Furnace for PRESS and NORMAL ceramics

CeramicMaster **PRESS**

USER MANUAL

CONTENT

1. INTRODUCTION

Thank you for having purchased the CERAMICMASTER PRESS furnace which, we are sure will all meet all your needs and will satisfy your high demands.

This furnace has been designed according to the requirements of latest industrial standards and we guarantee that you will use it many years as your closest assistant.

Press function is accomplished by a unique pressing mechanism driven by a stepper motor. This allows precise pressing. At the end of the process the furnace shows the depth of sinking of the plunger.

A system for warning of possible cracking of pressed rings is embedded. The decision for the termination of the pressing is taken at an early stage of the process, thereby is saving the user time.

The furnace has a kit for auto calibration that can be purchased separately. For more information, see section 11 AUTOCALIBRATION.

However, inappropriate use may damage the equipment and be harmful to personnel. Please observe the relevant safety instructions and read the Operating Instructions carefully.

We wish you pleasant and fruitful work with the CERAMICMASTER PRESS.

SYMBOLS:

This symbol indicates that there is high dangerous tension under the bonnet which it is put on.

This symbol indicates that the machine complies with the requirements of the Directives for Low Tension and Electromagnetic Compatibility as well as for the Standards harmonized with them.

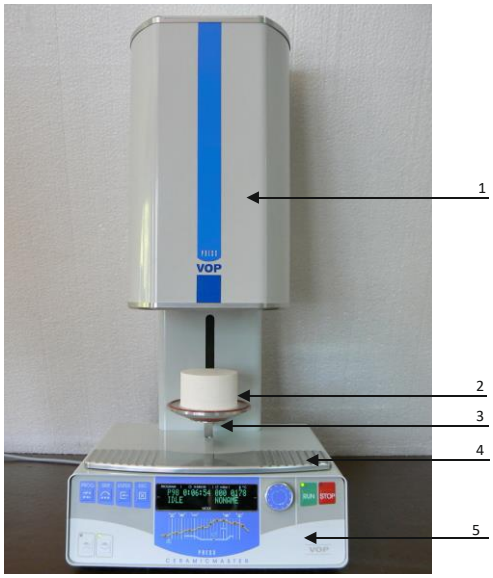
2. SAFETY INSTRUCTIONS

The following instructions must be observed in order to avoid personnel injury or equipment failure.

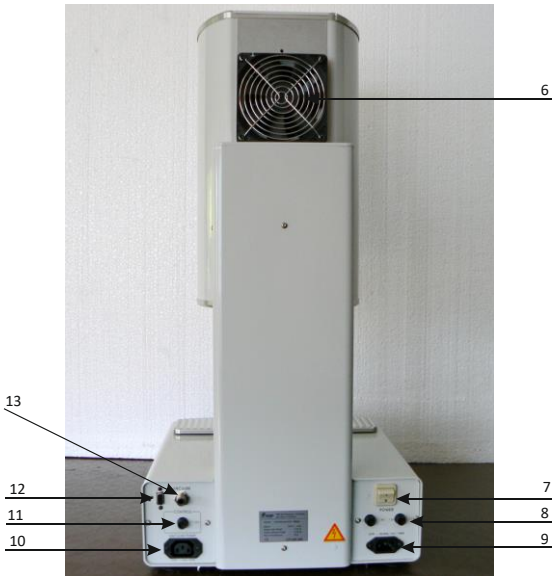
- the furnace must not be run by an operator who is not acquainted with these instructions;
- before turning on the plug in the net contact check if the voltage in the electrical network correspond to the working tension. In case of discrepancy, consult a specialist;
- on no account do not alter the device;
- the notices and stickers must be kept in good condition so that they are easily readable; they should not be removed!
- the machine must not function in case of being damaged and in position to injure the staff or a third person;
- keep the cables out of heat, oil and coarse objects; do not catch the device by the cable when you move it.
- switch off the furnace and pull out the plug of the feeder cable from the contact before each cleaning or upkeep.
- spare parts which are not specified by the manufacturer cannot be used!

CAUTION! If the machine is used by such means not indicated by the manufacturer, the provided protection can get worse!

