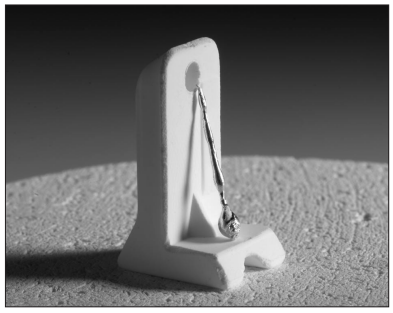
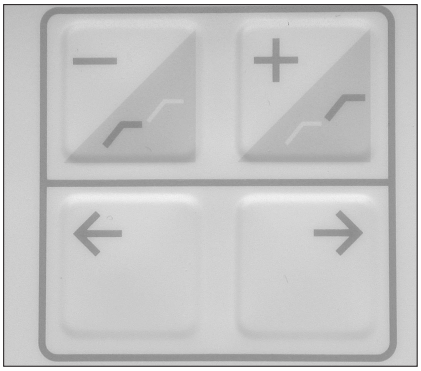


Figure C Temperature too high

Recalibration

A change in temperature of *50 °C (*90 °F) is possible in the Programat P200. Select program P199 to activate the calibration keys '+' and '–'. The program must not be started for this purpose.
The latest calibration value is indicated in the input field (70) if the cursor (80) is moved to the parameter field L (79) by means of the arrow keys.

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

While the calibration keys are in use, the calibration value in °C (°F) is shown in the input field (70). Entering the calibration value does not have to be confirmed with ENTER. Repeat the 'Silver Test' until the silver wire starts to melt correctly (B).

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

List of possible Error messages and their meaning

Operating errors
Error messages have to be acknowledged with STOP (60). Impossible values are not accepted. The value is deleted when ENTER is pressed and the 'old' value reappears. Parameters outside the acceptable value range are not accepted. Illogical values result in an error message being displayed.

Error No.	Description	Instructions for users
	Operating errors	
*** Err 1**	T-value entered is lower than the current temperature (temperature in the furnace chamber).	Allow the furnace to cool to a lower temperature, or enter a higher temperature value.
Err 2	T-value entered is lower than the B-value or higher than 1200 °C (2192 °F).	Set a logical temperature value.
Err 3	S-value entered invalid (observe Firing Table)	Set an acceptable closing time.
Err 4	H-value entered is invalid (observe Firing Table)	Set an acceptable holding time.
Err 5	t↗-value entered is below 30 °C/min (54 °F/min.) or higher than 140 °C/min. (252 °F).	Set an acceptable temperature increase value.
Err 6	B-value entered is lower than 100 °C (212 °F) or higher than 700 °C (1292 °F).	Set an acceptable stand-by temperature.
Err 7	B-value entered is higher than the T-value.	Set an acceptable stand-by temperature.
Err 8	L-value entered is higher than the T-value.	Set an acceptable value for the long-term cooling.
Err 9	V1-value entered is higher than the V_2-value.	Set a suitable V_1- or V_2-value.
Err 10	V-values entered are higher than the T-value.	Check the set temperature. Adjust the values for V_1 and V_2, if necessary.
Err 11	V_1- or V_2-value(s) missing.	Set the missing value.
Err 12	V-value entered is higher than 1200 °C (2192 °F).	Set a lower value.
***Err 13[1)]**	Temperature is too high (actual temperature is +12 °C (21.6 °F) higher than the T-value).	Take care when editing the parameters during a program in progress. If necessary, allow the furnace to cool to the set temperature and try again. Should this not help, there is probably a malfunction in the electronic controls.
***Err 14**	Temperature in the firing chamber is too high for the 'Silver Test' (above 400 °C (770 °F).	The furnace cools down and the program then starts automatically.
Err 15	L-value entered is higher than 1200 °C (2192 °F) or lower than 50 °C (122 °F).	Set a lower value for the long-term cooling.
Err 16	Firing temperature 1 > firing temperature 2	Set a lower value for firing temperature 1 or a higher value for firing temperature 2.
Err 17[1)]	Power failure lasting more than 10 s during a program in progress.	A program in progress has been interrupted by a power failure.
Err 18	Firing temperature 1 > vacuum values for the 2nd firing stage.	Set a lower value for firing temperature 1 or a higher value for the vacuum of the 2nd firing stage.
Err 19	The pre-vacuum function was selected, but the V2 value is missing or invalid.	V_2 value must be higher than B.
	Furnace errors	
***Err 20**	Error in the heating system. Low voltage; high temperature increase rate.	Check the fuse (24) in the supply unit. If this error message appears, the heater is switched off for safety reasons. The furnace head (1) opens and the keypad does not work. This error cannot be acknowledged with STOP. The furnace has to be switched off and switched on again.
Err 22	Closed furnace head is not acknowledged.	A foreign object between the furnace head (1) and the furnace base may obstruct the closing of the furnace head. See the end of the error list for further explanations regarding this error.
Err 23	Muffle is ageing.	The muffle is worn down. It is recommended to have is replaced. After having acknowledged the error message, however, the program can be started.
Err 24	Muffle is defective.	The muffle must be replaced immediately.
Err 25	Temperature is the furnace base is higher than 65 °C (149 °F).	Bring the temperature in the furnace base to value lower than 65 °C (149 °F). Make sure that the air vents are clean and free from obstruction.

