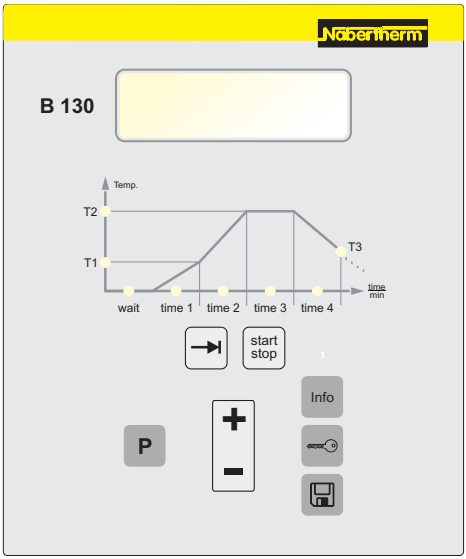
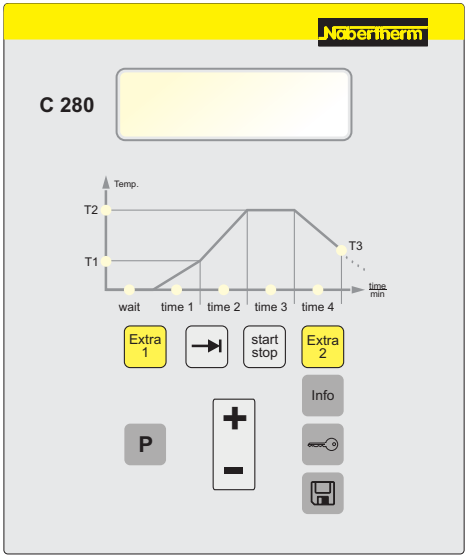
Nabertherm
MORE THAN HEAT 30-3000 °C

Operating Manual

Controller B 130/C 280 (Mb 1)

Read the operating manual before commissioning the Controller.

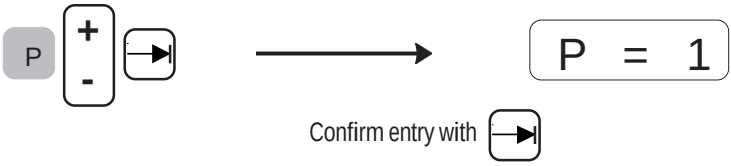




Short instructions

Switch the Controller on

Call in the program



Input program

Start the program

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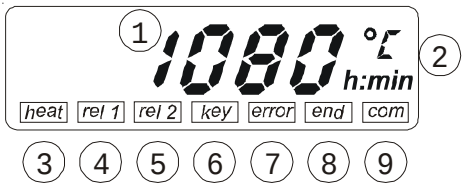
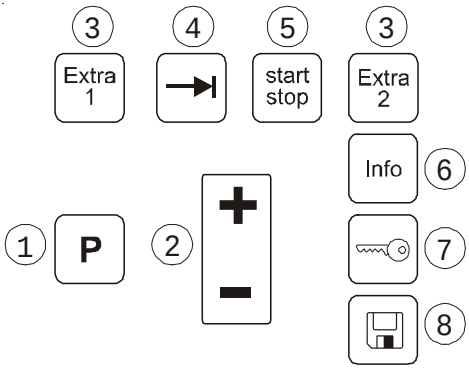
Display



1 Temperature indication
2 Display of units
3 Status field „heat“ heater ON
4 Status field „rel1“ Additional relay 1 (only C 280)
5 Status field „rel2“ additional relay 2 (only C 280)
6 Status field „key“ key locking
7 Status field „error“ error message
8 Status field „end“ program End
9 Status field „com“ communication with PC

Keyboard



1 „Program selection“
2 „+/-“
3 „Special functions“ (only C 280)
4 „Scroll“
5 „Programm Start/Stop“
6 „Info menu“
7 „Key locking“
8 „Save“

Mains switch/control current switch
The mains switch/control current switch is located under the Controller.

First terminate active heating programs, then switch off the furnace at the mains switch.

General information

Switch the mains switch to position „0“ and pull the mains plug before starting work on the electrical equipment!

Some parts in the furnace may be live even when the mains switch is switched off!