3. DESCRIPTION OF THE UNIT



1 Cover of the chamber
2 Ceramic table
3 Lift table
4 Cooling pad
5 Front panel



6 Fan
7 Mains switch
8 Mains fuses
9 Plug of power cord
10 Plug of pump's power cord
11 Fuse for pump
12 Plug of RS232
13 Nozzle of pump's hose

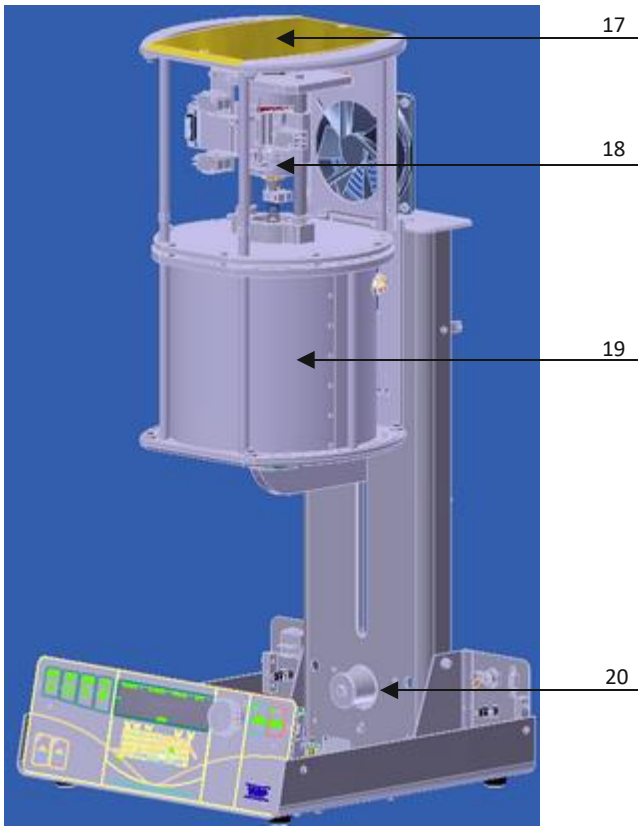

14


15

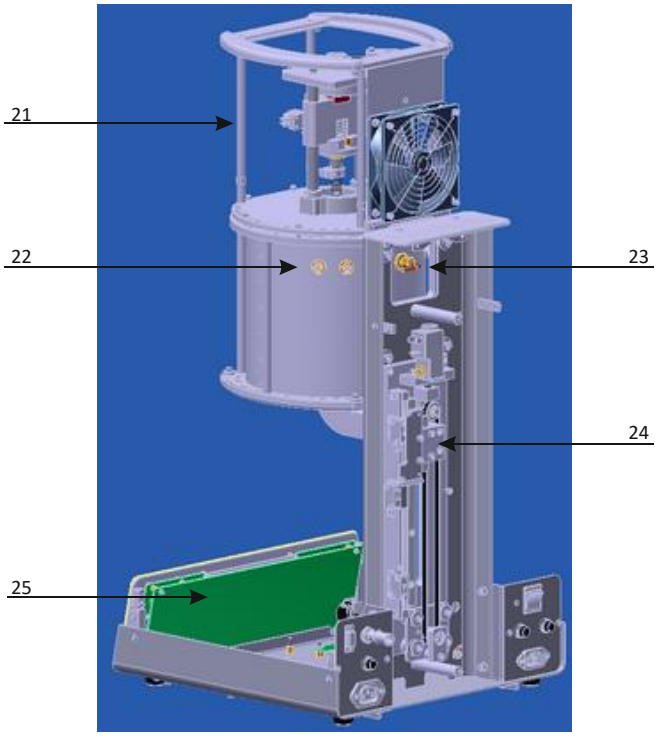
14 Hose of the pump
15 Adapter


16

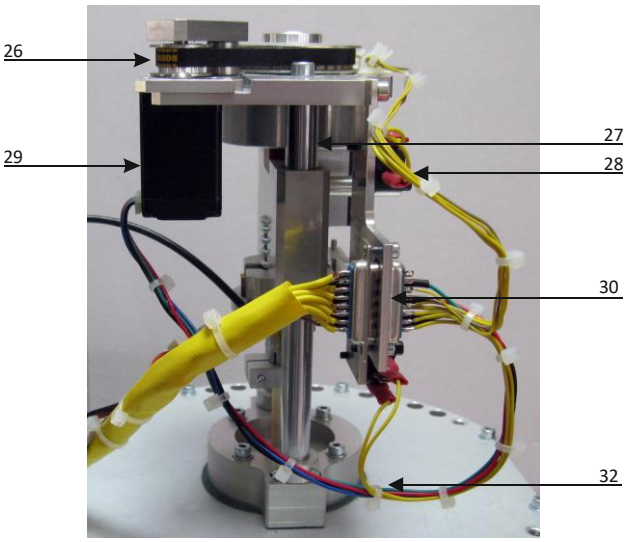
16 Vacuum pump



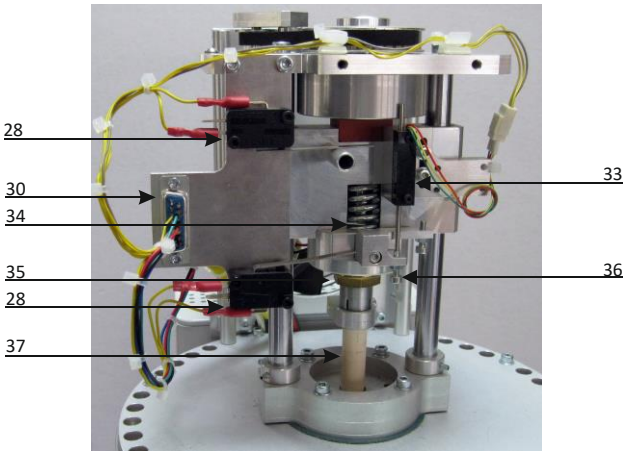
17 Upper cover of the chamber;
18 Press mechanism;
19 Chamber
20 Lift motor



