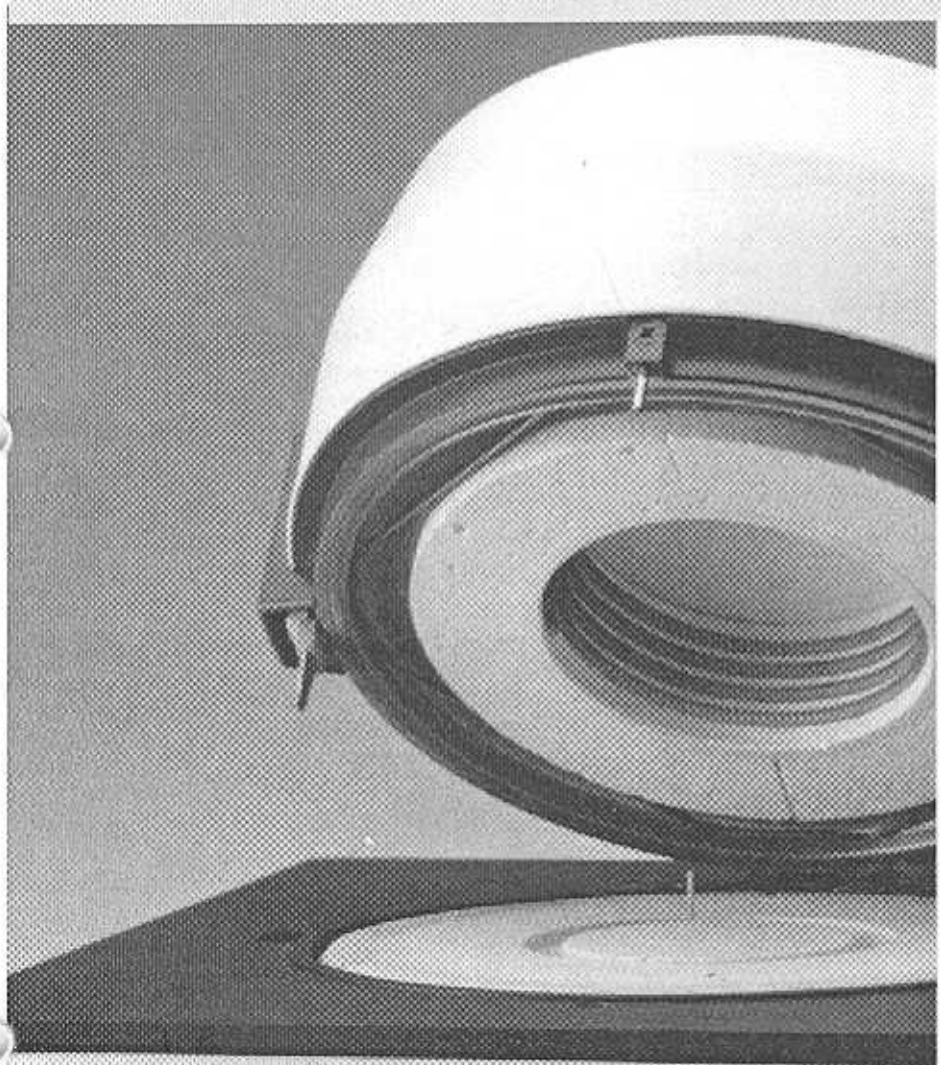
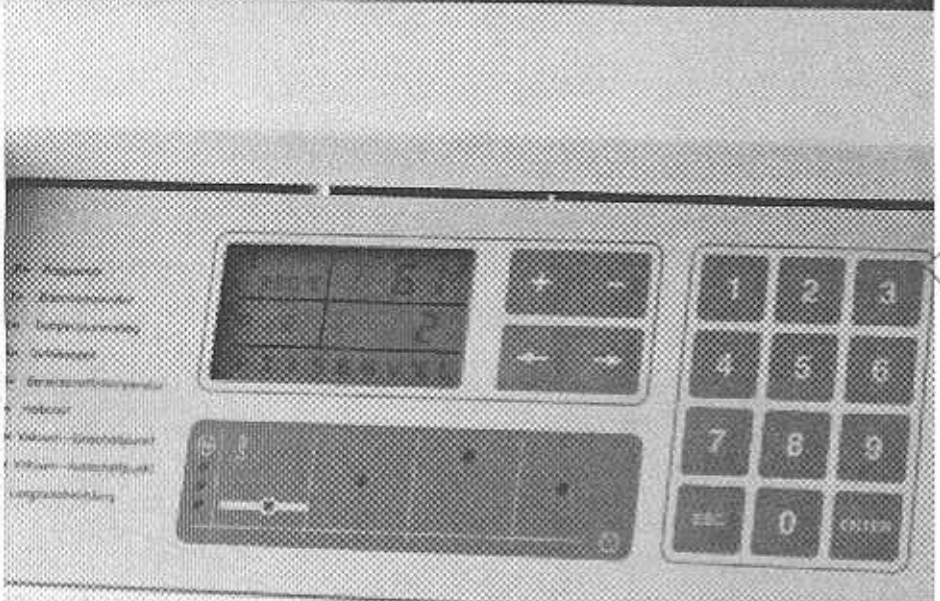
PROGRAMAT® P80