Fehler	Beschreibung	Hinweise für den Anwender
Err 27	Furnace head does not open after the initial start-up.	The opening process might be obstructed by external, mechanical influences. If this is not the case, contact your local Ivoclar Vivadent Service Centre. This error can only be acknowledged by switching the furnace off an on again.
Err 28	Furnace head has been moved manually or the opening process has been obstructed.	Move the furnace head (1) only by means of the corresponding keys.
***Err 29**	Temperature alert (temperature >= approx. 1300 °C (2372 °F).	If this error message appears, the heater is switched off for safety reasons. The furnace head (1) opens and the keypad does not work. If you want to close the furnace head (1) despite this error, proceed as follows: – Switch off the furnace and wait for 20 s. – Switch the furnace on again and wait until the furnace head is closed.
	Errors in the supply unit	
Err 30	Heating relay does not respond.	Contact your local Ivoclar Vivadent Service Centre.
Err 31	Vacuum valve does not respond.	Contact your local Ivoclar Vivadent Service Centre.
Err 32	Vacuum has been measured over a prolonged period of time – the furnace head cannot be opened (after the initial start-up).	The vacuum valve is probably stuck or dirty.
Err 33	The necessary vacuum has not been reached with 1 min.	Check the following items: – Is the firing chamber tight (is the sealing surface clean)? – Is the vacuum hose connected? – Is the vacuum pump connected? – Is the fuse (25) in order?
Err 34	Error in the electronic component for the supply unit.	Contact your local Ivoclar Vivadent Service Centre.
Err 35	Error in the electronic component for the supply unit.	Contact your local Ivoclar Vivadent Service Centre.
Err 38	Error in the electronic component for the muffle controls.	Contact your local Ivoclar Vivadent Service Centre.
	Errors in the control unit	
Err 40	Indicator for the electronic components defective.	Contact your local Ivoclar Vivadent Service Centre.
Err 42	Error in the program memory.	Contact your local Ivoclar Vivadent Service Centre.
Err 43	Write error in the firing program memory.	Contact your local Ivoclar Vivadent Service Centre.
Err 44	Read error in the firing program memory.	Contact your local Ivoclar Vivadent Service Centre.
Err 45	Checksum error in the firing program memory.	Checksum of a firing program invalid; the firing program will be initialized with the original values.
Err 46	Error when accessing the real time clock.	
Err 47	The firing program has recognized an invalid situation in the program sequence.	Conduct a power reset.
	Errors in the analog module	
Err 50	Sensor calibration is not valid.	Furnace can no longer be operated.
Err 51	Error in the microprocessor of the analog module.	Contact your local Ivoclar Vivadent Service Centre.
Err 52	Error in the calibration memory of the analog module.	Contact your local Ivoclar Vivadent Service Centre.
Err 54	Error in the electronic component for the temperature measurement.	Contact your local Ivoclar Vivadent Service Centre.
Err 55	Analog module cannot respond.	You probably have a poor power supply.
Err 56	Temperature in the furnace base is lower than 1 °C (33.8 °F).	Increase the temperature in the furnace base.
	Further error messages	
***Er:71**	Thermocouple defective at initialization.	Contact your local Ivoclar Vivadent Service Centre (2)
***Err 72**	Temperature leap.	Contact your local Ivoclar Vivadent Service Centre (2)
***Err 73**	Inadequate performance of the heater.	Contact you local Ivoclar Vivadent Service Centre (2)

*Furnace head opens when this error occurs.