21 Column
22 Heater's terminals
23 Vacuum nozzle
24 Lift mechanism
25 Control PCB



26 Belt of press mechanism
27 Conductors
28 Micro switches
29 Motor of press mechanism
30 Connector
31 Choke
32 Lute



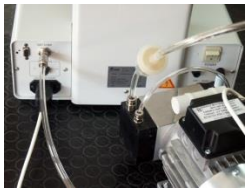
33 Linear sensor
34 Spring
35 Adjustment nut
36 Limiter
37 Quartz piston

4. INSTALATION AND INITIAL START-UP

UNPACKING

- Carefully remove modules from packages;
- Make sure that the mains voltage is ~230V and the contact is reliably grounded.

CONNECTIONS



- Connect pump supply cable to the terminal with label "VACUUM PUMP" on the rear panel;
- Connect the power supply cable to the terminal with label "POWER" on the rear panel;
- Connect vacuum hose to the vacuum fitting with label "VACUUM" on the rear panel.
- The net switch is on the rear panel, on the right. Put the furnace in a position which enables its easy engaging turning off from the master switch as well as from the contact.

5. PRACTICAL USE

DESCRIPTION OF BUTTONS

PROG - puts the number of the program which is to be performed into programming mode.

SKIP - skips phases DRY1, FIRE1, COOL1 and PRESS into programming mode.

ENTER - stores the changes in the current program but does not save them after the finish of the program.

ESC - cancels all changes.

RUN

- starts the chosen program when the indicator of the button flashes in green;
- permits the change of the chosen parameter value in a programming mode.

STOP

- stops the program at any moment;
- stops the movement of the table at any position;
- cancels all changes of the chosen parameter in a programming mode;
- recovers the normal working mode of the furnace after error.

- closes manually the furnace. The button can increase/decrease the chosen parameter value with 100 by pressing it while turning the multi functional rotary knob.

- opens manually the furnace . The button can increase/decrease the chosen parameter value with 10 by pressing it while turning the multi functional rotary knob.

MFRK - Multi Functional Rotary Knob. It is used for choosing of programs or parameters and set the values.

DESCRIPTION OF INDICATION

This furnace has 2 LINE VFD display.

The LINE 1 shows following information:

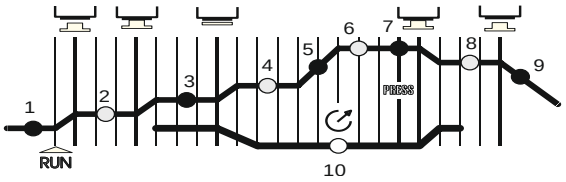
PROGRAM sector shows the number of the chosen program for execution or the program for entering of parameters.

H:MM:SS sector shows the time left till the end of the executed program.

mbar sector shows vacuum value in the closed chamber.

°C sector shows the current temperature value in the firing chamber.

MODE sector is on the second line
On the LEFT you can see information about current stage and on the RIGHT it shows the name of current program.



Indicator 1: the furnace is in the phase when the temperature increases until it reaches the value at which the drying procedure starts.

Indicator 2: the furnace is in the phase of first drying.

Indicator 3: the furnace is in the phase of second drying.

Indicator 4: the furnace is in the phase of first firing.

Indicator 5: the furnace is in the phase when the temperature increases to the value for second firing.

Indicator 6: the furnace is in the phase of second firing.

Indicator 7: the furnace is in the phase of pressing.

Indicator 8: the furnace is in the phase of first cooling.

Indicator 9: the furnace is in the phase of second cooling.

Indicator 10: the vacuum pump is switched on.

PARAMETERS AND PROGRAMMING

In order to change the value of a parameter it is necessary to do the following steps:

- With the multi functional rotary knob chose the program which parameters you want to change;
- Press button PROG. Indicator of the button RUN begins to blink green/red and you can see on the display:

  Pxx : VIEW DATA
  ENTRY TEMP xxxx
- This is the first parameter. Turn left/right the MFRK in order to chose the parameter you want to change;
- Press button RUN in order to chose the value of the parameter you want to change. If you have chosen the first parameter you would see on the display:

  Pxx : EDIT DATA
  ENTRY TEMP xxxx
- Indicator of the button RUN turns off and the red indicator on the button STOP begins to blink.
- Turn the MFRK to change the parameter value.
- Press button STOP in order to leave the programming of the current parameter. Indicator of the button RUN begins to blink again in green/red which means that it is possible to program next parameter.