Operating Instructions



Schulungsunterlage
Course material

CE

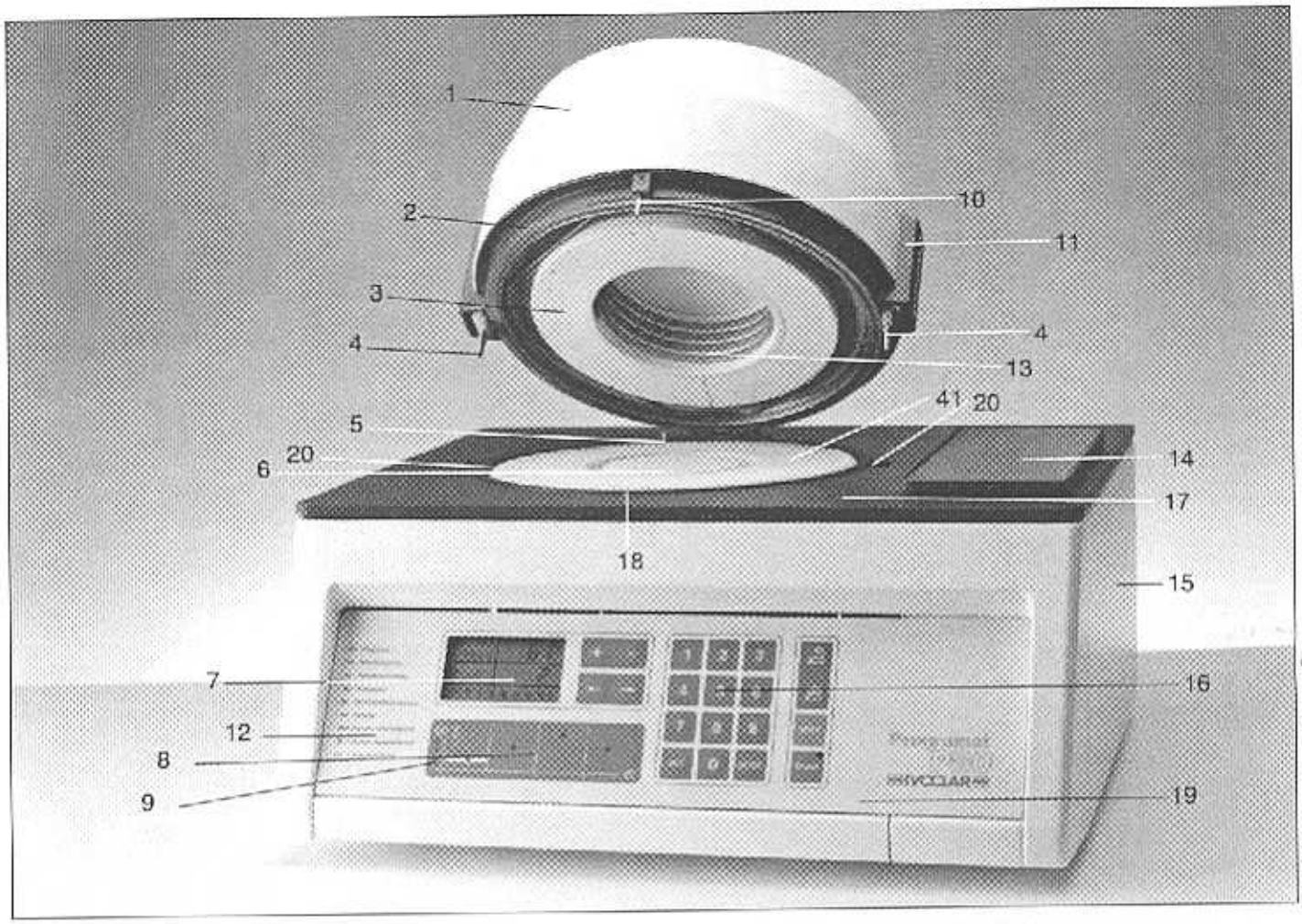
IVOCLAR

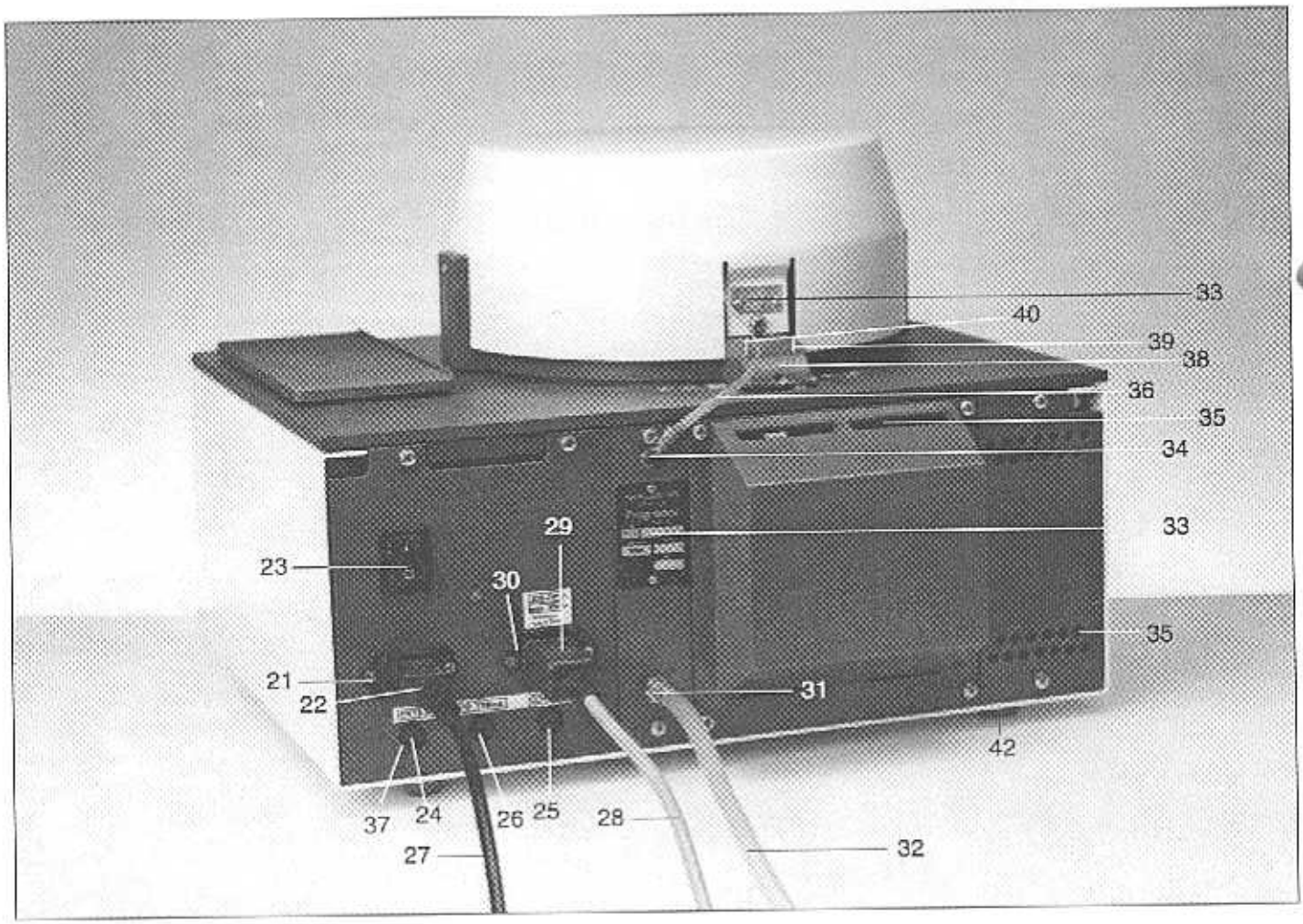
EC Declaration of Conformity

Document No./ Month, Year:	113/03/96	The product mentioned complies with the following European Directives:		Issued by:	Ivoclar AG FL-9494 Schaan
Manufacturer:	IVOCLAR Dental GesmbH Werk Bürs Bremschlstr. 16	Number:	a) 73/23/EEC b) 89/336/EEC	Place, Date:	Schaan, March 11, 1996
Address:	A-6700 Bludenz-Bürs	Text:	a) Low Voltage Directive b) Electromagnetic Compatibility	Valid Signature:	
Product: Name:	Programat P80 Type P80				

PROGRAMAT® P80

Operating Instructions


1
2
10
11
3
4
4
13
41
20
5
6
20
14
17
18
15
7
16
12
8
9
19


33
40
39
38
36
35
34
33
29
23
30
35
21
22
31
42
37
24
26
25
28
27
32

List of Parts

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 pins
11 Blade contact covers
12 Parameter sticker
13 Heating muffle
14 Cooling plate
15 Housing
16 Keys
17 Frame panel
18 Sealing rim
19 Keypad front panel
20 Blade contact openings
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 Protective conductor screw (base)
35 Air vents
36 Protective conductor
37 Fuse holder
38 Mounting lug
39 Openings for hinge pins
40 Hinge pins
41 Stone lining inserts (base)
42 Rubber feet

Control unit keypad

50 + key
51 – key
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 START key
62 LED status indicator

Firing curve display

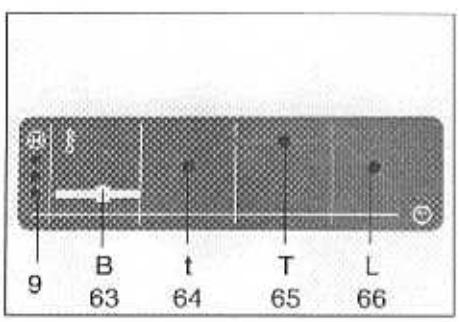
63 B = Stand-by temperature
64 t↗ = Temperature increase
65 T = Holding temperature
66 L = Long-term cooling

