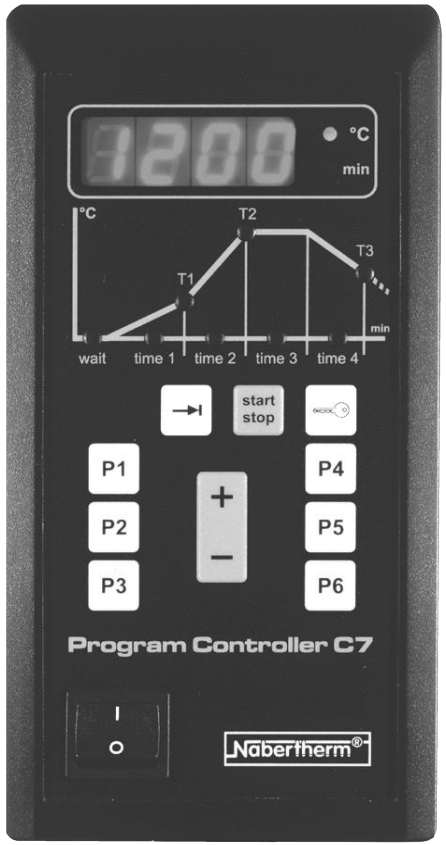
Nabertherm
MORE THAN HEAT 30-3000 °C

Operating instructions

Controller C 7 / S 7

Read the operating manual before commissioning the furnace.



Reg.-Nr. B 2.28 (englisch), February 2000

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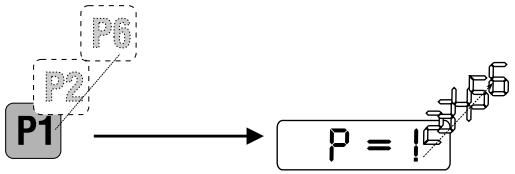
Angaben ohne Gewähr, Irrtümer und Änderungen vorbehalten

Short instructions

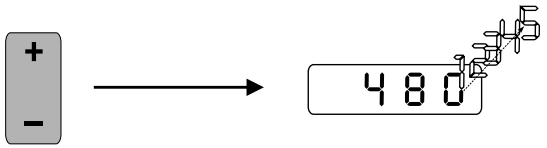
Switch on controller

Call up program number

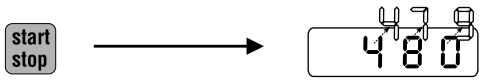


Select start delay time

Enter start delay time in min



Start program



Notes:

Technical Data

Tmax.	Set at works according to type of kiln
Measurement input:	Type S
Overvoltage category:	class II
Environmental conditionen:	Temperature: 5 °C - 40 °C in compliance with EN 60204, part 1 Humidity: 30% - 95%
Cleaning:	**Switch unit off load,** clean with damp cloth
Protection class:	C 7: protection class2 / totally insulated ⧈ S 7: protection class 1 / PE terminal ⏚
In the event of a power failure:	During the start delay time (**wait**) at <4sec: • remaining time is processed During the start delay time (**wait**) at> 4sec: • program is aborted During the heating-up time to **T1** and **T2** resp. cooling time to **T3** • the program is continued During dwell time **time3**: • the program is aborted

Rating data

Type	C 7 / S 7
Relais outputs:	C 7: 230 V - 6A (floating) S 7: 230 V - 16A
Supplay voltage:	230 V - 50/60 Hz, 3 VA
Fusing:	C 7: 32 mAT S 7: 40 mAT

Nabertherm
MORE THAN HEAT 30-3000 °C

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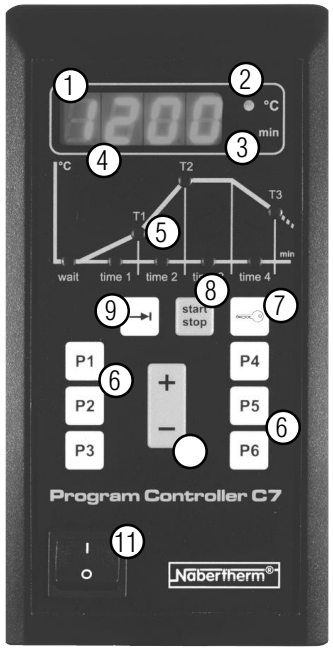
Control panel



