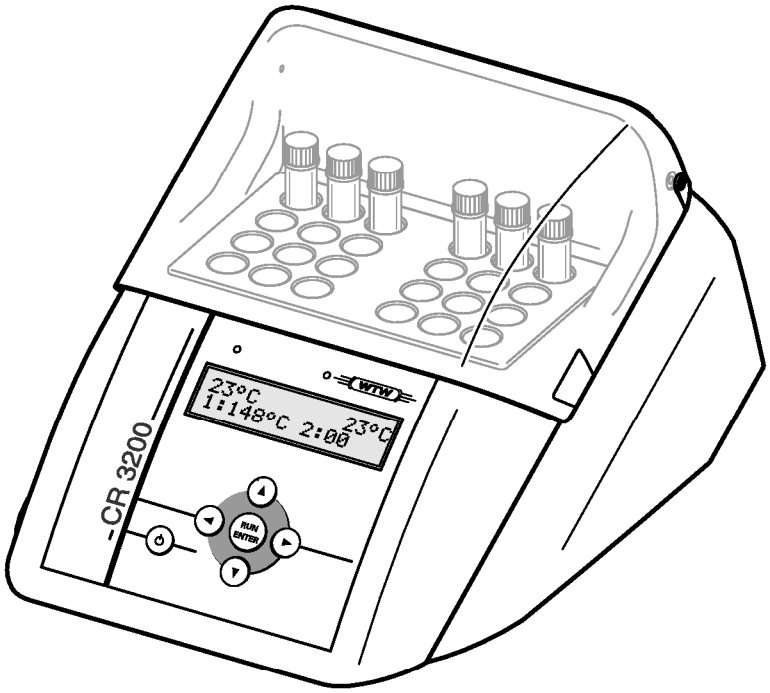
Operating manual

CR 3200



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Accuracy when going to press

The use of advanced technology and the high quality standard of our instruments are the result of continuous development. This may result in differences between this operating manual and your instrument. Also, we cannot guarantee that there are absolutely no errors in this manual. Therefore, we are sure you will understand that we cannot accept any legal claims resulting from the data, figures or descriptions.

CR 3200 - Contents

1 Overview

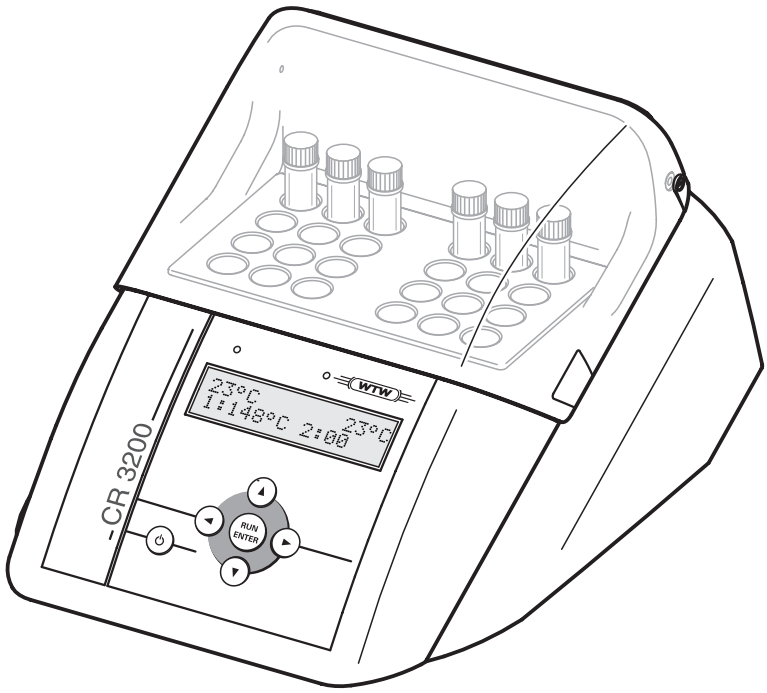
The thermoreactor CR 3200 is a dry temperature control device for laboratory use. It facilitates and secures the digestion using reaction cells.

The thermoreactor has 7 fixed temperature programs.