Work on the electrical equipment may only be carried out by specialists!

Features

The Controllers B 130 and C 280 are electronic temperature regulators with the following features:

	B 130	C 280
Overtemperature protection	✓	✓
Function of additional relay	-	✓
Delay time	✓	✓
Number of programs	2	9
Automatic optimization	✓	✓
Kilowatt-hour meter	✓	✓
Operating hours counter	✓	✓
RS 422 interface	optional	optional

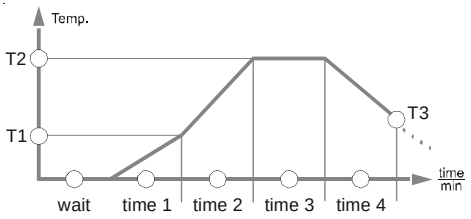
Safety

The Controller is provided with a number of electronic safety equipment. If a fault occurs, the furnace switches itself off automatically and an error message appears on the LC display. You can find more detailed information in the chapter **„Error messages“**.

Switching the Controller on

Switch mains switch to position „I“. Type and version of the Controller appear on the display. Then the Controller is ready to operate. All necessary settings for proper functioning were already made at the factory.

Input of program



Setting or changing programs/delay time
Every program has 2 ramps, one holding time and one cooling ramp.

- A linear rise in temperature (slow heating) is set in **the ramps** via a segment temperature „T“ and a segment time „time“.
- The period for which the temperature set in „T 2“ is to be maintained is defined in **holding time** „time3“. During the program run the holding time can be changed subsequently by selecting the time value „time 3“ and actuating the „➔“ key.
- The **natural cooling** of the kiln can be slowed down by setting „T3“ and „time4“. If no values are set the program will already be ended after dwell time „time 3“.

Segment	Time value	Comment
time 1+2	00:00	fast heating-up to T1 or T2
time 3	00:00	Skip segment „time 3“
time 3	99:59	execute the segment for an infinitely long period of time

- The values can be changed with the „+/-“ key. By actuating the key repeatedly, the value is changed by 1 °C (1 °F) or by one minute.

  Keep the key pressed to change the value more quickly.
  If this key is operated once
  for less than 2 seconds by 10 °C/s (°F/s), or by 10 min/s
  for less than 5 seconds by 100 °C/s (°F/s), or by 1 h/s

  Confirm the entry in **„T“** or **„time“** by actuating the „➔“ key. If this key is not pressed, the changes are discarded and the previously set value remains valid.

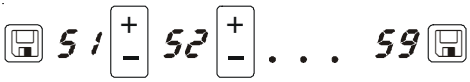
To ensure that old program values are not retrieved in a newly generated program, you should first call in the program 0.

The unit of the expected value °C/°F or h:mm is shown on the display.

Input the time in hours and minutes, e.g. enter 06:30 for six hours and 30 minutes.

Skip values that are not to be changed with „➔“. Changed settings are first of all only stored temporarily (please see also „Saving programs“).

Storing programs



After a program has been input or changed, the modified values are saved in a volatile memory.
If a program change is to be stored permanently, press the „🖫„ key and allocate a memory location to the program. When the „🖫„ key is actuated again, the program is saved definitely at the selected memory location, from which it can then be called-in.

If the storage key is not pressed a second time within 10 seconds the Controller displays again the furnace temperature. In this case the program is not stored.

Program locations that are already occupied are overwritten without further notice and can no longer be recovered.

Stored programs remain in the memory even when the system is switched off.

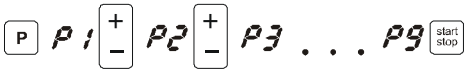
Starting the program

The following programs are preset and can be started directly:

B130	T1	time1	T2	time2	time3	time4	T3	
P 1	650	6:00	900	0:00	0:20	0:00	0	Biscuit baking
P 2	500	3:00	1050	0:00	0:20	0:00	0	Glaze baking

C 280	T1	time1	T2	time2	time3	time4	T3	
P 1	650	3:00	900	0:00	0:20	0:00	0	Biscuit baking 1
P 2	650	6:00	900	0:00	0:20	0:00	0	Biscuit baking 2
P 3	650	5:00	1100	0:00	0:30	0:00	0	Biscuit baking 3
P 4	320	2:00	1050	0:00	0:20	0:00	0	Glaze baking 1
P 5	500	3:00	1050	0:00	0:20	0:00	0	Glaze baking 2
P 6	500	3:00	1200	0:00	0:20	0:00	0	Glaze baking 3
P 7								unoccupied
P 8								unoccupied
P 9								unoccupied

For kilns with lower max. temperatures the preset programs will be adapted in accordance with the max. allowed temperature of the kiln.