1 Display with time and temperature indication

2 LED **„°C"**

3 LED **„min"**

4 Display-LEDs

5 LEDs **„Program status"**

6 Program keys 1 - 6

7 Locking key

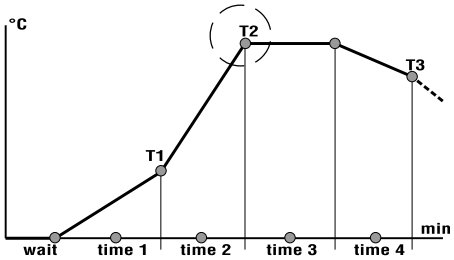
8 Key **„start/stop"**

9 Key **„continue"**

10 Cursor keys for altering program values

11 Rocker switch on / off

Features



The Controller C 7 (more than 3.6 kW) or S 7 (up to 3.6kW) is an electronic temperature controller which permits the precise control of your firing processses.
The controller features:

- a variable start delay time (time until start of kiln)
- six factory-stored programs with various temperature curves for bisk and glaze firing which you can alter and store individually
- two storeable heating up ramps and each one storeable dwell time and cooling ramp
- integrated LEDs which always indicate the actual program status

Safety

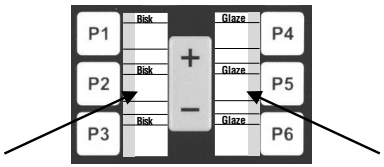
The controller is equipped with a number of electronic safety features. In the event of malfunction, the furnace switches off and a fault indication appears on the display.

For more details see **„Fault indications“**.

Firing curves

Prog		time1 [min]	T1* [°C]	time2 [min]	T2* [°C]	time3 [min]	time4 [min]	T3 [°C]
Schrühbrand	1	360	650	0	900	20	0	0
	2	240	650	0	900	20	0	0
	3	300	650	0	1100	30	0	0
Glasurbrand	4	180	500	0	1050	20	0	0
	5	120	320	0	1050	20	0	0
	6	180	500	0	1200	20	0	0

* With those kiln versions designed for a lower firing temperature, T1 and T2 are limited to this value.



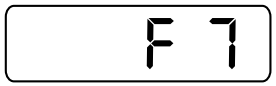
Programs **1-3** are typical firing curves for bisk firing. The particular thing here is the long linear heating-up time to 650 °C (**T1**), which facilitates the expulsion of chemically bonded water in the charge.

Programs **4-6** are usually used for glaze firing.

However, to achieve the best possible results always observe the firing curves recommended by the clay and glaze manufacturers.

For easy working with different temperature curves you can find various stickers inside this operating instructions. Just stick the respective sticker in a suitable position on the controller (look left) and enter your special information on it.

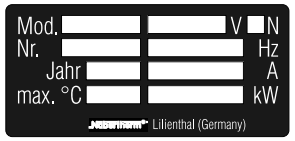
Attention:
When this fault indication appears, switch off the controller for a moment and then switch it on again. In most cases this will rectify the fault and the program will continue automatically.



Fault indication **F7** appears when the actual temperature is 30 °C higher than the maximum operating temperture (from version 12/97 onwards: 50 °C). This fault indication is triggered only when the furnace temperature has exceeded 700 °C.
Possible cause:

- Contactor defect

If it is not possible to eliminate the fault, please contact your customer service or call Nabertherm direct.



Rating plate kiln

To deal with the problem as fast as possible the following is always required:

- Fault indication shown on display
- Rating plate data (kiln and controller)

Typ	C 7	
	Type S	
	230 VAC	6 A
	230 VAC	3 VA
	32 mAT	50/60 Hz
F-Nr.	C 7 00 00000	CE

Rating plate Program Controller

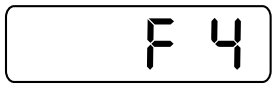
Fault indications

In the event of controller malfunction, the kiln switches off automatically and a fault indication appears on the display. This fault indication often facilitates the tracing and elimination of the fault.

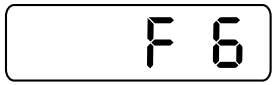
The following fault indications on the display may indicate a malfunction:

Fault indication **F1** (from version 12/97 onwards) appears when the kiln heats up too slowly or not at all (<4°C/h).
Possible cause:
- A fuse is defect
- A heating element is defect
- Earth Leakage Breaker (if installed) has triggered

Fault indication **F3** appears when a fault in the temperature measuring circuit occurs.
Possible cause:
- Thermocouple is defect
- Equalizing cable to thermocouple is defect



Fault indication **F4** appears when the thermocouple has been wrongly connected.
Possible cause:
- Thermocouple polarity is reversed (+,-)



Fault indication **F6** appears when a system fault in the controller occurs.
Possible cause:
- The controller is defect
- Extreme power system disturbance

Program segments

The segments of a program have the following meaning:

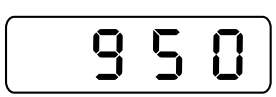
- **wait**
  denotes the start delay time in **min**, which permits a delayed start of a program. The start delay time is only stored for the actual time before every firing cycle. This means that, if required, you have to set a new start delay time before every firing cycle.