Some of the parameters can be skipped. This can be done by pressing button SKIP. In this way is skipped not only the given parameter but also the whole phase. The parameters that can be skipped are described later in the text.

There are three possible ways of leaving the programming mode after you have finished with the changes in the parameters' value:

FIRST EXIT: press button ESC. This will CANCEL all the changes that are made in the parameters' value in the program.

SECOND EXIT: press button ENTER. This will save the changes that are made in the parameters' value ONLY FOR THE TIME OF EXECUTION OF THE PROGRAM. After the end of the program all the changes are canceled.

THIRD EXIT: press button PROG. This will SAVE all the changes that are made in the parameters' value permanent.

The indicator of button RUN will flash in green in working mode if the temperature defined by the parameter IDLE TEMP is reached and if the temperature is not reached it will flash in red.

DESCRIPTION OF PARAMETERS IN ORDER OF THEIR APPEARANCE

IDLE TEMP	the temperature in IDLE mode. This is the temperature which the furnace keeps in STOP mode when the muffle is closed. Its value is from 150°C to 600°C but it can't exceed (ENTRY TEMP-20)°C. If the muffle is opened the temperature inside is 150°C.
PREDRY TIME	during this time the table stays in lower end position when the temperature in the chamber is equal to DRYTEMP. It can be changed from 0 s to 1 h.
ENTRY TEMP	starting temperature. This is the temperature which must be reached in the furnace firing chamber before the table starts moving upward after the start of the program. Its value is from 325°C to 750°C.
DRY1 TIME	the time for moving the table from lower end position to the medium position which is about 1,5cm from the upper end position of the table. It can be changed from 0s to 1h.
DRY2 RATE	increase rate of the temperature at a medium position of the table. Its value is from 30°C /min to 200°C /min. *This parameter can be skipped*.
DRY2 TEMP	drying temperature at a medium position of the table. Its value is from the value of parameter ENTRY TEMP °C to the value of parameter (FIRE1 TEMP – 20)°C. *This parameter can be skipped*.
DRY2 TIME	time for maintaining of the drying temperature at a medium position of the table. It can be changed from 0 s to1 h. *This parameter can be skipped*.
FIRE1 RATE	increase rate of the temperature for first firing. Its value is from 30°C /min to 200°C /min. *This parameter can be skipped*.
FIRE1 TEMP	the temperature for the first firing. Its value is from the value of parameter (DRY2 TEMP + 20)°C to the value of parameter (FIRE2 TEMP – 20)°C. This parameter can be skipped.
FIRE1 TIME	time for maintaining the firing temperature FIRE1 TEMP. It can be changed from 0s to 1h. *This parameter can be skipped*.
FIRE2 RATE	increase rate of the temperature for second firing. Its value is from 30°C /min to 200°C /min.
FIRE2 TEMP	temperature for the second firing. Its value is from the value of parameter (FIRE1 TEMP + 20)°C to 1200°C.
FIRE2 TIME	time for maintaining the temperature FIRE2 TEMP. It can be changed from 0s to 1h.
PRESS TIME	time for pressing. It can be changed from 0s to 1h. *This parameter can be skipped*.

PRESS RATE pressing force. Its value is from 20kg to 22kg. This parameter can be skipped.

STOP SPEED this parameter is used for assessment when the extrusion is finished. Sets the minimum plunger sink speed. The dimension is [µm/min]. When the speed drops below the set value it is considered that pressing is completed.
Then the following sign appears

PRESS STOP
TOTAL PRESS TIME: XX

accompanied by a sound. This way the furnace prompts how much time it had been needed for the pressing process. The program finishes by pressing the **STOP** button.
If it is set STOP SPEED=0, the time for pressing is determined by the value set in PRESS TIME.

COOL1 TEMP cooling temperature at a medium position of the table. Its value is from the value of the parameter (FIRE2 TEMP – 20)°C to the value of the parameter (ENTRY TEMP + 20)°C. *This parameter can be skipped*.

COOL1 TIME time for maintaining the cooling temperature fixed by the parameter COOL1 TEMP. It can be changed from 0s to 1h. *This parameter can be skipped*.

COOL2 TIME time for opening the furnace to the lower end position which starts after the time COOL1 TIME. It can be changed from 0s to 1h.

