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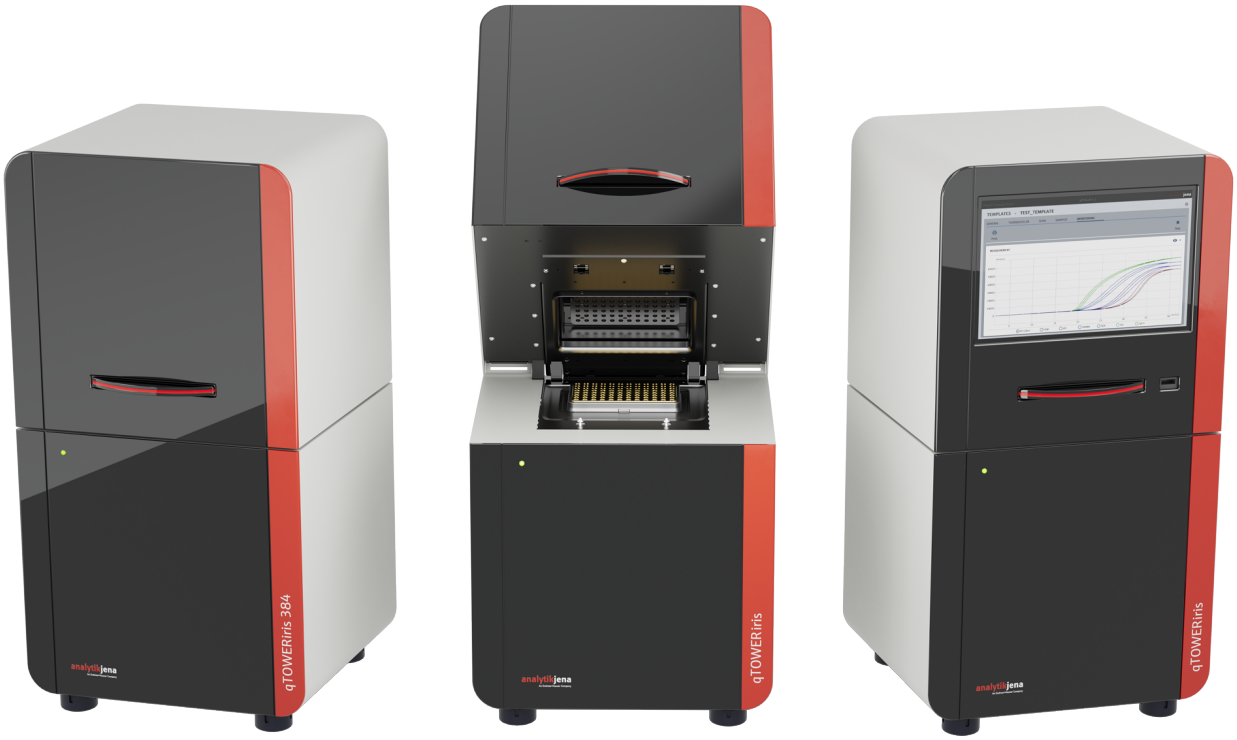
Operating Manual

qTOWER iris
Thermal Cycler



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For a proper and safe use of this product follow the instructions. Keep the operating manual for future reference.

General Information http://www.analytik-jena.com

Documentation Number 10-3107-102-23

Edition B (04/2024)

Technical Documentation Analytik Jena GmbH+Co. KG

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1 Notes on this operating manual

Content

This user manual describes the following device models:

- qTOWERiris
- qTOWERiris UV-ready
- qTOWERiris touch
- qTOWERiris touch UV-ready
- qTOWERiris 384
- qTOWERiris 384 UV-ready

In this manual, these models are collectively referred to as the **device**. Any differences between the models are explained in the relevant section.

The device is intended to be operated by qualified specialist personnel under observance of the operating manual.

The operating manual provides information about the design and operation of the device and provides operating personnel with the necessary know-how for safe handling of the device and its components. Furthermore, the operating manual includes information on the maintenance and servicing of the device as well as information on potential causes of malfunctions and their correction.

Conventions

Instructions for actions occurring in chronological order are numbered and combined into action units.

Warnings are indicated by a warning triangle and a signal word. The type, source and consequences of the hazard are stated together with notes on preventing the hazard.