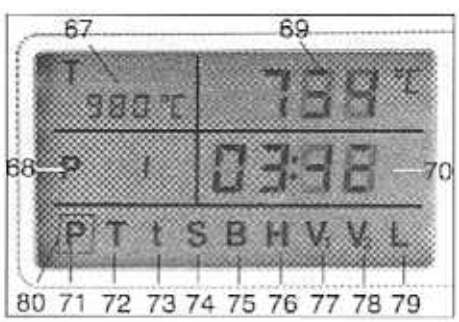
Parameter

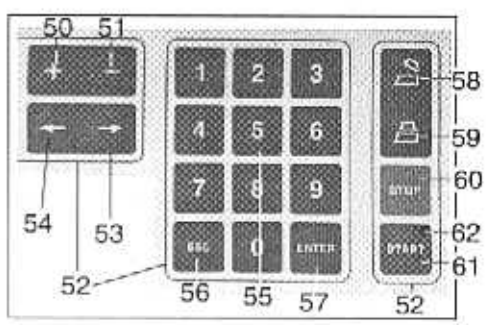
67 T = Set temperature in °C (°F)
68 P = Program number
69 °C = Actual temperature in °C (°F)
70 = Set value / remaining time in min:s/ error number

Display parameter in the menu

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 Long-term cooling
80 Cursor







1. Introduction / Signs and Symbols

1.1 Preface

Thank you for having purchased the Programat® P80. It is a highly technical quality product. The Programat® P80 has preset standard programs and also offers the option of various individual programs. The relevant firing data are shown on an illuminated LC-display.

The furnace is designed according to EN 61010-1 and thus complies with the relevant EU directives.

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® P80 is a high-tech product for dental 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 P80 furnace.

Contraindication

Burn hazard

Furnace:

Alternating current

Switched on

Switched off

Burn hazard. Hot surface.

Hazardous area/Risk of crushing
- Note: observe documentation
- Objects may only be placed into the firing chamber by means of tongs

1.3 Notes regarding the Operating Instructions

Furnace concerned: Programat® P80
Target group: Dental technologists

These Operating Instructions facilitate the correct, safe, and economic use of the Programat® P80 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® Service Center.

2. Safety First

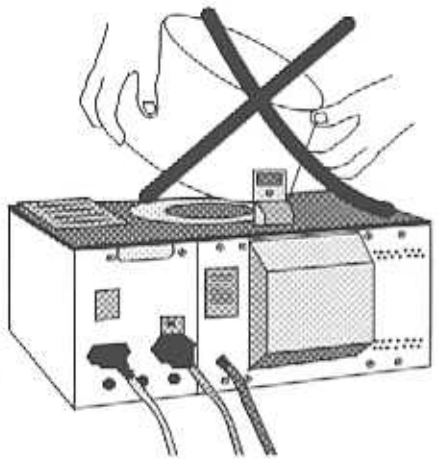
This chapter is especially important for personnel who work with the Programat® P80 or who have to carry out maintenance or repair work. This chapter must be read and the corresponding instructions followed.

2.1 Indications

The Programat® P80 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:

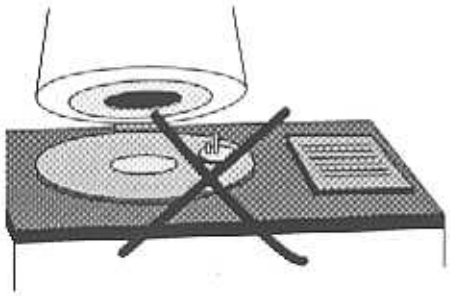
- The instructions, regulations, and notes in these Operating Instructions must be observed.
- The instructions, regulations, and notes in the vacuum pump Operating Instructions must be observed.
- The furnace must be operated under the indicated environmental and operating conditions (Chapter 9).
- The P80 must be properly maintained (see Chapter 7).



2.1.1

Contraindication

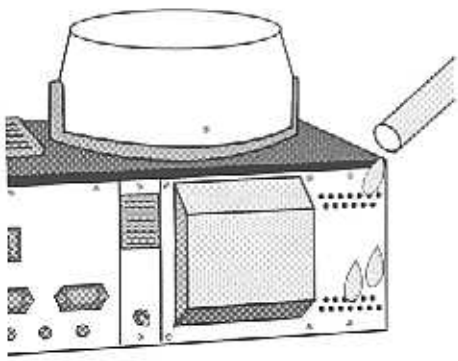
The furnace head should not be removed from the furnace base as long as it is still hot.



2.1.2

Contraindication

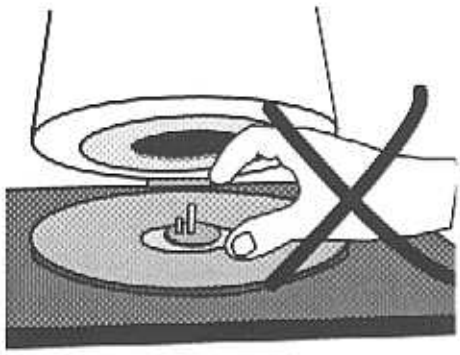
Firing trays must not be placed in the area surrounding the firing table, since this will obstruct the closing of the furnace head. Place the fired object on the cooling plate designed for that purpose. Never reach under the furnace head during operation. There is a risk of crushing.



2.1.3

Risks and dangers

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



2.1.4

Contraindication

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

Burn hazard

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

Please also refer to section 3.2 in Chapter 3.

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 objects, etc.)
- Always keep the air vents at the rear of the furnace free from obstruction.
- Position vacuum pump in a well ventilated place. The openings in the frame panel must always remain free from obstruction. Make sure that no foreign objects enter the furnace base.
- Do not place any objects on the frame panel. 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 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 the room temperature for approx. 1 hour (do not connect to the power yet).
- Note: Do not work with liquids near the furnace. Should a liquid accidentally enter the furnace, disconnect power and consult Customer Service. Do not operate the furnace.
- The furnace may be used 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.

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® P80 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 hazardous 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	Limiting the usable area
Grooves in the cooling plate	Permitting improved cooling

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 accessory assortment (firing trays G+K, tongs, Temperature Checking Set)
- Vacuum pump VP2
- 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® 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.

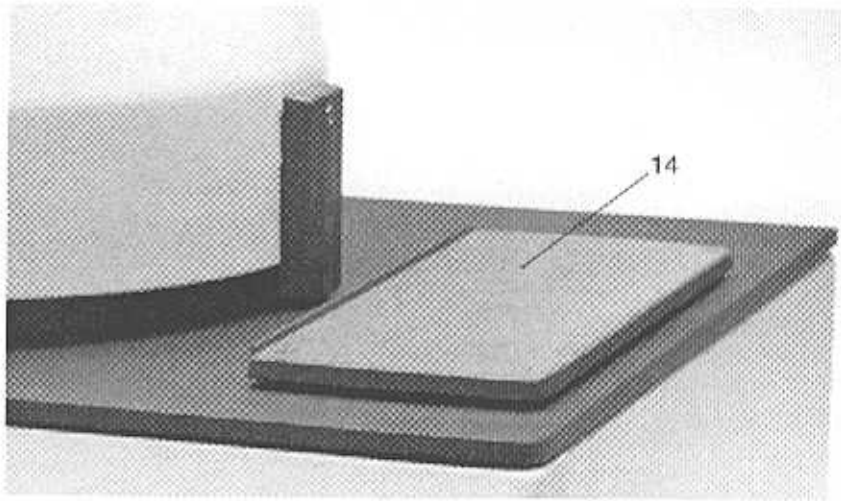
Also ensure that there is enough space between the furnace and the user, as the furnace releases heat during opening of the furnace head. The furnace should neither be placed nor operated in areas where there is an explosion hazard.