[1] No operating error.

[2] If this error message appears, the heater is switched off for safety reasons. The furnace head opens and the keypad is inactivated. This error cannot be acknowledged with STOP. The furnace has to be switched off and on again.

For safety reasons, the heating muffle may only be changed by a certified Ivoclar Vivadent Service Centre (Err 23 and Err 24).

Clearing measures for **Err 22,** if the motor for the furnace head is in an inappropriate position (provided that the 'close furnace head' key is not defective):

Situation A
The furnace has been switched on before the furnace head (1) is mounted (initial start-up or after maintenance of the furnace head):
Press STOP to acknowledge the error message. After that, press the 'close furnace head' key.

Secure the furnace head screw (see Chapter 4).

Situation B
Error message Err 22 appears if the furnace head (1) is correctly mounted.
Remove any objects that are possibly located between the furnace head (1) and the furnace base. Press STOP to acknowledge the error message. Then, press 'close furnace head' key. If Err 22 reappears, press STOP again and try the 'close furnace head' key again. It may be necessary to repeat this procedure more than once.
Do not use the 'open furnace head' key. Should be furnace head be opened during this process, it is not important, since the movements of the furnace head are normally self-adjusting.

Situation C
Same as situation B, but with the error occurring immediately after switching on the furnace, i.e. during the self-diagnosis.
Same as situation B.
Additionally, the furnace has to be switched off and on again at the end of the procedure to make sure that the self-diagnosis is repeated.

8.2 Technical malfunctions

These malfunctions may occur without an error message being displayed:

Description	Double-check	Action
Display not illuminated	Is the fuse for the electronic controls (26) OK?	Check fuse (26)
Furnace head does not open/close	Is the fuse (26) OK? Is the furnace head screw (39) thoroughly tightened?	Check fuse (26). Check furnace head screw (39).
Buzzer does not sound	Is the buzzer switched off (Tune 0)	Select tune 1–9, see Chapter 5.5
Vacuum pump not working	Is the vacuum pump correctly connected? Is the fuse (25) OK?	Connect vacuum pump according to the Operating Instructions. Check fuse (25)
Final vacuum not reached	Is the vacuum hose OK? Is the furnace airtight?	Check vacuum hose and vacuum connections. Replace pump. Clean sealing surface.

Approximately 1 second after switching on, the furnace carries out the automatic self-diagnosis (SELF is indicated in the display).

Important
Use only fuses with test labels and according to the respective values specified in 'Technical Data'

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 read the safety information in Chapter 2.

9. Product Specifications

This chapter contains all the relevant product specifications:

9.1 Delivery form

1 Programat P200
1 Power cord
1 Vacuum hose
3 Extra fuses
1 Operating Instructions
1 Warranty card
1 Screwdriver
Programat firing cards

Recommended accessories
– Vacuum pump VP3
– Programat Accessory Assortment (tongs, firing trays large and small, Temperature Checking Set)

Colour
Standard colour: white (RAL 9016)

9.2 Technical data

Power supply
Single-phase alternating current
200–240 V / 50–60 Hz
110–120 V / 50–60 Hz
Tolerated voltage fluctuations +/– 10%

Power consumption
Furnace with pump
200–240 V max. 1800 W
110–120 V max. 1300 W

Vacuum quality
3 LEDs indicating 25 %, 50 %, and 100 % vacuum quality.