- **time1**
  denotes the time in **min** required to reach temperature **T1**. This heating-up time is the so-called **low-power heating phase** in which chemically-bonded water is removed from the carge. Maximum heating-up time is **5000** min.

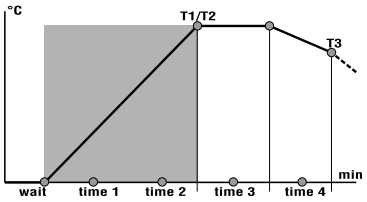
- **T1**
  denotes the temperature in **°C** from which heating-up to firing temperature **T2** is carried out at full power.

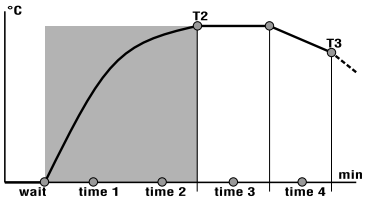
- **time2**
  denotes the time in **min** in which the kiln is heated up at full power **(full-power heating phase)** to reach the set firing temperature **T2**.

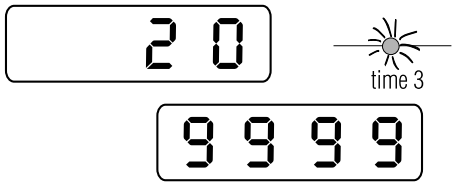
  The heating-up time can be defined as well like **time1**.

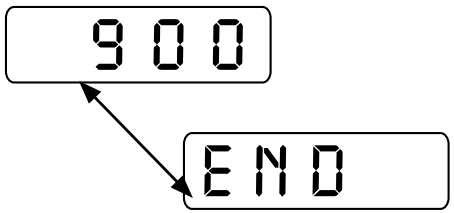


- **T2**
  denotes the firing temperature in **°C** which is reached in the **full-power heating phase.**









Tip:

- If you wish to heat up linearly to firing temperature **T2**, enter the same values for temperatures **T1** and **T2** and for **time2="0"**.

- If you want to reach firing temperature in the shortest possible time, enter the value **"0"** for **temperature T1, time1** and **time2.**

- **time3**
  defines the dwell time in **min** during which the firing temperature **T2** shall be maintained. If you require an unlimited dwell time enter „**9999**".

- **time4**
  defines the time for slow cooling down in **min**, which the kiln needs to temperature **T3**.

- **T3**
  defines the temperature in **°C**, which the kiln needs through the cooling down time.

Tip:

- We recommend to set a slow time cooling ramp if sensitive charge has to be fired and cooling cracks can be expected.

- **end**
  appears on the display alternately with the actual temperature when the dwell time **time3** or cooling ramp **time4** has expired or when a program has been stopped manually. For further details, see **„Stopping a program"** on page 11.

Locking a program

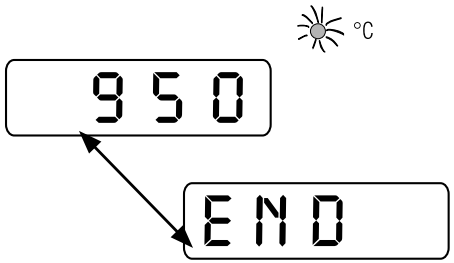
By means of the **locking key** you can lock a program which has started, to prevent unin-tentional or unauthorized interference in the firing process.

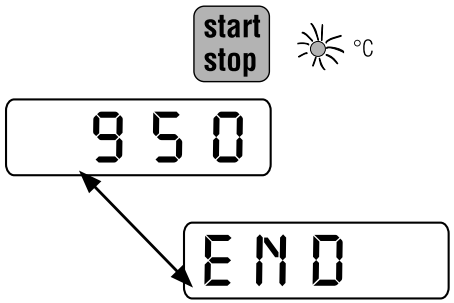
Press the key **after** you have started the program.

All keys are now deactivated, so that no unin-tentional or unauthorized operation can take place.

Locking is cancelled by switching off the program controller and switch on again.

Stopping a program





A program can be stopped **automatically** or **manually**.

When the program stops **automatically**, the program entered has been fully executed, the LED **°C** lights up and the actual temperature and the indication **„end"** appear alternately on the display.