Call the stored program with the **„P“** key and check the program by actuating the „➔“ button.

After input of a heating program the process can be started with **„start/stop“**. After the program has been started the diode of the respective active segment **„time1“** or **„time 2“** lights up during the program run. The set temperature profiles are automatically controlled by the Controller and the status field „heat“ starts flashing during the heating cycle.

When a delay time has been defined the diode **„wait“** lights up and the remaining delay time is counted down on the display. The status field **„heat“** flashes only when the program has been started.

Aborting the program

To abort a program press the **„start/stop“** key again. The heater is switched off and the status field **„end“** flashes.

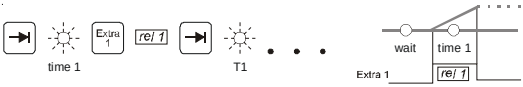
The program can be aborted at any desired time.

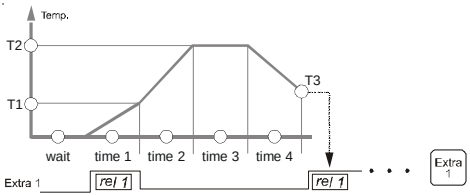
Locking of keys

To prevent unintentional or prohibited access to the program run, the keyboard can be blocked by means of the „key lock“ after the program has been started.

The key lock can only be released when the Controller is switched off and then on again (behaviour during switching off, please refer to „Power failure behaviour“)!

Programming of special functions (only C 280)





Two **optional** special functions „Extra 1“ and „Extra 2“ can be programmed dependent on the program with the Controller C 280.
While the program is input the functions can be set in any segment **„time 1 - time 4“** of all segment blocks (A-C) by pressing the corresponding „Extra“ key. If the function has been selected, the relevant status field **„REL 1“** or **„REL 2“** flashes on the display.
Press the corresponding „Extra“ key to deactivate the function again – the status field **„REL 1“** or **„REL 2“** disappears from the display.

If a function is to be activated after the program has been terminated (e.g. cooling fan), actuate the corresponding „Extra“ key when the LED „T 3“ is selected. The function remains then active until it is switched off manually with the respective „Extra“ key.

When the program is scrolled with „➔“ the defined special function of a segment is indicated by a flashing status field **„REL 1“** or **„REL 2“**.

Special functions can be activated or deactivated subsequently at any time, even during a program run, by actuating the corresponding „Extra“ key for the selected or activated segment.

Info menu

By actuating the „info“ key, the following process information can be displayed:

Pr selected program
SP temperature set value
Pt program runtime of the activated/last program in minutes
E power consumption of the activated/last program in kW/h

tt total operating hours
OP heater output in %
F1 fault memory of last error
F2 fault memory of last but one error
Ht highest program temperature of the activated/ last program
tA maximum furnace temperature

The info menu is not automatically switched over to the temperature display to prolong the time for viewing data!

Scroll the complete info menu by actuating the **„Info“** key until the furnace temperature is again displayed!
In case of a power failure all values are lost except the highest program temperature **„Ht“** and the total operating hours **„tt“**.

Data interface (optional)

The Controller B 130/C 280 can be equipped with an RS 422 data interface, that is optionally realized via a 9-pin D-Sub plug connection. This interface can be used to send and receive control functions as well as archive data. A data transmission is indicated on the display by **„com“** (communication with PC).

The interface is immediately ready for operation; e.g. for the Nabertherm furnace supervision software “Control-therm”.

To operate several Controllers/furnaces on one data network the interface address might have to be changed.

If the data connection line between the furnace and the PC/notebook is longer than 20 m, communication errors may occur if an interface power supply that is available as option is not used.