- 1: 148 °C for 120 minutes
- 2: 120 °C for 30 minutes
- 3: 120 °C for 60 minutes
- 4: 120 °C for 120 minutes
- 5: 100 °C for 60 minutes
- 6: 148 °C for 20 minutes
- 7: 150 °C for 120 minutes

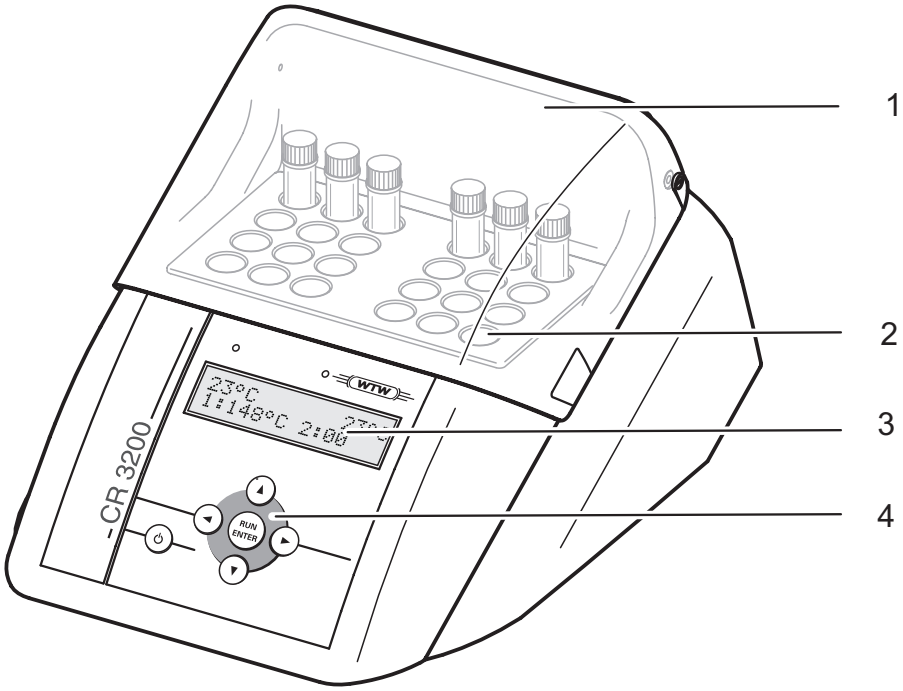
8 more temperature programs can be set up freely. The reaction temperature can be adjusted from room temperature to 170 °C, the heating time from 0 to 180 min.

The thermoreactor takes 24 reaction cells with an outer diameter of 16 mm.



Note
You will find information on accessories in the WTW catalog LABORATORY AND FIELD INFORMATION or via the Internet.

1.1 Components of the thermoreactor



1	Protection cover
2	Thermoblock with cell shafts
3	Display
4	Keypad

2 Safety

This operating manual contains basic instructions that you must follow during the commissioning, operation and maintenance of the thermoreactor. Consequently, all responsible personnel must read this operating manual before working with the thermoreactor. The operating manual must always be available within the vicinity of the thermoreactor.

Target group

The thermoreactor was developed for use in the laboratory. Thus, we assume that, as a result of their professional training and experience, the operators will know the necessary safety precautions to take when handling chemicals.

General safety instructions

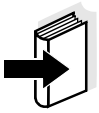
The individual chapters of this operating manual use the following safety labels to indicate different levels of danger:

Warning
indicates instructions that must be followed precisely in order to prevent serious dangers to persons.

Caution
indicates instructions that must be followed precisely in order to avoid slight injuries or damage to the instrument or the environment.

Other labels

Note
indicates notes that draw your attention to special features.



Note
indicates cross-references to other documents, e.g. application reports.

2.1 Authorized use

The authorized use of the thermoreactor is exclusively the heating of samples in cells in a laboratory. The technical specifications as given in chapter 8 TECHNICAL DATA must be observed. Only the operation and running of the measuring instrument according to the instructions given in this operating manual is authorized. Any other use is considered **unauthorized**.

2.2 General safety instructions

This thermoreactor is constructed and tested in compliance with the EN 61010 safety regulations for electronic measuring instruments. It left the factory in a safe and secure technical condition.