Elements of the control and analysis program are indicated as follows:

- Program terms are in bold (e.g., the **System** menu).
- Menu items are separated by vertical lines (e.g., **System** | **Device**).

Symbols and signal words used in this manual

The user manual uses the following symbols and signal words to indicate hazards or instructions. These warnings are always placed before an action.

WARNING

Indicates a potentially hazardous situation which can cause death or very serious (possibly permanent) injury.

CAUTION

Indicates a potentially hazardous situation which can cause slight or minor injuries.

NOTICE

Provides information on potential material or environmental damage.

2 Intended use

NOTICE

The device is intended for **general laboratory use**.

The device may only be used for the applications described in these operating instructions.

The manufacturer does not accept liability for any other use.

The device is a thermocycler which is licensed for real-time PCR experiments that amplify DNA via polymerase chain reaction (PCR) while using fluorescence spectroscopy for the highly sensitive detection of target sequences.

The device is fully controlled from the PC or an integrated tablet using the qPCRsoft software.

The device may only be used for the processes described in the user manual. Only the specified use is regarded to be the intended use. Using the device for any other purpose may compromise the safety of the user and the device.

Modifications, conversions and extensions are only permitted after consultation with Analytik Jena. The operator alone is liable for damage caused by unauthorized modifications, conversions and extensions.

3 Safety

For your own safety and to ensure error-free and safe operation of the device, please read this chapter carefully before commissioning.

Observe all safety instructions listed in this manual, as well as all messages and instructions displayed by the control- and analysis software on the monitor.

The device leaves the factory in a perfect condition with regard to safety. To maintain this condition and to ensure safe operation, the user must strictly observe the safety and operating instructions contained in this operating manual. For accessories delivered with the device and system components from other manufacturers, the information provided in their respective operating manuals has priority.

3.1 Safety labeling on the device

Warning and mandatory action labels have been attached to the device and must always be observed. Damaged or missing warning and mandatory action labels can cause incorrect actions leading to personal injury or material damage.

- Do not remove the warning and mandatory action signs.
- Replace damaged signs.

The following warning and mandatory action signs are used:

Warning/mandatory sign	Meaning
	Disconnect the power supply before opening the device cover.
	The device contains controlled substances. Analytik Jena warrants that these substances will not be released from the device within the next 25 years provided the device is employed as intended.
	General warning sign
	Warning against hot surface

3.2 Requirements for the operating personnel

The device must only be operated by qualified specialist personnel instructed in the use of the device. The operating personnel must meet the following requirements:

- Operate the device only after instruction and training.
- Know and avoid dangers when working with the device.
- Wear personal protective equipment such as protective gloves, lab coat and safety goggles.
- Training by Analytik Jena is recommended.

The operator of the device is responsible for compliance with safety and occupational health regulations. The operator must meet the following requirements:

- Provide information about national regulations on work safety and accident prevention and observe them during operation of the device.
- Instruct the operating personnel in the safe operation of the device. In doing so, also convey the contents of the manuals for the device system.

3.3 Safety instructions for transport and commissioning

Transport

The device is heavy. There is a risk of injury when lifting and carrying, especially from unsecured parts.

- Empty the device and secure all loose parts, e.g. with adhesive tape. Close the lid.
- Only lift the device with two people. Position each person on opposite sides of the device and firmly grasp the underside.
- Only transport the device in its original packaging. Insert all transport locks.

Ambient conditions during commissioning

The device is dangerous if it is installed in an unsuitable environment.

- Design the installation site according to the requirements in the installation plan.
- The device must not be installed in an explosive environment.
- Ensure that the main switch of the device is always freely accessible.
- Keep the ventilation slits clear.

Electrical conditions

The device may be dangerous if the conditions for the electrical connection are not met.

- Only use the supplied power cable or a cable of the same size with a protective earth conductor. Do not use an extension in the supply cable.
- Connect the power plug to a proper power outlet to ensure that the device meets protection class I (ground connector). Do not invalidate the protective effect by the use of an extension line which does not have a protective conductor.
- Check the electrical requirements of the device before connecting it to the mains.
- Set the voltage selector switch on the device according to the mains voltage available on site.
- Only connect the device and its system components to the power grid when they are switched off.

3.4 Safety instructions for operation

Electrical hazard

Lethal voltages may occur in the device.