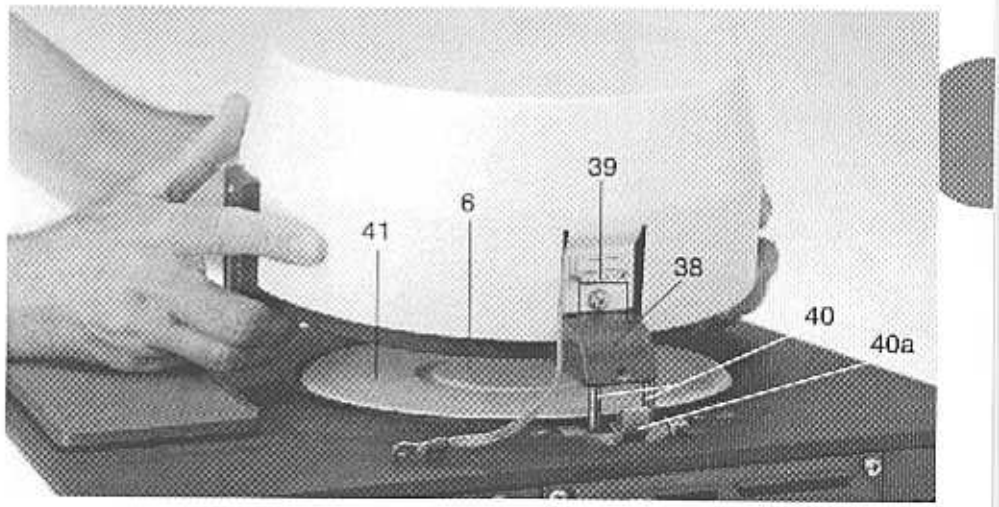
Check rating plate (33)
Make sure the voltage indicated on the rating plate (33) complies with the local power supply (see rear panel of furnace base and furnace head).

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

4.3 Assembly and initial start-up

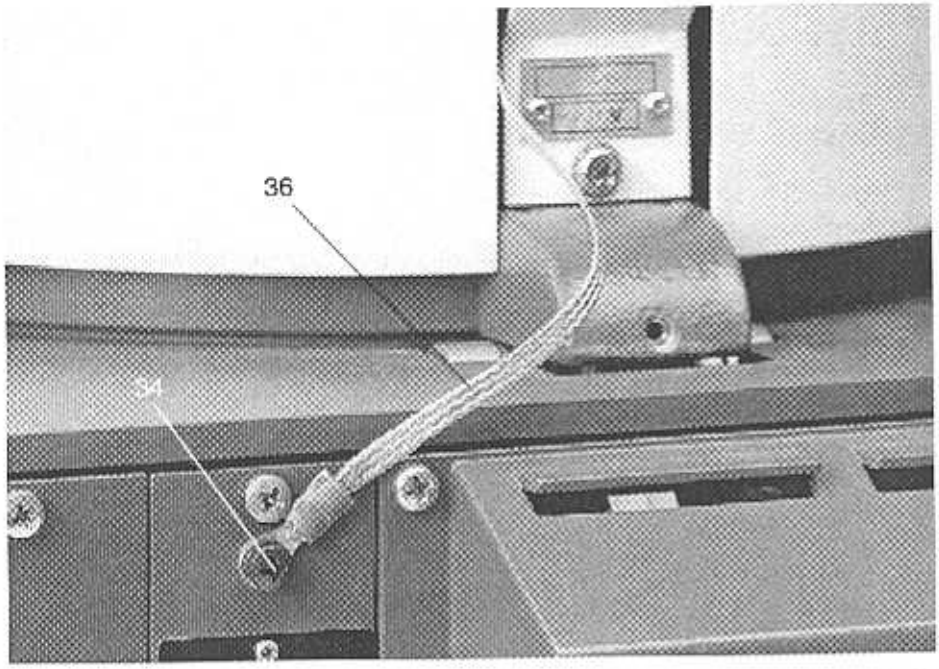
The furnace components are assembled as follows:

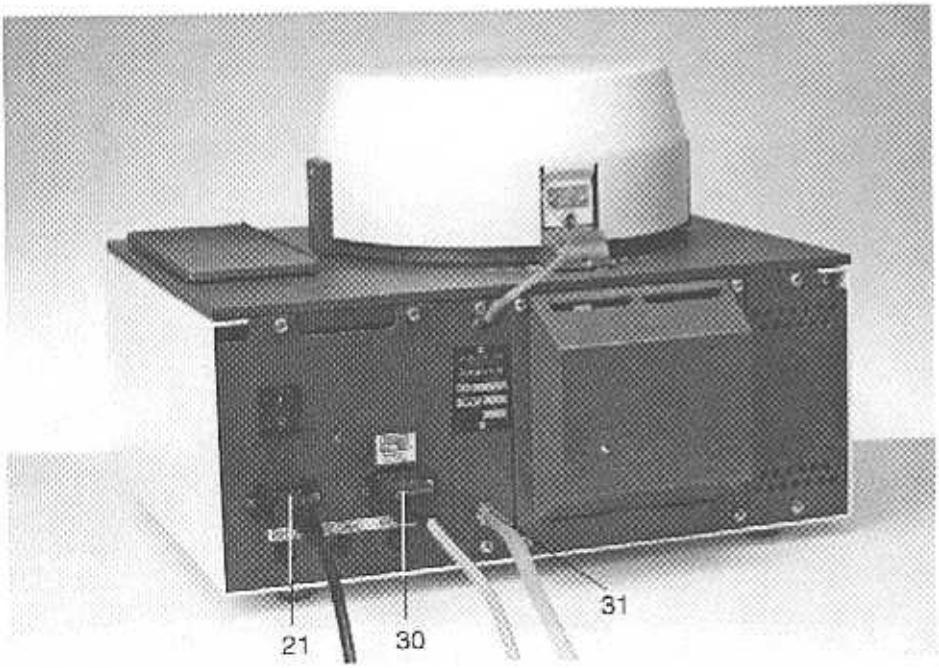




Step 1
Mounting the furnace head, completing the furnace base

- Remove protective paper from the firing plate (6) and position the plate in the stone lining insert (41).
- Clean sealing rim (18).
- Blow out the 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.
- Align the hinge pins (40) perpendicular to the furnace base.
- Hold the furnace head and mount it with the openings (39) in the mounting lug (38) onto the hinge pins (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.





Connect the protective conductor (36) of the furnace head with the furnace base using the black 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 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 VP2 vacuum pump from Ivoclar® (accessory), since this pump is especially coordinated with the unit. If other pumps are used, please observe and do not exceed the maximum power consumption.

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 on (only if the stand-by temperature has been reached).

Approximately 10 seconds after switching on, the furnace starts its automatic performance check (self-diagnosis). During this check, the field (69) in the display (7) shows the word 'SELF' for approx. 20 seconds (furnace head already closed). At the beginning of the performance check, all 8 diodes blink three times. 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 respective stand-by temperature. 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 P80 is equipped with a display showing the parameters in the bottom line.

The selection of the parameters is carried out with the "right"/"left" arrow keys. By entering the desired digits, the parameters may be changed. Another option is to reduce/increase the values with the '+'/'–' keys. The setting of the values is confirmed with ENTER (see Firing Tables in Chapter 10 for possible values). Should the desired values not be possible for the selected program or firing parameter, the framed symbol starts blinking, and an error message (Err) will be indicated. ESC may be used to erase 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 starts blinking. After reaching the first vacuum level, the blinking stops and the display 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 P80 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 few minutes.