VRUN TEMP temperature which defines the start of the time saved in the parameter VRUN TIME. Its value is from 0°C to 1250°C. If its value exceeds the value of the parameter FIRE2 TIME, vacuum will never start. *This parameter can be skipped*.

VRUN TIME time which defines the start of the vacuum. It starts after the firing chamber temperature reaches the value of the parameter VRUN TEMP. It can be changed from 0s to 1h. *This parameter can be skipped*.

VSTOP TEMP temperature which defines the start of the time VSTOP TIME. Its value is from 0°C to 1250°C. If its value exceeds the value of the parameter FIRE2 TIME, vacuum will never start. *This parameter can be skipped*.

VSTOP TIME time which defines the stop of the vacuum. It starts after the firing chamber temperature reaches the value of the parameter VSTOP TEMP. It can be changed from 0s to 1h. *This parameter can be skipped*.

VAC LEVEL level of the vacuum. You can set values between 100mBar and 970mBar. It will be written "max" on the display when the furnace is in program mode. When the furnace performs a program the maximum vacuum is held up inside the muffle. *This parameter can be skipped.*

PROGRAM NAME

In this parameter you can set a name for the current program. Choose the position for desired letter by using buttons and . Then choose the letter using MFRK.
Values of the parameters FIRE2 RATE, FIRE2 TEMP и FIRE2 TIME can be changed during the execution of the program. This can be done with the buttons PROG, SKIP and ENTER and with the turning of the multifunctional knob.

If you press the button PROG during the execution of a program the value of the parameter FIRE2 RATE will blink on the display and with MFRK will be able to change the programmed value.

Button SKIP changes parameter FIRE2 TEMP, and button ENTER changes parameter FIRE2 TIME.

ATTENTION!

When programming the temperature conditions for parameters ENTRY TEMP, DRY2 TEMP, FIRE1 TEMP, FIRE2 TEMP and COOL1 TEMP the program temperature cannot be lower than this of the previous parameter and at the same time higher than this of the next parameter.

Please consider that the data which you initiated in the skipped temperature-concerned parameters (by manipulating with button SKIP) exert influence on the programming of the adjacent temperature parameters.

The difference between the values of the parameters ENTRY TEMP and DRY2 TEMP can't be lower than 20°C! For instance supposing that the defined value of the parameter ENTRY TEMP is 500°C, then the value of the parameter DRY2 TEMP can be 520°C or more.

There is a possibility for fast changing of parameters which have TEMPERATURE and TIME dimensions. When you push the ⏃ button and rotate the **MFRK** the value will change by 100 points, and by pushing ⏃ and rotate the **MFRK** the value will change by 10 points.

6. ERRORS AND CORRECTIVE ACTIONS

General errors

1 - Missing signal "mains zero", entry 0

2 - Missing signal "mains zero", entry 1

3 - Mains frequency is not 50Hz or 60Hz.

Errors concerning the heating

15 - During running of a program: when the temperature is increasing the needed rate of increasing cannot be achieved.

19 - The required temperature is not reached for the selected time.

20 - The required temperature can not be reached during cooling.

21 - The selected temperature can not be reached during heating.

22 - Temperature is higher than 1200°C.

23 - Temperature is lower than 5°C.

99 - Interrupted thermo sensor or the temperature is higher than 1285°C.

Errors concerning the movement of the table

53, 54 - The drying position sensor of the working table is not reached for a required time during drying phase.

83, 85, 93 - The drying position sensor of the working table is not reached for a required time during opening phase.

84, 95 - The upper position sensor of the table (closing state) is not reached for the required time.

78, 86, 92, 94, 96 - The lower position sensor of the table is not reached for the required time during opening phase.

76 - The time for opening is over during the program controlled mode.

90 - The upper position sensor of the table is not reached for a long time in the MANUAL mode of closing.

91 - The lower position sensor of the table is not reached for a long time in the MANUAL mode of closing.

Errors concerning the vacuum

28 - The selected vacuum is not reached for the required time.

39 - The level of vacuum is too low during the pressing phase;

50 - There residual vacuum exists during the initial power on of the furnace.

51 - After releasing the vacuum, for the required time the vacuum is not released entirely.

75 - The vacuum can not be released in programming mode.

Errors concerning the pressing

47 - There is a big difference between stored and current initial value of the sensor, used for measuring the pressing force;

62 - The plunger has not reached the upper end position sensor for a number of steps of the stepper motor (58000) when the plunger has lifted up .

63 - The object has not been reached for a certain time (25 sec) at the beginning of pressing.

64 - The pressed ring is bad and will crack during the pressing process;

87 - Tthe lower end position sensor is reached during the pressing.

Errors concerning RS232 interface to the PC

40 - A non-number-type symbol has appeared during receiving.

41, 42 - A symbol is received which is not = or ~ during receiving.

160 - Received number for the minutes is greater than 59 during receiving.