Error messages

If an error occurs one of the following error messages is displayed:

Error code	Reason
„F 10“	The furnace does not reach the set temperature

„F 30-32“	Error of thermocouple or measuring circuit
„F 40“	Thermocouple has reverse polarity (e.g. after replacement of thermocouple - change polarity)
„F 50“	Temperature or time entry incorrect (correct entry)
„F 60-61“	Controller system error
„F 62“	Ambient temperature too low < -10°C
„F 63“	Ambient temperature too high > 70°C
„F 64-69“	Controller system error
„F 70“	Furnace temperature has exceeded the permissible „Tmax“ value
„F 90“	Voltage failure (displayed after the voltage has recovered)

Error messages can be reset by switching the mains switch off and on. Leave the equipment switched off for at least 5 seconds. The heater is in any case switched off.

If the error message does not reappear within one minute after the system is switched on, the Controller is again ready for operation. If the error message reappears, inform Nabertherm service.

When contacting Nabertherm service, please have the rating plate data available.

Power failure behaviour in different segments

wait/time3/time4: the program is aborted with error message F90

time1/time2: the program is continued

Technical specifications

Supply voltage	~85-250V 50/60Hz
Power consumption	3.5W
Sensor input	type S, K, R
Heater output	12 V, max. 130 mA
Safety relay	~250 V /16 A
Additional relay (option)	~250 V /3 A
Protection class:	I (protective earth)
Enclosure rating:	membrane keypad IP 65
	attached casing IP 20
	Furnace/switchgear (see Operating Instructions of furnace)
Interface (option)	RS 422 insulated
Measuring accuracy:	+/- 3°C
Lowest possible rate:	0.25 °C/h
Ambient conditions:	
Storage temperature:	- 20°C to + 75°C
Working temperature:	0 - 40°C, ensure sufficient circulation of air
Relative humidity:	5-90% non-condensing

Trouble shooting

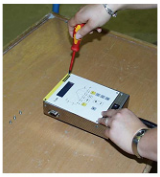
Error	Cause	Corrective action
Controller does not light up	Controller switched off	Switch mains switch to „I“
	No voltage	• Power plug plugged in? • Check house fuse
Furnace does not heat	Door/cover open	Close door/cover
	Door contact switch actuated	Check door contact switch
	„wait“ flashes	Set delay time to „00:00“
	No temperature input	Check temperatures T1/T2
Program does not change to the next segment	The holding time is infinite in „time2“ / „time4“	Set holding time < 99:59

Please contact Nabertherm service if the fault cannot be eliminated.

When contacting Nabertherm service, please have the rating plate data available.

Replacement instructions

1)



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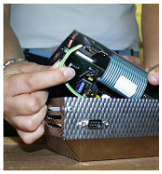


3)

4)

5)

Only a qualified electrician may carry out work on the electrical system.

Make sure that the mains switch is in position **„0“**!
Pull the mains plug before you open the housing!
If the furnace is not equipped with a mains plug, switch the mains connection voltage-free!

Removal

- Loosen the 4 fastening screws at the front side of the Controller.
- Tilt the Controller carefully out of the housing from the top
- Loosen the plug - if installed - of the flat ribbon cable for the interface
- Loosen the protective conductor connections
- Loosen both plug connectors

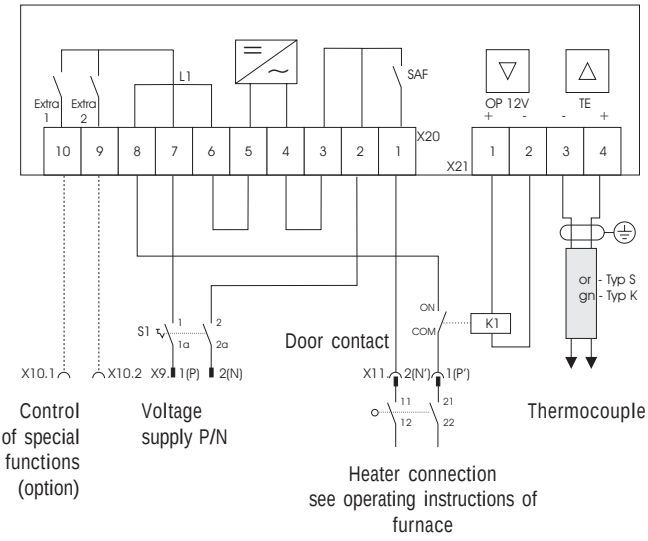
Do not pull the Controller at the cables by force out of the housing.