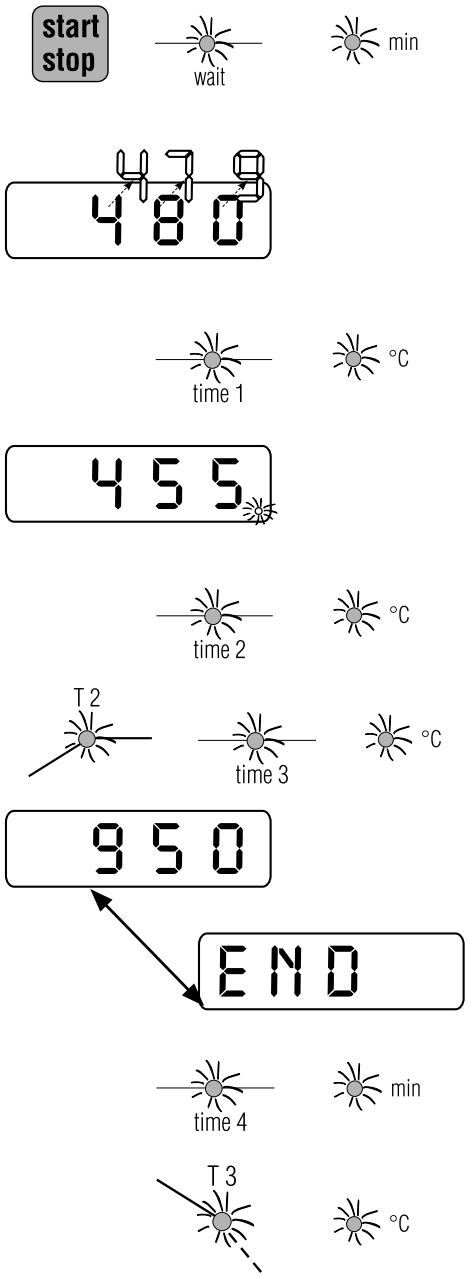
Attention:
All values entered remain saved (except start delay time).

To stop a program **manually**, press the **start/stop** key. LED **°C** lights up and the actual temperature and the indication **„end"** appear alternately on the display.

Attention:
When a program is stopped manually and restarted, all program values entered are reprocessed. Therefore, before restarting the program, please check the desired values and alter these accordingly.

See previous section for more details.

Starting a program



By pressing the **start/stop** key all values entered or altered are saved and the program automatically starts. If a start delay time has been entered the LEDs **wait** and **min** light up.

The start delay time appears on the display and runs backwards to **0**. In our example you can see a start delay time of **480 min** (=8hours). If no start delay time has been set the program starts immediately with **time1**.

As soon as the start delay time has expired (if entered) the LEDs **time1** and **°C** lights up and remain on until the set temperature **T1** has been reached.

The display LED remains on whilst the furnace heats up.

When the set temperature **T1** has been reached, the LEDs **time2** and **°C** lights up.

The LEDs **T2, time3** and **°C** lights up as soon as firing temperature **T2** has been reached.

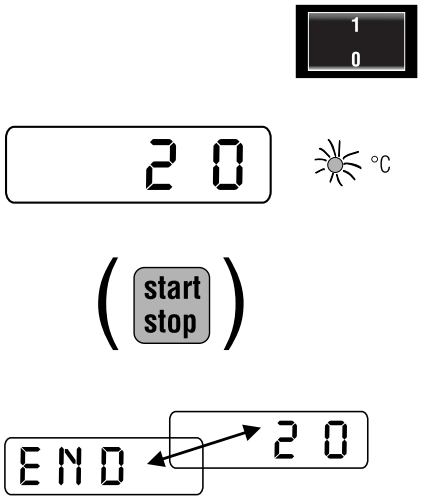
The temperature reached appears on display.

After dwell time **time3** has expired, the actual temperature and the indication **„end“** light up alternately on the display, if cooling ramp is not defined (**time 4=0, T3=0**).

If cooling ramp **time4** is defined, LEDs **time4** and **min** lights up.

If the temperature **T3** has reached, LEDs **T3** and **°C** light up.

Switching on the controller



The program controller is ready for operation when the rocker switch is switched on „**1**“.

The furnace temperature appears on the display (in case, for instance 20 °C) and the LED **°C** lights up.

Should one of the **„program status“** LEDs (see page 3, **control panel**) light up after switching on, press the **start/stop** key once, otherwise a program starts.

The indication **„end“** and the actual temperature appear alternately on the display

With the keys **P1 - P6** you can call up one of the programs stored at the factory.
For details concerning the content of these six programs, refer to the table in **„Firing Curves“** on page 4.