161 - Received number for the seconds is greater than 59 during receiving.

30; 31 - Timeout during receiving of programs

120 - ENTRYTEMP < IDLETEMP + 25

121 - ENTRYTEMP > 750
122 - ENTRYTEMP < DRY2TEMP-20
123 - DRY2RATE < 30 or DRY2RATE > 200
124 - FIRE1RATE < 30 or FIRE1RATE > 200
125 - FIRE2RATE < 30 or FIRE2RATE > 200
126 - DRY2TEMP > FIRE1TEMP-20
127 - FIRE1TEMP > FIRE2TEMP-20
128 - FIRE2TEMP > 1200
129 - COOL1TEMP < ENTRYTEMP+20
130 - COOL1TEMP > FIRE2TEMP-20
131 - VRUNTEMP > 1250
132 - VSTOPTEMP > 1250
133 - VACLEVEL > 971
134 - VACLEVEL < 100
135 - PR_RATE < 20 or PR_RATE > 30
136 - FIRE1TEMP < DRY2TEMP+20
137 - FIRE2TEMP < FIRE1TEMP+20
145 - PR_RATE < 20 or PR_RATE > 22
146 - 150 > IDLETEMP > ENTRYTEMP-20
156 - PRESSSTOPTIME > 999

CAUTION!

When any error appears, it is written on the display and the furnace beeps. The button STOP has to be pressed in order to exit from this state.

7. IMPORTANT PRACTICAL INFORMATION

1. Avoid positioning of furnace and pump in the immediate vicinity of heat sources (radiators).

2. Install the vacuum pump in a well-ventilated locations. Ensure that the apertures in the frame plate are free and that no foreign object can fall into the furnace base.

3. Avoid placing any objects on the frame plate, place only on the face cooling plate.

4. Ensure that the sealing ring in the furnace head and the sealing rim of the furnace base are kept clean and undamaged.

5. Always keep the firing chamber closed between firings.

6. It is strongly recommended to use porous ceramic tray (on request - № 81022).

WARNING! For the proper work of the furnace it is necessary to hold the furnace in stand-by mode for at least 0.5 hours. After switching on the furnace close the dome and wait 0.5 hours.

7. If the power supply is interrupted during the working process and:

7.1. If the temperature in the chamber has not decreased by more than 15 degrees, the current program will continue from the stage at which it has been stopped.

7.2. If the temperature in the chamber has decreased by more than 15 degrees, the following message will appear on the display:

LONG TIME POWER OFF

In this case the program cannot continue. You have to press the button STOP in order to exit this state.

The total number of the programs is 100 - with numbers from 0 to 99. Programs from №1 to №20 have parameters for ceramic NORITAKE. The manufacturer has entered equivalent parameters in all other programs.

Every program could be intended for press ceramic or for ordinary ceramic. It depends on if parameters PRESS TIME and PRESS RATE are skipped or not. If these parameters are skipped, the particularly chosen program is intended for ordinary ceramic. If they are not skipped, this program is for press ceramic.

The table of the furnace must be in the upper end position before it starts to execute program with a pressing. The table of the furnace must be in the lower end position before it starts to execute program without pressing.

The vacuum pump works all the time during execution of press programs. In this case the values recorded in vacuum parameters are not taken into account.

It is responsibility of the customer to enter the data for the ceramic that he uses before to start working.

8. EXCHANGE OF DATA AND PROGRAMS BETWEEN THE Ceramic Master PRESS FURNACE AND PC

Transfer of programs from PC to the Ceramic Master PRESS furnace.

Switch off the furnace. Keep the buttons **RUN** and **STOP** pressed simultaneously and switch on the power supply.

Wait for the following to appear:

STOP SOUND: YES (N0)

Press **ESC** button. The display will show:

CRASH TEMP LIMIT
040

Press **STOP** button.

Following question will appear:

Load data from PC?

The furnace prompts to enter data from the PC to the furnace. If no entering of data is needed then press the **ESC** button. If entering of data is needed then start the program ***Teraterm Pro*** on the PC.

Go to menu *SETUP/Serial Port* in this program and perform following settings:

Com x	**- Serial port number**
Baud Rate	**- 9600**
Data	**- 8 bit**
Parity	**- none**
Stop	**- 1 bit**
Flow Control	**- none**
Transmit Delay	**- 0ms 100ms**

Enter the menu *File/Send File* and perform following settings:

Options - select binary

Enter the file name where the programs are to be loaded from.

Press the **PROG** button of the furnace.

Select the function Open from the PC.

A message on the furnace display will appear:

RECEIVING
Programs – xx

This means that the programs are being loaded currently.

After finishing following question will appear on the display of the furnace:

Send programs to PC?

Push the **ESC** button .