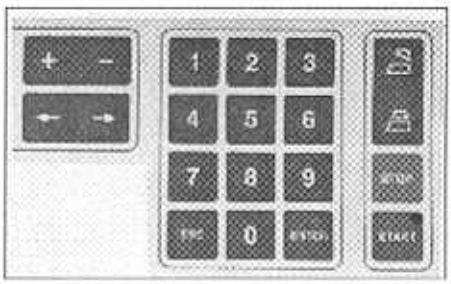
When a program is in progress, the display stops indicating the parameter value ten seconds after the last cursor movement. The remaining time of the program is indicated instead. If an arrow key (53, 54) is touched during this period, the remaining time disappears and the parameter value is indicated. Only a second touch of an arrow key (53, 54) will move the cursor symbol (80).

ENTER key

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

5.2 The menu

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



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.

Numeric keys (55)

- Numeric keys for entering the values: See Firing Table in Chapter 10 for possible values.
- Wrong values entered result in an error number being displayed.
- Impossible values are not accepted once ENTER is pressed. 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 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, 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)
- Buzzer stops
- Error message is deleted

Pressing this key twice has the following effects:

- Heater stops
- Vacuum stops
- Program is stopped (LED in the START key is dark)

START key (61)

- The program P is started by pressing this key. The LED in the key is illuminated.

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

Protect the display from direct sunlight

Description of the green LED 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 been stopped; the furnace heats to stand-by temperature.

5.4 Changing from °C to °F mode

The temperature mode can be selected by means of Program 97. This is generally done on the occasion of the initial start-up. Pressing ENTER sets °C or °F.

Program 97 cannot be selected if the auxiliary programs P91 to P96 and P98 are activated.

5.5 Selecting the buzzer signal

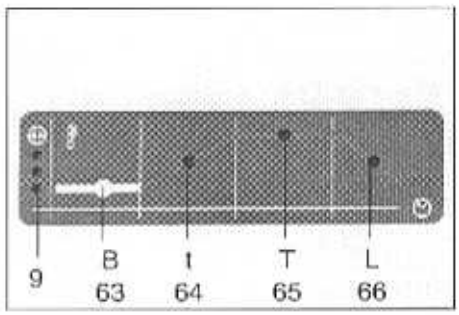
By selecting Program 91, the current buzzer tune is activated. There are 9 different buzzer tunes. Ø means that the buzzer is not activated. Pressing "+/–" results in the corresponding tune being played. ENTER activates the marked buzzer tune. Now select another program number and confirm with ENTER to leave P91.

5.6 Defining the 'Silver Test'

Temperature adjustment by means of the 'Silver Test' is described in Chapter 7.

5.7 Description of the firing curve display (8)

The firing curve display 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 on -> vacuum = 25 %
1st + 2nd	LED on -> vacuum = 50 %
1st + 2nd + 3rd	LED on -> vacuum = 100 %

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

Program status (firing phase)

Orange LED (63)
The LED is on if the temperature in the firing chamber = B -30 °C or B -54 °F, independent of the position of the furnace head.

Orange LED (64)
The LED is on if the program in progress is in its temperature increase stage. The duration of this stage depends on the temperature increase parameter t↗ (73). Holding temperature T is not yet reached. The furnace head is closed.

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

Orange LED (66)
The LED is on 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 on 0, this stage is omitted. The furnace head is closed.

Only one of these LEDs (64, 65, or 66) can be illuminated at a time.

6. Practical Use / Program Description

The operating procedure for the Programat® P80 will be explained with the help of a standard program.

6.1 Switching on/off

Switching on:

Put On/Off switch (23) at the rear of the furnace on position 'I'. After approx. 10 seconds, the unit conducts an automatic self diagnosis of the individual components (SELF appears in the display). The display then lights up and the furnace is ready for use.

Should this not be the case, please read Chapter 8.2.

Switching off:

Put the On/Off switch (23) on position '0' to switch off the furnace.

6.2 Firing with standard programs

Trial run

Step 1

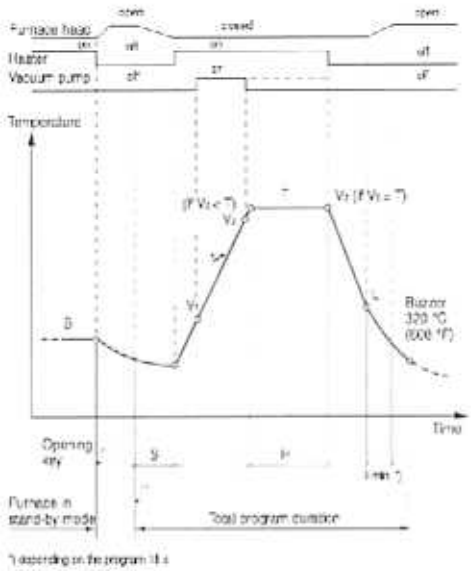
Select the desired standard program (P1-P9) with the P-parameter and confirm with ENTER.

e.g. P1

This program contains the following values:

Parameter	°C mode	°F mode
T *	980 (°C)	1796 (°F)
t↗	140 (°C/min.)	252 (°F/min.)
S *	0.18 (min.)	0.18 (min.)
B	403 (°C)	757 (°F)
H *	1 (min.)	1 (min.)
V_1	20 (°C)	68 (°F)
V_2	980 (°C)	1796 (°F)
L (*)	0 (no)	0 (no)

Typical program sequence



*) depending on the program (P1-P9)

Step 2

Press key (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.

Step 4

The buzzer indicates the end of the program.

Press key (furnace closes).

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 Alteration of standard parameters

Some parameters may be changed in the standard programs. Once the program has been completed, however, the modified value is changed back to the originally set standard value.
The parameters that can be altered are marked with '*' in the firing table.

Programs P1 to P9 (IPS Margin/ IPS Classic)

Standard programs with some data automatically set. The following values can be freely programmed: T, S, H, L. See also firing tables in Chapter 10.

Program P1

Heat treatment (oxidation) under vacuum.
Automatically set:
B = 403 °C (757 °F)
T = 980 °C (1796 °F)
V_1 = 20 °C (68 °F) = As soon as the furnace is closed
V_2 = T = End of holding time

Program P2

Same as P1, but without vacuum.

Program P3

1st opaquer firing (wash firing)
B = 403 °C (757 °F)
T = 980 °C (1796 °F)
V_1 = 550 °C (1022 °F)
V_2 = 1 °C (2 °F) below T = Beginning of holding time

Program P4

2nd opaquer firing
B = 403 °C (757 °F)
T = 970 °C (1778 °F)
V_1 = 550 °C (1022 °F)
V_2 = 1 °C (2 °F) below T = Beginning of holding time

Program P5

1st shoulder firing
B = 403 °C (757 °F)
T = 950 °C (1742 °F)
V_1 = 550 °C (1022 °F)
V_2 = 1 °C (2 °F) below T = Beginning of holding time

Program P6

2nd shoulder firing
B = 403 °C (757 °F)
T = 940 °C (1724 °F)
V_1 = 550 °C (1022 °F)
V_2 = 1 °C (2 °F) below T = Beginning of holding time

Program P7

1st dentin firing
B = 403 °C (757 °F)
T = 920 °C (1688 °F)
V_1 = 580 °C (1076 °F)
V_2 = 1 °C (2 °F) below T = Beginning of holding time

Program P8

2nd dentin firing (corrective firing)
B = 403 °C (757 °F)
T = 910 °C (1670 °F)
V_1 = 580 °C (1076 °F)
V_2 = 1 °C (2 °F) below T = Beginning of holding time

Program P9

Glaze firing with glazing paste
B = 403 °C (757 °F)
T = 900 °C (1620 °F)
V_1 = 0 (without vacuum)
V_2 = 0

6.3 Firing with individual programs

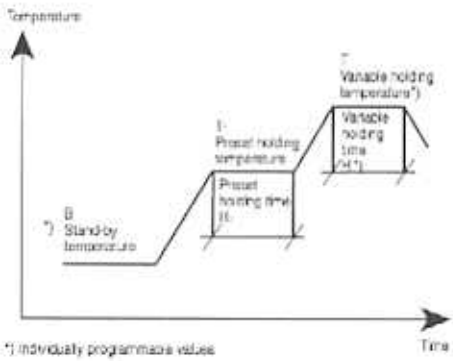
Programs P10 to P69
Individual programs

Freely programmable programs with normal opening of the furnace (1 minute). For possible values see the firing tables.