Acceptable data for pumps from other manufacturers
Max. performance: 300 W
Final vacuum: approx. 25 mbar
Use only tested pumps

Electrical fuses
200–240 V:
T 6.3 A (heating circuit) (24)
T 315 mA (controls) (26)
T 3.15 A (vacuum pump) (25)

110-120 V:
T 15A (heating circuit) (24)
T 500 mA (controls) (26)
T 5A (pump) (25)

Dimensions of fuses
200–240 V = Diameter 5 x 20 mm
110–120 V = Diameter 6.3 x 32 mm

Dimensions of the closed furnace
Width/depth/height/ = 415 x 390 x 296 mm

Usable size of the firing chamber
Diameter 80 mm, height 38 mm

Max. firing temperature
1200 °C (2192 °F)

Weight
Furnace head: 3.5 kg
Furnace base: 10.0 kg
Furnace complete: 13.5 kg

Safety information
The P200 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 +35 °C (+41 °F to +95 °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
500 mbar to 1060 mbar
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 +50 °C (–4 °F to +122 °F)

Acceptable humidity range
80 % relative humidity.

Acceptable ambient pressure
500 mbar to 1060 mbar

Use only original packaging of the Programat P200 together with the respective foam material for shipping purposes.

Standard Programs P1 to P10 (IPS d.SIGN)									Values in °C		(Status: March 2003)
P No.	**Program**		T **Holding temp. [°C]**	t ↗ **Temperature increase [°C]**	H **Holding time [min.]**	B **Stand-by temp. [°C]**	S **Closing time [min.]**	V1 **Vacuum on [°C]**	V2 **Vacuum off [°C]**	L **Long-term cooling [°C]**
1 - 189	Value ranges for all programs		100-1200	30-140	0:01-60:00	100-700	0:18-10:00	1-1200	1-1200	50-1200
11-189	Values preset by Ivoclar Vivadent		700	30	1:00	403	0:18	0	0	0
	Individual oxidation programs									
1	Oxidation		700*	30*	1:00*	403*	0:18*	0*	0*	0*
2	Oxidation		700*	30*	1:00*	403*	0:18*	0*	0*	0*
	IPS d.SIGN Standard programs									
3	First opaquer firing	w. v.	900	80	1:00	403	6:00	450	899	0*
4	Second opaquer firing	w. v.	890	80	1:00	403	6:00	450	889	0
5	First and second shoulder firing	w. v.	890	60	1:00	403	6:00	450	889	0
6	First dentin and incisal firing	w. v.	870	60	1:00	403	9:00	450	869	0
7	Second dentin and incisal firing (corrective firing)	w. v.	870	60	1:00	403	9:00	450	869	0
8	Glaze firing with glazing material	w. v.	830	60	1:00	403	4:00	450	829	0
9	Glaze firing without glazing material	w. v.	870	60	1:00	403	4:00	450	869	0
10	Add-on firing	w. v.	750	60	1:00	403	4:00	450	749	0

* The values stipulated in the instructions of the corresponding alloy manufacturer have to be observed and set.
After deactivating the write protection, all the parameters of the Standard Programs P1-P10 may be permanently changed.
Please refer to the current IPS d.SIGN Instructions for Use for additional information regarding the firing parameters.

Other Programs P190 to P199		Values in °C							
P **No.**	**Program**	T **Holding temp. [°C]**	t ↗ **Temperature increase [°C]**	H **Holding time [min.]**	B **Stand-by temp. [°C]**	S **Closing time [min.]**	V1 **Vacuum on [°C]**	V2 **Vacuum off [°C]**	L **Long-term cooling [°C]**
Auxiliary programs									
190	Adjusting the background illumination of the display	Setting with the -/+ keys, value range 0 - 4, 0 = without background illumination							
191	Adjusting the buzzer signal	Setting with the -/+ keys, value range 0 - 9, 0 = without buzzer, 1 = default							
192	Cleaning program [1)]	1130	100	10:00	403	0:18	700	1130	0
193	Vacuum test / Vacuum quality								
194	Interface printer / PC	Setting with the -/+ keys, if value in T = 0 = no protocol / 1 = printer / 2 = P Input in L= Language selection							
195	Pre-vacuum	Setting with the -/+ keys, input in H= Value range 1-5 min., in 1-min. incr							
196	Special program	For Service Technicians / Code entering							
197	°C or °F mode	Changing by entering the program number							
198	Information	About the software version, operating hours, firing hours, and vacuum pump hours							
Silver Test program									
199	Silver Test / Calibration [2)]	Values set by the manufacturer							

Legend:

w.v. - with vacuum
w/o v. - without vacuum
L = 0 = no → no long-term cooling

Buzzer sounds with the furnace head open and the temperature dropping below 320 °C

1) All values are preset, but may be changed, once the write protection is deactivated. The values will be stored permanently. (Value range: see freely programmable programs P1 to P189)

2) The values for T to V_2 are preset values. The calibration value shown in parameter 'L' is 0 when the furnace is shipped from the manufacturer.