Following question on the furnace display will appear:

Send log file to PC?

Press the **ESC** button.

Transfer of programs from the Ceramic Master PRESS to PC.

Switch off the furnace. Keep the buttons **RUN** and **STOP** pressed simultaneously and switch on the power supply.

Wait for the following to appear:

ait to appear message:

STOP SOUND: YES (N0)

Press **ESC** button. The display will show:

CRASH TEMP LIMIT
040

Press **STOP** button.

Following question will appear:

Load data from PC?

Press the ESC button and this question will appear on the furnace display:

Send programs to PC?

The furnace prompts to output the data from the furnace to the PC. If this is not needed, press the **ESC** button. When you wish to start transfer of data from the furnace to the PC start the program Teraterm Pro.

Open the menu *SETUP/Serial Port* and perform following settings:

Com x	**-**	**Serial port number**
Baud Rate	**-**	**9600**
Data	**-**	**8 bit**
Parity	**-**	**none**
Stop	**-**	**1 bit**
Flow Control	**-**	**none**
Transmit Delay	**-**	**0ms 100ms**

Go to the menu *File/Log* and perform following settings:

Options	**-**	**select binary**

Enter the file name where the programs are to be saved and select function Open.

Press the **PROG** button of the furnace.

After the end of the operation following question will appear on thefurnace display.

Send log file to PC?

Push the **ESC** button.

Close the file with the programs of the computer. This is done by going to the Teraterm Log window and pushing the **STOP** button.

Transfer of a LOG file from the Ceramic Master PRESS furnace to PC.

Switch off the furnace. Keep the buttons **RUN** and **STOP** pressed simultaneously and switch on the power supply.

Wait for the following to appear:

STOP SOUND: YES (N0)

Press **ESC** button. The display will show:

CRASH TEMP LIMIT
040

Press **STOP** button.

Following question will appear:

Load data from PC?

Press the **ESC** button and this question will appear on the furnace display:

Send programs to PC?

Press the **ESC** button and following question will appear on the furnace display:

Send log file to PC?

From the PC start the program Teraterm Pro.
Enter the SETUP/Serial Port menu and perform following settings:

Com x	**-**	**Serial port number**	
Baud Rate	**-**	**9600**	
Data	**-**	**8 bit**	
Parity	**-**	**none**	
Stop	**-**	**1 bit**	
Flow Control	**-**	**none**	
Transmit Delay	**-**	**0ms**	**100ms**

Go to the menu *File/Log* and perform following settings:

Options	**-**	**binary**

Enter the file name where the coded data from the furnace to be saved and select Open.

Press the **PROG** button of the furnace.

After the end of the process you can continue to work with the furnace.

Close the log file in the PC by going to the *Teraterm Log* window and pressing the CLOSE button.

Reloading of the control program (flash)

Form the PC start the program Teraterm Pro.

Go to the menu *Setup/Serial Port* and perform following settings:

Com x	**-**	**Serial port number**
Baud Rate	**-**	**9600**
Data	**-**	**8 bit**
Parity	**-**	**none**
Stop	**-**	**1 bit**
Flow Control	**-**	**none**
Transmit Delay	**-**	**0ms 100ms**

When the furnace is switched off push and hold the **MPRK** and switch on the furnace.
In the window of Teraterm Pro a message will appear:

VOP Co.
Press Space 1 – Here the program will count down 10 sec.

If within 10 seconds the SPACE bar (of the PC) is not pressed, the furnace will exit from the procedure. However, if the SPACE bar is pressed within 10 sec. then the internal program of the furnace will be deleted and the furnace will wait to load the new program, which is in HEX format file.

This is done in the following way:

In the program Teraterm Pro go to the menu *File/Send File* menu and perform following settings:

Options - select binary

Select the file containing the new program and press the Open button.

After finishing the data transfer the furnace will start automatically with the new control program.

9. TECHNICAL DATA

1. Electrical supply	~230 V, ±10%, 50Hz
2. Power consumption	
2.1. Furnace with vacuum pump	1700 W
2.2. Furnace without vacuum pump	1550 W
3. Category of overtension	II
4. Vacuum pump data	
4.1. Suction capacity	22 l/min
4.2. Regulated vacuum level	от 0.1 до 0.9 bar
5. Maximal firing temperature	1200°C
6. Effective firing chamber dimensions	Ф 95 мм; h 46 мм
7. Overall dimensions of closed furnace:	
7.1. Width	370 мм
7.2. Length	380 мм
7.3. Height	740 мм
8. Model Weight	26 кg
9. Number of programs	100
10. Working temperature	5°C - 40°C
11. Level of environment pollution	2

12. The device is designed for usage in normal dental premises up to 2000 m altitude above sea level.

13. The maximum relative humidity of the air must be 80% for temperatures up to 31°C, decreasing lineally to 50% relative humidity for temperature 40°C.