Programs P70 to P75

Special programs, each with a second, fixed holding time and holding temperature. For other possible values see the firing tables.

Program P	Fixed holding temperature T_1	Fixed holding time H_1
P70	575 °C (1067 °F)	2 minutes
P71	575 °C (1067 °F)	3 minutes
P72	600 °C (1112 °F)	2 minutes
P73	600 °C (1112 °F)	3 minutes
P74	625 °C (1157 °F)	2 minutes
P75	625 °C (1157 °F)	3 minutes



Program P76

Special program in which the first half of the individually set holding time is carried out with vacuum and the second half without vacuum. All values are freely programmable.

Example

Holding time H = 3 min. is carried out as 1.5 min. with vacuum and 1.5 min. without vacuum.

Programs P77 to P87

Individually programmable special programs such as P10 to P69, but with quick opening of the furnace (18 seconds). For possible values, see the firing tables.

Programs P88 to P90

Freely programmable "overnight" programs with normal opening of the furnace (1 min.). After the "overnight" program has been completed, the furnace head opens without the buzzer sounding and the furnace closes automatically after reaching a temperature of approx. 80 °C (176 °F) and then cools to room temperature. The green LED in the START key blinks. In the event of a power failure during the night, the furnace does not continue heating, but remains at room temperature.

The symbol keys to open/close the furnace work as soon as the head is automatically opened completely for the first time.

Program P91

With this program, the buzzer tune can be set. The frequency can be altered with the "+"/"-" keys. The values are indicated in the input field (70) of the display (range of values 0-9; 0 = no buzzer).

Program P97

This program is used to change from Celsius mode (°C) to Fahrenheit mode (°F). When entering P97, the mode is changed automatically.

Program P98

Display of working hours and software version.

- The current software version is indicated in the section for the set value (67), e.g. 60 = Version 6.0
- The number of working hours is indicated in the section for the current value (69)
- The number of firing hours is indicated in the input field (70)

Program P99

'Silver Test'
With the "+"/"–" keys, the temperature in the firing chamber can be recalibrated. The value is indicated in the input field (70).

6.4 Programming / changing programs

- **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 keys
  - Enter the value and confirm with ENTER

- **Important for the input of V_2 (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:
  V_2 = T (e.g. T = 1050 C, V_2 = 1050 °C
  or T = 1922 °F, V_2 = 1922 °F)
  (Vacuum is not switched off until the end of the holding time H)

- **Once the program has been completed, it is automatically stored.**

- In standard programs, the values T, S, H, and L may be altered. The values are automatically reset to the standard values once the program has ended.

- Changeover from one program to another:
  The program cannot be changed while it is in progress (green LED in the START key is on).
  - Press STOP twice
  - Select the parameter 'Program Number' with the arrow key 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 preselected T value:

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

2. To change preselected data for B, t↗, T, V_1, and V_2:
   - Press STOP
   - Select the desired parameter with the arrow key 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)

6.6 Important 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. 5 s) will interrupt a program and cause Err 17 to appear. Press STOP and restart the program for the program to continue its sequence (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.
- Remaining time indicator (70):
  After the program has been started and during the closing procedure of the furnace head, the remaining time indicator (70) displays "---". If the value entered for long-term cooling L is lower than 500 °C (932 °F) the remaining time indicator also displays "---". The remaining time appearing on the display is continuously updated during the program sequence (every 5 s). The indicated time 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.

7. Maintenance, Cleaning, and Diagnosis

This chapter describes the user maintenance and cleaning procedures. All other tasks must be performed by qualified service personnel at a certified Ivoclar® Service Center.

7.1 Monitoring and maintenance

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

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

What	Part	When
Check all plug-in connections for correct fit	Var. 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® Service Center.	Stone lining inserts (3, 6, 41)	monthly
Check if the sealing ring of the furnace head and the sealing rim of the furnace base are cleaned and undamaged.	Sealing ring of the furnace head (2); sealing rim of 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® Service Centre.	Keypad (16, 19)	weekly
Check temperature. Use the temperature checking set to check and adjust the temperature in the furnace.	Firing chamber	every 6 months

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	weekly	soft, dry cloth
Cooling plate (14)	daily	cleaning brush
Stone lining inserts (3, 6, 41)	daily	cleaning brush
Sealing ring of the furnace head (2) Sealing rim of 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 P99, a special calibration program.

Material required (in the Temperature Checking Set 2)

- Ivoclar® firing tray
- 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 P99).
b) Insert silver wire into the Ivoclar® sample holder (see also the notice enclosed in the Temperature Checking Set 2).
c) Select P99 (Silver Test program)
d) Press  and place the sample holder 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 (pitted) at the end of the program, the furnace temperature is correctly calibrated (Figure B). If not, recalibration is necessary.

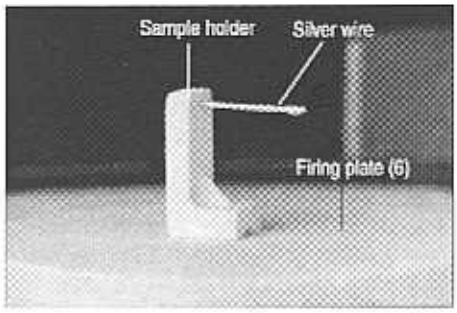


Figure A Temperature too low

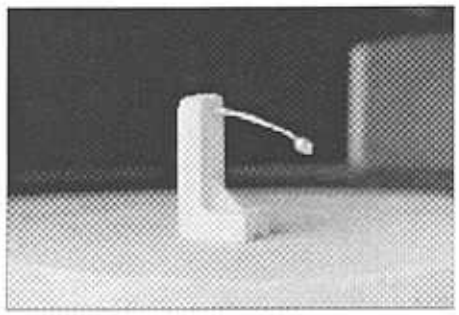


Figure B Temperature just right

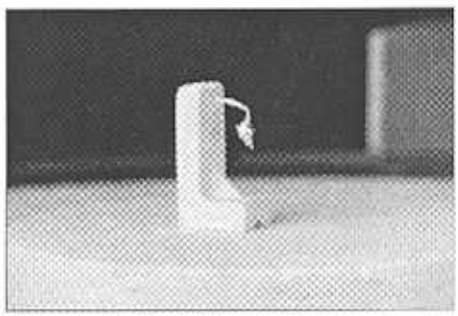
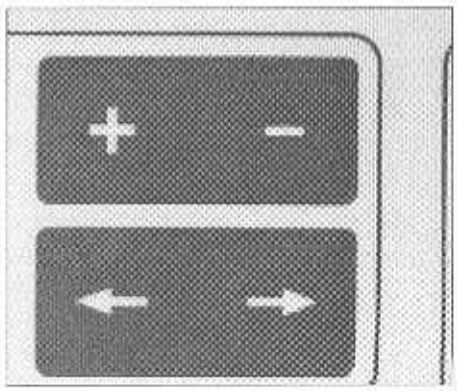


Figure C Temperature too high

Recalibration

A change in temperature of ±50 °C (± 90 °F) is possible in the Programat® P80. Select program P99 to activate the calibration keys "+" and "–". The program does not need to 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.
We recommend not to recalibrate the furnace immediately before it reaches 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 (B).