Function and operating safety

The smooth functioning and operational safety of the thermoreactor can only be guaranteed if the generally applicable safety measures and the specific safety instructions in this operating manual are followed during operation.

The smooth functioning and operational safety of the thermoreactor can only be guaranteed under the environmental and electrical operating conditions that are specified in chapter 8 TECHNICAL DATA.

If the thermoreactor was transported from a cold environment to a warm environment, the formation of condensate can impair the functioning of the measuring system. In this event, wait until the temperature of the thermoreactor reaches room temperature before putting the thermoreactor back into operation.

Caution

The thermoreactor is only allowed to be opened by personnel authorized byWTW.

Safe operation

If safe operation is no longer possible, the thermoreactor must be taken out of service and secured against inadvertent operation. Safe operation is no longer possible if the thermoreactor

- has been damaged in transport
- has been stored under adverse conditions for a lengthy period of time
- is visibly damaged
- no longer operates as described in this manual.

If you are in any doubt, please contact the supplier of the thermoreactor.

Obligations of the purchaser

The purchaser of this thermoreactor must ensure that the following laws and guidelines are observed when using dangerous substances:

- EEC directives for protective labor legislation
- National protective labor legislation
- Safety regulations
- Safety datasheets of the chemical manufacturers.

3 Commissioning

3.1 Scope of delivery

- Thermoreactor CR 3200
- Connection cable for mains connection
- Operating manual

Warning
Always keep the original packing including the inner packing. If you have to transport the instrument, the packing protects the instrument optimally from hard shocks.
The original packing is also required for the appropriate return transport of the instrument if it has to be repaired.
Please note that the warranty does not cover damage caused by inappropriate transport.

3.2 Initial commissioning

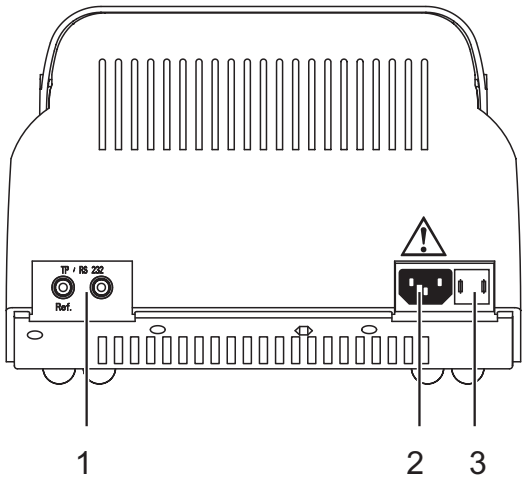
Note

The thermoreactor works at an ambient temperature of +5 °C to +40 °C. When the thermoreactor was transported from a cold environment to a warm environment, condensate may occur and cause a malfunction. Wait until the thermoreactor has adjusted to the new environmental conditions before putting it into operation again (see also chapter 8 TECHNICAL DATA).

Setting up the thermoreactor

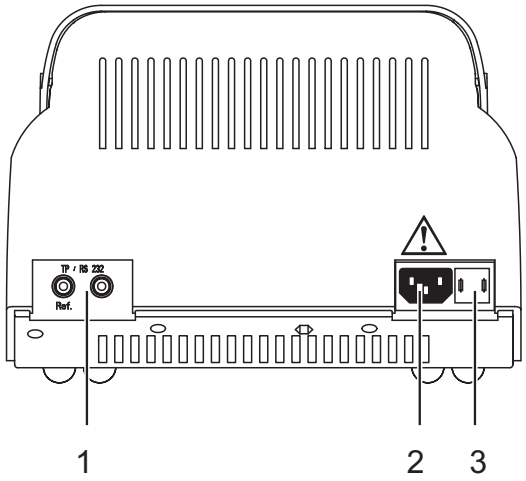
1	Place the thermoreactor firmly onto a heat-resistant underground.
2	Make sure that there is enough space between the thermoreactor and other instruments or devices that are heat-sensitive.