- Before each start-up, make sure that the device and its safety devices are in proper working condition.
- In case of malfunctions of electrical components, switch off the device immediately and disconnect it from the electrical power supply.
- Do not remove or bypass any protective devices such as the housing.
- Prevent liquid from penetrating the device.
- Do not use the device in environments with extreme humidity (>95 %), or in locations in which condensation occurs.

Thermal hazard

During operation, there is a risk of burns on the sample block and on the hot samples. During rapid heating of the sample block, samples can vaporize explosively. The hot steam can cause scalds.

- Only operate the device if the lid is closed.
- Only use sample vessels, microtiter plates, adhesive foils, and caps that are suitable for PCR applications.

Mechanical hazard

The device can tip over if the lid is pushed open quickly. There is a risk of crushing at the lid.

- Open the lid slowly without pushing it open.
- Close the lid slowly. Make sure that fingers and hands are not trapped between the underside and the lid.

Hazard from substances

The device can be used to handle hazardous substances. The operator is responsible for the safe handling of these substances.

- If the device has been contaminated with hazardous substances, decontaminate it as described in the operating manual. Use other methods only after consultation with Analytik Jena.
- Do not apply oil between samples and sample block. Oil can cause harmful vapors to form.

3.5 Safety instructions for maintenance and cleaning

There is a risk of electric shock if contact is made with live components, which may lead to serious injury.

Unauthorized servicing can lead to maladjustment or damage of the device and its system components.

- Work on electrical components inside the device may be carried out by customer service only.
- Only carry out the maintenance actions listed in the operating manual.
- Switch off the device before maintenance and cleaning. Only work on a switched-on device if this is expressly required by the operating manual.
- Use only original spare parts, wear parts and consumables. These have been tested and ensure safe operation.
- After maintenance, ensure that all safety devices are fully functional again.
- Clean the device with a damp, non-dripping cloth. Do not use organic solvents, abrasive cleaners or bleach.

3.6 Behavior during emergencies

In an emergency such as a laboratory fire, live devices put rescue personnel at risk.

- If possible, switch off the device and its components at the power switch and disconnect the power cable from the mains socket.

4 Design and function

4.1 Design, connections and control elements

The device combines a PCR thermocycler with a patented fluorescence photometer.

The lock with handle and the LED for status display are located on the front side of the device.

The models with integrated tablet can be controlled as stand-alone systems entirely via the software installed on the tablet. The integrated tablet is also located on the front side of the device.

The figure below shows the device components and the models without and with integrated tablet.