8. What if ...

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

8.1 Error messages

List of possible error messages and their meaning

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 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 is below 18 s or more than 10 min.	Set an acceptable closing time.
Err 4	H-value entered is more than 40 min.	Set a shorter holding time.
Err 5	I-*-value entered is below 30 °C/min. (54 °F/min.) or higher than 140 °C/min. (252 °F/min.)	Set an acceptable temperature increase time.
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	V_1-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	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)	Set a lower value for the long-term cooling.
Err 17	Power failure lasting more than 5 s during a program in progress	A program in progress has been interrupted by a power failure.
	Furnace errors	
* Err 20	Error in the heating system	Check the F2 fuse in the supply unit. If this error message appears, the heater is switched off for safety reasons. The furnace is opened and the keypad does not work. If you want to close the furnace head (1) despite the 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.
Err 22	Closed furnace head is not acknowledged.	A foreign object between the furnace head (1) and the frame panel (17) may obstruct the closing of the furnace head.
Err 23	Muffle is aging.	The muffle is worn down. It is recommended to have it 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 in the furnace base is higher than 65 °C (149 °F).	Bring the temperature in the furnace base to a value lower than 65 °C (149 °F). Make sure that the air vents are clean and free from obstruction.
Err 27	Furnace head does not open after the initial start-up.	None
Err 28	Furnace head has been moved manually.	Move the furnace head (1) only by means of the corresponding keys.

Error No.	Description	Instructions for users
*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 is opened and the keypad does not work. If you want to close the furnace head (1) despite the 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.	None
Err 31	Vacuum valve does not respond.	None
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	Necessary vacuum has not been reached within 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 F1 fuse in order?
Err 34	Error in the electronic component for the supply unit.	None
Err 35	Error in the electronic component for the supply unit.	None
Err 38	Error in the electronic component for the muffle controls.	None
	Errors in the control unit	
Err 40	Indicator for the electronic components defective.	None
Err 43	Error in the memory.	The program parameters are probably invalid.
	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.	None
Err 52	Error in the calibration memory of the analog module.	None
Err 53	Error in the system memory.	None
Err 54	Error in the electronic component for the temperature measurement.	None
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.

* Furnace head opens when this error occurs.

For safety reasons, the heating muffle may only be changed by a certified Ivoclar® Service Center (Err 23, 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. 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. Press STOP when the lever (40a) between the two hinge pins (40) (see lower picture on page 11) reaches its highest position over the frame panel (17). Then, switch off the furnace. Align the two hinge pins (40) in a vertical position and mount the furnace head. During mounting, the furnace head should be held in an almost closed position. After that, switch on the furnace.

Situation B
Error message Err 22 appears if the furnace head (1) is correctly mounted.

Remove objects that are possibly located between the furnace head (1) and the frame panel (17). Press STOP to acknowledge the error message. Then, press the '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 the 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 F3 fuse for the electronic controls OK?	Check F3 fuse (26)
Furnace head does not open/close	Is the F3 fuse OK?	Check F3 fuse (26)
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 F1 use OK?	Connect vacuum pump according to the Operating Instructions. Check F1 fuse (25)
Final vacuum not reached	Is the vacuum hose OK? Is the furnace airtight?	Check vacuum and hose connections Replace pump. Clean sealing surface.

Approximately 10 s after switching on, the furnace carries out the automatic self-diagnosis (SELF is indicated in the display). The illumination of the LC-display (7) has to light up immediately after switching on.

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® Service Center. Please refer to the addresses on the last page of these Operating Instructions.

If repairs during the warranty period are not carried out by a certified Ivoclar® Service Center, 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® P80
1 Power cord
1 Vacuum hose
3 Extra fuses
1 Operating Instructions
1 Warranty card

Recommended accessories
- Vacuum pump VP2
- Programat® accessory assortment (tongs, firing trays G+K, Temperature Checking Set)
- Programat® firing cards

Colour
White (RAL9016)

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 vacuum pump
200-240 V max. 1800 W
110-120 V max. 1500 W

Vacuum quality
By means of 3 LEDs in stages of 25, 50, 100 %

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)
T 315 mA (controls)
T 3.15 A (pump)

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

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 433 x 295 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: 10.5 kg
Furnace complete: 14.0 kg

Safety information
The P80 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 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 altitudes of up to 2000 m above sea level.

9.4 Acceptable transportation and storage conditions

Acceptable temperature range
-20 °C to +50 °C (-4 °F to +122 °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

Use only original packaging of the Programat® P80 together with the respective foam material for shipping purposes.

Programat® P80

Standard Programs P1 to P9 (IPS Margin/ IPS Classic)

Values in °C

P No.	Program		T Holding temp. [°C]	t↗ Temperature increase [°C]	S Closing time [min.]	B Stand-by temp. [°C]	H Holding time [min.]	V_1 Vacuum On [°C]	V_2 Vacuum Off [°C]	L Long-term cooling	Operating Instructions Chapter	Page
1–9	Value ranges for Standard Programs		100–1200		0:18–10:00		0:01–40:00			1–1200		
1	Oxidation	w.v.	980*	140	0:18*	403	1:00*	20	980	no	6.2	15
2	Oxidation	w/cv.	980*	140	0:18*	403	1:00*	0	0	no	6.2	15
3	1st Opaquer firing (wash firing)	w.v.	980*	80	6:00*	403	1:00*	550	1° below T	no*	6.2	15
4	2nd Opaquer firing	w.v.	970*	60	6:00*	403	1:00*	550	1° below T	no*	6.2	15
5	1st Shoulder firing	w.v.	950*	60	4:00*	403	1:00*	550	1° below T	no*	6.2	15
6	2nd Shoulder firing	w.v.	940*	60	4:00*	403	1:00*	550	1° below T	no*	6.2	15
7	1st Dentin firing	w.v.	920*	60	4:00*	403	1:00*	580	1° below T	no*	6.2	15
8	2nd Dentin firing (corrective firing)	w.v.	910*	60	4:00*	403	1:00*	580	1° below T	no*	6.2	15
9	Glanzbrand mit Glasurmasse	w/cv.	900*	60	4:00*	403	1:00*	0	0	no*	6.2	15

* These values can be changed for one firing. After completion of the program, the values are changed back to the standard values.

Freely programmable programs P10 to P90

10–90	Value ranges for freely programmable prog.		100–1200	30–140	0:18–10:00	100–700	0:01–40:00	1–1200	1–1200	1–1200	
10–90	Values preset by Ivoclar®	700	30	0:18	403	1:00	0	0	0		
						0 = without H	0 = without V_1	0 = without V_2	0 = without L		
Individual Programs											
10–69		700	30	0:18	403	1:00	0	0	0	6.3	16
Special Programs											
70	Preset T1 575 °C/Preset H1 2 min. [1]	700	30	0:18	403	1:00	0	0	0	6.3	16
71	Preset T1 575 °C/Preset H1 3 min. [1]	700	30	0:18	403	1:00	0	0	0	6.3	16
72	Preset T1 800 °C/Preset H1 2 min. [1]	700	30	0:18	403	1:00	0	0	0	6.3	16
73	Preset T1 800 °C/Preset H1 3 min. [1]	700	30	0:18	403	1:00	0	0	0	6.3	16
74	Preset T1 625 °C/Preset H1 2 min. [1]	700	30	0:18	403	1:00	0	0	0	6.3	16
75	Preset T1 625 °C/Preset H1 3 min. [1]	700	30	0:18	403	1:00	0	0	0	6.3	16
76	Holding time with vacuum [2]	700	30	0:18	403	1:00	0	0	0	6.3	16
77–87	Quick opening of the furnace head 0:18 m	700	30	0:18	403	1:00	0	0	0	6.3	16
88–90	Overnight Program [3]	700	30	0:18	403	1:00	0	0	0	6.3	16
Auxiliary Programs											
91	Buzzer adjustment	Selection with "+/-"-keys, value range 0–9; 0 = no buzzer, 1 = standard value								5.5	14
97	Changing from °C to °F	Changing by entering the program number								5.4	14
98	Information	About software version, operating hours, and firing hours								6.3	16
Silver Test Program											
99	Silver Test / Calibration [4]	955	50	1:00	403	3:00	0	0	0	7.3	20