Adjusting the mains voltage



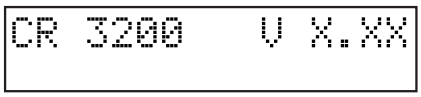
3	Check whether the arrow on the housing points to the mains voltage (115 or 230 V) given on the fuse holder (3) that is provided by the mains.
4	If the wrong mains voltage is set, perform steps 5 to 7.
5	Pull out the fuse holder (3).
6	Turn the fuse holder (3) so that the arrow on the housing points to the mains voltage (115 or 230 V) provided by the mains.
7	Push the fuse holder (3) in completely.

Connecting the mains cable



1	Socket for temperature probe or PC
2	Socket for mains plug
3	Fuse holder

8	Connect the mains cable to the socket 2 on the thermoreactor.
9	Connect the mains cable to an easily available mains socket. The thermoreactor is now in the Standby mode. The display shows the name of the instrument.



The thermoreactor is ready for operation.

4 Basic principles of operation

This chapter provides you with basic information on how to operate the thermoreactor.

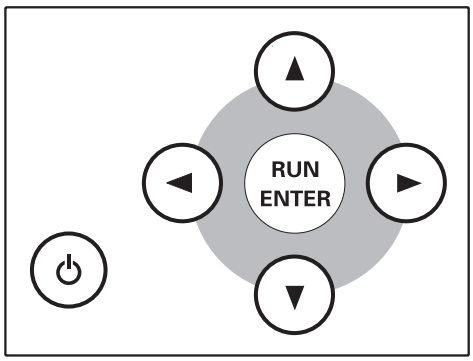
4.1 Operating and display elements

Using the six keys of the keypad (see section 4.1.1) you control the thermoreactor.

Temperature values, available temperature programs or settings can be viewed in the display (see section 4.1.2).

The control lamps above the operating panel are assigned to the thermoblock. Their color (red or green) and their state (flashing or illuminated) show the current operating state of the thermoreactor (see section 4.1.3).

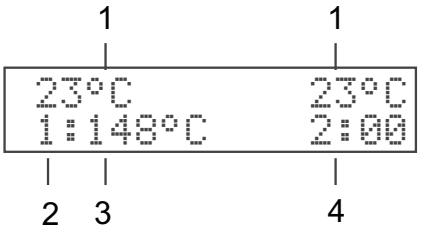
4.1.1 Keys



Key	Meaning
⏻	On/off switch
RUN ENTER	● Making or confirming a selection or ● Starting the timer for the reaction time (active temperature program).
RUN ENTER + ⏻	Keep RUN ENTER depressed and simultaneously press ⏻: Changing to the *SETUP* menu from the Standby mode
◄ ►	● Changing between the temperature setting and the reaction time setting (in the *SETUP* menu) or ● Canceling the active temperature program
▲ ▼	● Selecting the temperature program (program selection) or ● Changing settings and switching between settings (*SETUP*) ● Starting the scrolling through settings by keeping the key depressed

4.1.2 Display

Example: Program selection



1	Temperature in the thermoblock
2	Number of the temperature program
3	Specified temperature
4	Reaction time in hours and minutes

4.1.3 Control lamps (LEDs)

The control lamps above the operating panel are assigned to the thermoblock and indicate the current operating state.

LED	flashes	is illuminated
green		Program selection
red	active temperature program: heating period or cooling period	active temperature program: reaction temperature reached
red and green	active temperature program: program canceling selected	

If the control lamps are off the thermoreactor is in the Standby mode.

4.2 Operating modes

The thermoreactor has three operating modes:

- Standby
  The display shows the model and version number of the thermoreactor.
  Using the RUN ENTER and ⏻ keys simultaneously takes you to the *SETUP* menu. There you can:
  - Edit the 8 temperature programs and the temperature test program (setting the temperature and reaction time for the programs *8* to *15* and *T*, see section 5.5.1)
  - Set the display contrast (*CONTRAST:0* to *9*, see section 5.5.2)
  - Activate a manual confirmation before the timer for the reaction time is started (*START TIMER:MAN.* or *AUTO*, see section 5.5.3)
- Program selection
  After switching on with ⏻ the display shows the current temperature value for the thermoblock. The second display line shows the temperature programs and the temperature test program to be selected if a reaction time of at least one minute has been set (see section 5.5.1). The control lamps above he display light up green.
- Active temperature program
  The display shows the current temperature value for the thermoblock. The control lamps above the display light up or flash red.