Standard Programs P1 to P10 (IPS d.SIGN)								Values in °F		(Status: March 2003)
P **No.**	**Program**		T **Holding temp. [°F]**	t ↗ **Temperature increase [°F]**	H **Holding time [min.]**	B **Stand-by temp. [°F]**	S **Closing time [min.]**	V1 **Vacuum on [°F]**	V2 **Vacuum off [°F]**	L **Long-term cooling [°F]**
1 - 189	Value ranges for all programs		212-2192	54-252	0:01-60:00	212-1292	0:18-10:00	34-2192	34-2192	122-2192
11-189	Value ranges for all programs		1292	54	1:00	757	0:18	0	0	0
	Individual oxidation programs									
1	Oxidation		1292*	54*	1:00*	757*	0:18*	0*	0*	0*
2	Oxidation		1292*	54*	1:00*	757*	0:18*	0*	0*	0*
	IPS d.SIGN Standard programs									
3	First opaquer firing	w. v.	1652	144	1:00	757	6:00	842	1650	0*
4	Second opaquer firing	w. v.	1634	144	1:00	757	6:00	842	1632	0
5	First and second shoulder firing	w. v.	1634	108	1:00	757	6:00	842	1632	0
6	First dentin and incisal firing	w. v.	1598	108	1:00	757	9:00	842	1596	0
7	Second dentin and incisal firing (corrective firing)	w. v.	1598	108	1:00	757	9:00	842	1596	0
8	Glaze firing with glazing material	w. v.	1526	108	1:00	757	4:00	842	1524	0
9	Glaze firing without glazing material	w. v.	1598	108	1:00	757	4:00	842	1596	0
10	Add-on firing	w. v.	1382	108	1:00	757	4:00	842	1380	0

* The values stipulated in the instructions of the corresponding alloy manufacturer have to be observed and set.
After deactivating the write protection, all the parameters of the Standard Programs P1-P10 may be permanently changed.
Please refer to the current IPS d.SIGN Instructions for Use for additional information regarding the firing parameters..

Other Programs P190 to P199		Values in °F							
P **No.**	**Program**	T **Holding temp. [°F]**	t ↗ **Temperature increase [°F]**	H **Holding time [min.]**	B **Stand-by temp. [°F]**	S **Closing time [min.]**	V1 **Vacuum on [°F]**	V2 **Vacuum off [°F]**	L **Long-term cooling [°F]**
Auxiliary programs									
190	Adjusting the background illumination of the display	Setting with the -/+ keys, value range 0 - 4, 0 = without background illumination							
191	Adjusting the buzzer signal	Setting with the -/+ keys, value range 0 - 9, 0 = without buzzer, 1 = default setting							
192	Cleaning program [1)]	2066	180	10:00	757	0:18	1292	2066	0
193	Vacuum test / Vacuum quality								
194	Interface printer / PC	Setting with the -/+ keys, if value in T = 0 = no protocol / 1 = printer / 2 = PC Input in L= Language selection							
195	Pre-vacuum	Setting with the -/+ keys, input in H= Value range 1-5 min., in 1-min. increments							
196	Special program	For Service Technicians / Code entering							
197	°C or °F mode	Changing by entering the program number							
198	Information	About the software version, operating hours, firing hours, and vacuum pump hours							
Silver Test program									
199	Silver Test/Calibration [2)]	Values set by the manufacturer							

Legend:

w.v. - with vacuum
w/o v. - without vacuum
L = 0 = no → no long-term cooling

Buzzer sounds with the furnace head open and the temperature dropping below 608 °F

1) All values are preset, but may be changed, once the write protection is deactivated. The values will be stored permanently. (Value range: see freely programmable programs P1 to P189)

2) The values for T to V_2 are preset values. The calibration value shown in parameter 'L' is 0 when the furnace is shipped from the manufacturer.

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