



Mastercycler® ep

Bedienungsanleitung · Operating instructions · Mode d'emploi
Istruzioni d'impiego · Manual de Instrucciones

eppendorf

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1 Safety precautions



Please read the operating instructions carefully before using the Mastercycler ep. The Mastercycler ep may only be used to carry out PCR and related methods by qualified specialists in the research lab.

The following instructions must be unconditionally observed:

The safety regulations valid for the lab are to be constantly observed when working with the device.

In order to avoid damage through condensation, the device may first be switched on 12 hours after being set up. This is also the case when the location of the device is changed.

The mains voltage must coincide with the information on the identification plate.

The device must be connected to a grounded socket.

The device must be switched off and the plug pulled before maintenance work, and cleaning are carried out. Wait for the block to cool.

A flow of compensating current can occur when several Mastercycler ep are networked incorrectly. The connections must be checked prior to commissioning.

The Mastercycler ep must stand completely on the stable work surface.

There must be enough space available to avoid blocking the front and rear ventilation slots. It should also be possible for cooling air to find its way beneath the device.

The distance between the rear air slots and the wall should be at least 10 cm.

It should be ascertained that the air slots remain free and that the exhaust slots are not blocked.

There should be no paper or other objects under the device that might lead to the blocking of the ventilation.

It should be ascertained that the control panel is held securely in the holding clamp.

The control panel may not be placed on the device or the lid.

The control panel may not be separated from a switched on Mastercycler ep.

If the lid is in the cleaning position, components with sharp edges are exposed. Extra caution should be exercised when cleaning the heated lid (particularly with respect to the sharp edged rollflex cable).

Don't place the fingers between the lid and the housing of the device when opening or closing the lid or when cleaning. The fingers could otherwise be caught between them.

Don't reach underneath the heated lid.

Sample material may not be filled directly into the Thermoblock.

Damage to the block and the heated lid can result from using sample tubes other than those recommended.

Unsuitable tubes can be damaged to such an extent that sample material may escape. This is especially important to remember when working with infectious materials.

It should be ascertained that the PCR plates are correctly situated in the block. Damage to the block and the lid, or escape of sample material may otherwise result.

If tubes are heated in the block without using the heated lid, these can burst when the temperature is too high, potentially causing the escape of sample material.




The Thermoblock, the inner side of the heated lid and micro test tubes / PCR plates can reach temperatures of over 50 °C very quickly. There is a risk of burns!

The heated lid should be kept closed until temperatures of around 30 °C or less are reached. Do not use materials (tubes, PCR plates, caps, foils, mats) that are not sufficiently temperature resistant (to 120 °C).

▼▲ Caution: Hot Surface



Symbol on the Thermoblock:

Warns of a potentially hot Thermoblock (▼) or a hot inner side of the heated lid (▲).  shows, that gradient operation can result in the temperature being hotter on the right side than on the left side.

Explosive, flammable and volatile materials may not be heated in the Mastercycler ep. The device may not be operated in rooms at risk of explosion.

The appropriate safety regulations should be observed when working with pathogenic material, radioactive materials or other health-damaging materials.

It should be ascertained that no liquids penetrate into the device.

1 Safety precautions / 2 Installation

Repairs should only be carried out by an Eppendorf AG authorized specialist. The authorization can only be obtained through participation in a certified course of training.

Transfer

If the device is passed on to someone else, please include the instruction manual.

Disposal

In case the product is to be disposed of, the relevant legal regulations are to be observed.

Information on the disposal of electrical and electronic devices in the European Community

The disposal of electrical devices is regulated within the European Community by national regulations based on EU Directive 2002/96/EC on waste electrical and electronic equipment (WEEE).

According to these regulations, any devices supplied after 13.08.05 in the business-to-business sphere, to which this product is assigned, may no longer be disposed of in municipal or domestic waste. They are marked with the following symbol to indicate this.



As disposal regulations within the EU may vary from country to country, please contact your supplier if necessary.

2.1 Delivery package

The following parts are included in the delivery package:

- 1 Mastercycler ep gradient / Mastercycler ep gradient S / Mastercycler ep 384
- 1 power cable
- 1 operating instructions
- 1 Certificate of Conformity
- 1 pouch of PCR tubes 0.2 ml
- 2 PCR plates twin.tec skirted / semi-skirted
- 1 pouch sealing material
- 2 tools for emergency unlocking of lid

2.2 Setting up the device

In order to avoid damage caused by condensation, the device may first be switched on 12 hours after setting up. This also applies to a change of location.

The Mastercycler ep must stand completely stable on the work surface.

There must be sufficient space that the front and rear air slots are not covered and that cooling air can reach below the device.

The distance between the air slots and the wall must be at least 10 cm.

Space requirement:

Width:	26.0 cm
Depth:	41.0 cm
Height:	30.5 cm

Mains connection: An earthed wall socket for the Mastercycler ep. The control panel is also supplied through the mains connection of the Mastercycler ep.

It should be ensured that the air slots are free, and that the supply and exhaust air paths are not blocked. There should be no paper under the device. This can block the ventilation path.

The mains voltage must agree with the information on the name plate.

The device must be connected to a grounded socket.

The delivery carton should be kept in order to be able to ship the device in case repairs are necessary.

2 Installation

2.2.1 Removing the transport securing device on devices with a motorized lid



Before the Mastercycler ep is started up, the transport securing device must be removed!

The transport securing devices should be retained and replaced at the intended point for any transport operation in order to avoid transport damage!

On devices with a motorized lid, the transport securing device attached behind the lid is removed as follows and replaced in reverse sequence if needed:



In order to be able to use the transport safety device, the block must be loaded with empty tubes and the lid closed under the Cyclor node in the LID menu (see Ch. 3.5). As soon as the lid is in the front position, the device can be switched off at the mains power switch and the transport safety device inserted into the guide rail.

Warning! Any time the device is transported, the transport securing device must be replaced in this position!

To remove the **transport securing device under the heated lid**, the above-described transport securing device must first be removed on a device with a motorized lid.

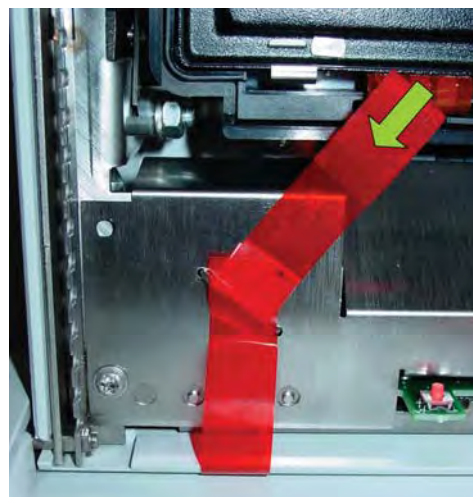
- Then connect the mains cable to the mains supply and the mains connection socket (see Chapter 2.3.1, Fig. 2). Switch on the device at the mains switch.
- Once the device has been switched on, the heated lid automatically moves into the rear position.
- As soon as the lid is in the rear position, switch the device off again and pull out the mains plug.

Proceed as follows to remove the transport securing device.

- Open lid upwards
- Remove the transport securing device by slowly pulling the red tab in the direction of the arrow (see illustration). Hold the lid steady in the upright position during this process.

The transport securing devices must be retained in case the device requires shipping.

Warning! Any time the device is transported, the transport securing device must be replaced in this position!



2 Installation

2.2.2 Transport securing device for manual lids

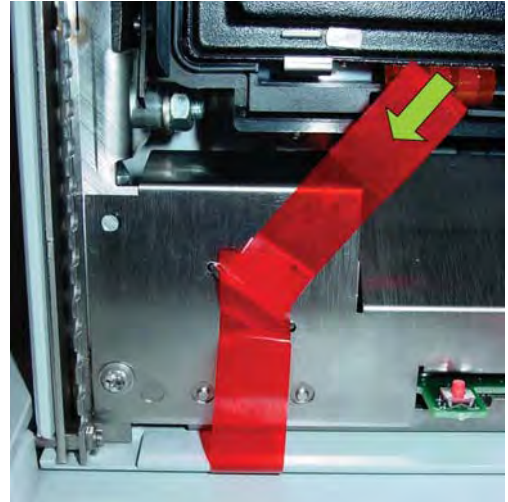
 **The transport safety device must be removed prior to starting up the Mastercycler ep!**

Proceed as follows to remove the transport safety device:

- Push the lid of the Mastercycler ep into the rear position and open upwards.
- Remove the transport securing device by slowly pulling the red tab in the direction of the arrow (see illustration). Hold the lid steady in the upright position during this process.

The transport securing device must be retained in case the device requires shipping.

Warning! Any time the device is transported, the transport securing device must be replaced in this position!



2 Installation

2.3 Functional units

2.3.1 Mastercycler ep

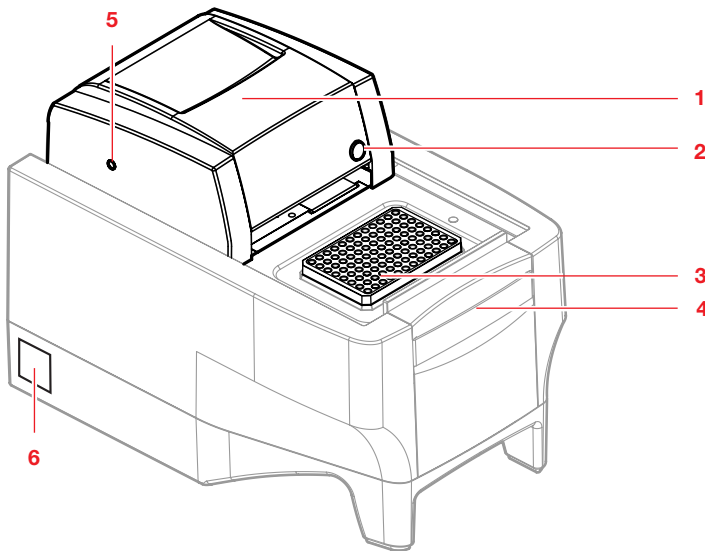


Fig. 1: Front view

- 1 ESP Heated lid (opened)
- 2 Status display
- 3 Thermoblock
- 4 Holding clamp for control panel
- 5 Opening for emergency unlocking of lid
- 6 Identification plate

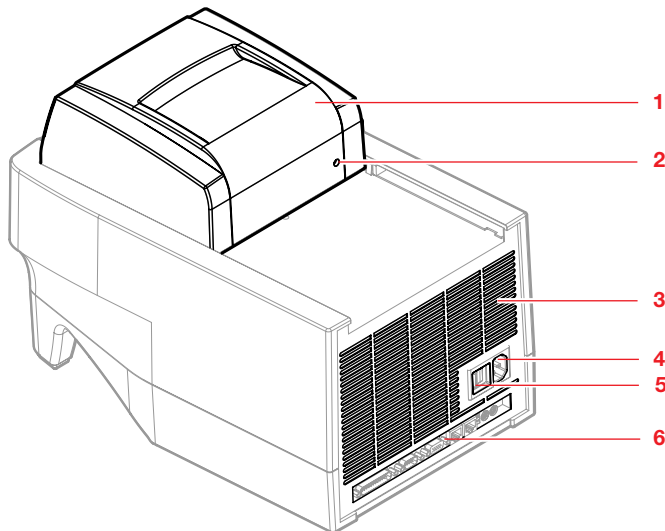


Fig. 2: Rear view

- 1 ESP Heated lid (closed)
- 2 Opening for emergency unlocking of lid
- 3 Air slots
- 4 Mains connection socket
- 5 Mains switch 0 = off / I = on
- 6 Terminal block (see Fig. 3)

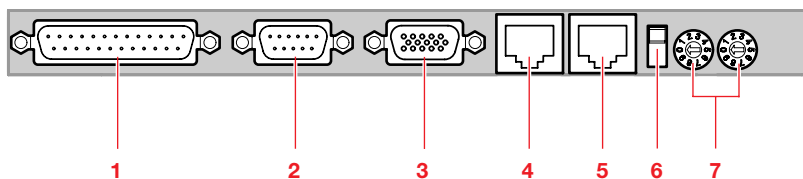


Fig. 3: Terminal block

- 1 Printer: parallel interface
- 2 RS232: serial interface
- 3 Control Panel: Connection Control Panel
- 4 CAN_out
- 5 CAN_in
- 6 Term: Terminal resistance
- 7 Address: Rotary switch address

Only devices meeting the IEC 950/EN 60950 (UL1950) norms may be connected to the interfaces.