5 Operation

5.1 Inserting the reaction cells

The reaction cells can either be inserted at room temperature or when the thermoreactor has been preheated.

Caution
When dealing with chemicals always follow the safety data sheets and the regulations for prevention of accidents.

Caution
Observe the analysis specifications of the test sets used.

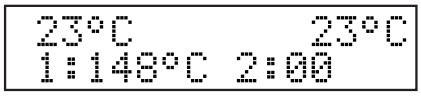
Warning
The thermoblock can become very hot (170 °C).
There is danger of burning when the thermoblock is heated up.

Note
When cold reaction cells are inserted in the preheated thermoblock it can cool down by approx. 3 °C.

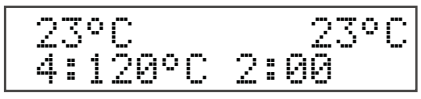
1	Insert the filled reaction cells in the cell shafts.
2	Close the protection cover.

5.2 Starting a temperature program

1	Switch the thermoreactor on with ⏻.



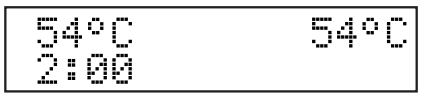
2	Select a temperature program with ▲ ▼. You can select from 7 predefined temperature programs and a temperature test program (see Abschnitt 5.5.1).



3	Start the displayed temperature program with RUN/ENTER. The control lamp for the thermoblock flashes red. The nominal reaction time (in hours and minutes) appears on the display.

Note
The reaction temperature is reached when the temperature in the thermoblock is in a range of ± 1 °C around the adjusted temperature for two minutes constantly. The control lamps of the thermoblock will then light up red.

Note
If the start of the timer for the reaction time has been set to automatic in the *SETUP* menu (*START TIMER:AUTO* see Abschnitt 5.5.3), the reaction time automatically starts after the reaction temperature has been achieved. The reaction temperature is kept constant during the reaction time.



Note
If the start of the timer for the reaction time has been set to manual in the *SETUP* menu (*START TIMER:MAN.* see Abschnitt 5.5.3), an *S* is displayed in front of the nominal reaction time. With this setting the thermoreactor controls the temperature until the timer for the reaction time is started by pressing RUN/ENTER.

4	If an S appears in front of the reaction time: Start the timer for the reaction time with RUN/ENTER. The S in front of the reaction time disappears.

The reaction temperature is kept constant during the reaction time. The control lamps of the thermoblock will then light up red.

After the reaction time has expired the control lamps flash red and an acoustic signal is heard.

5	Using RUN/ENTER confirm the end of the reaction time for each thermoblock. The temperature program and the acoustic signal are finished. The thermoreactor is in the program selection mode.

5.3 Stopping a temperature program

You can terminate a running program at any time.

1	Using ◄ ►, terminate the running temperature program. The control lamp for the thermoblock flashes red/green. The safety query *STOP?* is displayed.

2	Using RUN/ENTER confirm the safety query *STOP?*. The temperature program is finished. The control lamps of the thermoblock will then light up green. or: Using ◄ ►, leave *STOP?*. The query *STOP?* disappears from the display. The temperature program is continued.

Note
While *STOP?* is displayed the temperature program goes on running. As soon as a section of the temperature program is finished (e.g. after the end of the heating period or after the end of the reaction time), the *STOP?* display is overwritten.

5.4 Temperature test program

With the temperature test program, you can check the temperature in the thermoblock with the aid of an external temperature probe that is available as an accessory (see chapter 9 ACCESSORIES/OPTIONS). While the temperature test program is active, the display shows the current temperature of the thermoblock and at the same time the measured temperature value of the external temperature probe.

The thermoreactor functions correctly if the temperature of the external temperature probe does not deviate from the nominal temperature value by more than 2 °C.

If the deviations from the nominal value are greater, further measures can be necessary (see chapter 7 WHAT TO DO IF...).

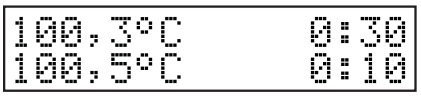
Note
The external temperature probe has the same accuracy as the internal temperature sensor.