14. Working modes

14.1. Programming mode

Programming of the parameters is fully described in chapter 7. PROGRAMMING.

14.2. Working mode

It shows the number of the executed program and the parameters' value of the ongoing program phase.

The values of all parameters could be seen if you use the Multi Functional Rotary Knob **MFRK**.

10. MAINTENANCE

Clean only with a dry or slightly moist cloth (no solvents!).

Change the safety locks with the announced valus only, namely:

1.25A, slow (class T).
8A, slow (class T).

No repair activity by a service technician who is not authorized by the manufacturer is allowed!

The lifting and carrying should be made only with the both hands from below as the furnace stands on end.

No carrying and transportation in another state except for vertical position is allowed!

11. AUTOCALIBRATION

The furnace is optionally provided with a kit for autocalibration, which is a ceramic table fitted with special holders. A wire of pure silver 9999 is attached on them. These holders are connected by wires to the other side of which a special connector is mounted.
The auto calibration kit is put in place on the tray. The connector is plugged in the socket labeled ACAL. This socket is located at the rear side of the furnace.
After plugging on the upper left corner of the display the sign * appears.
Start any program. After about 2 hours the program ends.
If during the execution of the program there was a problem and the silver wire is disconnected, when calculating coefficient was outside the normal range, the display shows:

Err: Bad value = KKKKK
TTTTT RRR AAAAA,

Where

KKKKK is the wanted coefficient
TTTT.T is the temperature at break
RR.R is the ambient temperature
AAAAA is the value measured by ADC

(the normal range of the coefficient is between 10000 and 12000)

If during the execution of the program there was no problem and autocalibration has proceeded normally, the display shows:

Old = OOOOO New = KKKKK
TTTTT RRR AAAAA,

Where

OOOOO is the old coefficient
KKKKK is the new coefficient
TTTT.T is the temperature at break
RR.R is the ambient temperature

AAAAA is the value measured by ADC

The furnace beeps at the end of the program.

Perform the following actions:

Take out the plug from the socket ACAL;

Remove the auto calibration kit;

Place the working ceramic tray again.

Press the STOP button;

Once you press the STOP button, the furnace is restarted and is ready for operation.

ATTENTION: ***This accessory is sold separately.***

12. ANTI-CRACKING SYSTEM

Before the melting of pressing material, a certain force is applied on the ring and precisely evaluate deformations occurred. The evaluation is obtained as an evaluation coefficient K, which takes values between 5 and 100.

Lower value of this factor leads to a low probability to crack of the ring.

When this coefficient is smaller than 10, the probability of cracking is less than 2%.

The research shows that the best screening of the rings which are most likely to brake is when K = 40.

This factor can be adjusted by the user. The change is made in the following way:

Switch off the furnace. Keep the buttons **RUN** and **STOP** pressed simultaneously and switch on the power supply.

Wait for the following to appear:

STOP SOUND: YES (N0)

Press **ESC** button. The display will show:

CRASH TEMP LIMIT
040

The coefficient is adjusted by rotating of **MPK**. It is stored by pressing **PROG** button.

The smaller value of this coefficient means that more rings could be determined as likely to break. So a suitable ring might be refused.

This anti-cracking system can be stopped if the coefficient is set to show

CRASH TEST DISABLE

This sign appears when K>100.

ATTENTION:

This protection significantly increases the probability of achieving good results, but since the cracking of the rings depends on many factors, 100% success is not achieved.

The results of our researches have shown that for the effective pressing it is enough rings to be made according to prescribed technology.

Properly crafted ring has very high strength, greatly exceeding the pressing force.

In 99.9% of cases for cracking of the rings the cause is poor manufacture.

13. DELIVERY SCOPE

Furnace CERAMICMASTER PRESS	1 pc.
Vacuum pump PVD-M22	1 pc.
Power cable	1 pc.
Flexible tube for the vacuum	1 pc.
Spare fuses	
1.25A/250V	1 pc.
8A/250V	2 pc.
User Manual	

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Ceramic Master PRESS

WARRANTY SHEET

"VOP" Ltd. warrants the consumer for proper operation of all parts and materials in this product during a period of **12 months** since the day of its purchase.

During this period VOP Ltd. or its authorized persons will repair on its own account all defects which have occur during the normal operation of the machine.

Defects caused by improper transportation, storage and manipulation of the product or due to malfunction of the electrical mains supply are repaired on the account of the customer.

This warranty shall become void if attempts are made to repair the product by persons not authorized by the producer.

Serial Number _____

Invoice number _____

Date _____

MANAGER of "VOP" Ltd

_____ _____

CLIENT:

Serial Number _____

Invoice number _____

Date _____

Voucher Manufacturer