2 Installation

2

Installation

2.3.2 ESP (electronic sample protection) Heated lid

All variants of the Mastercycler ep are equipped with a novel ESP heated lid technology. With this technology, the lowering point and the loading pressure of the ESP heated lid are entirely electronically controlled. The optimal pressure is applied for all sample tubes and PCR plates, effectively minimizing evaporation. Due to the controlled lowering point of the ESP heated lid, the samples are thermally protected during the heating-up procedure.

There are two variants of the ESP heated lid, one for manual closing and a motorized heated lid.

The manual heated lid is simply drawn forward over the inserted tubes following sample loading prior to starting a program.

The motorized heated lid is also processible and need not be drawn over the inserted sample tubes. This solution is especially suited for use in automated systems.

When opening and closing the lid, or when popping up into the cleaning position, avoid placing the fingers between the cover and the housing of the device.



Do not reach beneath the lid when the heated lid is open.

2.3.3 Control Panel

The control panel can be suspended in the holding clamp of the Mastercycler ep or placed separately on a planar surface.

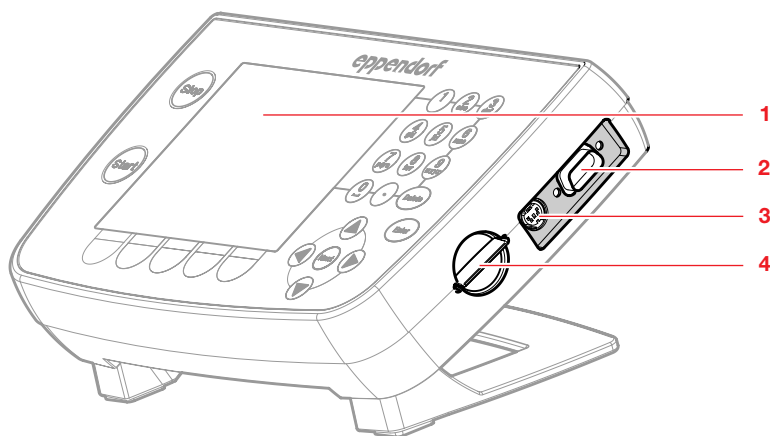


Fig. 4: Control panel

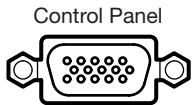
- 1 Display
- 2 Serial interface
- 3 Connection for PS/2 mouse
- 4 Receptacle for MultiMediaCard™

Only devices meeting the IEC 950/EN 60950 (UL1950) norms may be connected to the interfaces.

2 Installation

2.4 Starting up the device

2.4.1 Connecting a Mastercycler ep to a control panel



Control Panel

Connect the connecting cable of the control panel with the "Control Panel" on the rear side of the Mastercycler ep.

Term



ON

Set the Term switch on the rear side of the Mastercycler ep to ON.

Address



Set the "Address" of the Mastercycler ep. To do this carry out the adjustment 01 with the Address rotary switched on the rear side of the Mastercycler ep.

(This would mean, that the arrowpoint of the left rotary switch would be set to 0 and that of the right rotary switch to 1).

Connect the mains cable to the Mastercycler ep and then to the power main.
(see Fig. 2 rear view).

Before switching on the device it must be ensured that the mains voltage is the correct one for the device. To this purpose please compare the information given on the name plate (see Ch. 2.3.1, Fig. 2).

After switching on the device, the connected Mastercycler ep will be automatically recognized by the software and presented in the control panel display.

The control panel may not be separated from a switched on Mastercycler ep.

Connection and start-up of a printer is described in Chapter 2.4.4.1. A PS/2 mouse can also be connected to the control panel (see Chapter 2.4.4.2).

2.4.2 Connection of several Mastercycler ep to one control panel

Up to 5 Mastercycler ep can be connected to one control panel and controlled from there. An additional CAN-Bus cable is required for each additional Mastercycler ep connected to the control panel (see ordering information).

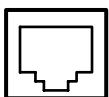
Observe total current consumption! Do not use multiple power sockets!



Control Panel

Connect the connecting cable of the control panel with the "Control Panel" connection on the rear side of the first Mastercycler ep (1).

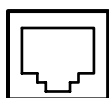
CAN_out



Mastercycler ep (1)

Connect the CAN-Bus connecting cable with the CAN_out connection of the first Mastercycler ep (1).

CAN_in



Mastercycler ep (2)

Connect the open end of the CAN-Bus connecting cable with the CAN_in connection of the second Mastercycler ep (2).

Connect further Mastercycler ep by connecting a CAN-Bus connecting cable from the last connected Mastercycler ep with the CAN_out connection to the new Mastercycler ep CAN_in.

2 Installation

2

Installation

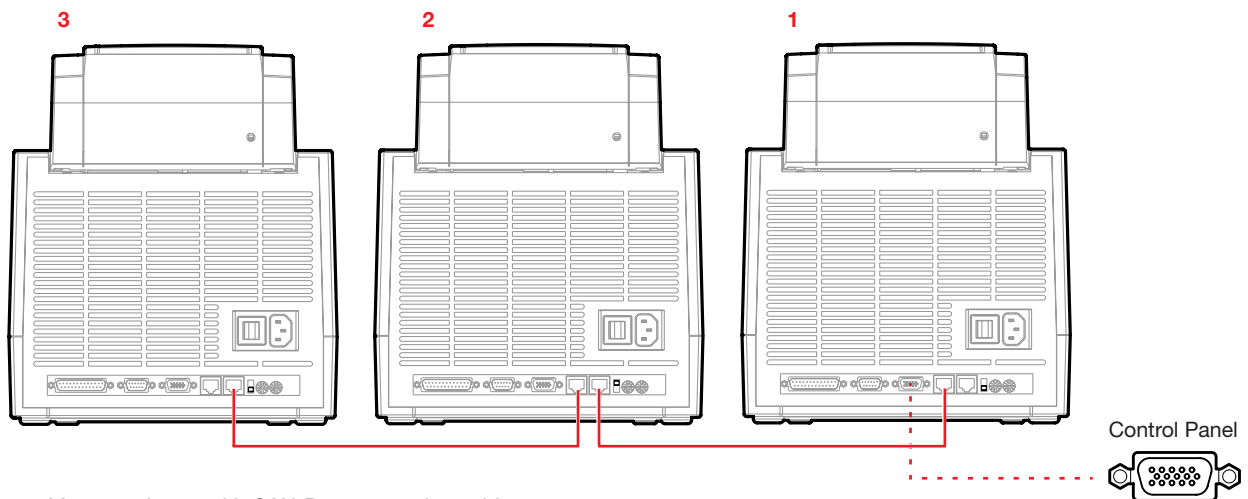


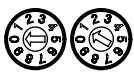
Fig. 5: Mastercycler ep with CAN-Bus connecting cables



Set the Term switch in the terminal blocks of the Mastercycler ep: the first and last Mastercycler ep connected from the control panel to TERM ON (see Fig. 6 Mastercycler ep, 1 + 3).



Set all TERMS between the first Mastercycler with the Control Panel and the last Mastercycler ep to OFF (see Fig. 6 Mastercycler ep, 2). (If two Mastercycler ep are networked, both devices must be set to TERM ON).



Set the addresses with the rotary switches in the terminal block.

The Mastercycler ep connected to the control panel (1) must be assigned the address 01. The other connected Mastercycler ep can receive addresses between 02 and 05.

Note: It should thereby be ascertained that the same address hasn't been assigned twice.

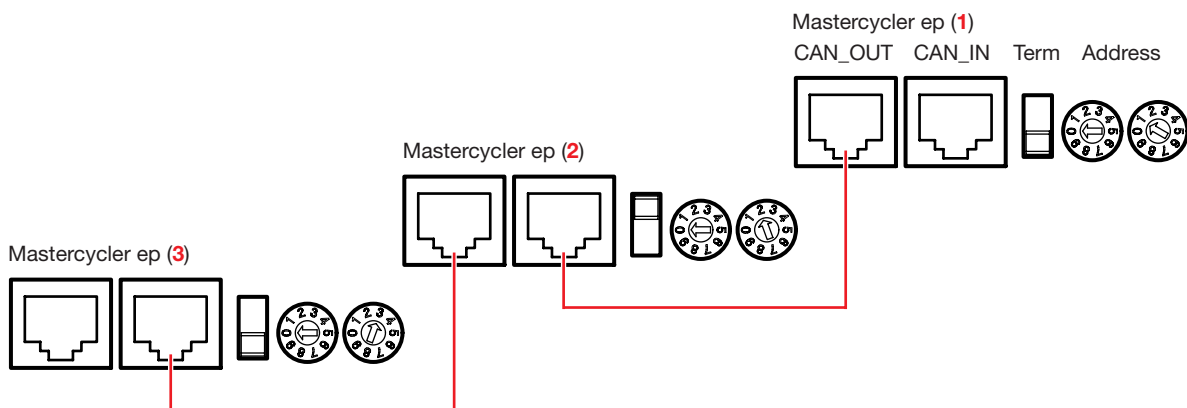


Fig. 6: Enlargement of the terminal blocks of 3 connected Mastercycler ep

Once the devices are switched on, all connected Mastercycler ep will be automatically recognized by the software and represented in the Control Panel display.

The control panel may not be separated from a switched on Mastercycler ep.

2 Installation

2.4.3 Networking of up to 30 Mastercycler ep

A computer and the Mastercycler ep CycleManager networking software will be necessary for the networking of up to 30 Mastercycler ep (see ordering information).

2.4.4 Connection of additional components (printer / mouse)

2.4.4.1 Printer

If required, one printer per Mastercycler ep can be connected in order to print out protocols and programs.

Connect printer with a Centronics cable (not a standard accessory) in the terminal block Mastercycler ep with the printer connection and switch on the printer.

Note: If the formatting of the printout is not satisfactory, the necessary settings (character set, line spacing, characters per line, etc.) must be carried out on the printer. For this purpose please read the operating instructions for the printer.

2.4.4.2 PS/2 mouse

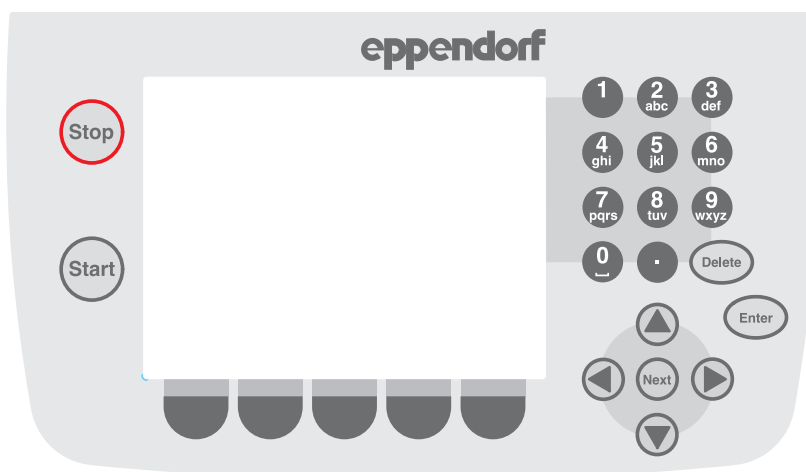
If required, a PS/2 mouse can be connected to a control panel for navigation and programming.

Connect the mouse plug with the control panel connection. (See Ch. 2.3.3, Fig. 4)

A mouse pointer appears in the display when the Mastercycler ep is switched on.

3 Operation

3.1 Control Panel keys



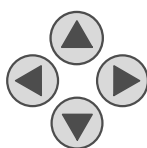
Start a selected program on a connected Mastercycler ep.



Stop a running program on a connected Mastercycler ep.



Select functions. The function of the key changes with the represented monitor display. The current function of the key will be displayed above the relevant key in the display.



Move a marking in the graphic display.
Move the cursor within an alphanumerical input field.



Move the cursor into the next input field.



Delete characters in the input fields **that are to the right of the cursor**.
A marked entry can be completely deleted with the DELETE key.
Delete folders or programs in own index.

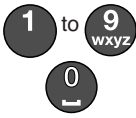


Confirm input.
Open selection lists.



Enter a decimal point in the numerical input fields.

3 Operation

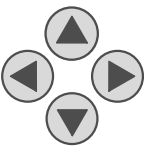


Input of alphanumeric characters in the input fields. In the case of numerical input fields (e.g. temperature and time entries) the keys only represent numbers.

Alphanumeric input fields have keys with multiple functions. By pushing several times on the individual keys it is possible to select the desired letter or numeral. The entry of "pcr 3", for example, is carried out by pressing the following keys:

- p
- c
- r
- (space)
- 3

An alternative for entering alphanumeric characters is carried out through the software over a keyboard in the display:



Select character in the display.



Insert the selected character.



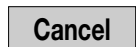
Delete the character to the left of the cursor.



Delete the entire field.



Confirm the entered name.

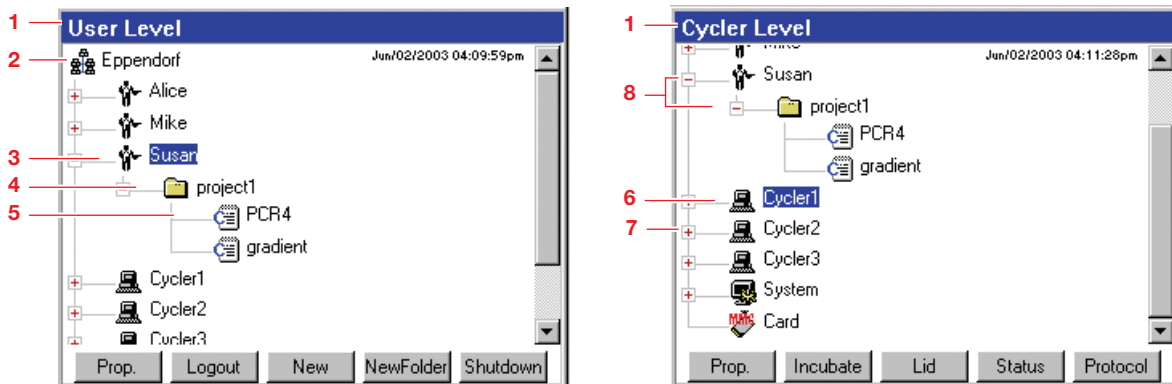


Cancel the input.

3 Operation

3.2 Navigation tree

The start screen of the software shows a navigation tree, in which all users and all Mastercycler ep connected to the operation component are listed. Nodes for system settings and other functions are also present. Various areas and levels are identified by symbols in the navigation tree.



- | | |
|-----------------|-----------------|
| 1 Level display | 5 Program level |
| 2 Top level | 6 Cycler level |
| 3 User level | 7 Closed node |
| 4 Folder level | 8 Open node |



Move dark highlighted marking in the navigation tree.



Opens nodes. The created folders and programs are then visible below the individual users. When opening a cycler node, setting options and information about the device are displayed there. Or press the **Enter** key.



Closes nodes.

Depending upon the level of the navigation tree at which the marking is found, the function of the function keys changes in the lowest lines of the display.

3.3 First start-up / Administrator settings

In the course of the first startup a window will first appear in which the current date and time can be set.



Enter the numbers with the number keys on the control panel.



Go to the next input field.



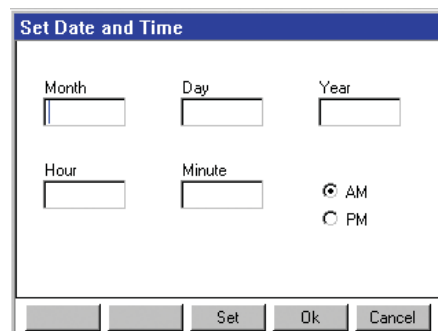
Selects am/pm.



Confirms input.








Exits screen.

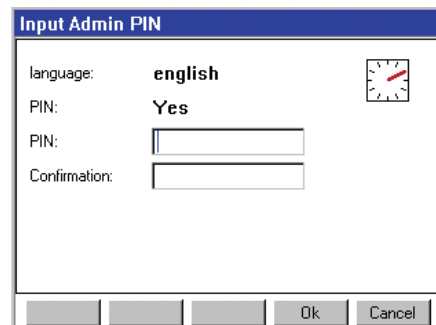


3 Operation

3.3.1 Logging in as administrator

A dialogue will first appear, in which the administrator must enter his PIN (personal identification number). This number must consist of at least four digits and may not contain any spaces.










-  Input of the administrator PIN.
-  Move the marking into the next field.
-  Repetition of the input of the administrator PIN in the Confirmation field.
-  Confirm the input. Or  .



If required, this dialogue can be accessed to change the Administrator PIN with the function key Prop. under the System node (see Ch. 3.4).



3.3.2 Setting up new users

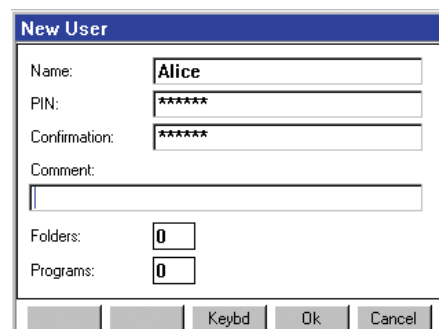
The start screen will appear following the log-on of the administrator. New users can be configured here.

-  Press the NEW USER function key.
-  Enter name. Letters can also be entered over  .
-  or  Go to the PIN field.
-  Enter desired PIN.
-  or  Switch to the Confirmation field.
-  Enter PIN again.



Note: If a user forgets his PIN, the logged-on administrator can assign him a new PIN. The administrator cannot view user PINs.

-  or  Next field.
-  Enter comments where necessary. Letters can also be entered over  .
-  Confirm entry with OK.



The screen changes back to the start screen and the newly set up user is displayed.

3 Operation

3.3.3 Deleting users

Users can only be deleted by the administrator. To do this he must log on as described in Ch. 3.3.1.



Move marking to the user to be deleted.



Press DELETE key.



Confirm with YES.

3.4 System nodes

Further higher settings can be carried out under the system nodes. These are partly only accessible to the Administrator.



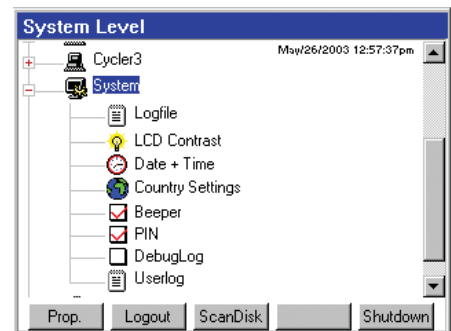
Display of the current system specific and change the Administrator PIN .



Log-off of the current user.



Shutdown of the software to switch off.



3.4.1 Logfile

All executed activities are documented in the Logfile.



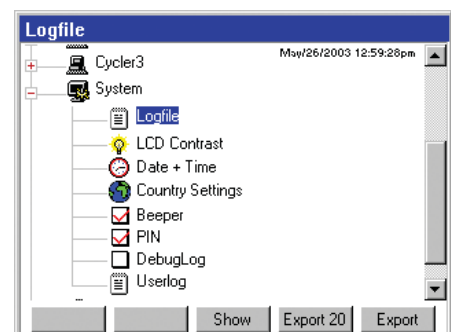
View the Logfile.



Save the last 20 entries of the Logfile on the MultiMediaCard™.



Save the Logfile on the MultiMediaCard™.



3.4.2 LCD Contrast

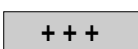
The display contrast can be set under this function.



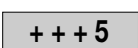
Less contrast.



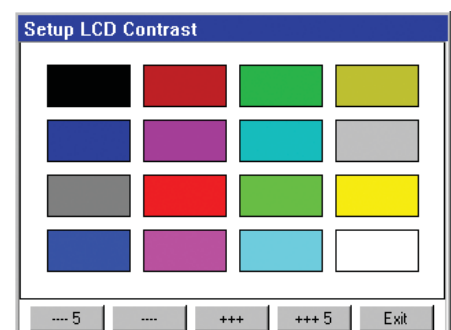
5 times less contrast.



More contrast.



5 times more contrast.



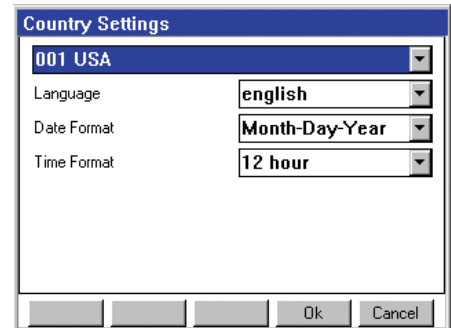
3 Operation

3.4.3 Date + Time

Setting the date and time of day can be carried out as described in chapter 3.3 under Date + Time. The administrator has to be logged on for this setting.

3.4.4 Country settings

Select country-specific display of time and date. The administrator has to be logged on for this setting.



3.4.5 Beeper

Switches the alarms on and off.

3.4.6 PIN

Setting for the usage of personal identification numbers (PIN) by the Administrator.

Unselect

Deactivation of the user-specific log-on. The Login dialogue is no longer displayed when the machine is switched on. There is no longer any access control and all users have access to the administrator settings.

Select

Activation of the user specific log-on. Each user has his own PIN-protected area.

3.4.7 DebugLog

Additional function which can be switched on in certain servicing situations.

3.4.8 UserLog

The UserLog records all the actions performed on the Control Panel. All Login/Logout processes and any actions which involve saving data are saved on a user-specific basis, as are all program interactions like Start, Pause or Cancel.

Show

Views the UserLog.

ExptClear

Exports the UserLog to the MMC™, the UserLog is then deleted.

Export

Exports the UserLog to the MMC™.

3 Operation

3.5 Cyclers nodes

Under the cycler nodes it is possible to view and set various properties related to the Thermoblock.

- Prop.** Display of device properties.
- Incubate** Bring Thermoblock to a settable temperature.
- Lid** Bring ESP heated lid to an settable temperature.
- Status** Go to the status display while PCR program is running.
- Protocol** Displays the protocol of the last PCR program processed which contains records of temperature progression. Each time a new program is started on the Cyclers, the previous protocol is overwritten.



System can be selected after opening the Cycle node.

- Block** Display of block properties.
When activating the auto-restart time, a time can be entered, within which a running program should be continued in event of a power outage. In the event of a longer power failure the program will be ended.
- Restart**
- Sensors** View the current sensor temperatures.
- Validation** Testing of the device temperature with help of a temperature sensor. The sensor is a component of the temperature validation system.
- Calibration** For the adjustment of the device temperature with the help of a temperature sensor. The sensor is a component of the temperature validation system.



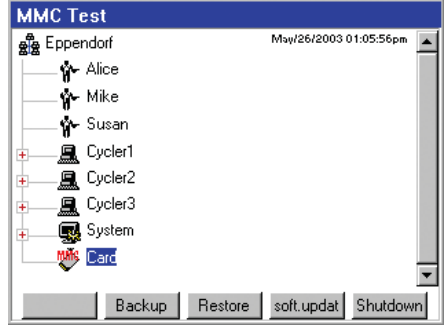
The temperature validation system (see ordering information) is required for the Validate and Calibrate function. A detailed operation description is found in the operating instructions of the temperature validation system.

3 Operation

3.6 MultiMediaCard™

The MultiMediaCard™ provides the opportunity to save all programs of the control device on the exchangeable data carrier. Marking the MultiMediaCard™ in the navigation tree enables the following functions:

- Backup** Save all data and settings, including the programs and user structure of the control panel on the MultiMediaCard™.
- Restore** Recovery of the Control Panel with the data saved on the MultiMediaCard™. This function is only available to the administrator. The programs and settings saved on the Control Panel are overwritten during this process.
- Soft.updat** Calls up a dialogue to perform software updates for the Control Panel and the Thermocycler.
- Shutdown** Shuts down the software for switching off the device.



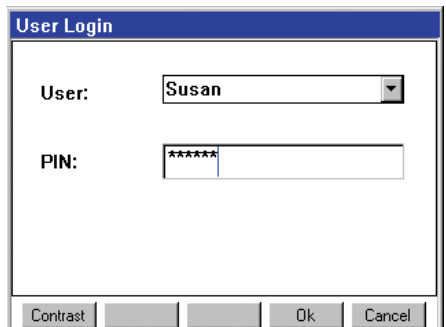
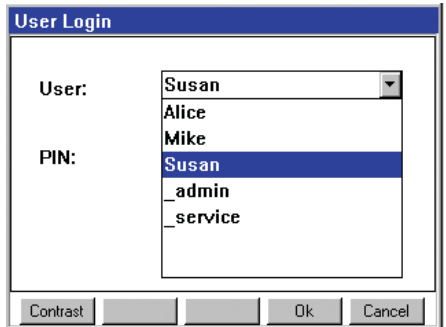
3.7 Operation in the navigation tree

3.7.1 Login

In order to be able to work with the Mastercycler ep, one must log in as a user.

Switch on the Mastercycler ep.

- Enter** Open User selection list.
- ▲** Select User.
- ▼**
- Enter** Confirm the User.
- ▼** or **Next** Next field.
- 1** to **9 wxyz** Enter PIN where necessary.
- Ok** Confirm with OK.



The logged-in user now has all reading and writing rights in his directory for all files and programs and can start all programs on the connected Thermocyclers.

3 Operation

If the wrong PIN was entered accidentally, the "wrong PIN" message appears. After confirming with the OK function key, the login procedure is interrupted and the display returns to the navigation tree. Through renewed activation of the **Login** function key the user returns to the Login dialog.

The folders and programs of other users can be looked at, and it is possible to copy the folders and programs of other users into your own directory.

If a program of another user is opened in the program editor, this will only be available in viewer mode. The program can be looked at in the editor but can not be changed there.

To start and edit the programs of other users it is necessary to copy the program into your own folder.

3.7.2 User change

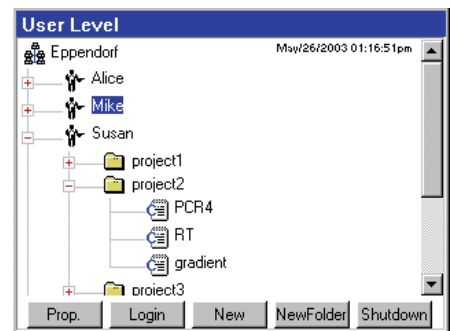
In order to log into the system when another user is already logged in, proceed as follows:



Move the marker to a user node.



Press the LOGIN function key.



The User Login dialog appears, in which the user can log in as described in Ch. 3.7.1.

3 Operation

3.7.3 Creating folders

A logged in user can create folders below his name (nodes) and file related programs there in order to be able to find them more easily later. To create a new folder, proceed as follows:



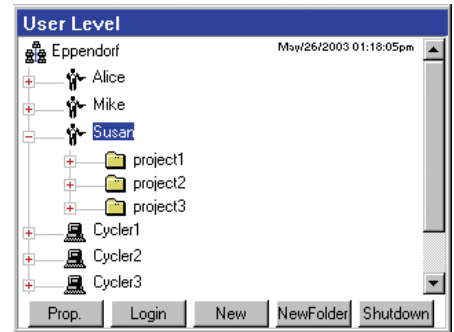
Move the marker to a user node.



Press the NEW FOLDER function key.



Accept the displayed folder name with OK or delete it with **Delete**.



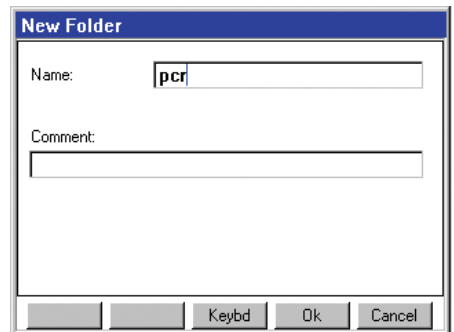
Enter new folder names when necessary. Letters can also be entered over **Keybd**.



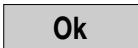
Go to the Comment field.



Accept comment with OK or delete with **Delete**.



Enter new comment if necessary. Letters can also be entered over **Keybd**.



Confirm entry with OK.

Programs can now be copied into the folders or created (see Ch. 3.7.4 and 3.7.5).

3 Operation

3.7.4 Creating programs

A logged in user can create programs underneath his nodes or in one of his folders. The editing functions for these programs are only accessible to the logged in user. Other users may only look at these programs and copy them.

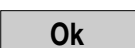
Proceed as follows to create a new program:



Mark the user or a folder.



Press NEW PROG function key.



Accept displayed program names with OK or delete with **Delete**.



Enter new program names if necessary. Letters can also be entered over **Keybd**.



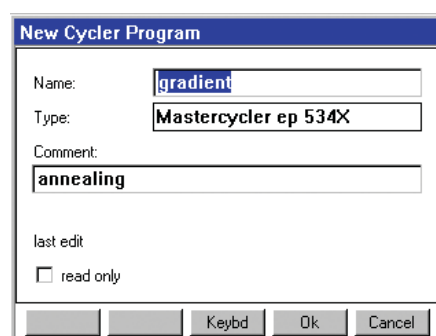
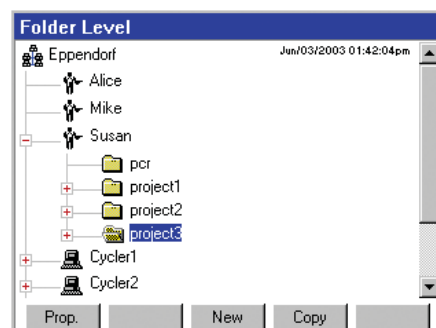
Go to the Comment field.



Enter new comment if necessary. Letters can also be entered over **Keybd**.



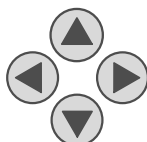
Confirm entries with OK.



3.7.5 Copying programs and folders

All programs and folders of other users can be copied into your own directory and started or edited there.

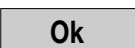
Proceed as follows to copy a program or an entire folder:



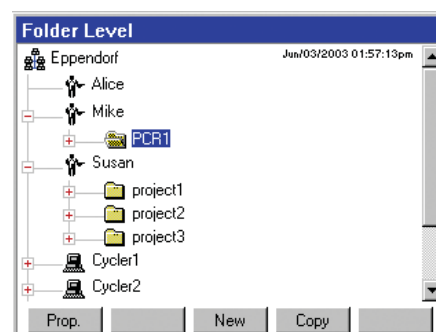
Move the marking to the folder or program to be copied.



Press COPY function key.



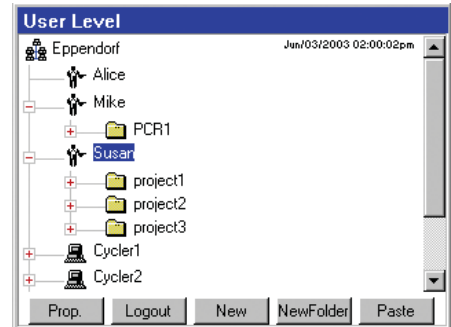
Dialog: Folder / Confirm "Program copied into clipboard" with OK.



3 Operation



Move marking to own user or to target folder.



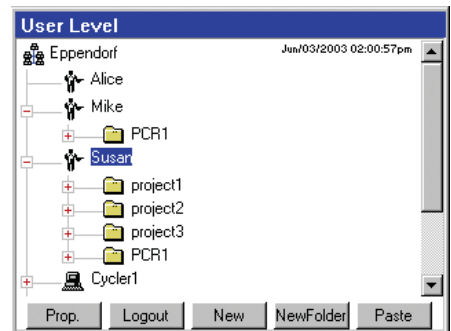
Note: It should thereby be noted that a folder can only be inserted under a user. Conversely, a program can be inserted either under a user or in a folder.



Insert folder or program with the PASTE function key.



Dialog: Confirm "Folder / Program pasted" with OK.



The copied folder / program appears in the navigation tree and can be processed in the program editor or started directly on a connected Mastercycler ep.

3.7.5.1 Copying programs and folders to/from the MultiMediaCard™

A MultiMediaCard can be used to store programs. To use a card to store programs, a backup needs to be performed first so that the user nodes are transferred to the card.

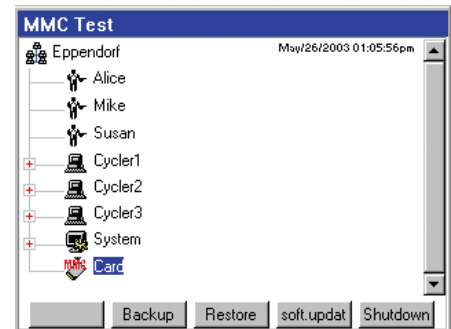
Plug an MMC into the Control Panel.



Perform a backup.



Open the MMC node, display users.



The administrator can see and edit all the user nodes on the MMC. A logged-on user has access only to his own user node on the MMC.

The programs can be saved to the MMC and transferred from the MMC to the Control Panel using the Copy and Paste functions.

Note: programs cannot be started directly from the MMC but must first be copied to a user node on the Control Panel.

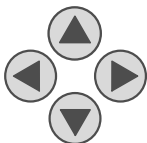
3 Operation

3

Operation

3.7.6 Deleting programs and folders

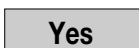
A program or folder can be removed from one's own user nodes in the navigation tree.



Move marking to the appropriate folders / program.



Press DELETE key.



Confirm enquiry with YES.

3.7.7 Properties

The function key "Properties" enables the display and changing of properties levels at which the marking is currently found.

User Properties

A logged-in user or the administrator can change the name, the PIN and the comment.

The user PIN is not visible to the Administrator.

Name:	Susan
PIN:	*****
Confirmation:	*****
Comment:	
Folders:	3
Programs:	6

Folder Properties

Under "Folder properties" it is possible to change the name and the comment of the folder concerned.

Name:	project2
Comment:	

Program Properties

Under "Program properties" it is possible to change the name and the comment.

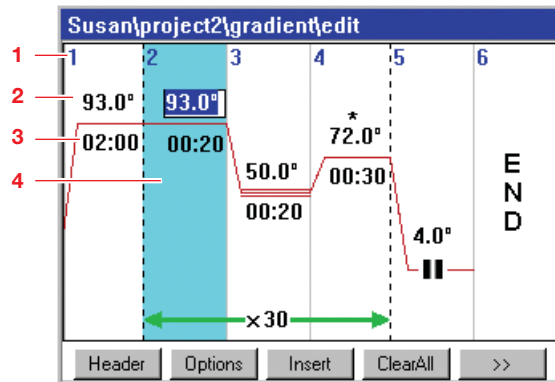
The time of the last change is displayed. By activating the checkbox "Read only", it is possible to write-protect the relevant program.

Name:	gradient
Type:	Mastercycler ep 534X
Comment:	
last edit	May.26.2003 11:29:36am
<input type="checkbox"/> read only	

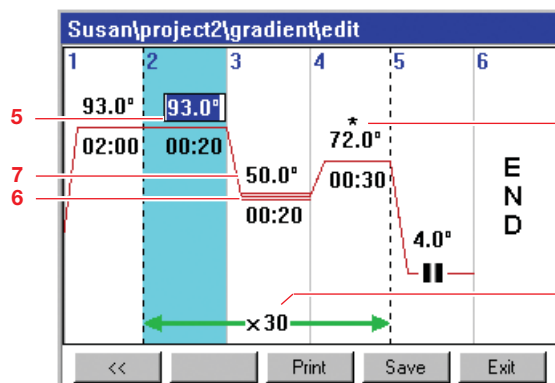
4 Programming

4.1 Program editor

Graphic programming is simple in the program editor. The most important information is presented clearly and immediately in the graphic and can be directly edited. Additional settings of the program steps can be carried out in a dialog. Various program steps can be inserted into and removed from the graphic.



- 1 Number of the program step
- 2 Temperature
- 3 Holding time
- 4 Marking of a step



- 5 Marked input field
- 6 Set gradient
- 7 Median temperature of the gradients
- 8 Additional settings for the temperature step
- 9 Number of cycles

4.1.1 Function keys in the editor

- Header** Program header; settings for control strategy and heated lid behavior (see Ch. 4.3.1).
- Options** Expanded setting options of a temperature step (see Ch. 4.2.1).
- Insert** Insert a new program step (see Ch. 4.3.3).
- Clear all** Deletion of the entire editor (see Ch. 4.3.3).
- >>** **<<** Activation of the hidden function keys.
- Print** Print the program in list form on a connected printer.
- Save** Save the edited program (see Ch. 4.3.2 and 4.3.3).
- Exit** Leave the program editor.

4 Programming

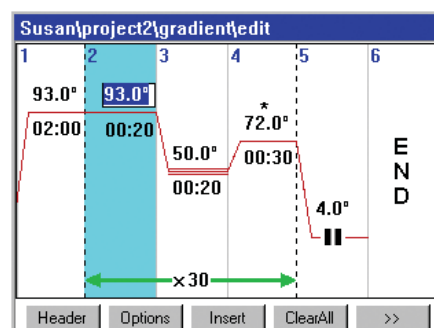
4.2 Program steps

The various program steps available for programming are explained in the following along with their parameters.

4.2.1 TEMP - Temperature

Temperature step, which can be inserted at any point in the program. The main parameters of the temperature step, temperature and holding time, are represented in the editor graphic and can be directly edited there.

TEMP	Nominal temperature in Celsius
Allowable values:	4.0 to 99.0 °C
Input steps:	0.1 °C
Time:	Holding time in minutes and seconds
Allowable values:	00:01 to 99:59 mm:ss
Input steps:	1 s

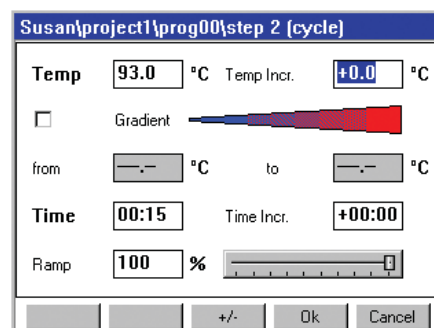


Additional functions of the temperature step can be accessed over the function key **Options**.

Temp Incr - Temperature increment:

Increase / decrease of the temperature of the programmed temperature step to the next cycle by this amount.

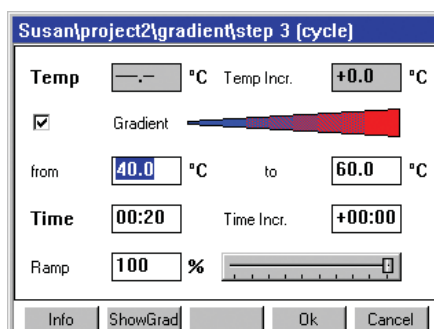
Standard setting:	0.0 °C
Allowable values:	0.0 to 10.0 °C
Input steps:	0.1 °C
Temperature increase:	+
Temperature decrease:	-



Gradient:

When using the gradient function, each column of the Thermoblock is set to a different temperature. If the marking is found on the check box, this can be activated by pressing the **Enter** key. As soon as this is activated, the temperature fields from / to will be released and the Temp and Temp Incr fields will be simultaneously deactivated.

Standard setting:	deactivated
from Temp:	Temperature of the left block side
Standard setting:	40.0 °C
Allowable values:	30.0 °C to 99.0 °C
Input steps:	0.1 °C
to temp:	Temperature of the right block side
Standard setting:	60.0 °C
Allowable values:	30.0 °C to 99.0 °C
Input steps:	0.1 °C



The temperatures of the individual columns can be viewed with the **ShowGrad** function key. The maximum spread of the gradients depends upon the Mastercycler ep used. A homogenous temperature distribution is maintained over the entire block when the gradient function is switched off.

4 Programming


Time Incr. – Time increment:

Increase / decrease of the holding time of the programmed temperature step to the next cycle by this amount.

Standard setting: 00:00
Allowable values: 00:00 to 01:00
Input steps: 1 s
Time increase: +
Time decrease: -


Susan\project2\gradient\step 3 (cycle)

Temp °C Temp Incr. °C

Gradient 

from °C to °C

Time Time Incr.

Ramp % 


Ramp – Heating and cooling rates:

Speed at which the set temperature of the programmed step is achieved.

Standard setting: 100 %
Allowable values: 1 to 75 % and 100 %
Input steps: 1 %


Susan\project2\gradient\step 3 (cycle)

Temp °C Temp Incr. °C

Gradient 

from °C to °C

Time Time Incr.

Ramp % 

For procedures involving slow heating or cooling, various values can be given for the ramp. The current value will then be displayed in the input field. The heating and cooling rates depend upon the Mastercycler ep used.

4 Programming

4

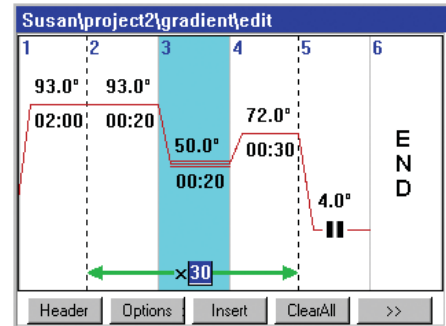
Programming

4.2.2 Cycle

The Cycle command contains temperature steps, which are repeated according to the number entered.

Number of Temp - number of repetitions with which the temperature commands are to be run through.

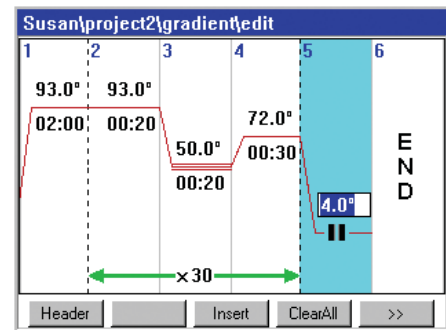
- Standard setting: 30
- Allowable values: 1 to 99
- Input steps: 1



4.2.3 Hold

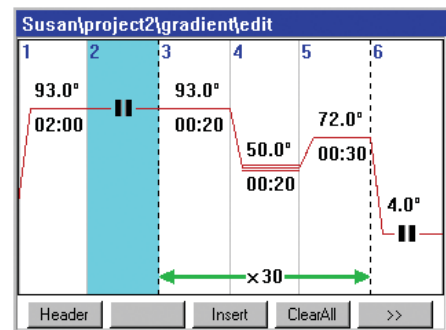
The program maintains the temperature at the entered value until the **Enter** key is pressed.

- Standard setting: 4.0 °C
- Allowable values: 4.0 °C to 99.0 °C
- Input steps: 0.1 °C



4.2.4 Pause

The program is stopped and the temperature remains at the last value of the last temperature command. The program continues after the **Enter** key is pressed.

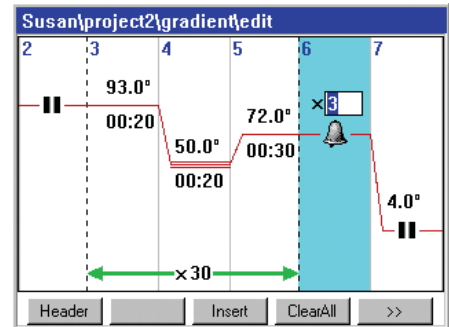


4 Programming

4.2.5 Sound

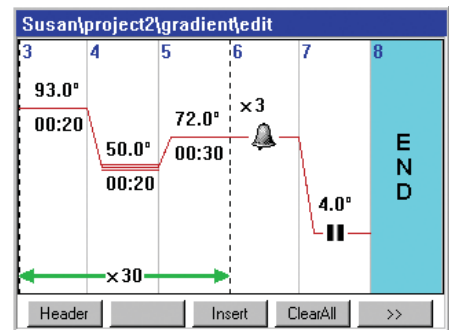
It is possible to issue an acoustic signal to announce a programmed pause or the end of the program.

Sound
 Standard setting: 3
 Allowable values: 1 to 9 (number of signals)
 Input steps: 1



4.2.6 End

The end mark appears automatically at the end of the program. All other program steps can be inserted before this point.



4.3 Create program

4.3.1 Header settings

The header settings form the program header, in which the control strategy and the behavior of the heated lid are set with reference to the program. The Header dialog is accessed with the **Header** function key in the program editor.

Lidtemp. heated lid temperature. When 0 °C to 36 °C is entered, the heated lid remains switched off. An entry of more than 110 °C will be reset to 110 °C.

Allowable input values: 37 °C to 110 °C
 Input steps: 1 °C

4 Programming

4

Programming

ESP heated lid

Depending upon the input, the program will start either prior to or after reaching the entered lid temperature.

The heated lid is first lowered and the program started after reaching the set temperature.


The lid descends automatically following the program start.

Switch off lid at low Block temp.

Depending upon the input, the heated lid will be switched off at low block temperatures.

If block temperatures of less than 37 °C are maintained for more than 5 minutes, the heated lid will shut off automatically.

The lid heater is first switched off at the end of a program.

Remark: If the last command in a program is a hold step, the heated lid remains switched on until the  key is pressed.

Mastercycler ep

any
any
gradient
gradient S
384

Selection of the Mastercycler ep. Here you can select from the Mastercycler ep gradient, ep gradient S and ep 384 devices.

All Mastercycler ep are distinguished by their heating and cooling rates and partly by their gradient spreads. ANY can be set if no particular block has been planned for the program. (Standard setting: ANY)

NOTE: If a program is started on a block type other than that set in the header, a message will appear on the display, bringing it to your attention that the program was created for a particular block, and that some settings may deviate on the basis of different block characteristics (gradient spreads, heating and cooling rates).

Control

block
block
sim. tube

The type of regulation of the block temperature control is established with this command.

The temperature on the Thermoblock is measured and the nominal temperature then set. (Standard setting) The temperature of the Thermoblock is adjusted to the temperature of the tubes and the sample volume by the software depending upon the tube type.

Simulate Mastercycler

Enables the simulation of the temperature characteristics of the Mastercycler / Mastercycler gradient, in order to guarantee simple transferability of already established programs.

With this setting it is possible to simulate the temperature control behavior of a Mastercycler / Mastercycler gradient and thus to establish protocols from the Mastercycler in general without further optimization on the Mastercycler ep.

Protocols taken over from the Mastercycler may need to be optimized again, because the temperature characteristics vary and may influence the PCR results.

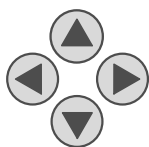
Pulse

On Mastercycler ep gradient devices, it is possible to accelerate initial heating up once more using the Pulse function.

4 Programming

4.3.2 Create program with program template

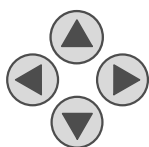
In order to generate a program, either the program template automatically available in the editor for each newly created program can be edited or any other existing program can be changed.



Mark the program.



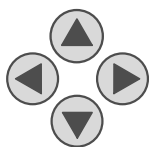
Open the program editor. Or press **Enter** key.



Move the marking to the desired field



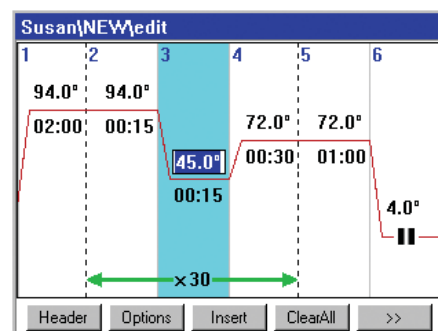
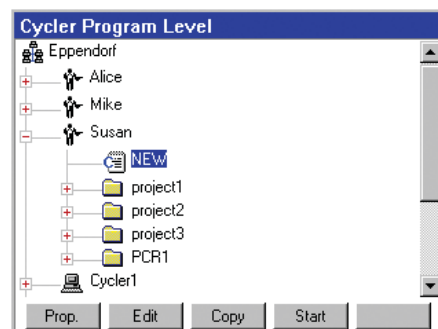
Enter new value and confirm with **Enter**.



Move marking to the next field.



Enter new value and confirm with **Enter**.



If other setting options are to be changed for temperature commands, the dialogue can be called up with the **Options** function key. All further settings (increments in the cycle, gradient function) can be set there (see Ch. 4.2.1).

In order to establish the properties for the heated lid temperature control and the temperature control, a dialog is called up with the **Header** function key, in which all necessary settings can be changed (see Ch. 4.3.1).



Save the edited program.

If the changes carried out are to be rejected, the user can leave the editor with the **Exit** function key without saving the program.
















4 Programming

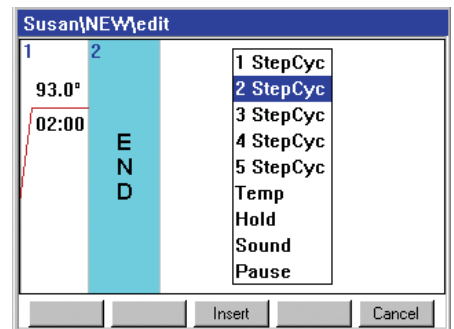
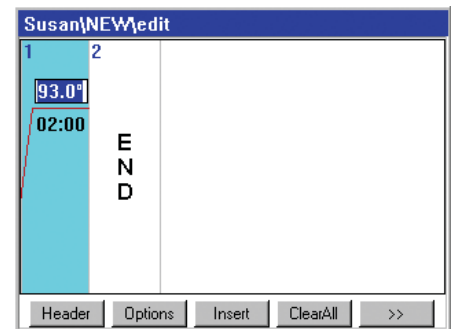
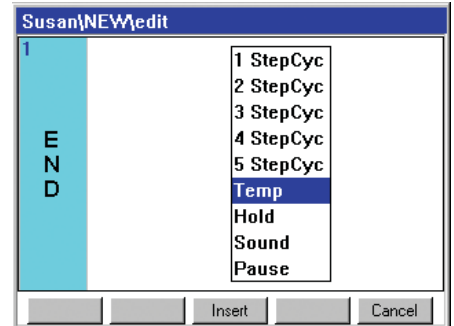
4

Programming

4.3.3 Create program without template

In order to create a program without a program template, the complete program can be deleted to the final mark from the editor with the **Clear all** function key and an new program created.

- Insert** Open the selection window.
-   Select the program step.
- Insert**
or
 Insert the selected step to the left of the mark.
-  
 Confirm input of the desired temperature with Enter.
-  Change to the input field for hold time.
-   
 Input desired hold time and confirm with Enter.
-  Move the mark.
- Insert** Open the selection window.
-   Select the program step.
- Insert**
or
 Insert the selected step to the left of the mark.



4 Programming



Enter

Confirm input of the desired temperature with Enter.



Change to the input field for hold time.



Enter

Input desired hold time and confirm with Enter.



Change to the input field for number of cycles.



Enter

Confirm input of the desired number of cycles with Enter.



Change to the next temperature step.



Enter

Confirm input of desired temperature with Enter.



Change to the input field for hold time.



Enter

Confirm input of desired hold time with Enter.



Move the mark.

Insert

Open the selection window.



Select the program step.

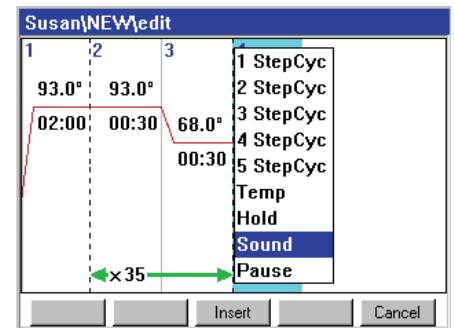
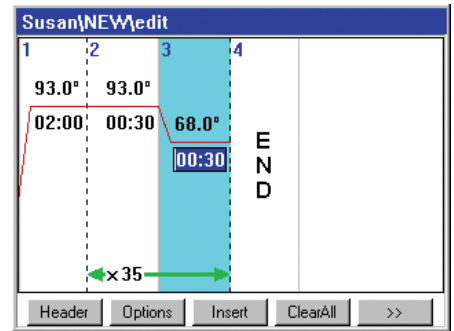
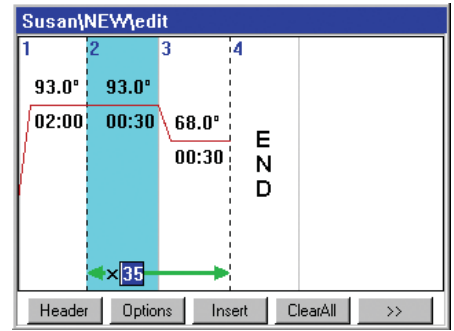


Insert

or

Enter

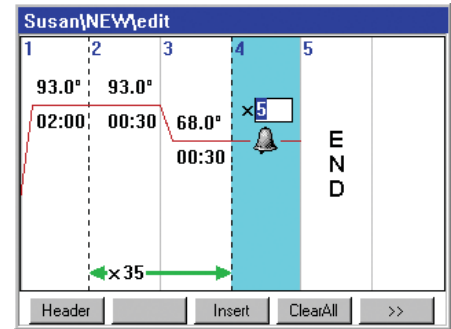
Insert the selected step to the left of the mark.



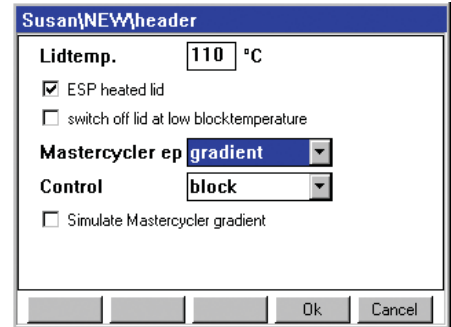
4 Programming



Confirm input of cycle number with Enter.



Invoke the header.



Enter the desired lid temperature.



Move the mark and switch off the function.
Switch off lid at low block temperatures.



Move the mark and open the selection window for the block type.



Select the block type and confirm with Enter.



Accept the header settings.



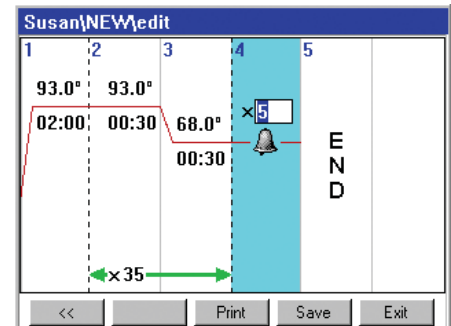
Change the function key assignment.



Save the program.



Exit the editor.



4 Programming

4.4 Transfer program

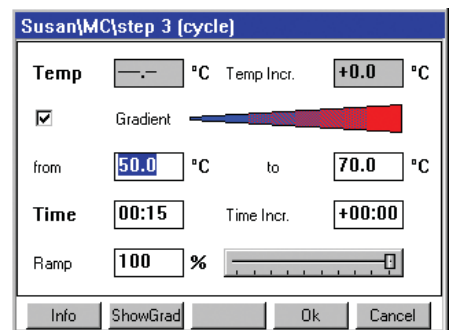
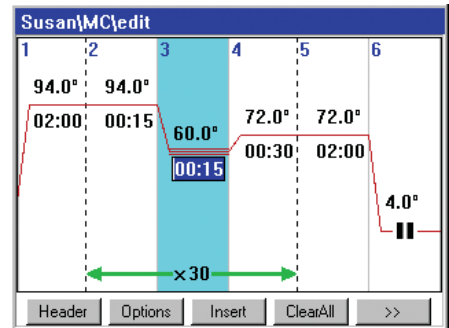
4.4.1 Transfer program from Mastercycler / Mastercycler gradient to the Mastercycler ep

PCR programs already established on the Mastercycler / Mastercycler gradient can easily be transferred to the Mastercycler ep without first having to optimize the temperatures and hold times again.

Enter the Mastercycler program into the Mastercycler ep editor.

```

1 T = 94.0 °           0:02:00
2 T = 94.0 °           0:00:15
3 T = 60.0 °           0:00:15
  +0.0 °               +0:00
  R = 3.0 °/s          +0:0 °/s
  G =10.0 °
4 T = 72.0 °           0:00:30
5 GOTO 2               REP 29
6 T = 72.0 °           0:02:00
7 Hold 4.0 °           ENTER
    
```

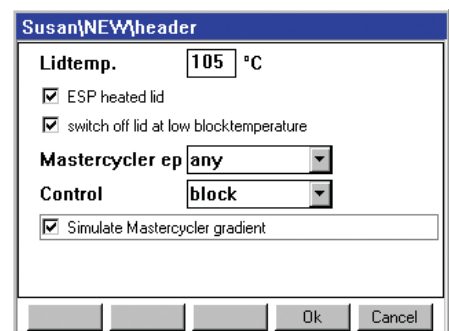


Input of the header settings

```

Lid 105 °
Wait      △ ESP heated lid
auto      △ switch off lid at low blocktemperature
Control block
    
```

Activation of the Checkbox Simulate Mastercycler



After saving, a program can be started on the Mastercycler ep without renewed optimization of the parameters.

5 PCR run / operation

5.1 Preparation

5.1.1 Sample loading

In order to achieve an optimum temperature transition, it should be ensured that the tubes sit correctly in the Thermoblock and do not wobble. Tubes that are not sufficiently temperature resistant (to app. 120 °C) may not be used.

This generally also applies for foils for sealing PCR plates. Due to the controllable lid heating it is also possible to use foil that melts at over 100 °C. The lid heating could be set to 95 °C for example.

The Mastercycler ep gradient and Mastercycler ep gradient S can be loaded with up to 96 PCR tubes (0.2 ml) or one 96-well PCR plate. In order to guarantee even pressure of the heated lid when using tubes, we recommend positioning a tube in each corner of the Thermoblock. Additional tubes should be evenly distributed in the block.

The Mastercycler ep 384 can be loaded with a 384-well PCR plate.