5.4.1 Starting the temperature test program

Note
All other temperature programs are blocked while the temperature test program runs.

1	Connect the external temperature probe to the socket at the thermoreactor (see chapter 3 COMMISSIONING).
2	Insert the external temperature probe in a cell shaft.
3	Switch the thermoreactor on with ⏻.
4	Using ▲ ▼, select the temperature test program *T*.

5	Using RUN/ENTER start the temperature test program *T*.



The first display line shows the nominal measuring time and the temperature of the thermoblock. The second display line shows the temperature of the external temperature probe. After the nominal temperature has been reached, the measuring time is counted down in the second display line.

During the temperature regulation phase, the thermoreactor saves the measured temperature values of the external temperature probe in a test report every 60 seconds.

As soon as the temperature test is finished, "*PRINT*" appears on the display.

You can now output the measuring data of the temperature test to a PC or printer.

You have the following options now:

- Connect the thermoreactor with a PC and transmit the test report to a terminal program (see Abschnitt 5.4.2).
- Connect the thermoreactor with a printer and download the test report to the printer (see Abschnitt 5.4.2).
- Leave the temperature test program with RUN/ENTER.

The test report in the thermoreactor is erased in any case at the end.

5.4.2 Downloading the test report to an external printer/PC

To transmit the temperature test report to a printer or PC, a printer cable or PC cable is required (see chapter 9 ACCESSORIES/OPTIONS). You can record the test report with the aid of a so-called terminal program on the PC side.

Generally, a terminal program serves to establish a connection to a meter at a data interface and to communicate with the meter via a console on the display. A terminal program usually offers the possibility to save the contents of the console in a text file or print it. If the terminal program is connected to the thermoreactor, it can receive the temperature test report and display it on the console.

Terminal programs are available by different manufacturers for different operating systems. The "HyperTerminal" terminal program is included in Windows (versions 95 to XP). It is in the program menu under *Accessories*.

More detailed information can be taken from the user information of the terminal program.

Sample report

```
CR 3200 V.X.XX
Tref = 148 C
1: Tblock = 147.5 C
2: Tblock = 147.6 C
3: Tblock = 147.7 C
.   .       .
.   .       .
```

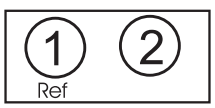
Downloading the test report

Precondition:
The temperature test is finished and *PRINT* is displayed (see Seite 60).

1	Disconnect the external temperature probe from the thermoreactor.

Note
When connecting the PC or printer cable observe the cable poling. Data transmission is possible with the correct poling only.

Socket assignment



1 Ref
2 TxD

2	Connect the thermoreactor to the PC or printer. (Cable see chapter 9 ACCESSORIES/OPTIONS). To do so: ● plug the reference plug (unmarked) in the "Ref" socket (1). ● plug the signal plug (marked by a red ring) in the socket (2).
3	Start the terminal program on the PC.
4	Set the following transmission data in the terminal program:

Baud rate	4800
Handshake	none
Parity	none
Data bits	8
Stop bits	1
Record	none

5	Start the data transmission with RUN ENTER. After the transmission is finished the test report is deleted in the thermoreactor.

5.5 Settings

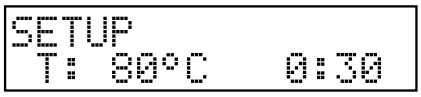
5.5.1 Editing a temperature program

The temperature programs 1 to 7 are installed permanently and cannot be changed.

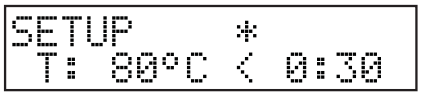
The temperature programs 8 to 15 and the temperature test program can be edited according to individual requirements.

Note
For the temperature test program, a TFK CR external temperature probe is required (available as an accessory, see chapter 9 ACCESSORIES/OPTIONS).

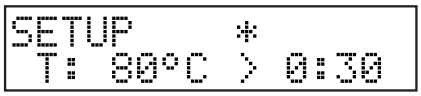
1	Switch to the Standby mode.
2	Keep the RUN/ENTER key depressed while you press ⏻ to switch to the *SETUP* menu. *SETUP* and, in the second line, an editable parameter are displayed.
3	Using ▲ ▼ select a temperature program no. 8 to 15 or the temperature test program.