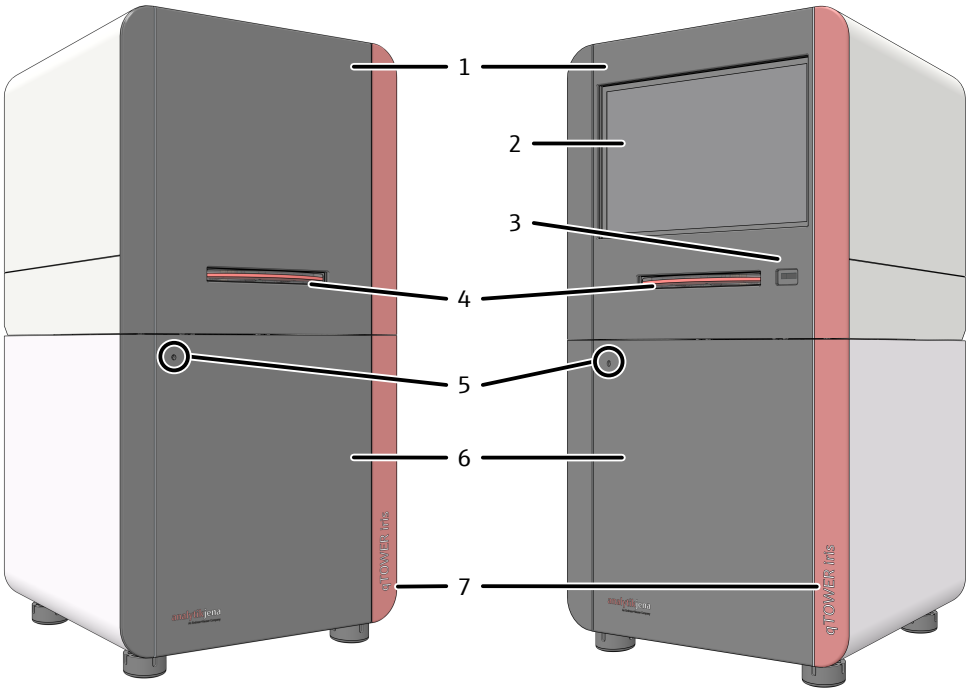


Fig. 1 Front of the devices, left without and right with integrated tablet

1 Upper part with fluorescence spectrometer
2 Operating tablet (only for models with integrated tablet)
3 USB port (only for models with integrated tablet)
4 Lock with handle
5 LED for status display
6 Lower part with thermocycler
7 Device name

The device is opened by folding back the upper part and the cover for the sample block and fluorescence photometer it contains. To this end press the handle in until the lock disengages with a click and the upper part gently snaps open. The upper part can then be folded back from the handle.

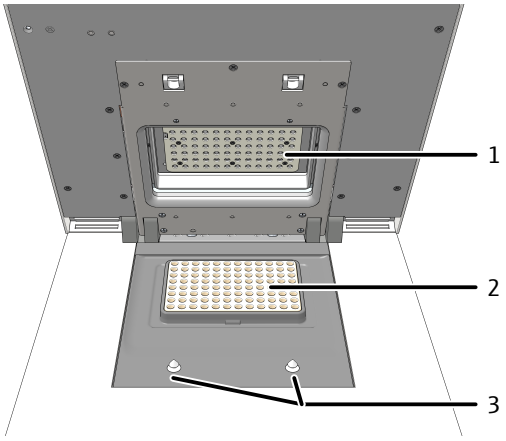


Fig. 2 Open device

1 Heated lid
2 Sample block
3 Locking pins

The mains connection and the power switch are located on the device rear.

There are also connection interfaces are located on the rear of the device: a USB port for connection to the PC and an Ethernet port for connection to a network.

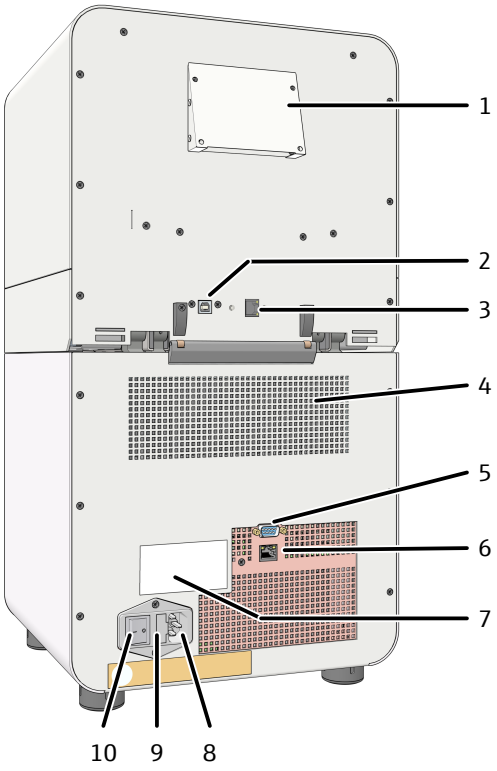


Fig. 3 Rear of the device

1 Ventilation for fluorescence spectrometer
2 USB port for connection cable to an external PC
3 Ethernet port (only for models with integrated tablet)
4 Ventilation grille on the thermal cycler
5 Service connection
6 Ethernet port for network connection
7 Type plate
8 Power connection
9 Fuse holder for device fuses
Mains switch

The voltage selector switch is located on the bottom of the device, behind a cover. It can be used to adjust the operating voltage to the mains voltage.