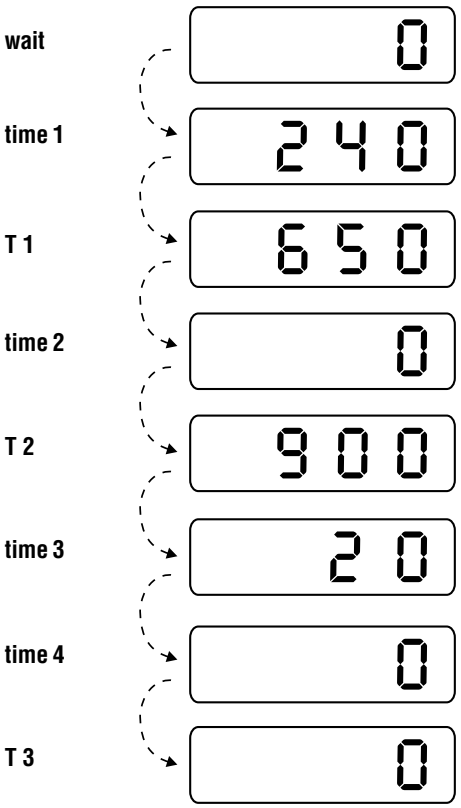
Calling up a program

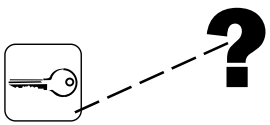
Press key **P1 - P6**; the program stored or processed last appears on the display (in this case, for instance program 1).

Tip:
If the values set at the factory do not correspond with the firing curve you require, you can alter these and store them. For more details, see **„Altering program values“** on page 9.

Attention:
If no value is entered within 10 seconds, the actual temperature appears on the display.

Checking program values





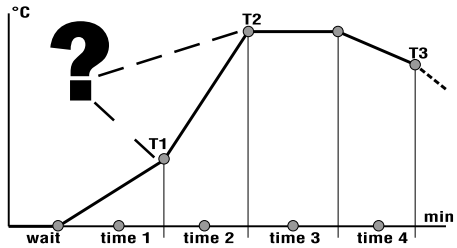
It is possible to check all values even whilst a program cycle is running. However, values can only be altered when the program has not been started yet .

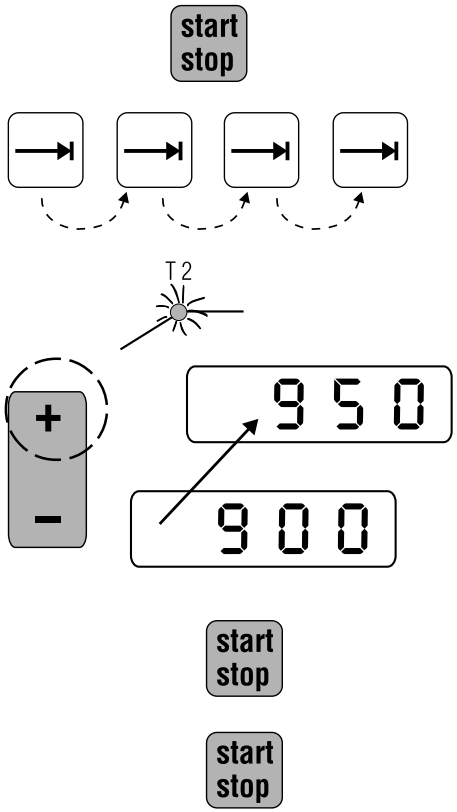
By pressing the key ⇥ you can check the program segments **wait, time1, T1**, **time2, T2, time3, time4 and T3** one after the other on the display. In this case all factory-set values of program 2 are shown.

If a running program is locked, the values cannot be checked. For details about the locking function, see **„Locking a program“** on page 11.

Attention:
If no value is entered within 10 seconds, the actual temperature appears on the display.

Altering program values





All programs can be altered individually and thus adapted to meet your particular needs.

Before carrying out any alteration, make sure that none of the **„program status“** LEDs are on.

If one of the **„program status“** LEDs is on, the program controller is processing a program.

To carry out alterations, press the **start/stop** key.

Press the key ⇥ until the LED of the program segment you wish to alter flashes.

In our example, the value for firing temperature **T2** from program **2** shall be raised from 900 °C to 950 °C. As soon as LED **T2** lights up, you can make the alteration.

Press the key + – until the value **950** is achieved.

By pressing the **start/stop** key all values entered or altered are stored and the program **automatically starts**. The factory-set values of this program are automatically overwritten.

If the program should not start yet, press the key **start/stop** again.

Attention:
If no value is entered within 10 seconds, the actual temperature appears on the display.