4	Using RUN/ENTER edit the selected temperature program. The two parameters, temperature and time, are displayed. The editing is marked on the display by *. The selected parameter is marked by an arrow < or >.



5	Using ▲ ▼ change the parameter (e.g. temperature).
6	Using ◄ ► switch to the other parameter.



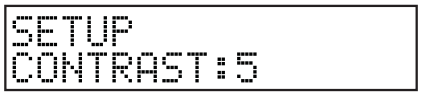
7	Using ▲ ▼ change the parameter (e.g. reaction time).
8	Using RUN/ENTER confirm the changes. The marking on the display (*) disappears.

9	Using ⏻ leave the *SETUP* menu. The changes are stored. The thermoreactor is switched on (operation mode: program selection).

5.5.2 Setting the display contrast

The display contrast can be set in 10 steps.

1	Switch to the Standby mode.
2	Keep the RUN/ENTER key depressed while you press ⏻ to switch to the *SETUP* menu. *SETUP* and, in the second line, an editable parameter are displayed.
3	Using ▲ ▼ select *CONTRAST*.



4	Using RUN/ENTER edit the contrast setting. The editing is marked on the display by*.

5	Using ▲ ▼ set the contrast from 0 to 9.
6	Using RUN/ENTER confirm the changes. The marking on the display (*) disappears.
7	Using ⏻ leave the *SETUP* menu. The changes are stored. The thermoreactor is switched on (operation mode: program selection).

5.5.3 Setting the timer for the reaction time

After the start of a temperature program the thermoblock starts heating up. Depending on the setting, the timer for the reaction time starts automatically after the reaction temperature has been reached or only after confirmation by keypressing.

With the setting *START TIMER:AUTO* the timer for the reaction time starts immediately after the reaction temperature has been reached.

With the setting *START TIMER:MAN.* the timer for the reaction time starts after confirmation by keypressing only.

1	Switch to the Standby mode.
2	Keep the RUN/ENTER key depressed while you press ⏻ to switch to the *SETUP* menu. *SETUP* and, in the second line, an editable parameter or a temperature program are displayed.
3	Using ▲ ▼ select *START TIMER*.

4	Using RUN/ENTER set the start of the timer for the reaction time. The editing is marked on the display by *.
5	Using ▲ ▼ select *MAN.* or *AUTO*.
6	Using RUN/ENTER confirm the changes. The marking on the display (*) disappears.
7	Using ⏻ leave the *SETUP* menu. The changes are stored. The thermoreactor is switched on (operation mode: program selection).

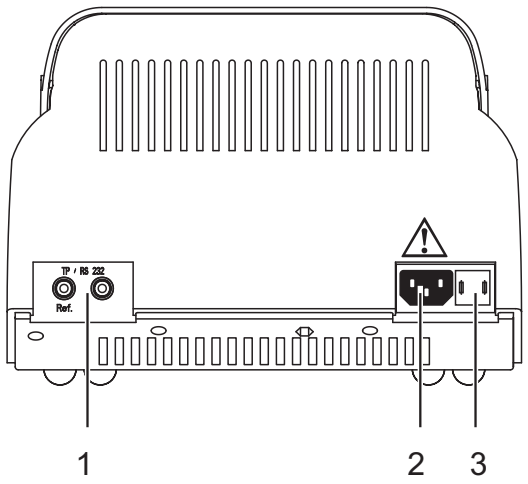
6 Maintenance, cleaning, disposal

6.1 Maintenance

The CR 3200 thermoreactor is maintenance-free.

6.2 Exchanging the fuses

1	Disconnect the line power cable from the thermoreactor.



2	Pull out the fuse holder (3).
3	Exchange one or both fuses (6.3 AT).
4	Turn the fusion holder (3) so that the arrow on the housing points to the line voltage (115 or 230 V) provided by the power line.
5	Push the fusion holder (3) completely in.

6.3 Cleaning the enclosure

Wipe the thermoreactor with a damp cloth.