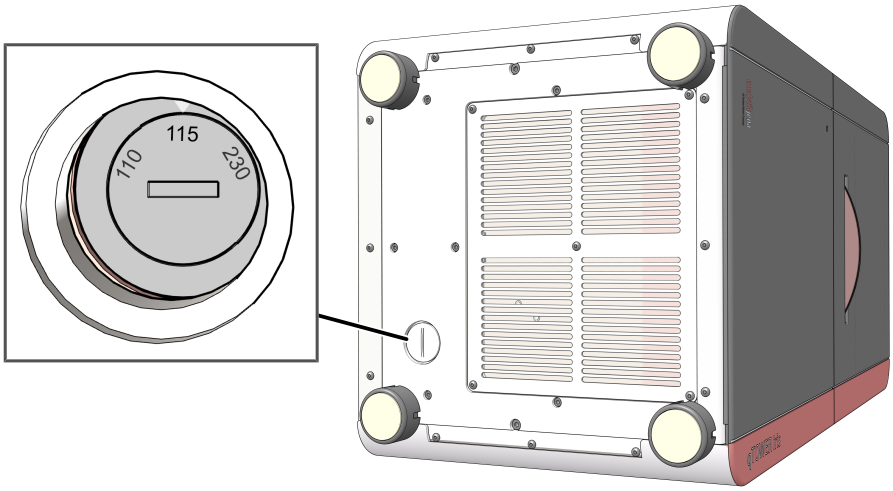


Fig. 4 Underside of the device with voltage selector switch

The following accessories are included in the delivery scope of the device:

- Power cable
- Connection cable for connecting to the PC
- CD or USB stick with qPCRsoft software, with manual for software and device
- Operating manual and software manual (print version)
- Packaging and packaging instructions

Fig. 5 Mains and connection cable

Only use the mains cable supplied or a mains cable with the same specifications.

4.2 Function

4.2.1 Fluorescence spectrometer

The detector unit for a thermal block with 96 wells is a patented 8-channel epi-fluorescence photometer with fiber multiplexer and a mechanical scanning device.

The detector unit for a thermal block with 384 wells is a patented 16-channel epi-fluorescence photometer with fiber multiplexer and a mechanical scanning device.

The device is an open platform for real-time PCR and supports both intercalating dyes as well as individual sensors and kits from various manufacturers. The device can be used in various applications, such as expression analyses, genotyping and the detection of pathogens.

Light source

A long-life, sturdy five-color LED (blue, green, white, red, and UV) in the device is used as an excitation light source for the emission of fluorescent dyes. The light source does not require any preheating time.

Multiplexer with color modules

The color modules with the excitation filters are mounted on a rotating filter wheel, the multiplexer. Analytik Jena offers a number of color modules of which up to six can be installed simultaneously in the multiplexer.

Retrofit or replacement of the installed modules may be carried out by the Analytik Jena service team at any time.

NOTICE

If you intend to extend the application spectrum of the device with regard to using filter modules, always contact the service department because extensions – to be performed by the operator himself – are **not** intended by the manufacturer.

Measuring head

The measuring head as a mechanical scanning unit scans the sample block column by column.

Detector

The detector (photomultiplier) allows measurement of the sample fluorescence in up to six spectral channels during PCR, providing verification of multiple target sequences in a single PCR reaction. The signal from the fluorescent dyes excited by a light source correlates quantitatively with the amount of PCR product and may be shown in real-time.

4.2.2 PCR thermocycler

The thermal block with 96 wells is made of silver for the best possible performance and thermal conductivity. The silver is coated with gold for corrosion protection. Due to its excellent heat conductivity, silver equilibrates extremely quickly, providing maximum speed and uniform temperature distribution.
This achieves a high temperature homogeneity and uniformity in combination with heating rates of up to 8 °C/s and cooling rates of up to 5.5 °C/s.

The thermal block with 384 wells is made of aluminum that conducts heat very well. This achieves a high temperature homogeneity and uniformity in combination with heating rates of up to 4 °C/s and cooling rates of up to 2 °C/s .
This powerful thermal block is suitable for high-throughput applications in particular.

The gradient function of the thermal block is particularly suited for establishing new primary pairs.

The thermal blocks are perfectly sealed to prevent condensed water from penetrating the Peltier elements underneath the sample block and other parts of the electronics. This protects the Peltier elements and prolongs the service life of the device.

4.2.3 Heated lid

The device comes equipped with an automated heated lid. This can be set to 30 to 110 °C and prevents condensation forming in the area of the reaction tubes above the block surface level. Furthermore, the heated lid guarantees – regardless of the consumables used – a reliable contact between the reaction tubes and the thermal block during the entire real-time PCR run thanks to a constant contact pressure. This significantly improves temperature uniformity.

4.2.4 Plastic

NOTICE

Unsuitable sample vessels and microtiter plates can lead to instrument damage and incorrect results.

- