eppendorf

Register your instrument!
www.eppendorf.com/myeppendorf

CycleManager X50

Software Manual - English

From software version 2.2

The CycleManager X50 contains open source software. License information is available after installation under %PROGRAMFILES%\CycleManager\license.rtf

6349 900 066-03/032024

Table of contents

1 Operating instructions

1.1 Using this manual

Two manuals are supplied with the CycleManager X50 software:

- Software manual: The software manual describes how to use the CycleManager X50 software.
- Operating manual for the device: The operating manual for the device describes how to operate the Mastercycler X50 in conjunction with the CycleManager X50 software.

The current versions can be found on our webpage www.eppendorf.com/manuals.

Information on installing the device can be found in the Mastercycler X50 operating manual.

Information on installing the software can be found as a PDF file on the supplied data carrier.

The CycleManager X50 contains open-source software. After installation, the license information is available under the following, language-independent path: %PROGRAMFILES%\CycleManager\license.rtf

1.2 Symbols used

Depiction	Meaning
1. 2.	Actions in the specified order
▸	Actions without a specified order
•	List
Text	Display or software texts
ⓘ	Additional information

1.3 Abbreviations used

PCR
Polymerase Chain Reaction

PDF
Portable Document Format

USB
Universal Serial Bus

2 Safety

2.1 Intended use

The CycleManager X50 is a PC software for monitoring and controlling the Eppendorf Mastercyclers X50i, X50l and X50t, each without a control unit. This device is intended for general laboratory use and must only be operated by persons trained in laboratory techniques and procedures.

2.2 Antivirus protection

To protect the system against viruses and malware, the use of malware protection software is recommended. Each user is responsible for ensuring the system is not infected with viruses.

- If you have questions regarding malware protection software, contact your administrator or the manufacturer of the software.

2.3 IT security

To prevent unauthorized access, data loss, sample loss and data misuse, protect the CycleManager X50 against access from the Internet.

- Observe the basic security instructions when working with IT systems.
- Contact your network administrator.
- Set up a firewall.
- Use a VPN client if you access the internal network from an external source.

This software uses various network interfaces.

- You must not rename, remove or reconfigure the network interfaces during operation.

3 Installation

Information on installing the software can be found as a PDF file on the supplied data carrier.

API connection
The CycleManager X50 can be controlled with external programs via a software interface. For more information on the interface and detailed interface documentation, contact your local Eppendorf partner.

3.1 System requirements

3.1.1 CycleManager server

- Windows 10 Pro/Enterprise and Windows 11 Pro/Enterprise
- 4 GB RAM
- 2 TB of free hard drive space
- Intel Core i5, 2.8 GHz clock frequency (or higher)
- 1 network interface:
  If the server is to be integrated into the intranet, 2 network interfaces are required.
- Ethernet switch:
  Compatibility with IEEE 802.3 Ethernet switch at a data transfer rate of 10/100 MBit/s or 10/100/1000/... MBit/s
  Ensure that IGMP snooping from the IEEE 802.3 Ethernet switch does not interfere with the Mastercycler's network. To do this, disable IGMP snooping if present.

3.1.2 Cycler Bridge

A separate computer for the *Cycler Bridge* component is required in the following cases:
- The cyclers are not in the same subnet as the server with the CycleManager X50 software.
- Cyclers in remote laboratories should be connected to a server with the CycleManager X50 software via the intranet.

- Windows 10 Pro/Enterprise and Windows 11 Pro/Enterprise
- 1 GB RAM
- 250 GB of free hard drive space
- Intel Core i5, 2.8 GHz clock frequency (or higher)
- 2 network interfaces

3.1.3 Client

- *Chrome* Internet browser
- Screen resolution 1366 × 768 pixels (or higher)

3.2 Introduction

The CycleManager is a network-based software application and contains the following software components:

- CycleManager bridge
- CycleManager server

Depending on the area of application, these components can be installed together on one PC or distributed within the network infrastructure in various ways.

Prior to installing the CycleManager X50, discuss the following issues with the IT administrator:
- Integration of the CycleManager X50 into the network
- Installation
- Installation requirements, e.g., preparation of the corporate network, availability of the IT administrator on the installation day
- Access rights required for installation

3.3 CycleManager X50 components

3.3.1 CycleManager bridge

The CycleManager bridge runs in the background. The CycleManager bridge connects with the connected devices and forwards communications to the CycleManager server.

The CycleManager bridge must be installed on a computer that is directly connected to the devices or to the device network.

If the connected devices are not located in the same subnet as the server with the CycleManager X50 software, a separate computer is required for the CycleManager bridge.

3.3.2 CycleManager server

The CycleManager server runs in the background. The CycleManager Server receives traffic from at least one CycleManager Bridge.

The CycleManager server can be installed on the same computer as the CycleManager bridge. Alternatively, the CycleManager server can be installed on a different computer in the corporate network.

The CycleManager Server provides the web interface. You can access the CycleManager server with a browser. It can be accessed locally or via a computer in the corporate network.

The computer that hosts the CycleManager server also hosts the CycleManager database. The CycleManager database must be backed up at regular intervals.

3.4 Network configuration

Set the computer on which the CycleManager server is installed to automatically update the date and time.
Problems with the CycleManager may occur during operation if you change the date and time manually. If you are using a manual date and time display, note the following points:

- Set the date and time before installing the CycleManager server.
- Do not change the date and time after installing the CycleManager server.

You can install the CycleManager X50 in the network in 3 different ways.

3.4.1 Device network

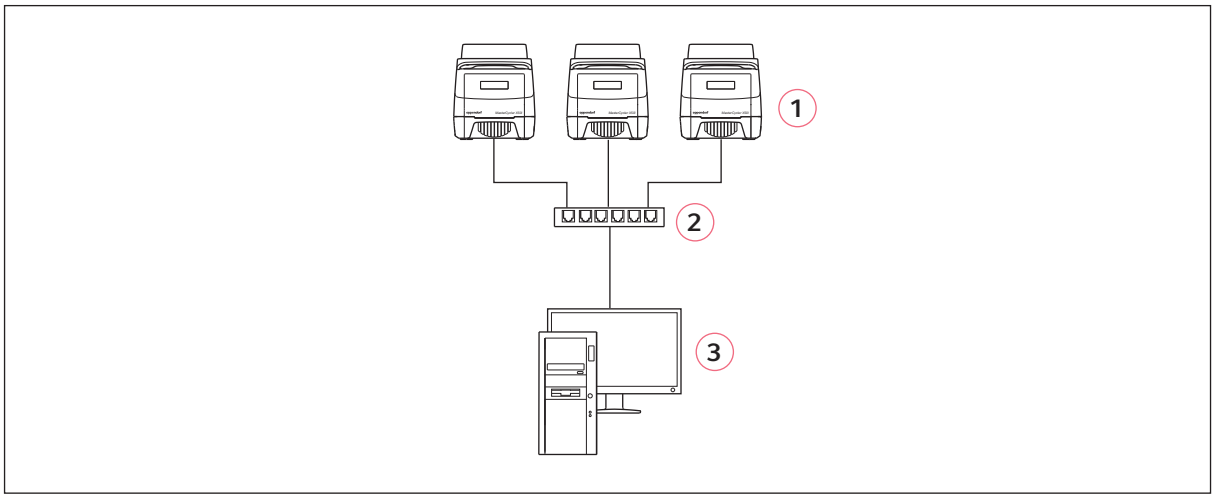


Fig. 3-1: Device network

1 Mastercycler X50

2 Ethernet switch

3 Device network computer

In the device network, the Mastercycler X50s are connected to a device network computer via an Ethernet switch. The device network computer is located near the devices.

The following software is installed on the device network computer:
- CycleManager bridge and CycleManager server software modules
- CycleManager database
- Chrome browser

Eppendorf SE does not provide an Ethernet switch.

Ensure that IGMP snooping from the IEEE 802.3 Ethernet switch does not interfere with the Mastercycler's network. To do this, disable IGMP snooping if present.

3.4.2 Distributed network

Synchronize the date and time on all computers in this network configuration.

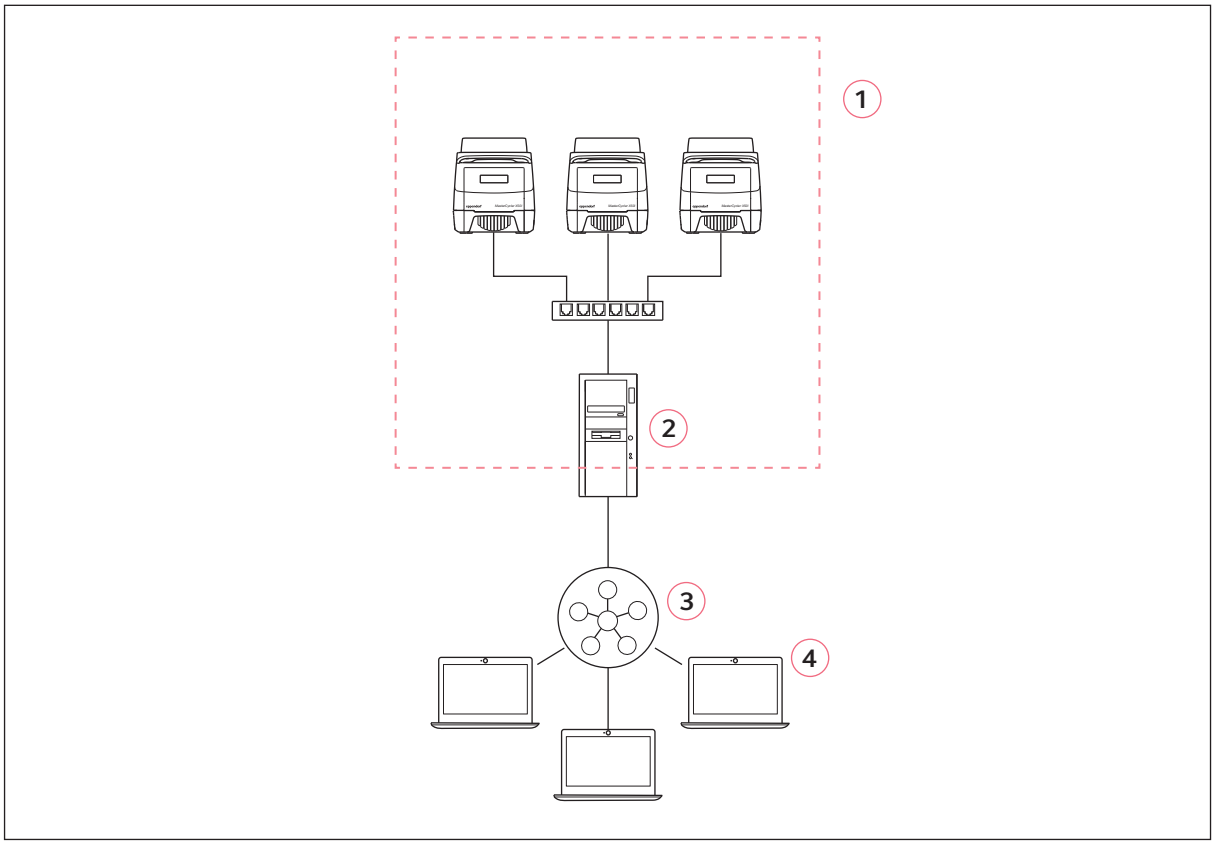


Fig. 3-2: Distributed network

1 Device network
(see *Device network on p. 13)*

2 Device network computer

3 Corporate network

4 Clients

In a distributed network, the Mastercycler X50s are connected to a device network computer via an Ethernet switch. The device network computer is connected to the Ethernet switch and the corporate network via 2 Ethernet interfaces. Multiple clients access the device network computer via the corporate network.

The following software is installed on the device network computer:
- CycleManager bridge and CycleManager server software modules
- CycleManager database

The following software is installed on the clients:
- Chrome browser

3.4.3 Multiple distributed network

Synchronize the date and time on all computers in this network configuration.

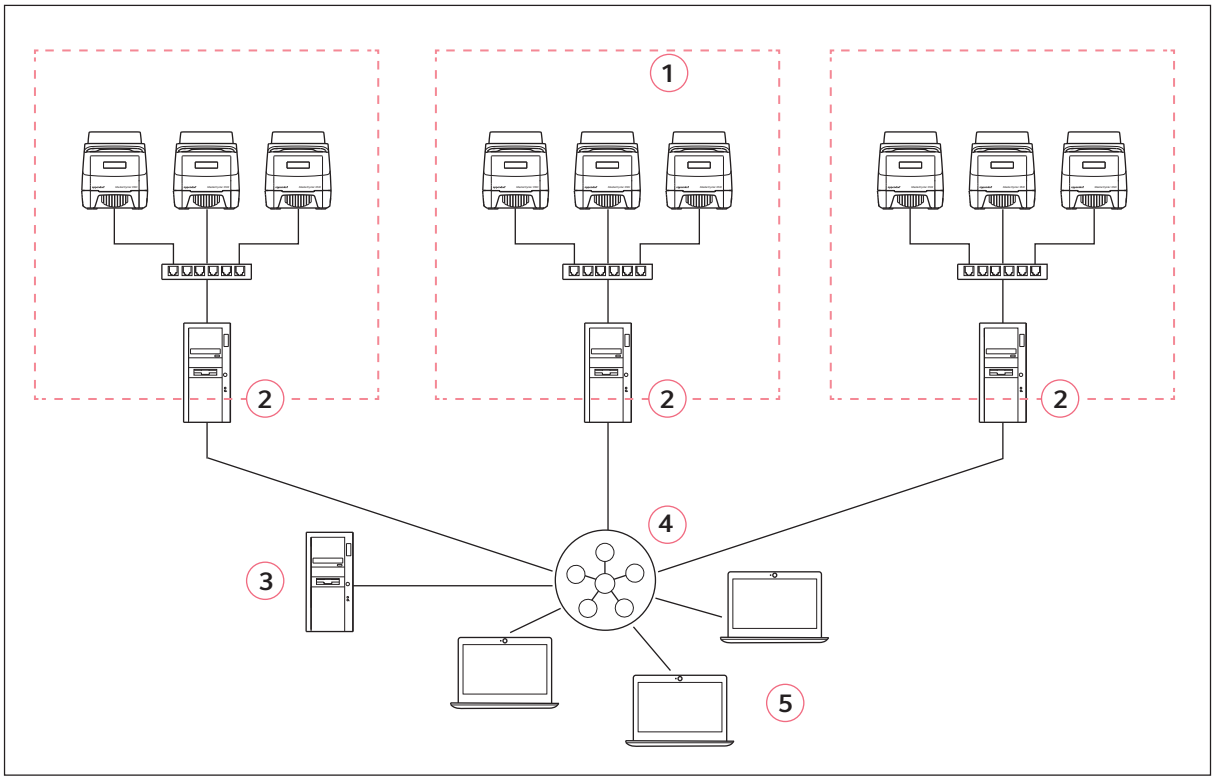


Fig. 3-3: Multiple distributed network

1 Device network
(see *Device network on p. 13)*

2 Device network computer

3 Server

4 Corporate network

5 Client

A multiple distributed network consists of multiple device networks. In each device network, the Mastercycler X50s are connected to a device network computer via an Ethernet switch. The device network computers are connected to the Ethernet switch and the corporate network via 2 Ethernet interfaces. A server connected to the corporate network communicates with the device network computers and provides the CycleManager X50 web interface. The installation can be used when the cyclers are in physically separate laboratories.

The following software is installed on the device network computers:
- CycleManager bridge software module

The following software is installed on the server:
- CycleManager bridge software module
- CycleManager server software module

The following software is installed on the clients:
- Chrome browser

3.5 Installing the CycleManager X50

3.5.1 Preparing installation

Before installing the CycleManager X50, discuss the following topics with IT administration:
- Integration of the CycleManager X50 into the network
- Carrying out the installation
- Installation requirements, e.g., preparation of the corporate network, availability of IT administration on the day of installation
- Access rights required for installation
- Devices to be managed by the CycleManager X50 must not be assigned to a Mastercycler X50 with a touch screen interface. Remove existing assignments of Mastercycler X50 to CycleManager X50.

The installation program configures the firewall of all computers on which the CycleManager X50 is installed.

To integrate the device network into the corporate network, allow communication via the following network ports on the corporate firewall:

Port number	Log	Direction	Activated for
1887	TCP	in	CycleManager bridge
5353	UDP	in/out	CycleManager bridge
3030	TCP	in	CycleManager server

Energy management
During installation, the computer's energy management is reconfigured.
If configuration fails, configure energy management manually with the following setting:
Sleep mode (normal operation) = OFF

3.5.2 Installing the CycleManager X50

Prerequisites
- You are logged in on the computer as administrator.
- The CycleManager X50 installation file is on a USB stick.

1. Connect the USB stick to the computer.
2. Double-click on the CycleManagerX50_Setup.exe file on the USB stick.

3. Read and confirm the safety instructions.

   Installation is started. You are guided through the installation.

4. Select the software modules to be installed.
   - *All features (default)*: For all networks. All modules of the CycleManager X50 are installed on the device network computer or the server.
   - *Bridge only*: For installation in multiple distributed networks. The CycleManager bridge module is installed on a device network computer.
   - *Selected components*: For installation in multiple distributed networks. The CycleManager server module and other software modules are installed on a server.

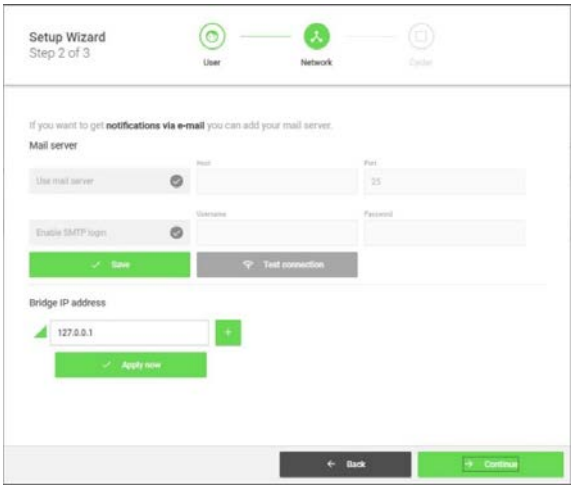
   If you selected the *Selected components* option, a list of all software modules appears. Modules that are already installed on the computer are disabled in the list.

   - ▸ To change the selection, click on a triangle.
   - ▸ Check whether installed modules are overwritten.

5. Restart the computer.

   After restarting the computer, it will take 2 minutes for all software components to start. The installation is then complete and you can configure the software.

3.5.3 Configuring the CycleManager X50



Once the installation is complete, you will be guided through the configuration process. The software starts a configuration wizard. The configuration wizard supports you with the following tasks:

- Creating a user
- Configuring the network
  If you have a device network installed, the software automatically configures the network.
  If you have a distributed network or a multiple distributed network installed, you must enter the IP addresses of all device network computers in the configuration wizard. To do this, enter the IP address of a bridge computer in the *Bridge IP-Adresse* field. To add a bridge computer, press the **+** key next to the field.
- Assigning connected cyclers

3.6 Performing an update

3.6.1 Performing a software update

Prerequisites

- You are logged in on the computer as administrator.
- The CycleManager X50 is on a USB stick.

1. Connect the USB stick to the computer.
2. Double-click on the CycleManagerX50_Setup.exe file on the USB stick.
3. Read and confirm the safety instructions.

   Installation is started.
   The older software version is uninstalled.
   You are guided through the installation.
4. Restart the computer.

   After restarting the computer, it will take 2 minutes for all software components to start. The installation is then complete.
   The update is complete. The CycleManager X50 is up to date.

3.6.2 Firmware update

The firmware is integrated in the CycleManager X50 software.

If you connect a Mastercycler X50 without a user interface to the CycleManager X50 software, the device's firmware will be automatically updated.

3.7 Uninstalling the CycleManager X50

3.7.1 Deleting the CycleManager X50 program

Prerequisites

- You are logged in on the computer as administrator.

1. If you are using the Windows 10 operating system, select the *Windows > Settings > Apps > Apps & features* menu path.
2. Select CycleManager X50.
3. Press the *Uninstall* button.

   You are guided through the uninstallation.
4. Restart the computer.

   Uninstallation is complete.

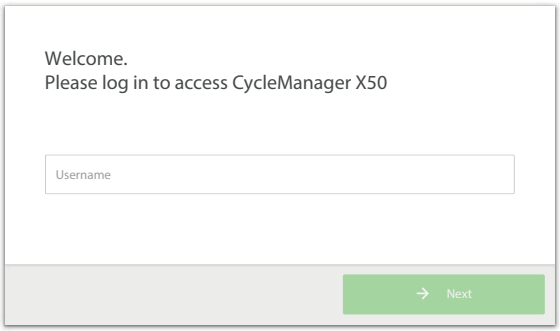
4 Operation
4.1 Operating the user interface
4.1.1 Logging users in and out

To protect your login data, note the following points:
- Use a secure password.
- Change your password once a year.
- Do not write down your passwords.
- Disable the autofill feature in your browser.

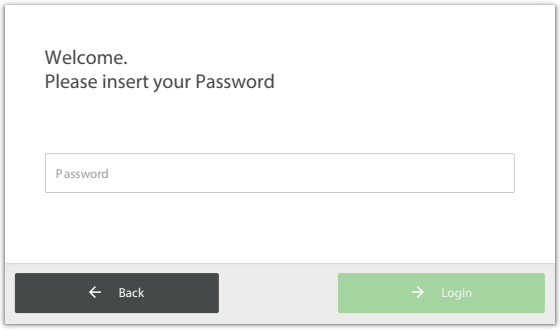
1. Start the *Chrome* Internet browser.
2. Start the CycleManager X50: Enter *localhost:3030* or *<IP server installation>:3030* in the *Chrome* address bar.

   The login window appears.

Logging in a user



3. Enter the user name and confirm with *Next*.



4. Enter your password and confirm with *Login*.

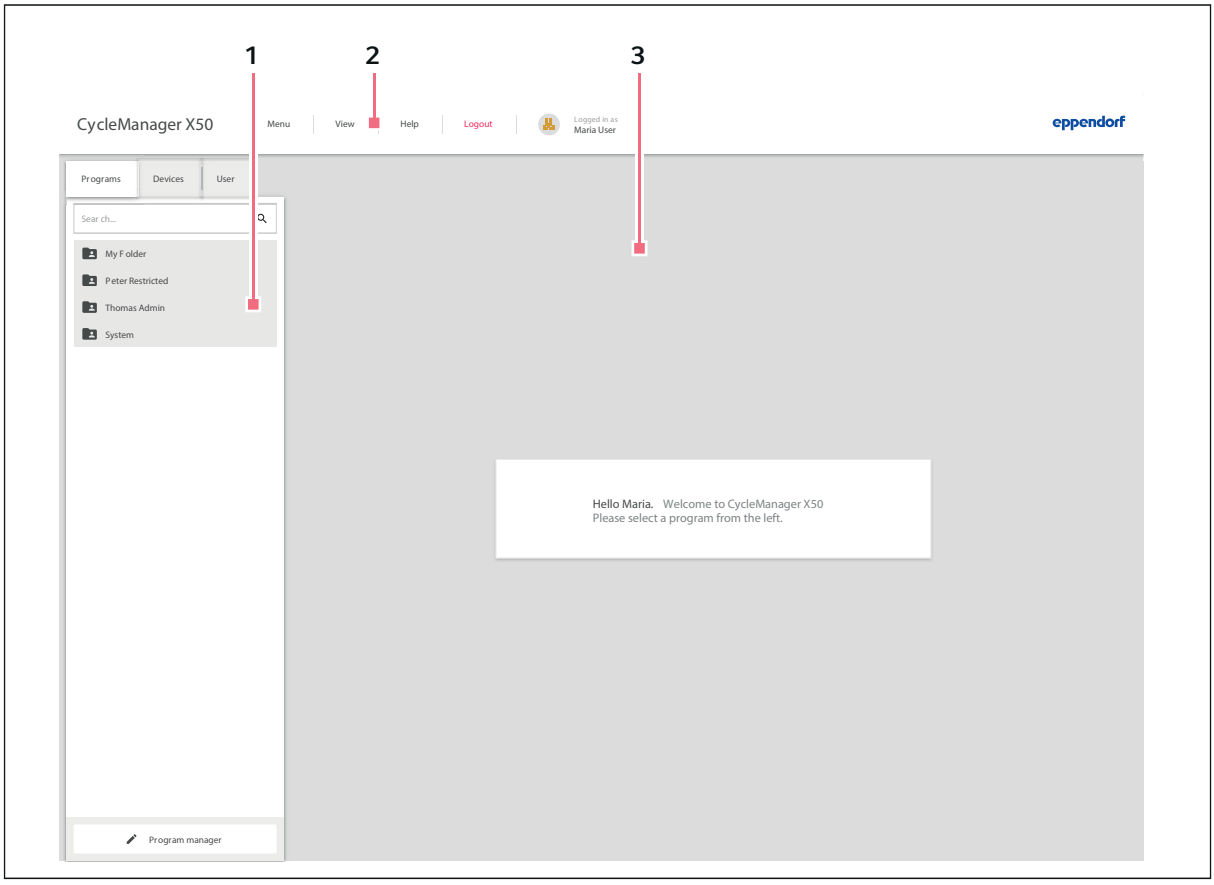
   If you entered the correct password, the user is automatically logged in.
   The start window appears.

Logging out a user

1. Click on *Logout* in the menu bar.

   The user is logged out and the login window appears again.

4.1.2 Start window

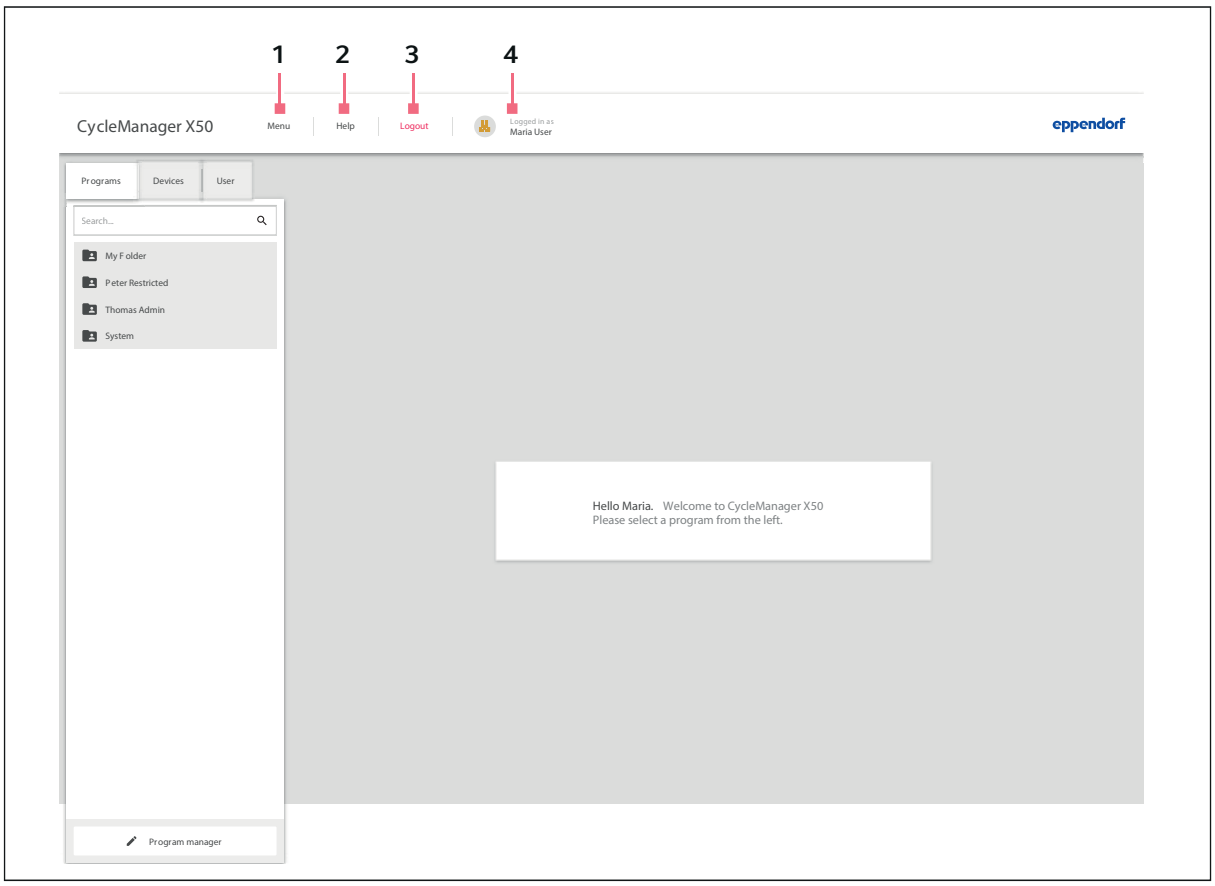


1 Navigation area
The navigation area is where programs, devices and users are managed. Users with standard rights and administrators can directly access the *Program manager* in the navigation area.

2 Menu bar

3 Editing window
The editing window is where, for example, PCR programs are edited or the connected devices are controlled.

4.2 Menu bar



1 *Menu*

2 *Help*

3 *Logout*

4 **Logged-in user**

4.2.1 Calling up the menu

1. Click on the *Menu* button.
   The menu items are displayed.
2. Select the menu item.

4.2.2 Menu > Info, Service Contact, Network, Backup/Restore

- **Info**
  - Software:
    Current software version

  - Server resources:
    Free hard drive space
  - Copyright
  - User:
    Logged-in user

- **Service Contact**
  - Service partner contact details
- **Network**
  - Prerequisite: two e-mail addresses are entered in the user profile. Configure an e-mail address for notifications on a mail server. Configure the second e-mail address for sending run records/ protocols.
    You can use the first e-mail address to send the following notifications by e-mail:
    The PCR program is in the final hold step.
    The PCR program is in the completed state.
    Program start message
    The set service function for a device will soon be necessary.
    The device is in an error state.
  - Configure the IP address of the bridge server.
    The server's IP address is entered by default. Enter additional IP addresses manually.

    Note: Do not rename the interfaces used on the computer with the bridge server during operation.

- **Backup/Restore**
  Backup and restore the entire database (login data, programs, etc.).
  Backup: The database can be backed up manually or automatically at regular intervals.
  If an automatic backup is created, the first backup will occur after the set interval has expired.
  Example: With a weekly backup, the database is backed up for the first time after a week.
  Restore: When database restoration starts, users have 5 minutes to complete all ongoing work.
  After the *Restore*, restart the PC with the server installation.

4.2.3 Menu > Settings

Only the administrator can make settings in the *Settings* menu item.

- **Firmware**
  - Firmware status:
    Current firmware version for all connected devices.
  - Upload date:
    Date when the firmware was last changed.
  - Upload firmware:
    Depending on the settings under *Menu > Settings > Service > Disqualification*, a firmware update may lead to the disqualification of all connected devices.

    You can search for and select the file with the firmware via the input line. If the update is performed, the new firmware is installed on all connected devices.

    If devices with a different firmware version are added, the firmware is automatically adjusted to the firmware version of the CycleManager X50.

- **Restart**
  - If the *Auto restart* function is activated, the program that is currently running will automatically continue after a mains/power outage. The *Max interrupt time* parameter determines how long a mains/power outage may last. The current program will not continue if power is restored to the device after this time has elapsed.
- **Service**
  - Reminder functions for self test, verification and assay validation. Once the specified limits (intervals and number of program runs) have been exceeded, the device can be tested using these functions. Depending on the disqualification setting, an appropriate test must be carried out.
  - *Disqualification:*
    Specify conditions when the device is no longer qualified.
  - *Disqualification on software changes* (Mastercycler X50 firmware)
  - *Disqualification on hardware changes*
  - *Disqualification on failed self-test*
  - *Disqualification when verification expires*
- **Assign Devices**
  - *Assigned to this cyclemanager*:
    All devices assigned to the CycleManager are displayed.
  - *Not assigned to this cyclemanager*:
    All devices that are recognized by the CycleManager via the network and are not assigned to this CycleManager are displayed.

4.2.4 Menu > Program manager

Program manager (see *Programming on p. 31)*

4.2.5 Menu > Log/Events/Protocols

You can call up the following views in the *Events* window:

- *Log* are messages that come from the server.
- *Events* come from the cycler and have all notification types: *Alarm, Warning, Notice*
- *Protocols*: List with the logged program runs

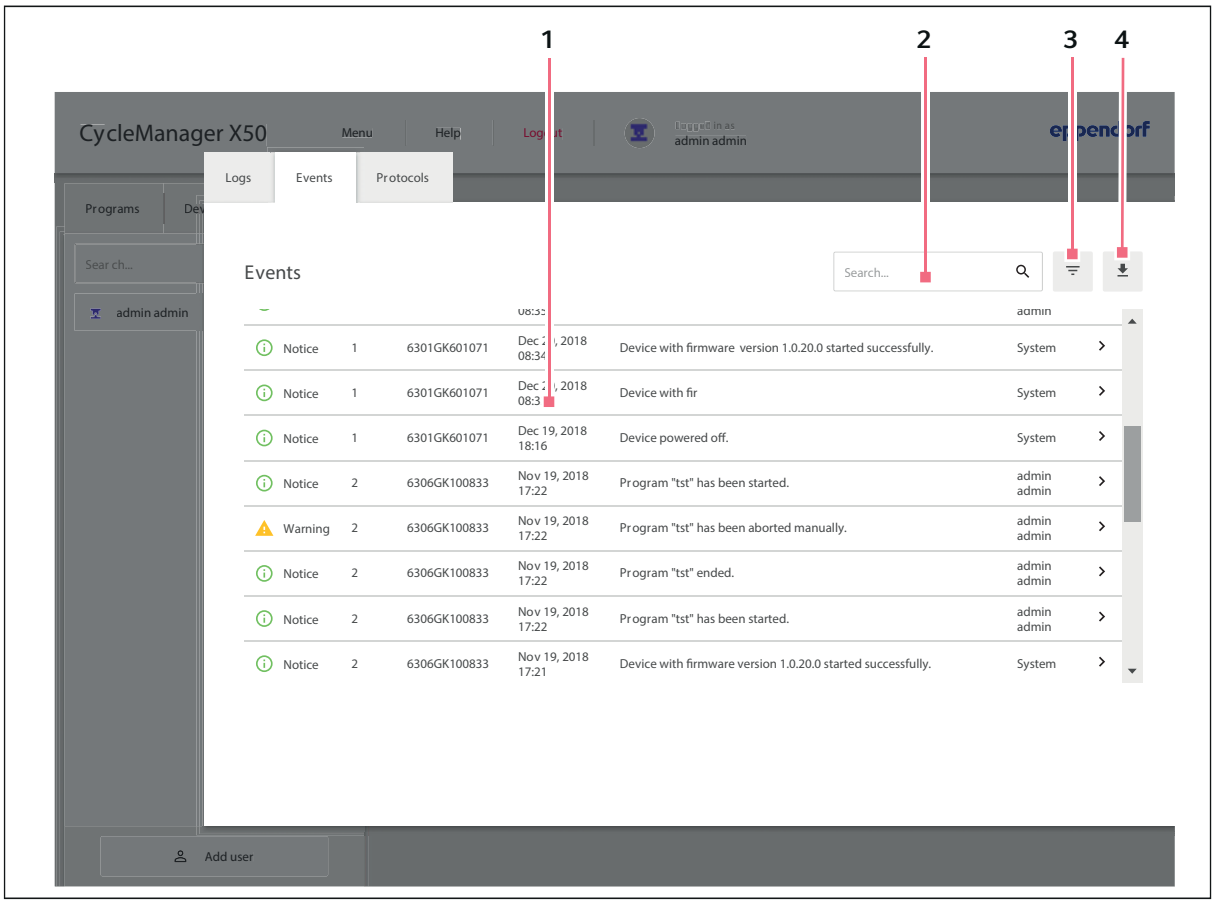


Fig. 4-1: Events

1 Notification or message

2 Search field

3 Filter options

4 Export the displayed event list to the download folder

Calling up *Events*

1. Call up the *Menu*.
2. Select the *Events/Log* menu item and the *Events* tab.

Filtering the event list

3. Click on the filter options button.

   The filter options selection opens.
   - *Device number*: Number on the device display
   - *Serial number*: Serial number of the device
   - *Priority*: Priority of the notification (*Warning or higher, Alarm or higher, Error*)
   - *Timespan*: Period in which the notification was made (*Start Date, End Date*)
   - *Acknowledgement status*: Status of the notifications (*Acknowledged, Not acknowledged*)
   - *Program*: Filtering by program name

4. Select the filter option.
   An input mask appears or a selection with further filter options.
5. Fill in the input mask or select the filter option.
6. Confirm the entry with *Add Filter* or cancel with *Cancel*.
   The filtered notifications and messages are displayed.

If a filter is activated, a symbol appears behind the filter option.

To deactivate a filter, click on the symbol behind the filter option.

Calling up more information

- Select a notification or message from the event list.
  The window with the information about the selected notification or message appears.
  The window is closed with *Close*.

Exporting the event list

- Click on the Export button.
  The event list is saved as a CSV file in the download folder.

4.2.6 Menu > Log

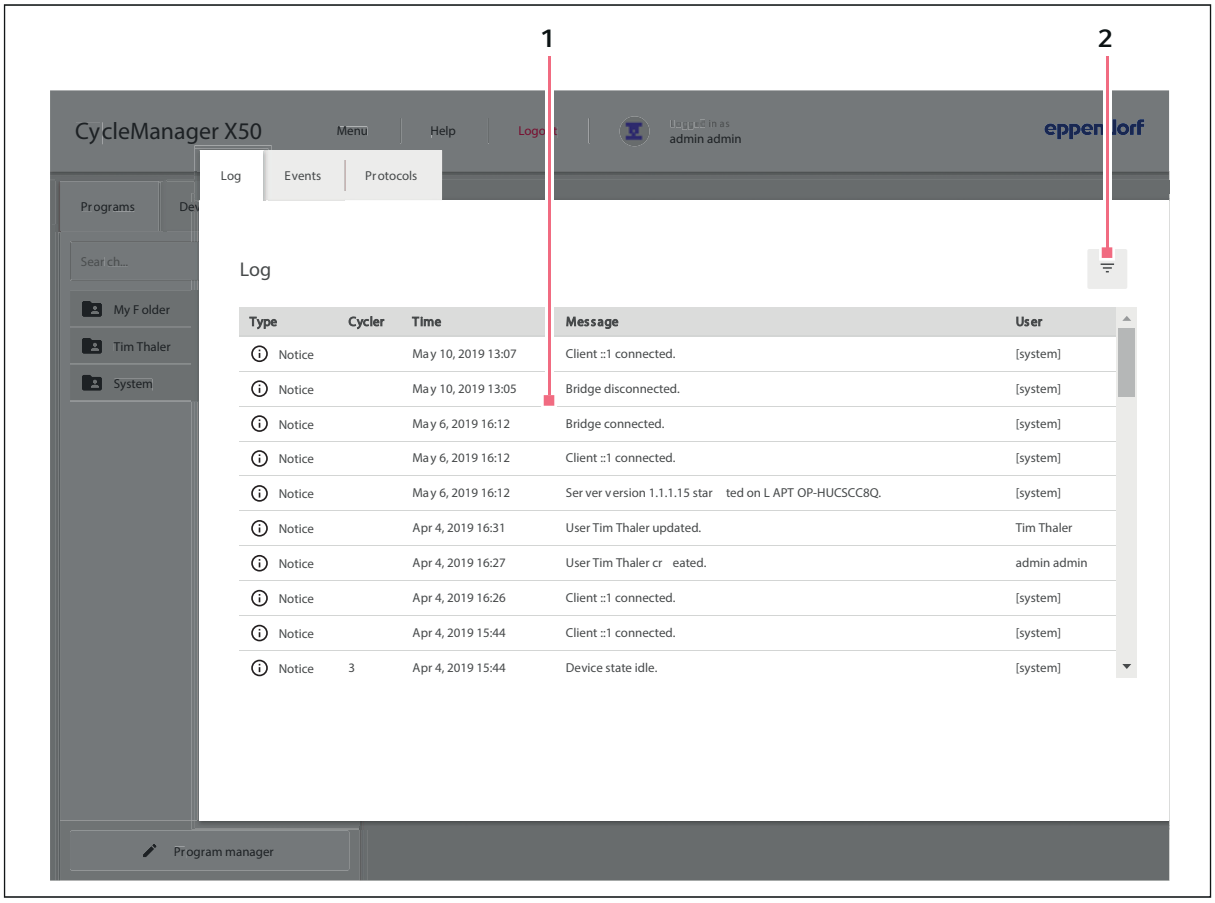


Fig. 4-2: Log

1 Message

2 Filter options

Calling up *Events*

1. Call up the *Menu*.
2. Select the *Events/Log* menu item and the *Log* tab.

Filtering the *(Log)* list

3. Click on the filter options button.

   The filter options selection opens.
   - *Device number*: Number on the device display
   - *Serial number*: Serial number of the device
   - *Priority*: Priority of the notification (*Warning or higher, Alarm or higher, error*)
   - *Timespan*: Time of the notification (*Start Date, End Date*)

4. Select the filter option.

   An input mask appears or a selection with further filter options.

5. Fill in the input mask or select the filter option.
6. Confirm the entry with *Add Filter* or cancel with *Cancel*.
   The filtered list is displayed.

If a filter is activated, a symbol appears behind the filter option.

To deactivate a filter, click on the symbol behind the filter option.

4.2.7 Menu > Protocols

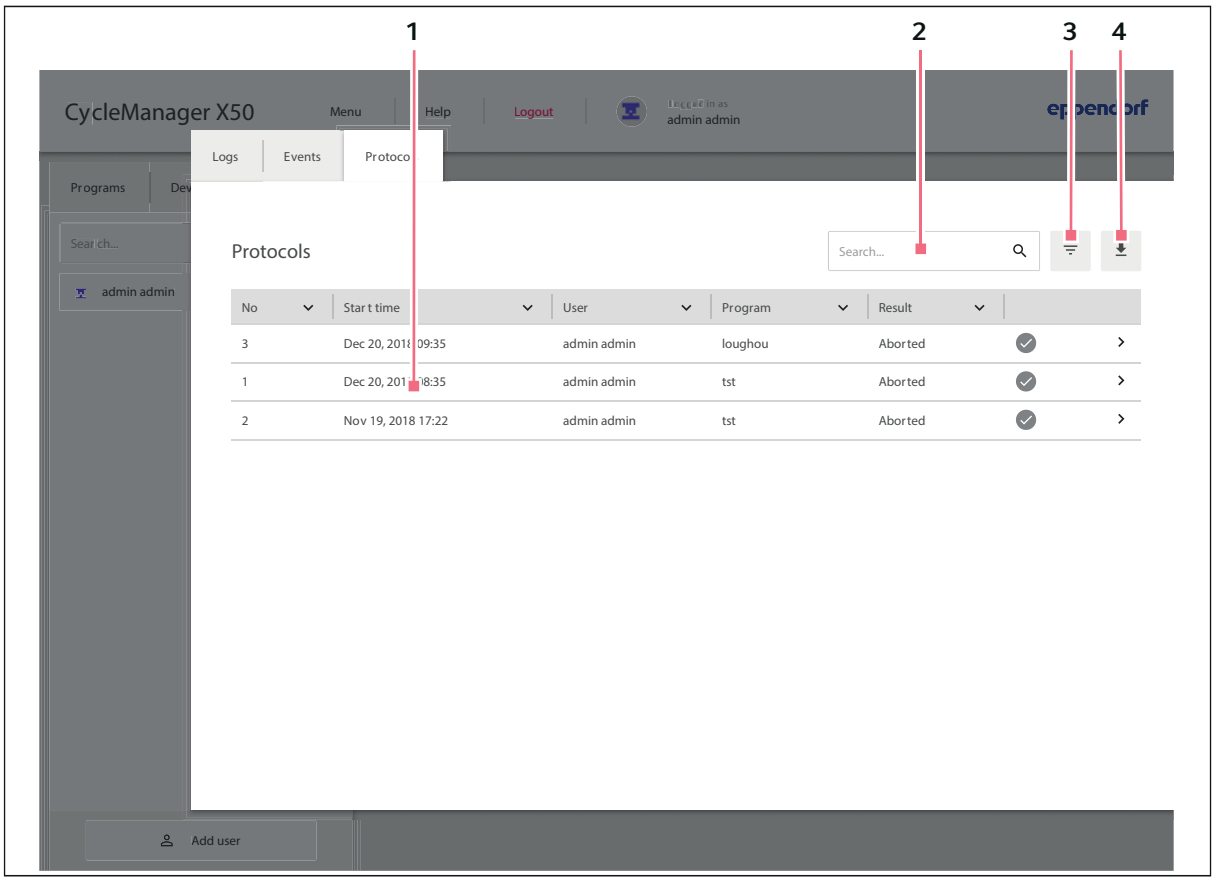


Fig. 4-3: Protocols

1 Protocol entry

2 Search field

3 Filter options

4 Export

Calling up the protocol

1. Call up the *Menu*.
2. Select the *Protocols* menu item.
   The list of logged program runs appears.

Filtering protocol entries

3. Click on the filter options button.

   The filter options selection opens.
   - *Device number*: Number on the device display
   - *Serial number*: Serial number of the device
   - *Timespan*: Time of the notification (*Start Date, End Date*)

4. Select the filter option.

   An input mask appears.

5. Fill in the input mask.
6. Confirm the entry with *Add Filter* or cancel with *Cancel*.

   The filtered protocol entries are displayed.

If a filter is activated, a symbol appears behind the filter option.

To deactivate a filter, click on the symbol behind the filter.

Exporting protocol entries

1. Select the protocol entries for the export.
2. Click on the Export button.

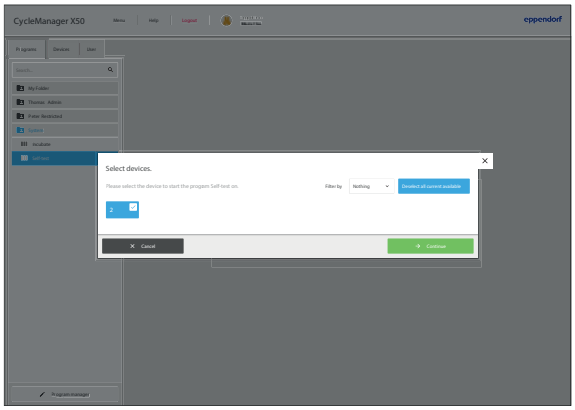
   All the selected protocols are saved in a PDF file in the download folder.

3. To complete the process, confirm the message.

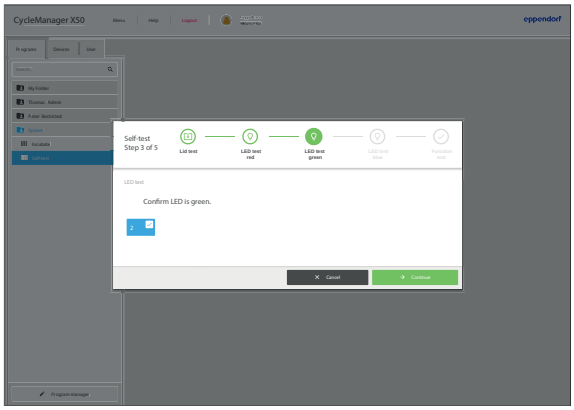
4.3 Self test

Any user can perform the self test.

You can use the self test to check that the thermocyclers are functioning correctly without any additional aids.

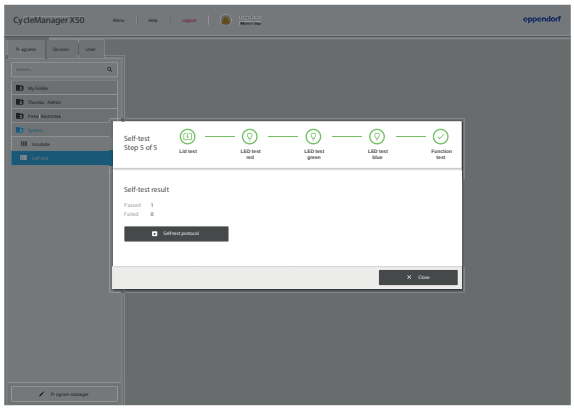


1. Call up *Self test* under *Programs* > *System*.
2. Select the device.
3. Continue by selecting *Continue*.



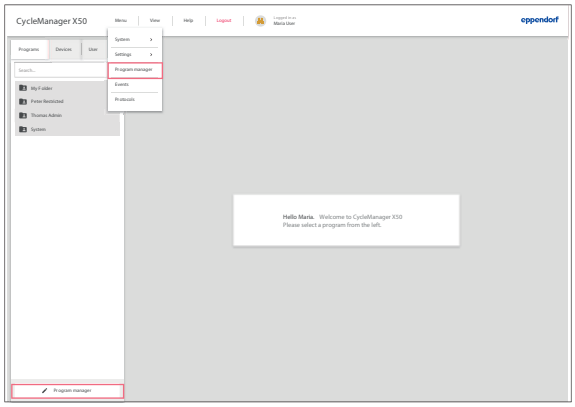
4. Follow the self test instructions.
   Note: If one of the lid sensors does not automatically detect the closed lid:
   - Press the *I confirm that I have closed the lid / all the lids* button.

   The self test is resumed.



5. Use *Self-test protocol* to save the self test results as a PDF file in the download directory.
6. End the self test with *Close*.

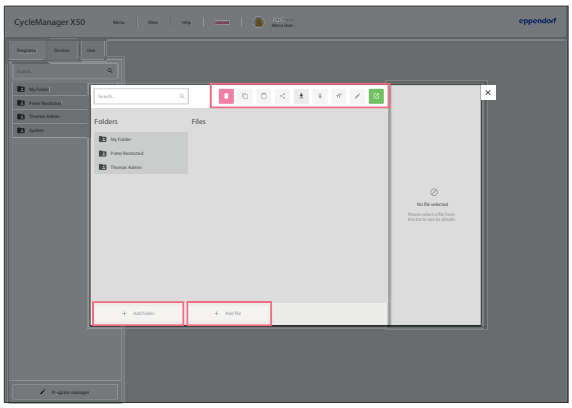
5 Programming
5.1 *Program Manager* overview
5.1.1 Calling up the *Program Manager*



- Call up the *Program Manager* on the home screen.
  The window with the *Program Manager* is displayed.

You can also call up the *Program Manager* from the *Menu*.

Depending on the user rights, the available folders and programs are displayed.



Toolbar with editing functions

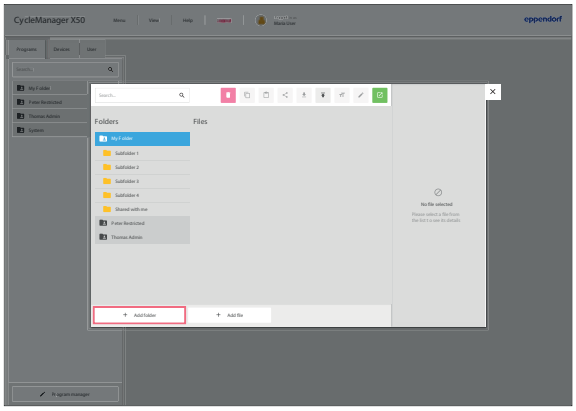
- *Delete* button: Folders or programs can be deleted depending on user rights. Your own folders and programs can always be deleted.
- *Copy* button: Copy programs
- *Paste* button: Paste programs
- *Share* button: Share programs with other users
- *Export* button: Copy programs to the Windows download folder
- *Import* button: Import programs. Programs cannot be imported if the program name contains special characters or umlauts.
- *Rename* button: Rename folders or programs
- *Set as template* button: Save programs as a template
- *Edit* button: Open and edit programs
- *Open* button: Open programs

- *My folder* folder: Folders for your own subfolders and programs
- *Shared with me* folder: Programs that other users have shared with me are displayed.

Adding folders and programs

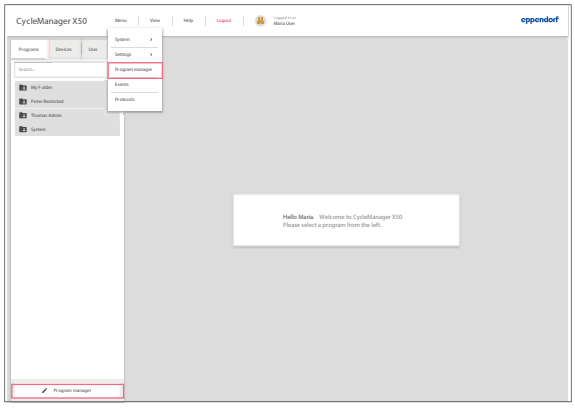
- + *Add folder*: Create a new folder
- + *Add program*: Create a new program

5.2 Creating a new folder

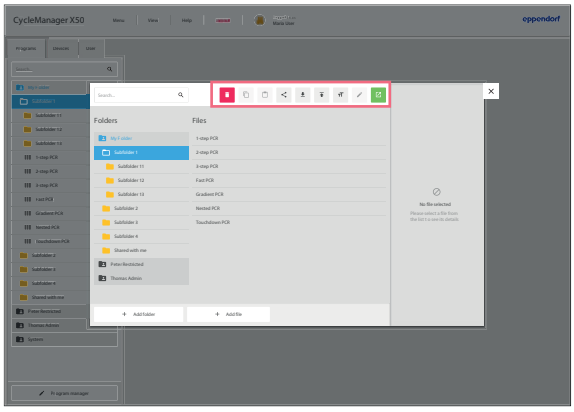


1. In the folder structure, select the folder, e.g., *My folders*.
2. Click on the + *Add folder* button.
   An input mask appears.
3. Enter a name for the folder.
4. Confirm the entry.
   The new folder is displayed under *My folders*.

5.3 Managing folders



1. Tap on *Program Manager* in the home screen.
   The options for editing the folders are displayed.
   Functions that cannot be selected are displayed in a light font.



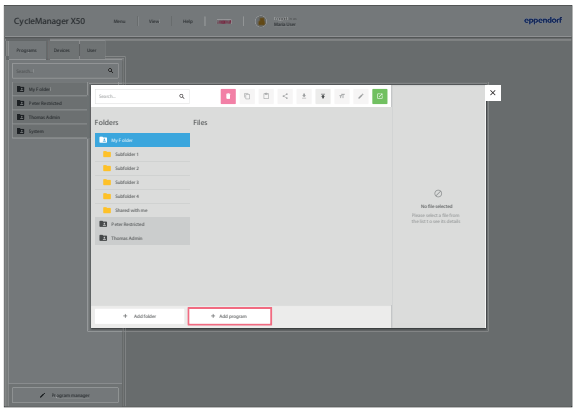
2. Select the folder from the folder structure.
3. Click on the editing function.
   The window for the selected editing function opens.

The following editing functions for folders are available:

- *Delete* button: You can delete folders if you have the appropriate user rights. You can always delete your own folders.
- *Share* button: Share your own folders with other users
- *Import* button: Import folders from the download directory
- *Rename* button: Rename your own folders
- *Open* button: Open the selected folder

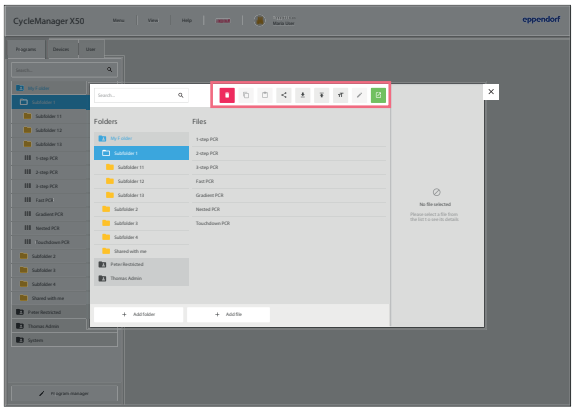
5.4 Creating a new program

You can create and save up to 1000 programs.



1. In the folder structure, select the storage location for the new program.
2. Click on the + *Add program* button.
   An input mask appears.
3. Select a template.
4. Enter a name for the program.
5. Confirm the entry with *Add*.
   The new program is saved in the selected folder.

5.5 Managing programs

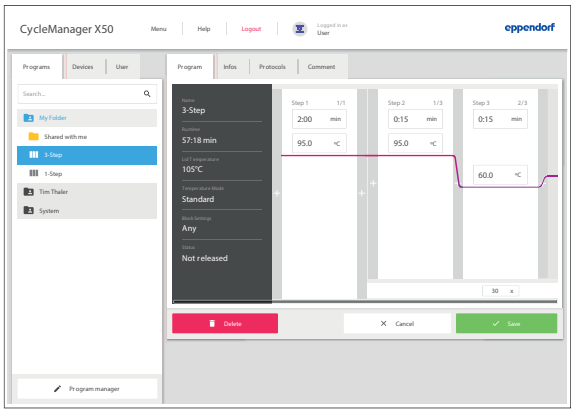


1. Select the program.
   The options for editing the programs are displayed. Functions that cannot be selected are displayed in a light font.
2. Click on the editing function.
   The window for the selected editing function appears.
3. Confirm the changes.
   The changes are saved.

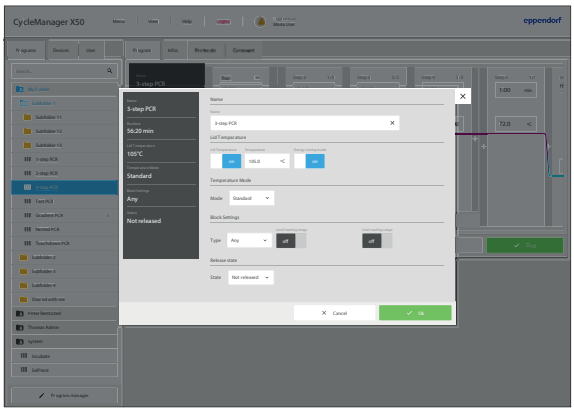
The following editing functions for programs are available:

- *Delete* button: Delete the program
- *Copy* button: Duplicate the program
- *Share* button: Share your own programs with other users
- *Export* button: Copy the program to the Windows download directory
- *Import* button: Import the program
- *Rename* button: Rename the program
- *Edit* button: Edit the selected program
- *Open* button: Open the selected program

5.6 Customizing program settings



1. Select the program.
2. Click on the *Edit* button.
   The window with the header settings and the program steps is displayed.
3. Left-click in the header settings.
   The editing window for the header settings is displayed.



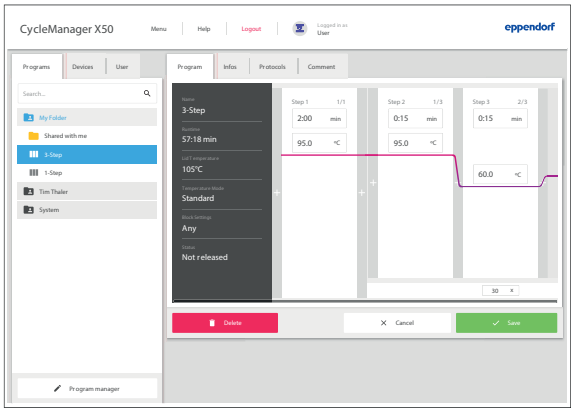
- *Name*: Program name
- *Lid Temperature*: Lid temperature settings
  - *Lid Temperature*: Activate or deactivate the heated lid
  - *Temperature*: Set the lid temperature (37 °C to 110 °C)
  - *Energy-saving mode*: If the function is activated, the heated lid switches off when the block temperature drops below 15 °C.
- *Temperature Mode*: Block temperature control mode
  - Fast (≤10 µL)
  - Intermediate (10 µL–20 µL)
  - Standard (20 µL–50 µL)
  - Safe (>50 µL)
- *Block Settings*: Set the block type and limit the heating and cooling rates. You must set the block type to display the correct gradient temperatures.
- *Release State*: Select the program status.

You can no longer change programs with the status "Released". The programs can also be used by users with restricted rights.
You can undo the "Released" status.

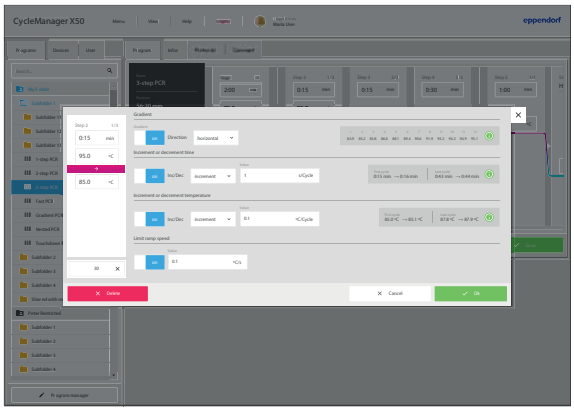
▸ Only release programs after thorough testing.

5.7 Editing programs

5.7.1 Selecting the program step



1. Select the program.
2. Click on the *Edit* button.
   The window with the header settings and the program steps is displayed.

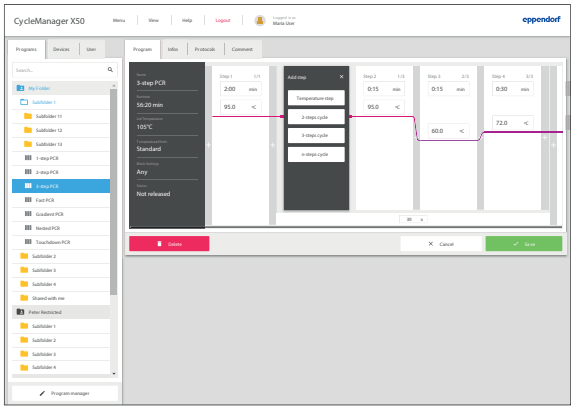


3. Select the column with the program step to be edited.
   The window with the editing options appears.

- *Gradient*: Set the gradients. Prerequisite: The block type has been correctly selected.
- *Increment or decrement time*: Incremental change of the holding time to the next cycle
- *Increment or decrement temperature*: Incremental change of the temperature to the next cycle
- *Limit ramp speed*: Set the temperature control speed of the thermoblock

5.7.2 Inserting a program step

There is a button with the plus sign (+) to the right and left of a program step. You can use this button to add further program steps.



1. Click on the + button to the left or right of a program step.

   A selection menu appears. Depending on the previous or following program step, you can select the following program steps:
   - *Temperature*: Single temperature step with adjustable block temperature and holding time
   - *2-Steps Cycle*: Cycle program step with 2 temperature steps and an adjustable number of repetitions (1 to 99)
   - *3-Steps Cycle*: Cycle program step with 3 temperature steps and an adjustable number of repetitions (1 to 99)
   - *n-Steps Cycle*: Cycle program step with up to 40 temperature steps and an adjustable number of repetitions (1 to 99)
   - *Hold*: Temperature step with adjustable block temperature and indefinite holding time. The set temperature is maintained until the program is manually resumed or ended.

2. Select a new program step.

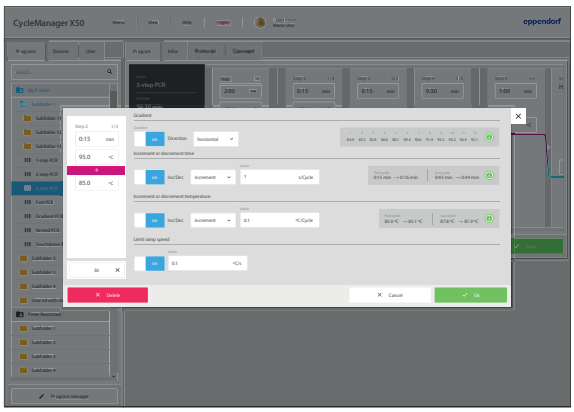
   The new program step is inserted.

3. Set all the parameters for the program step such as block temperature, holding time or number of repetitions.
4. Insert further program steps if required.
5. Save the finished program with *Save*.

5.7.3 Setting gradients

You can use a gradient step to optimize the specificity and yield in PCR reactions. A vertically or horizontally increasing temperature gradient is generated during the holding time. The ramp rates before and after the gradient step are constant over the entire thermoblock.

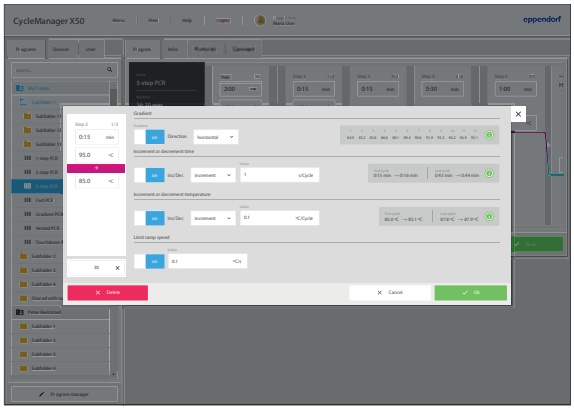
The gradient function is only available if you have correctly selected the *Block Settings* in the header settings for the device. If *Any* is selected, the gradient temperatures for the aluminum block 96 are displayed.
You can set the gradient temperature between 30 °C and 99 °C. If a gradient temperature has been defined below 30 °C, an error message will appear. The gradient spread is max. 30 °C.



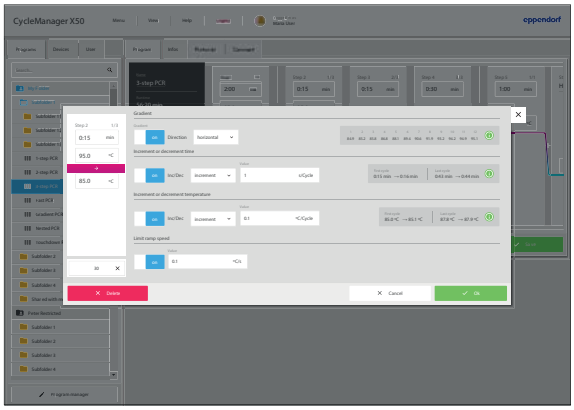
1. Select a column with the program step to be edited.
2. Switch the function on with the *Gradient* button.
3. Select a horizontal or vertical gradient function.
4. Set a lower and upper temperature in the left column.
5. Confirm the changes with *Ok*.

5.7.4 Defining increments and decrements

You can define an increment and a decrement only for program steps with multiple cycles.



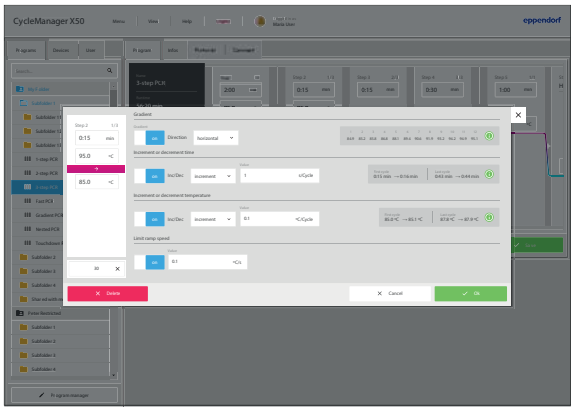
1. Select the column with the program step to be edited.
2. Switch the function on with the *Increment or decrement time* button.
3. Select an increment or a decrement for the cycle time.
4. Enter the cycle time under *Value*.
   The duration of the next cycle will be increased or reduced by the set value.
   Adjustable from 00:01 min to 01:00 min in 1-second increments.



5. Switch the function on with the *Increment or decrement temperature* button.
6. Select an increment or a decrement for the block temperature.
7. Enter the block temperature under *Value*.
   The value can be set within the block limits of 4 °C and 99 °C in 0.1° C increments. An error message will appear if a block limit is exceeded or not reached.
8. Close the window.
9. Confirm the changes with *Ok*.

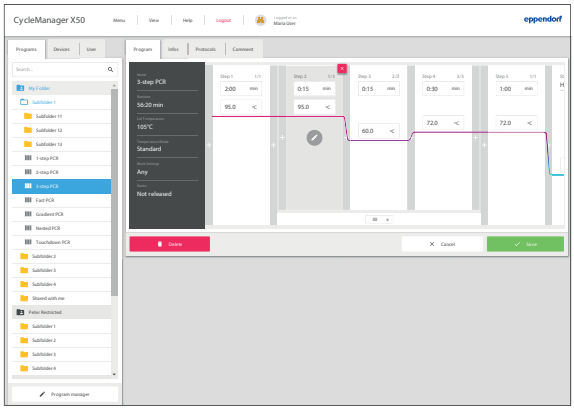
5.7.5 Defining the ramp

Use the ramp to set the temperature control speed of the thermoblock.



1. Select the column with the program step to be edited.
2. Switch the function on with the *Limit ramp speed* button.
   The ramp that leads to the selected step is limited.
3. Enter the value for the ramp rate under *Value*.
   The maximum ramp rate depends on the cooling rate.
4. Confirm the changes with *Ok*.
5. Save the finished program with *Save*.

5.7.6 Deleting a program step



1. Select the column with the program step to be deleted.
2. Delete the program step with the **x** button.

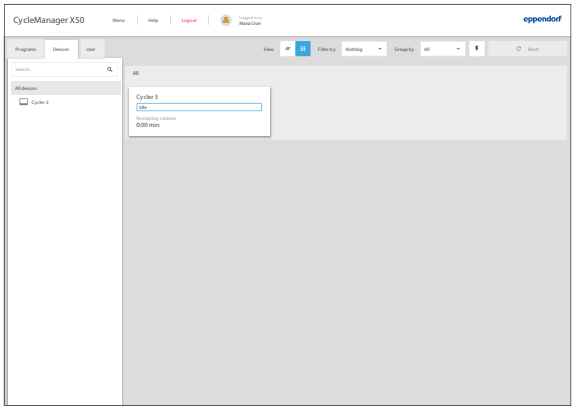
You can also delete a program step in the program step editing window.

- Click on the program step. The program step editing window will appear.
- Delete the program step with *Delete step*.

6 Device management

6.1 Devices in the navigation area

6.1.1 Devices in the overview

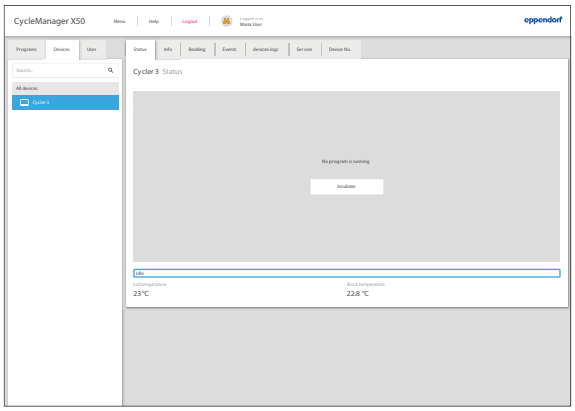


- Select the *Devices* tab in the navigation area.

  All devices assigned to the CycleManager X50 are displayed under *All devices*. You can customize the view. Filter options:

  - *View:*
    - Booking overview
    - Device overview
  - *Filter by:*
    Filter the selection of devices
  - *Group by:*
    Group the devices in the view
  - *Reset:*
    Reset the filter settings

6.1.2 Devices in the single view



1. Select the device in the selection list.

   A window with information about the selected device appears.

6.1.3 Device information

Status
- Information about the current status of the selected device.

Info
- Device information
  - *Name*
  - *Block*
  - *Lid type*
  - *Serial number*
  - *Firmware*
  - *Last adjustment*
  - *Last verification*
  - *Last self test*
  - *Last assay validation*
  - *Last user*
  - *Last program*

Booking
- Booking system. You can book the selected device using the **+** symbol in the top right corner:
  - Select the date in the calendar sheet and enter the start time.
  - Enter the duration of the booking.
  - Confirm the booking with *Save*.

  No further booking can be created by other users for the booked period.
  In addition to the booking for the device, another booking is generated in the calendar for the program that the user starts on the device on the booked date.

Events
- Notifications or messages relating to the selected device are displayed.
  Filtering the event list (see p. 23)

Maintenance
- *Self test*: Any user can perform the self test.
- *Assay validation*: Validate the *Assay Validation* as administrator.
- *Qualification*: Set the qualified status as administrator.
- *Verification*: Upload or view the verification protocol.
- *Manual restart*: Restart the device.

Log
- List of all activity between the device and the server that affects the selected device.

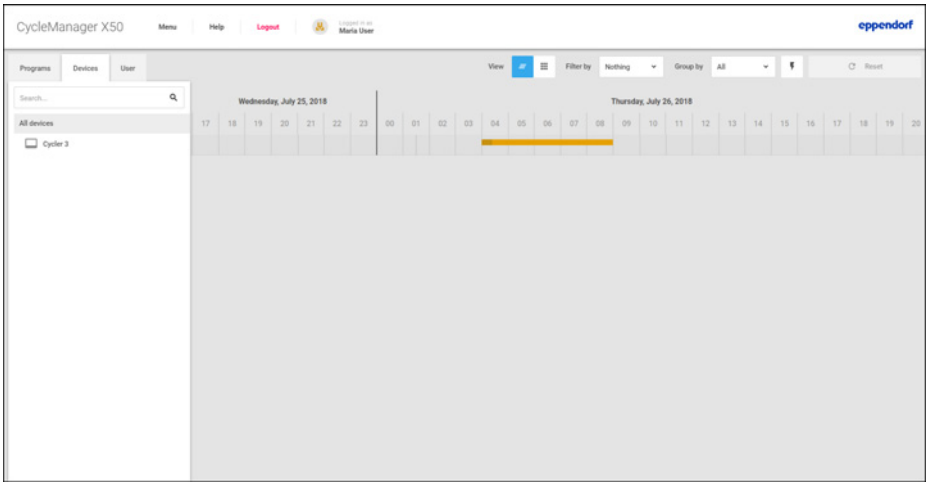
Assignment
- Number on the device display
- *Blink* button: The status light on the device flashes white. This allows the device to be identified more quickly by the user.

6.2 Booking devices

Booking programs (see *Starting a program at a planned time on p. 57)*

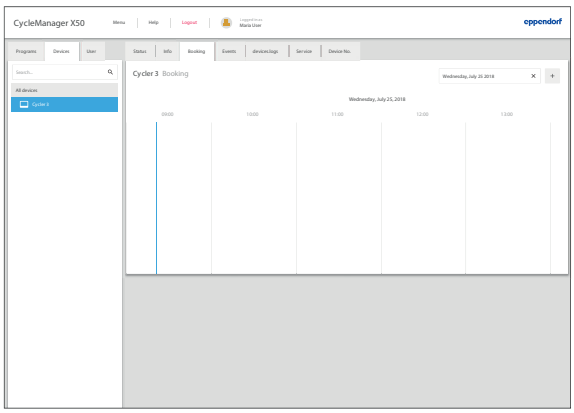
6.2.1 Displaying the bookings for all devices

The booking overview displays the bookings for all devices.
You cannot create any bookings in the overview.
You can call up, edit and delete existing bookings via the overview.



1. In the navigation area, select the *Devices* > *All devices* tab.
2. Switch to the booking overview using the *View* button.

6.2.2 Calling up the booking page for devices



1. In the navigation area, select the *Devices* tab.
2. Select the device in the selection list.
   The booking window for the selected device appears.
3. Select the *Booking* tab.
   The booking view appears.

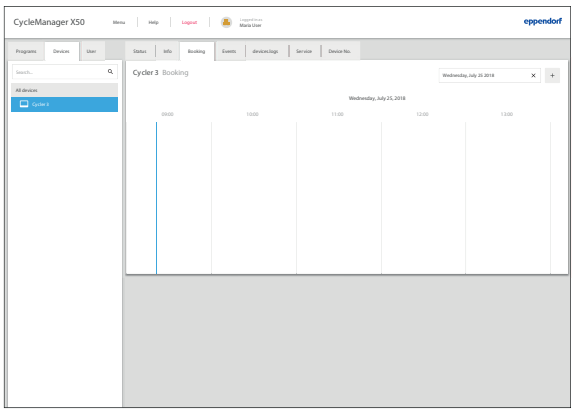
6.2.3 Navigating in the booking view

Bookings are displayed in yellow in the booking view.

Currently running programs are displayed in blue.

The following time views are available in the booking view:

- Year view with months
- Month view with days
- Day view with hours



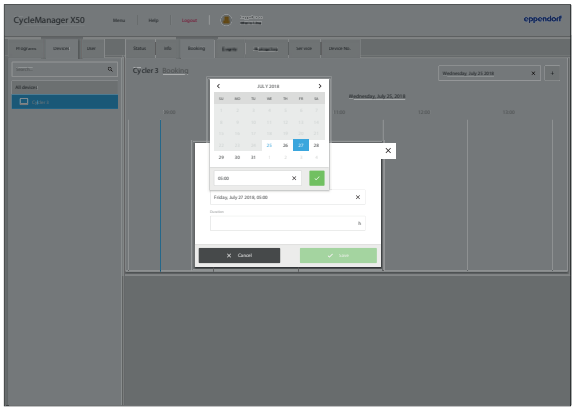
- Click on the top line in the booking view.

  The view changes to a coarser division of time, e.g., from the month view to the year view.
- Click on an entry (month, day) in the timeline header.

  The view switches to a finer division of time, e.g., from the month view to the day view.
- Use the arrow keys or hold down the left mouse button to move the timeline to the left or right.
- Double-click on a booking.

  You can call up the booking and edit or delete it.
  Delete bookings in the top right corner of the booking window using the **x** symbol.

6.2.4 Creating a new booking



1. Click on the **+** symbol in the top right corner of the booking view.
   The input window for bookings appears.
2. Click on *Start time* in the input line.
   The calendar sheet for the current month appears.
3. Select the date in the calendar sheet and enter the start time.
4. Enter the duration of the booking in the *Duration* input line.
5. Confirm and save the booking with the *Save* button.
   The booked device cannot be booked or started by any other user during the booking period.
   You cannot start a program if the end of the program overlaps with a booking.

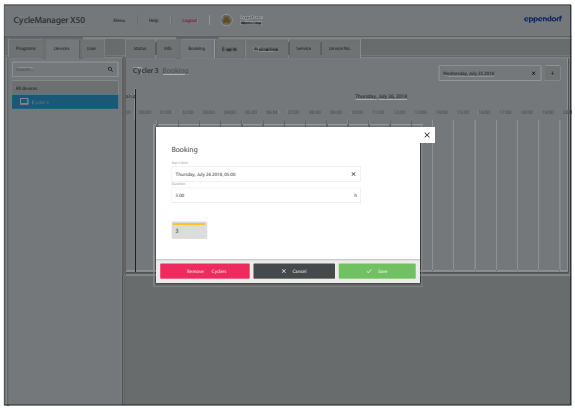
The booking will expire if you do not start the device within 15 minutes from the time of booking.
A booking is automatically extended if two conditions are met:

- You start a program with the *Start after lid movement* button on the booked device during the booking period.
- The lid is still open 15 minutes after the start.

If there are scheduling conflicts with a subsequent booking, both users will be notified.

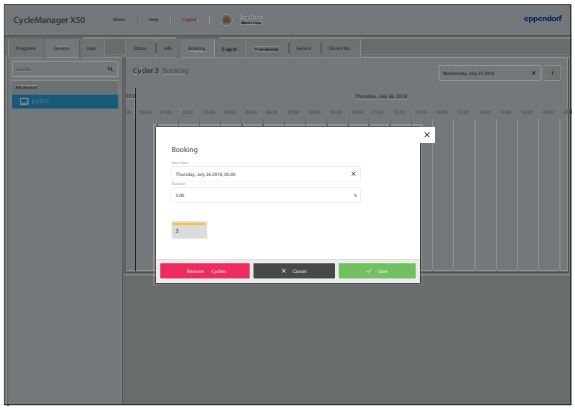
In addition to the booking for the device, another booking is generated in the calendar for the program that the user starts on the device on the booked date.

6.2.5 Editing a booking



1. In the booking view for a device, double-click on a booking.
   The booking editing window appears.
   Alternatively, you can also call up the booking in the overview for all bookings.
2. Change the booking.
3. Select the devices.
4. Confirm the changes with the *Save* button.
   The booking is changed for the selected devices.

6.2.6 Deleting a booking



1. In the booking view for a device, double-click on a booking.
   The booking editing window appears.
   Alternatively, you can also call up the booking in the overview for all bookings.
2. Select the devices.
3. Click on the *Remove Cyclers* button.
   The booking is deleted for the selected devices.

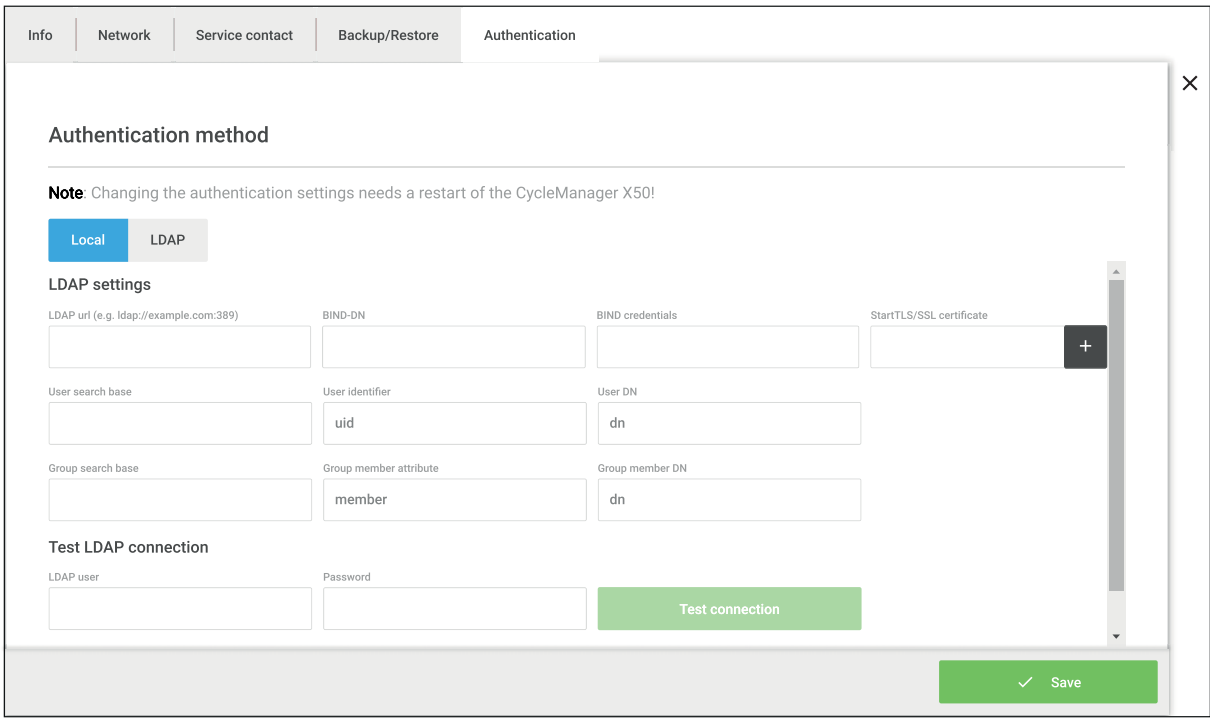
7 User administration

7.1 User management via an LDAP server

User management can be carried out either locally or via an LDAP server.

If the LDAP server fails, login is no longer possible. As soon as the LDAP server is online again after a failure, user management will work again.
Only an authorized service technician is able to log in if the LDAP server has failed. In this case, contact your local Eppendorf partner.

7.1.1 Configuring the LDAP server



1. Click on the *Menu* button.
2. Select the *Authentication* menu item.
3. Select *LDAP*.
   - User management via the LDAP server is activated.
   - Local user management is deactivated and can no longer be used.
4. Fill out all fields for *LDAP settings*.

   Detailed information on integrating the CycleManager X50 software into an existing LDAP can be found on the server computer in the directory *C:\Program Files\CycleManager\Supplementary*.
5. Save the settings with *Save*.

7.2 The user administration concept

User administration can be used to organize access to PCR programs. There are three user roles:

- Administrator
- User with standard rights
- User with restricted rights

7.2.1 Administrator

The administrator has additional rights:

- Access to network functions and device management.
- Access to user administration

7.2.2 User with standard rights

A user with standard rights is allowed to use the CycleManager X50 without restrictions, create, rename, move and delete programs and folders.

7.2.3 User with restricted rights

A user with restricted rights is allowed to use the CycleManager X50 with restrictions, e.g., select, start and stop a program that has been shared with him and that is released.

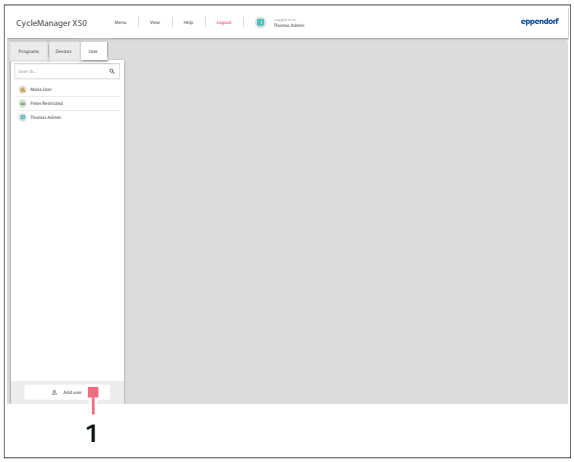
7.3 Editing user accounts

NOTICE! Data loss due to loss of the administrator password
The administrator can only change their password using their access data. If the administrator's access data is lost, changes to user management or the system settings will no longer be possible.
In this case, the administrator password will have to be reset by an authorized service technician or another administrator.

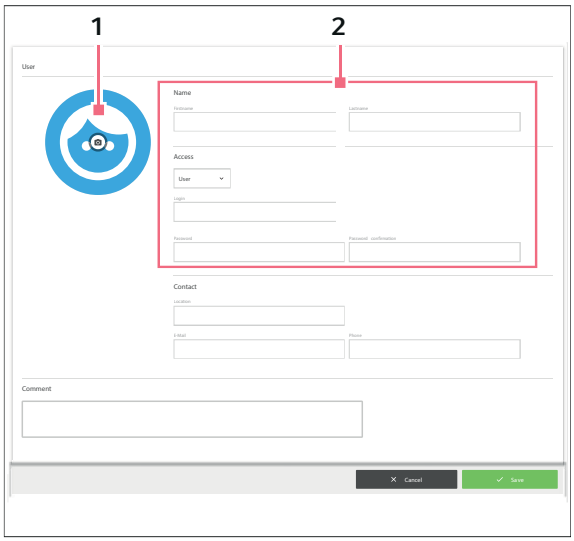
- ▸ Create a second user account with administrator rights.
- ▸ Keep the administrator password secure.

7.3.1 Creating a user account

A user account can only be created by an administrator.



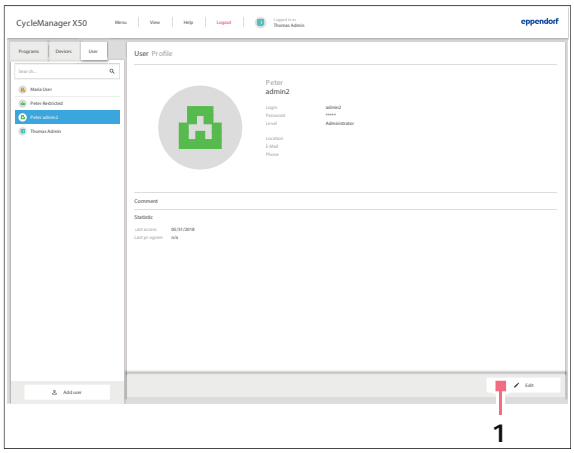
1. On the *User* tab, click on the *Add user* button (**1**).
   An input mask appears.



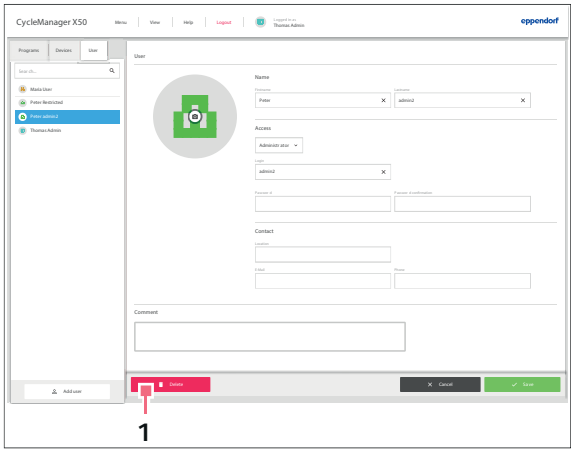
2. Fill in the mandatory fields (**2**) and assign access rights.
3. Import an optional photo (**1**).
4. Optional: Fill in the contact details and comments.
5. Confirm the entries with *Save* or cancel them with *Cancel*.
   The user account has been created.

7.3.2 Editing user accounts

Users with restricted rights or standard rights can only edit their own entries. The user's own password can also be changed.
Administrators can change the access rights for user accounts, reset passwords or delete user accounts. The administrator can only change the password for their own user account.
The user name cannot be changed by either the administrator or the user.



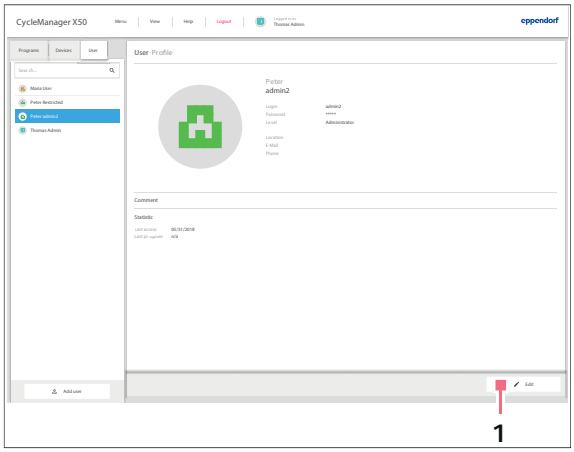
1. Select a user on the *User* tab.
2. Click on the *Edit* button (**1**).
   An input mask appears.



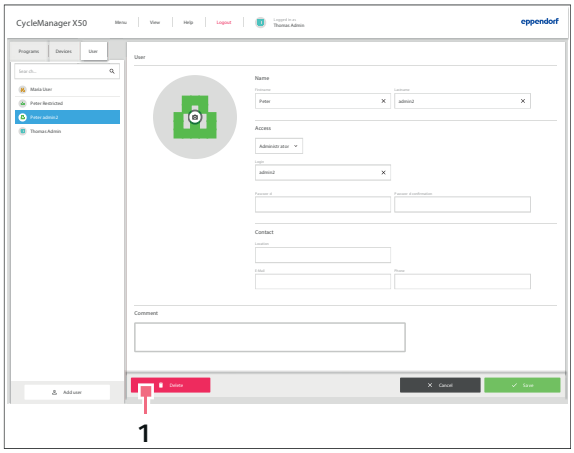
3. Enter the changes in the user profile.
4. Assign access rights.
   - Administrator
   - User
   - Restricted User
5. Confirm the entries with *Save*.
   The changes are saved.

7.3.3 Deleting a user account

User accounts can only be deleted by the administrator. An administrator cannot delete their own user account.



1. On the *User* tab, select a user account to be deleted.
2. Click on the *Edit* button (**1**).
   An input mask appears.



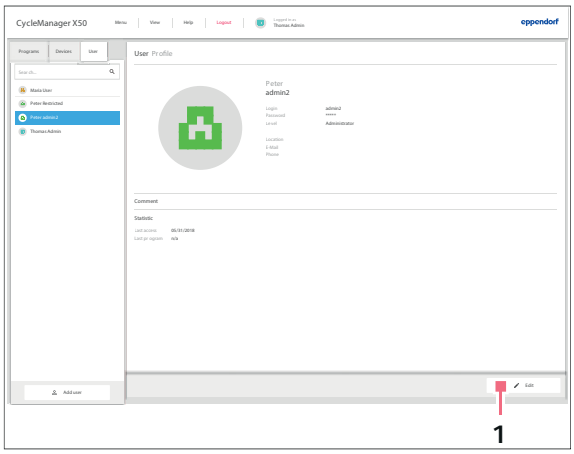
3. Click on the *Delete* button (**1**).
4. Confirm that you want to delete the user account with *Delete*.
   The user account is then deleted.

7.3.4 Resetting the password for a user account

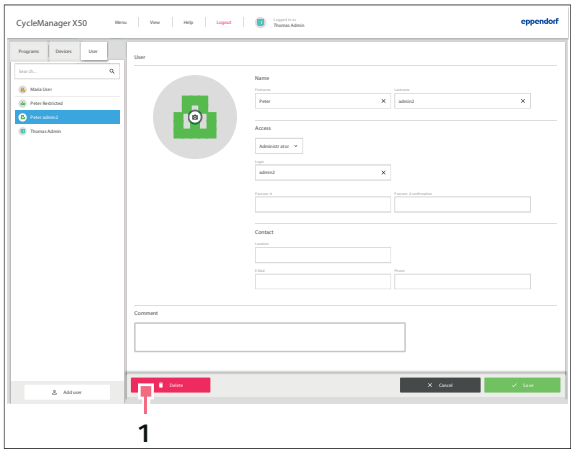
If the user has forgotten their password, the administrator can create a new password.

The administrator can only change their password using their current access data. If the administrator's access data is lost, changes to user management will no longer be possible. In this case, the administrator password will have to be reset by an authorized service technician or another administrator.

- Create a second user account with administrator rights.



1. Select a user account on the *User* tab.
2. Click on the *Edit* button (**1**).
   An input mask appears.



3. Enter the password again.
4. Confirm the entries with *Save*.
   The user can log in with the reset password and will be prompted to create their own password.

8 PCR run

8.1 Loading the thermoblock

8.1.1 Selecting the sample tubes

WARNING! Biohazard due to unsuitable reaction vessels, plates and lids.
Unsuitable reaction vessels, plates and lids will get damaged in the Cycler. This will release sample material.

- Only use reaction vessels, plates and lids that meet the requirements specified in the operating manual.

Approved sample tubes for devices with a thermoblock with 96 wells

You can load the thermoblock with the following sample tubes:

- 0.1 mL PCR strips
- 0.2 mL PCR tubes and PCR strips
- 96-well PCR plates

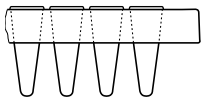
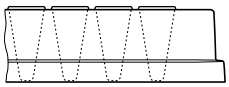
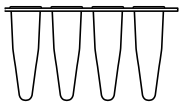
Approved sample tubes for devices with a thermoblock with 384 wells

You can load the thermoblock with the following sample tubes:

- 384-well PCR plates

Compatible PCR plate types

The following PCR plate types are compatible:

Semi-skirted PCR plate	Skirted PCR plate	Non-skirted/unskirted PCR plate
		
PCR plate with surrounding half-edge	PCR plate with full surrounding edge	PCR plate without a surrounding edge

Requirements for sample tubes

Make sure that the sample tubes meet the following requirements:

- Temperature resistance is at least 110 °C.
- Exact fit in the thermoblock.

Maximum volumes

The sample volumes that can be used may vary depending on the type of sample tubes used.

For devices with a thermoblock with 96 wells
- PCR plates: Max. 100 µL
- 0.1 mL PCR strips: Max. 100 µL
- 0.2 mL PCR tubes and PCR strips: Max. 100 µL

For devices with a thermoblock with 384 wells
- PCR plates: Max. 25 µL

8.1.2 Inserting the sample tubes

WARNING! Biohazard due to sample material directly in the thermoblock.

- Do not fill sample material directly into the thermoblock.
- Only use reaction vessels, plates and lids that meet the requirements specified in the operating manual.

WARNING! Biohazard when tempering with the heated lid open.

Observe the following information:

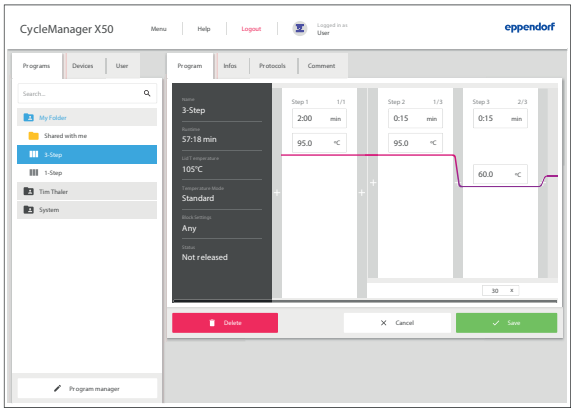
- Never run programs with an empty thermoblock. Always load the thermoblock with PCR plates or PCR tubes for a program run.
- Load the tubes in the center of the thermoblock and ensure that they are positioned symmetrically towards the center of the thermoblock.
- Load the thermoblock with at least 5 tubes. If you have fewer reaction batches, insert additional empty tubes so that the thermoblock is loaded with at least 5 tubes.

Very soft PCR tubes can be deformed at high temperatures. To prevent deformation:
- Increase the number of empty sample tubes in the thermoblock.
- Reduce the temperature of the heated lid.
- Use original Eppendorf PCR consumables. Eppendorf PCR consumables are optimally matched to the device.

8.2 Selecting programs

8.2.1 Selecting a program

Restricted user: The usable programs for users with restricted rights are displayed in the *Shared with me* folder.



1. Select the *Programs* tab in the navigation area.
   The available folders with programs are displayed depending on the user rights.
2. Open the *My folders* folder.
   Your own folders are displayed.
3. Open one of your own folders.
   Your own available programs are displayed.
4. Select a program.
   The editing window displays information about the selected program.

8.2.2 Information about programs

You can call up further information via the tabs in the editing window of a selected program.

Program

Display of the set parameters and the current release status of the program. In addition to displaying the parameters, the individual program steps of the selected program are displayed.

- *Edit*: Adjust the program
- *Start*: Start the program

Infos

Organizational information about the selected program.

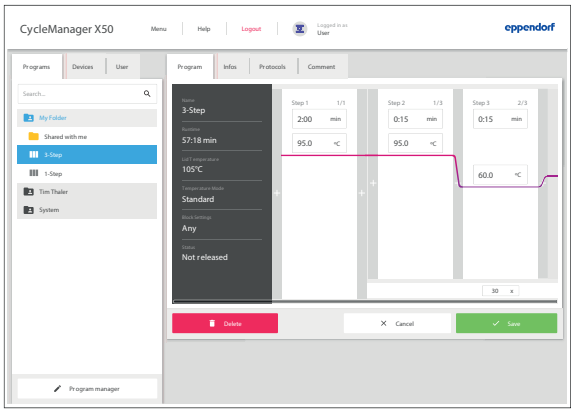
Protocols

All recorded protocols for the selected program.

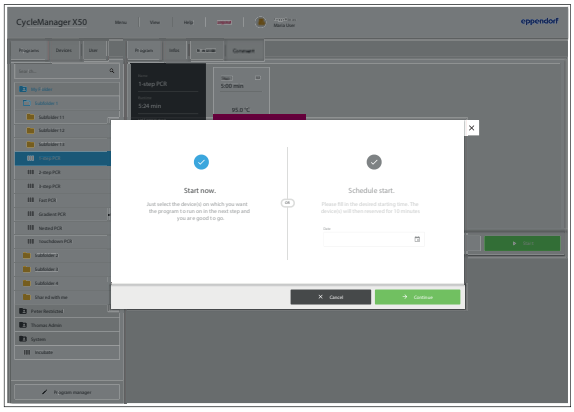
Comment

Comments that are edited using the *Edit* button.

8.3 Starting a program

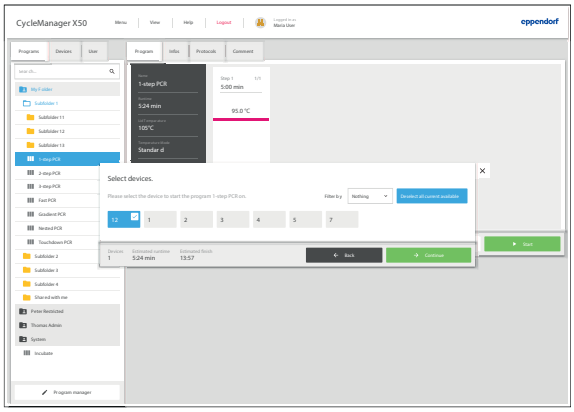


1. Select the program on the *Programs* tab.
   The editing window displays information about the selected program.
2. Click on the *Start* button.

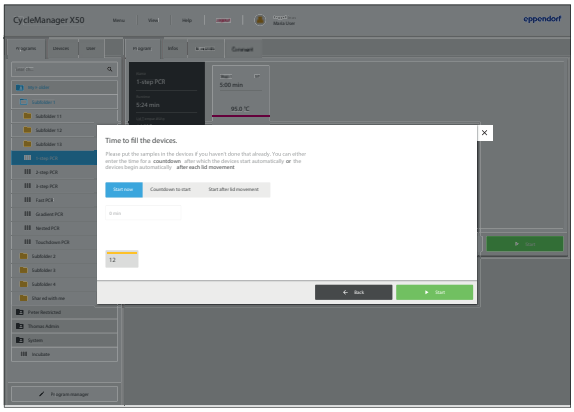


3. Select *Start now*.
4. Continue by selecting *Continue*.
   All the devices that are currently connected to the CycleManager X50 are displayed.

You can use *Schedule start* to schedule the program start at a later time and book the devices depending on the program.



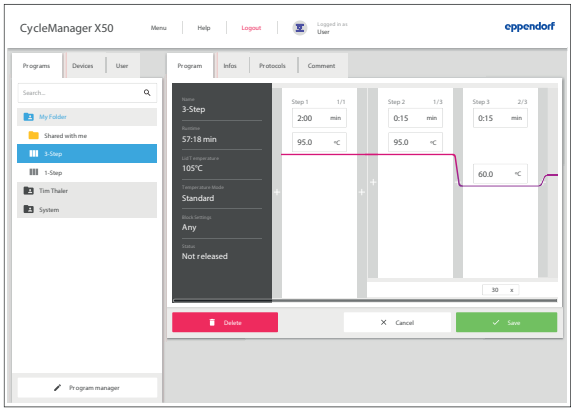
5. Select the device.
   You can select multiple devices.
   You can select multiple devices at the same time by dragging a frame around them.
   You can use the *Select all current available/ Deselect all current available* button to select or deselect all the currently available devices.
   You can use the filter function to limit the selection via a drop-down list.
6. Continue by selecting *Continue*.



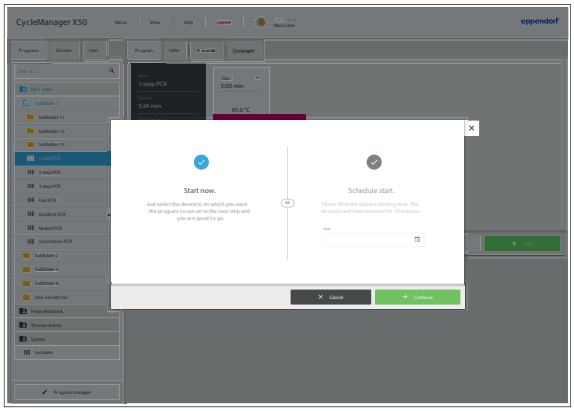
7. Define the start time.
   The following options are possible:
   - *Start now*: The program starts immediately.
   - *Countdown to start*: The program starts after a defined period of time (1 min - 120 min).
   - *Start after lid movement*: The program starts after the device lid is closed.
8. Start the program.

8.4 Starting a program at a planned time

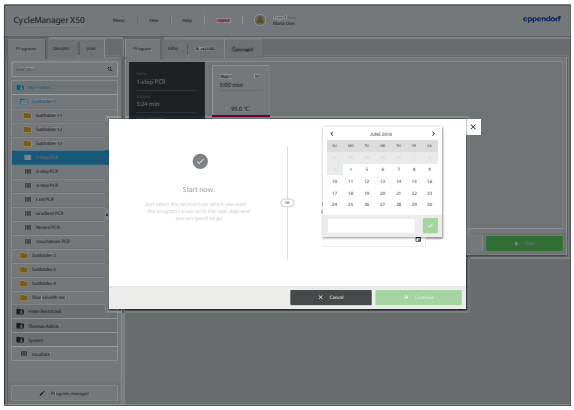
8.4.1 Reserving a device



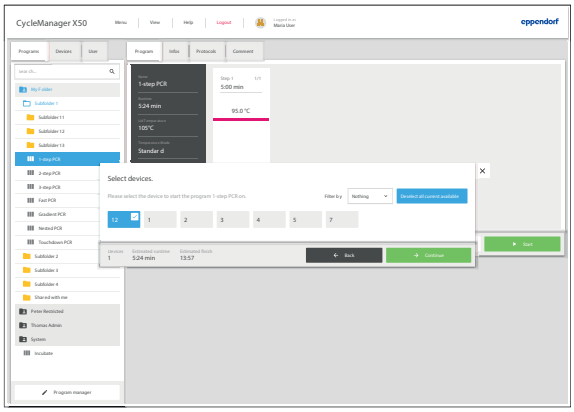
1. Select the program on the *Programs* tab.
   The editing window displays information about the selected program.
2. Click on the *Start* button.



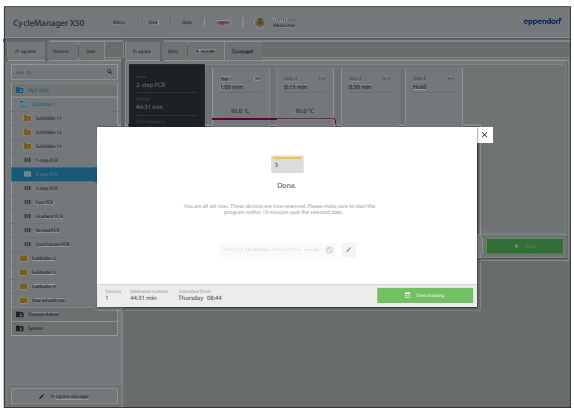
3. Select *Schedule start*.
4. Click in the *Date* input line.
   A calendar sheet for the current month appears.



5. Select the date in the calendar sheet and enter the start time.
6. Confirm the booking and continue by selecting *Continue*.
   All devices that are connected to the CycleManager are displayed.



7. Select the device.
   You can select the devices manually. You can select multiple devices.
   If there is an overlap, you cannot select the device and the message *Status: Device is booked* appears.
   You can use the *Select all current available/ Deselect all current available* button to select or deselect all the currently available devices.
   You can use the filter function to limit the selection via a drop-down list.
8. Continue by selecting *Continue*.
   All the information about the reservation of the device is displayed.



9. Determine the type and time of notification.

Possible types of notification:

- E-mail
- Notification function from *Chrome*

10. Close the window.
    The reservation has been completed.

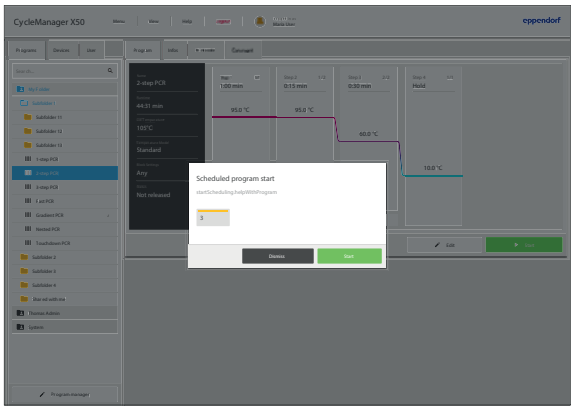
8.4.2 Starting a program at a scheduled time

Prerequisites

- The device has been reserved.

A window appears at the scheduled time.

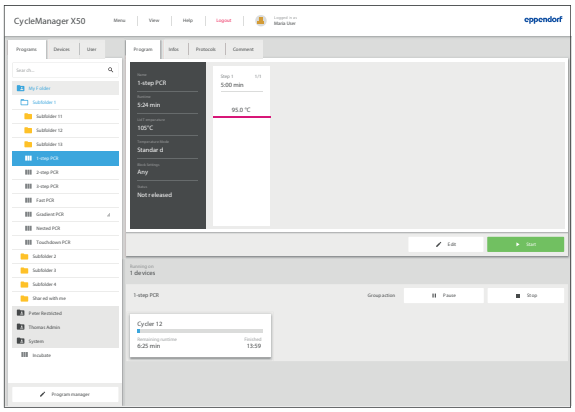
If you do not run the program within 15 minutes, the reservation will be deleted and the device released.



1. Load the thermoblock.
2. Close the heated lid.
3. Click on the *Start* button.
   The program is executed on the reserved device.
   Cancel the reservation with *Dismiss*.

8.5 Pausing and resuming a program

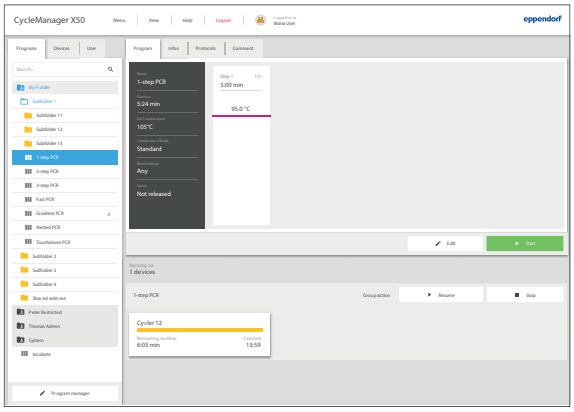
You can perform the *Pause*, *Stop* and *Resume* functions in the program view, in the device overview and in the single view.



1. Select a program in the *Programs* tab.
   If the selected program is running on one or more devices, the current information about this program and the devices is displayed in the lower half of the screen.
   - Number of devices on which the program is executed.
   - Program name
   - Device number on which the program is executed.
   - Remaining run time
   - Time at which the program is due to finish.
2. Move the cursor over the display of a device. An overlay appears with the *Pause* and *Stop* buttons.

Group actions: Use the *Pause* and *Stop* buttons to perform these functions for all devices on which the selected program is running.

3. Click on the *Pause* button.
   The program is paused.

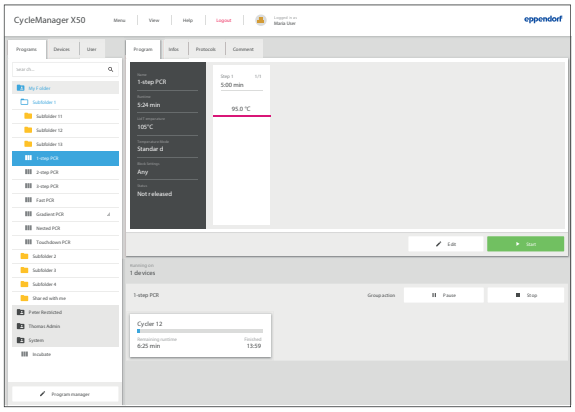


4. Click on the *Resume* button.
   The program is resumed.

You can resume programs in the program view and in the device overview.
You can group paused programs in the device overview under *All devices* and then resume them together.

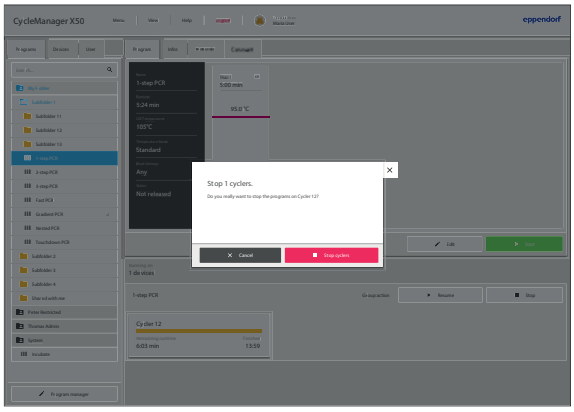
8.6 Canceling the program

You can perform the *Pause*, *Stop* and *Resume* functions in the device overview and in the single view.



1. Select a program in the *Programs* tab.
2. Move the cursor over the display of a device. An overlay appears with the *Pause* and *Stop* buttons.
3. Click on the *Stop* button.
   A window with a confirmation prompt appears.

Group actions: Use the *Pause* and *Stop* buttons to perform these functions for all devices on which the selected program is running.



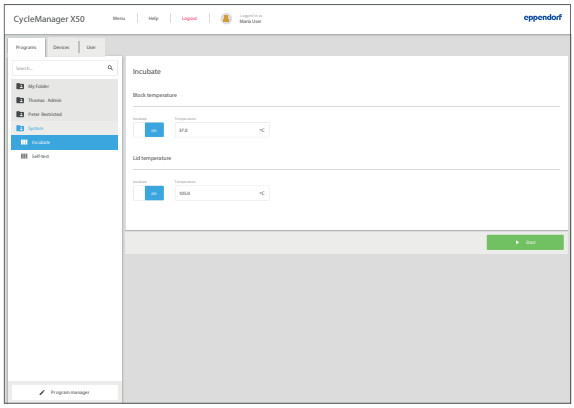
4. Confirm that the program should be canceled with *Stop cyclers*.
   The program is ended.

8.7 Incubate

You can control the temperature of the thermoblock and the lid independently of a PCR run.

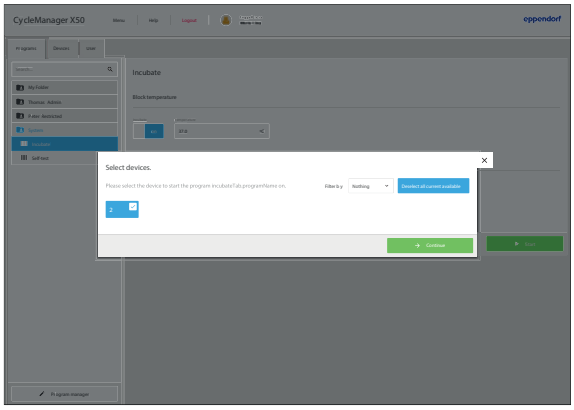
You can set the *Incubate* function for one, multiple or all devices.

Calling up the *Incubate* function



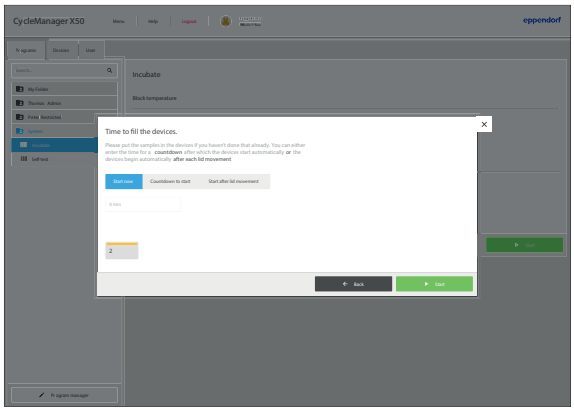
1. Call up the *Incubate* function under *Programs* > *System*.
2. Set the temperature for the thermoblock.
3. Activate the *Incubate* function for the thermoblock.
4. Set the temperature for the lid.
5. Activate the *Incubate* function for the lid.
6. Confirm the settings with *Start*.

Assigning a device



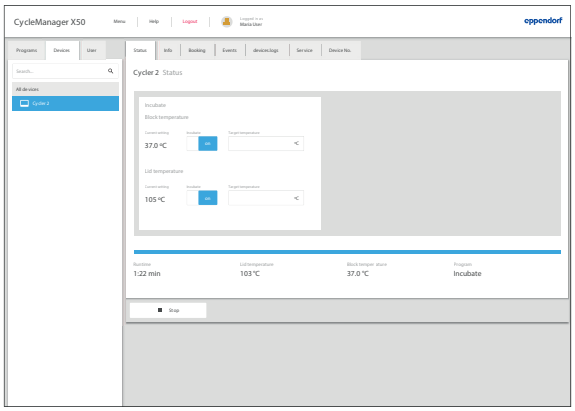
7. Select one or more devices.
8. Continue by selecting *Continue*.

Starting the *Incubate* function



9. Determine the start time.
   The following options are possible:
   - *Start now*: The program starts immediately.
   - *Countdown to start*: The program starts after a defined period of time (1 min - 120 min).
   - *Start after lid movement*: The program starts after the device lid is closed.
10. Start the *Incubate* function.

Ending the *Incubate* function



11. Select one or more devices.
12. Press *Stop* to end the *Incubate* function.

Evaluate Your Manual

Give us your feedback.
www.eppendorf.com/manualfeedback

Your local distributor: www.eppendorf.com/contact
Eppendorf SE · Barkhausenweg 1 · 22339 Hamburg · Germany
eppendorf@eppendorf.com · www.eppendorf.com