Caution

The housing is made of synthetic material. Thus, avoid contact with acetone or detergents that contain solvents. Remove any splashes immediately.

6.4 Cleaning the thermoblock of spilled cell contents

If liquid penetrated a thermoblock (e.g. from a cell), clean the thermoblock as follows:

Warning

Cells can contain poisonous or corrosive substances. If the content has been set free observe the danger notes on the cell. If necessary take the corresponding protective measures (protective goggles, protective gloves etc.).

Warning

The thermoblock can become very hot (170 °C). There is danger of burning when the thermoblock is heated up.

1	Switch off the thermoreactor and disconnect the power plug.
2	Allow the thermoreactor to cool down.
3	Unscrew the cover plate on top of the thermoblocks.
4	Clean the cover plate, block surfaces and borings with a damp cloth.
5	Screw on the cover plate again.

Note

Discoloration that remains on the thermoblock and cover plate does not affect the functioning of the thermoreactor.

6.5 Disposal

Dispose of the thermoreactor as electronic waste at an appropriate collection point. It is illegal to dispose of the thermoreactor in household refuse.

7 What to do if...

There is nothing on the display

Cause	Remedy
– The power supply is interrupted	– Check mains cable and connections – Exchange the fuses – Repair by service department

Bars are displayed instead of the temperature (-°C)

Cause	Remedy
– With an active temperature test program: the signal of the external temperature probe was not recognized	– Connect the temperature probe – Repair by service department
– In the program selection mode: internal temperature probe defective	– Repair by service department

Temperature deviation during the temperature test program

Cause	Remedy
– Bad thermal contact between the external temperature probe and the thermoblock	– Use original accessories only – Close the protection cover during the temperature test – Contact the service department

Cuvette emptied / thermoblock contaminated

Cause	Remedy
– e. g. leaking cuvette	– see section 6.4

8 Technical Data

Reactor type	Dry temperature control device with safety cover
Cell shafts	2 x 12 cell shafts for reaction cells 16 ± 0.2 mm
Reaction time setting	20 min, 30 min, 60 min, 120 min (via fixed programs) 8 freely adjustable programs: 0...180 min
Temperature setting	100 °C, 120 °C, 148 °C, 150 °C via fixed programs and 8 freely adjustable programs: Room temperature ...170 °C
Controlling accuracy	± 1 °C ± 1 Digit
Temperature stability	± 0.5 K
Overtemperature protection	190 °C ± 5 °C
Heating time (with empty thermoblock) from 25 °C to	100 °C approx. 5 min 120 °C approx. 7 min 148 °C approx. 10 min
Temperature of the enclose at an environmental temperature of 25 °C	< 30 °C with a block temperature of 148 °C
Output	unidirectional RS232 interface with 2 banana sockets for: ● external temperature probe or ● printer or PC cable
Power supply	230 VAC 50 Hz ± 15 % 115 VAC 60 Hz ± 15 % Power consumption: 560 W Fuses 2 x 6.3 AT
Enclosure	PC ABS, recyclable, high temperature resistant
Protective class	I according to DIN VDE 0700 part 1/11.90

Insulation group	Insulation group: B according to DIN VDE 0110/11.72
Overvoltage category	II
Protection	IP 20 according to DIN 40050
Ambient temperature	Storage -25 °C to +65 °C Operation +5 °C to +40 °C
Climatic class	2 according to VDI/VDE 3540 Relative humidity: Yearly mean: < 75 % 30 days /year: 95 % Other days: 85 % Light dew: yes
EMC	EN61326 FCC Class A
Test certificates	cETLus, CE
Dimensions	D x W x H: 292 x 245 x 180 mm
Weight:	3.6 kg
Safety standards	EN61010 UL3101 CAN/CSA C22.2-1010 EN61010-2-010 IEC-CAN/CSA C22.2-1010.2.010

9 Accessories/Options

Designation	Accessory
TFK CR	External temperature probe for the monitoring of test equipment of the CR 3200 and CR 4200 thermoreactors
AK CR/PC	PC cable for thermoreactors, CR 3200 and
AK CR/P	Printer cable for thermoreactors CR 3200 and CR 4200

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