Insertion

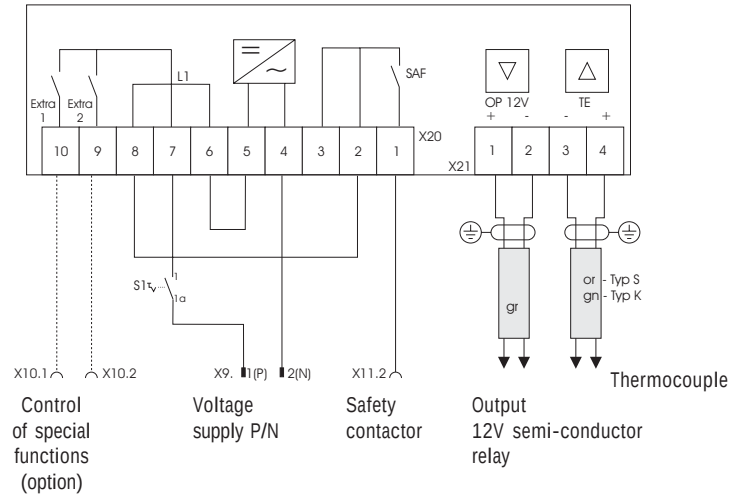
- Plug the two plug connectors on the new Controller
- Attach the protective conductor connection to the Controller
- Check the earth connection of the orange and grey measuring line
- Attach the plug of the interface line (if installed)
- Check that the protective conductor is properly connected before you install the Controller
- Position the Controller in the mounting frame
- Make sure that no cables protrude or are squeezed
- Screw in the 4 fastening screws.
  Fasten the fastening screws only finger-tight to avoid damaging the membrane keypad!
  The replacement must be carried out by a specialist!

Electrical connection

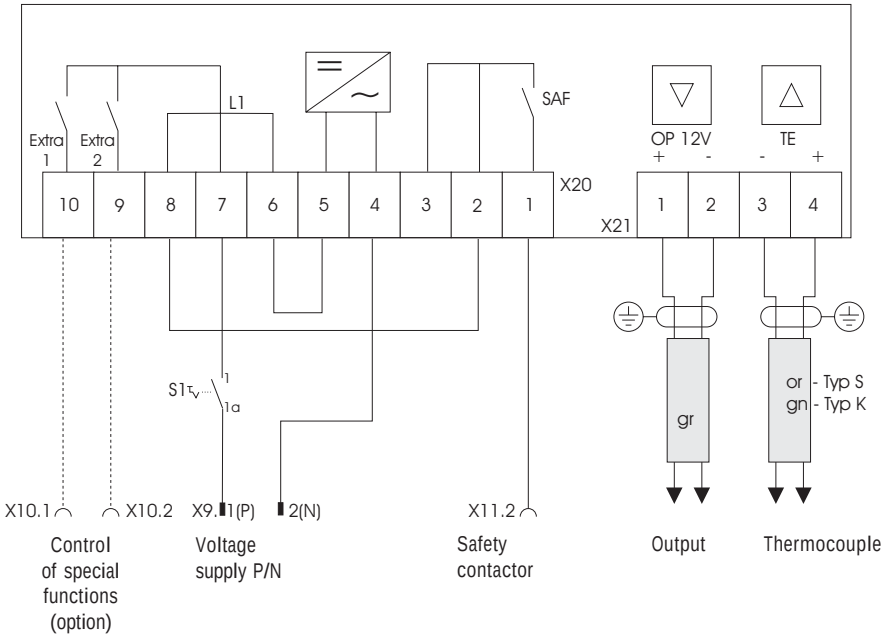
Furnaces up to 3.6kW



Furnaces > 3.6kW with semi-conductor relay



Furnaces > 3.6kW with heater contactor



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