5.1.2 Sample volume

The temperature control can be set to the Thermoblock or to the tubes and sample quantities used. In the program header of each PCR program it is possible to choose between the temperature modes Block, sim Tube and active Tube under the menu point Control (see also Ch. 4.3.1). The adjustment to the tubes and sample volumes takes place at the start of the program. The sample quantity should then be

0.2 ml PCR tubes and 96-well PCR plates between 10 µl and 100 µl

384-well PCR plates between 5 µl and 25 µl.

5.2 Start program

A logged-on user can start a created PCR program in a variety of ways.

From the editor:

Save

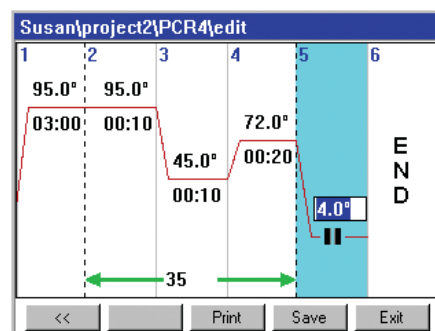
Save the generated program.

Insert the sample tube.

Draw the ESP heated lid forwards over the samples (only necessary for manual operation).

Start

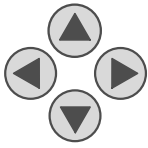
Start the program.



In order to attain optimally distributed pressure when using only a few sample tubes, these should be inserted in the middle and empty tubes in the four corners of the Thermoblock,

5 PCR run / operation

In the navigation tree:



Move mark to the program.

Insert sample tube.

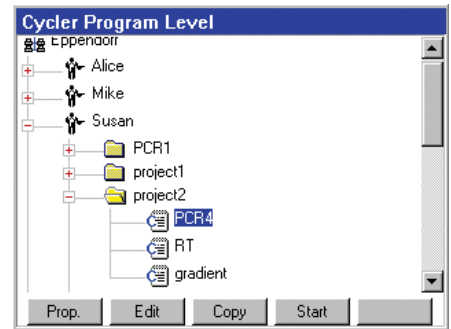
Draw the ESP heated lid forwards over the samples (only necessary for manual operation).

Start

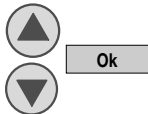
or

Start

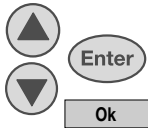
Start the program.



The following input should be made after the program is started:



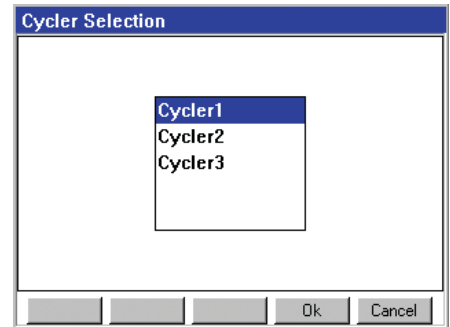
Select a connected Thermocycler (only with several connected devices).



Select of the tube type used



Input of the filling volume (only for Control: sim Tube).

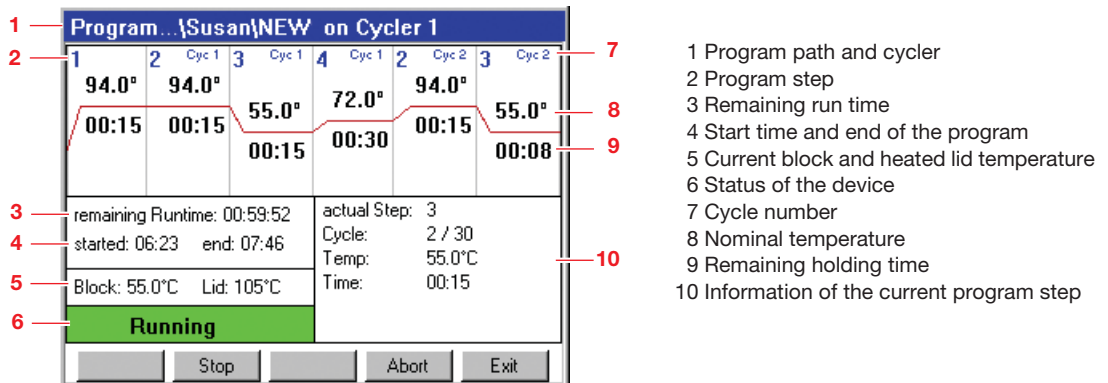


The program starts and the status display appears after this input is made.

5 PCR run / operation

5.3 Status display

The status display appears immediately following the start of a program. The progress of a running program can be followed in the status display. Current program information is shown. The presently active step is recognized as a blinking line in the graphic display. In addition to the graphic display, program-specific information is shown in two information boxes.



5.3.1 Exit the status display



The status display can be left with Exit.

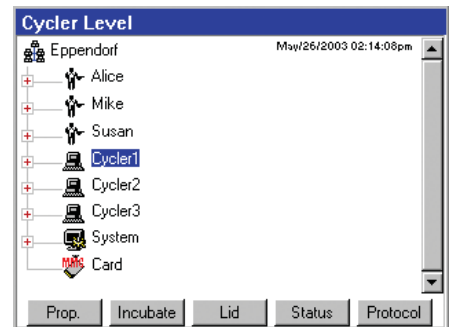
5.3.2 Calling up the status display



Mark the desired Mastercycler ep.



Call up the status display.



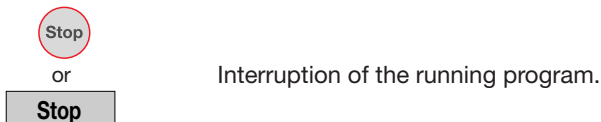
5 PCR run / operation

5.4 Functions in the status display

The following functions in the status display are possible while a program is running:

5.4.1 Interruption under a running program

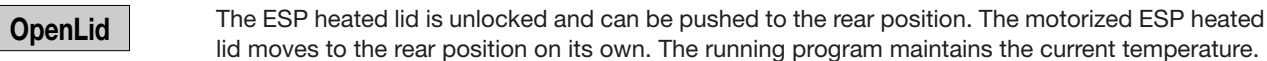
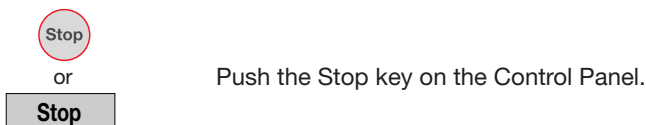
The program can be interrupted, for instance, in order to add reagent.



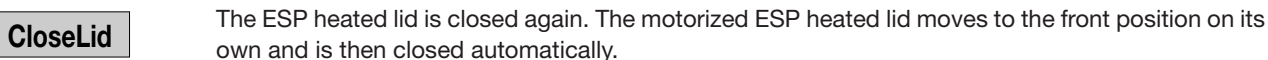
The current temperature of the block and the lid is maintained and the colored status display changes to yellow and shows paused.

5.4.2 Opening and closing the ESP heated lid

The heated lid can be opened as follows while the program is running.



If the program is then resumed, the ESP heated lid is again pulled forward over the samples.



5.4.3 Continue program

A stopped program can be continued at any time.



The program is continued at the point of interruption and the colored status display changes to green again and shows running.

5.4.4 Abort program

A running program can be aborted at any time.

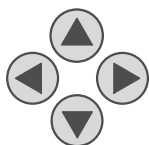


Program "idle" appears in the display.

5 PCR run / operation

5.5 Protocol

For purposes of documentation following the run of a PCR program, the affiliated protocol can be saved either on the MMC™ or printed on a connected printer.



Move mark to the desired program under the Mastercycler ep.

Protocol

Invoke the protocol.

Print

Print out on a connected printer.

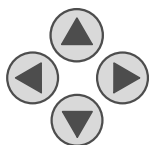
Export

Save the protocol on a MMC™.

Note: The next start of a program on the Mastercycler ep results in the deletion of the protocol and the creation of a new one.

5.6 Remove from operation

The system must be shut down in order to switch off the Mastercycler ep.



Move mark to the Eppendorf System or Card node.

Shutdown

Shut down the system.



Following the shutdown it is possible to switch off all connected Mastercycler ep with the power switch.

6 Maintenance

The device may only be opened by a qualified specialist. The device guarantee becomes defunct with unauthorized work on the device!

6.1 Cleaning

The device must be switched off and the mains plug pulled before maintenance or cleaning is carried out.



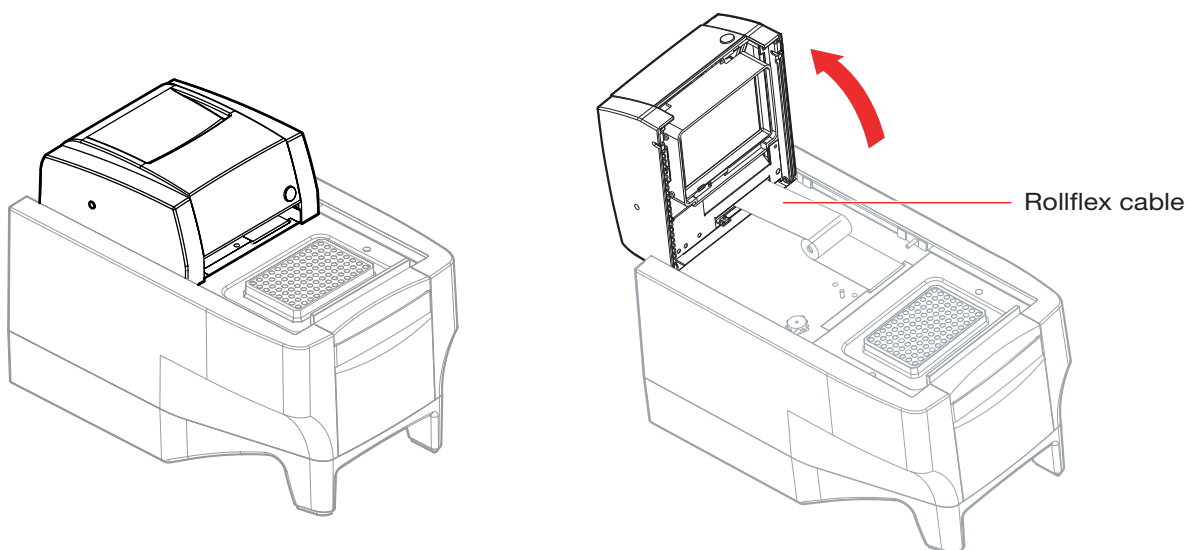
Thermblock, inner side of the heated lid and micro test tubes / PCR plates reach temperatures of more than 50 °C very quickly. There is a danger of burns!

Keep heated lid closed until the temperature reaches 30 °C or less.

It should be ascertained that no liquid penetrates into the device.

The device should be protected from organic solvents and aggressive chemicals. Make sure that no liquid penetrates into the interior of the device. For reasons of safety the device must always be shut off and the plug pulled when cleaning the device. The surface of the Mastercycler ep and the Control Panels can be wiped off with a damp cloth or with mild lab cleaner.

The heated lid can be popped up for purposes of cleaning. To do this the heated lid must be pushed into the rear position. The heated lid can then be popped up into a vertical position.



Be careful of sharp edges when cleaning the heated lid (e.g. rollflex cable).

When opening and closing the lid or when popping it up into the cleaning position, be careful not to let the fingers come between the lid and the housing of the device, where they can be pinched or caught.

Impurities on the heated lid can be removed with water or a mild lab cleaner.