Programat® P80

Standard Programs P1 to P9 (IPS Margin/ IPS Classic)

Values in °F

P No.	Program		T Holding temp. [°F]	t↗ Temperature increase [°F]	S Closing time [min.]	B Stand-by temp. [°F]	H Holding time [min.]	V_1 Vacuum On [°F]	V_2 Vacuum Off [°F]	L Long-term cooling	Operating Instructions Chapter	Page
1–9	Value ranges for Standard Programs		212–2192		0:16–10:00		0:01–40:00			1–1200		
1	Oxidation	w.v.	1795*	252	0:16*	757	1:00*	68	1796	no	6.2	15
2	Oxidation	w/o.v.	1796*	252	0:16*	757	1:00*	0	0	no	6.2	14
3	1st Opaquer firing (wash firing)	w.v.	1796*	144	6:00*	757	1:00*	1022	2° below T	no*	6.2	15
4	2nd Opaquer firing	w.v.	1778*	144	6:00*	757	1:00*	1022	2° below T	no*	6.2	15
5	1st Shoulder firing	w.v.	1742*	144	4:00*	757	1:00*	1022	2° below T	no*	6.2	15
6	2nd Shoulder firing	w.v.	1742*	144	4:00*	757	1:00*	1022	2° below T	no*	6.2	15
7	1st Dentin firing	w.v.	1688*	108	4:00*	757	1:00*	1076	2° below T	no*	6.2	16
8	2nd Dentin firing (corrective firing)	w.v.	1670*	108	4:00*	757	1:00*	1076	2° below T	no*	6.2	16
9	Glaze firing with glazing paste	w/o.v.	1652*	108	4:00*	757	1:00*	0	0	no*	6.2	16

* These values can be changed for one firing. After completion of the program, the values are changed back to the standard values.

Freely programmable programs P10 to P90

10–90	Value ranges for freely programmable prog.	212–2192	54–252	0:16–10:00	212–2192	0:01–40:00	34–2192	34–2192	34–2192		
10–90	Values preset by Voclar®	1292	54	0:16	757	1:00	0	0	0		
						0 = without H	0 = without V1	0 = without V2	0 = without L		

Individual Programs

10–69		1292	54	0:16	757	1:00	0	0	0	6.3	16

Special Programs

70	Preset T1 1067 °F/Preset H1 2 min. 1)	1292	54	0:16	757	1:00	0	0	0	6.3	16
71	Preset T1 1067 °F/Preset H1 3 min. 1)	1292	54	0:16	757	1:00	0	0	0	6.3	16
72	Preset T1 1112 °F/Preset H1 2 min. 1)	1292	54	0:16	757	1:00	0	0	0	6.3	16
73	Preset T1 1112 °F/Preset H1 3 min. 1)	1292	54	0:16	757	1:00	0	0	0	6.3	16
74	Preset T1 1157 °F/Preset H1 2 min. 1)	1292	54	0:16	757	1:00	0	0	0	6.3	16
75	Preset T1 1157 °F/Preset H1 3 min. 1)	1292	54	0:16	757	1:00	0	0	0	6.3	16
76	Holding time with vacuum 2)	1292	54	0:16	757	1:00	0	0	0	6.3	16
77–87	Quick opening of the furnace head 0:16 m.	1292	54	0:16	757	1:00	0	0	0	6.3	16
88–90	Overnight Programs 3)	1292	54	0:16	757	1:00	0	0	0	6.3	16

Auxiliary Programs

91	Buzzer adjustment	Selection with "+/-"-keys, value range 0–9. 0 = no buzzer, 1 = standard value	5.5	14
97	Changing from °C to °F	Changing by entering the program number	5.4	14
98	Information	About software version, operating hours, and firing hours	6.3	16

Silver Test Program

99	Silver Test / Calibration 4)	1751	90	1:00	757	3:00	0	0	0	7.3	20

Legende

Buzzer sounds with the furnace head open and the temperature dropping below 320 °C (608 °F)

Programs P1 to P76, open furnace head; 1 minute

w.v. = with vacuum;

w/o.v. = without vacuum;

L = 0 = no –> means without long-term cooling

1) These values are preset and are not shown in the display.

2) The first half of the individually set holding time is carried out with vacuum, the second half without vacuum.

3) Overnight program: Furnace head opens in 1 min. without the buzzer sounding, furnace head closes after opening at T <=80 °C (176 °F) and stops heating.

4) The values for T up to V2 are preset. The calibration value L is set on 0 when the furnace is shipped from the manufacturer.

Ivoclar – worldwide

Deutsche Ivoclar Dental GmbH
Postfach 1152
D-73471 Ellwangen
Germany
Tel. 07961/889-0

Ivoclar Division France
B.P. 118
F-74410 Saint-Jorioz
France
Tel. 04.50.88.64.00

Ivoclar-Vivadent s.r.l.
Via dell'Industria 16
I-39025 Naturno (BZ)
Italy
Tel. 0473/670111

Ivoclar Comercial S.A.
c/Valderribas 82
E-28007 Madrid
Spain
Tel. 91/5524175

Ivoclar-Vivadent UK Limited
Meridian South
Leicester
LE3 2WY
Great Britain
Tel. 116/2654055

Ivoclar Dental (N.Z.) Ltd
Wellesley Street
P.O. Box 5243
Auckland
New Zealand
Tel. (09) 630-5206

Ivoclar Pty. Ltd.
1 – 5 Overseas Drive
P.O. Box 367
Noble Park, Vic. 3174
Australia
Tel. 03/97959599

Ivoclar Williams
Ivoclar North America, Inc.
23 Hannover Drive
St. Catharines, Ont. L2W 1A3
Canada
Tel. (800) 263-8182

Ivoclar Williams
Ivoclar North America, Inc.
175 Pineview Drive
Amherst, N.Y. 14228
USA
Tel. (800) 533-6825

Ivoclar-Vivadent
Branch Office in Poland
Swietokrzyska 36 apt. 37
PL-00-116 Warszawa
Poland
Tel. 22/6202464; 6202661

Dental Medico AB
Gårdsfogdevägen 2
S-161 70 Bromma
Sweden
Tel. 08/6323730

Ivoclar-Vivadent S.A. de C.V.
Av. Mazatlan No. 61, Piso 2
Col. Condesa
06170 México, D.F.
Mexico
Tel. (5) 553-0038

This apparatus has been developed solely for use in dentistry. Start-up and operation should be carried out strictly according to the Operating Instructions. Liability cannot be accepted for damages resulting from misuse or failure to observe the instructions. The user is solely responsible for testing the apparatus for its suitability for any purpose not explicitly stated in the instructions. Descriptions and data constitute no warranty of attributes and are not binding.

Printed in Liechtenstein © 1996 Ivoclar Schaan/Liechtenstein
154677/497/0.3/e/DP

Version: 3
Date information prepared: March 1997
Valid: Software version 6.0

Ivoclar Aktiengesellschaft
Bendererstrasse 2
FL-9494 Schaan/Liechtenstein
Tel. 075 / 235 35 35
Fax 075 / 235 33 60
http://www.ivoclar.com

IVOCLAR