6 Maintenance

6.2 Emergency unlocking of the heated lid

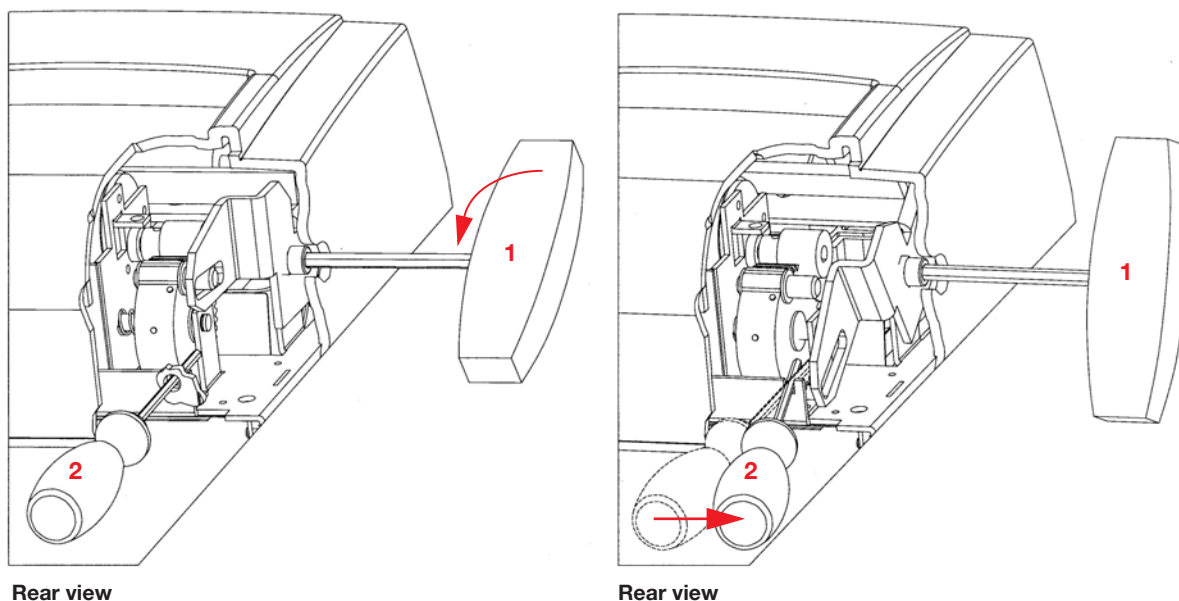
In the event of a power failure, it is possible to open the heated lid by an emergency unlocking method. The two tools for emergency lid unlocking are required for this.

Before the emergency unlocking operation is performed, the device must be switched off and the mains plug removed.

Turn the device round so that the rear is visible.

Remove the two plastic plugs in the heated lid.

Position the tools at right-angles in the holes provided as shown in the illustration..



Rear view

Rear view

- Turn Tool 1 approx. 30° in the direction of rotation shown by the arrow and hold in this position.
- Move Tool 2 at right-angles to this in the direction shown by the arrow until unlocking is clearly heard, then remove Tool 2.
- Continue to move Tool 1 in the direction of rotation and **slowly and evenly** push the lid back by hand, then remove Tool 1.

After the lid has been unlocked by the emergency method, the lid should be engaged again.

- To do this, connect the device with the mains cable and switch it on. The lid automatically moves back into its initial position and engages.

7 Troubleshooting




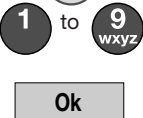
It is possible to eliminate faults in programming or in the handling of the device by correcting the cause of such faults which is shown in the display.

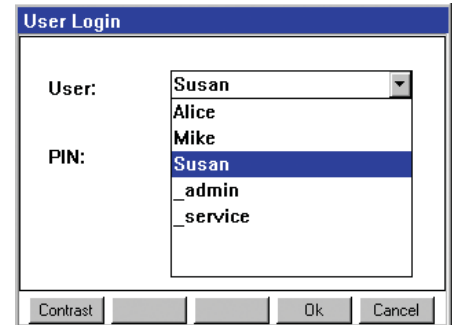
Technical faults may be triggered by faults such as a power failure or power fluctuations. In most cases it is therefore sufficient simply to switch the device off and back on again after about 10 seconds. If the fault occurs again, please note the fault code (e.g. 0x0B04) shown in the display and inform Eppendorf Service.

8 Short instructions


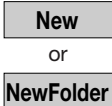
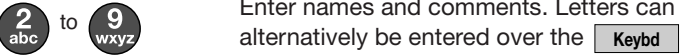

8.1 Login

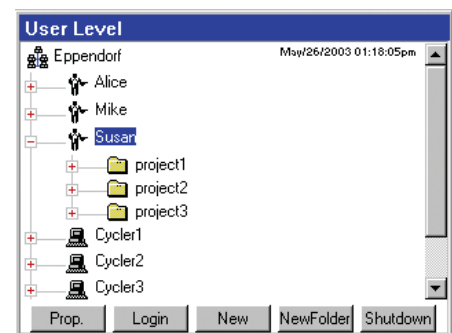
The Login dialog first appears when the device is switched on. The Login dialog can be reached from the navigation tree through the Login key when the marking stands on a user.

-  Open the selection list.
-  Select user and confirm.
-  Enter PIN.
-  Confirm the entry.


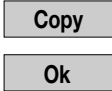

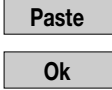


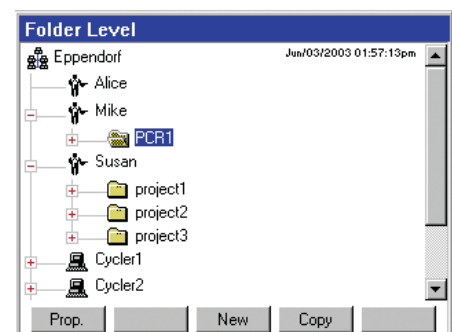
8.2 Creating folders and programs

-  Select user or file.
-  Create new program or new folder.
-  Enter names and comments. Letters can alternatively be entered over the **Keybd**.
-  Conform the entry.



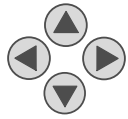
8.3 Copying of files and programs

-  Select folder or program.
-  Copy folder/ program into the clipboard.
-  Move marking to target folder or user.
-  Paste the folder or program.



8 Short instructions

8.4 Deleting programs and folders

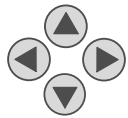


Select folder or program.



Delete the folder or program.

8.5 Creating a program



Select program.



Open program editor.



Set the lid temperature, lid functions and control mode.



Confirm the header settings and return to the program editor.



Move the marking in the graphical interface.



Enter the temperatures, hold times and number of cycles directly in the graphical interface.



Expanded setting options for temperature steps: Gradient setting, increment entries and ramp setting.



Insert program steps to the left of the marking.



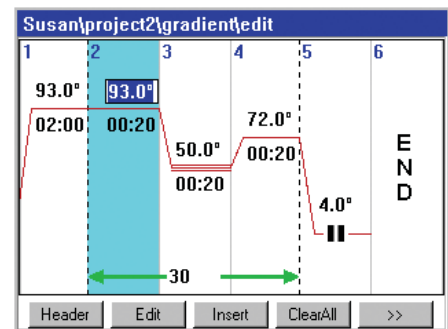
Delete the entire program editor.



Save the changed program.

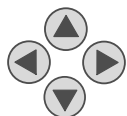


Exit the editor.



8 Short instructions

8.6 Starting the program



Move the marking onto the program.

Start

or

Start

Start the selected program.

Insert the sample tubes into the Thermoblock, pull the heated lid forwards over the tubes (only manual variants).



Ok



Selects a connected Thermocycler (only if several devices are connected).

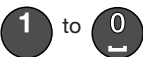


Enter



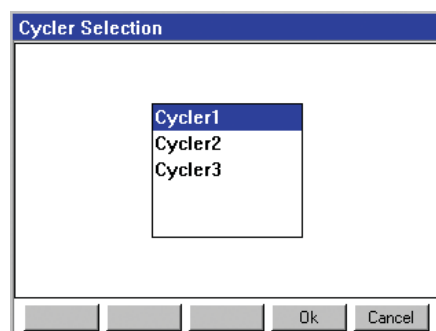
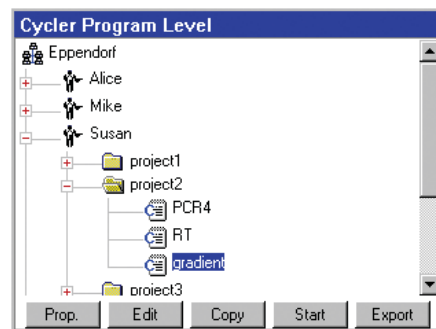
Ok

Selects the tube type used.



Ok

Enters filling volume (only for Control: sim tube).



8.7 Program run

Stop

or

Stop

Stop the running program.

Resume

Continue a stopped program.

Abort

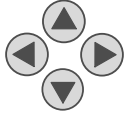
Interrupt a running or stopped program.

Exit

Leave the status display.

8 Short instructions

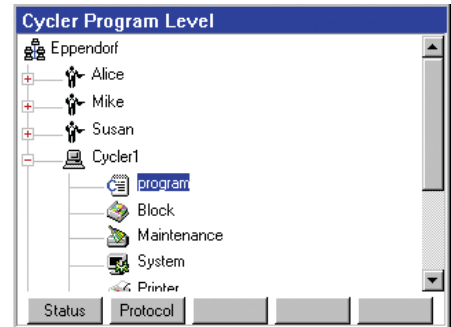
8.8 Calling up the status display



Status

Mark the program in the cyclers nodes.

Call up the status display.



8.9 Switching off the device

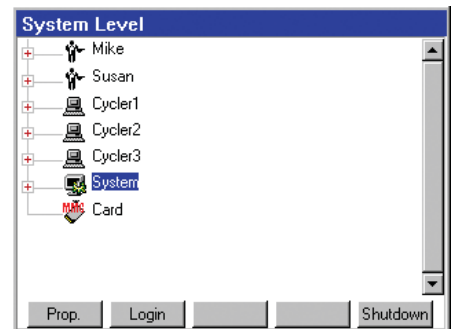


Shutdown

Move mark to the Eppendorf System or Card node.

Shut down the system.

Switch off device using the mains switch.



9 Technical data

9.1 Mastercycler ep

	Mastercycler ep gradient	Mastercycler ep gradient S	Mastercycler ep 384
Sample capacity	96 x 0.2 ml PCR tubes or a 96-Well PCR plate (unskirted, semi-skirted, skirted – according to SBS Standard)		one 384-Well PCR plate
Temperature control range of the block	4 °C to 99 °C		
Spread of the gradient	1 °C to 20 °C	1 °C to 24 °C	1 °C to 20 °C
Temperature range of the gradient	30 °C to 99 °C		
Temperature control range of the lid	37 °C to 110 °C	37 °C to 110 °C	37 °C to 110 °C
Block homogeneity 35 °C 90 °C	$\leq \pm 0.3 \text{ °C}$ $\leq \pm 0.4 \text{ °C}$		
Control accuracy	$\pm 0.2 \text{ °C}$		
Heating rate* Cooling rate*	app. 4 °C/s app. 3 °C/s	app. 6 °C/s app. 4.5 °C/s	app. 4 °C/s app. 3 °C/s
Dimensions (W x D x H) Weight	26 cm x 41 cm x 30.5 cm 17 kg		
Power source Consumption	100 V – 130 V, 50 – 60 Hz 200 V – 240 V, 50 – 60 Hz 800 W		
Over voltage category Degree of contamination Safety class	II (IEC 610 10-1) 2 1		
Ambient conditions Storage conditions	15 °C to 35 °C, 70 % rel. humidity, up to 2000 m above mean sea level -20 °C to 70°C, 85 % rel. humidity		


*Measured on the block

Technical specifications subject to change!

9.2 Control Panel

Number of Mastercycler ep thermomodules in selectable form	1 to 5
Number of programs	> 700
Number of folders	> 100
Max. number of cycles	99
Dimensions (W x D x H)	25 cm x 16.5 cm x 11 cm
Weight	1.2 kg
Power source	Supply occurs over connected thermomodule
Consumption	Occurs over connected thermomodule

Technical specifications subject to change!

The device has the  mark.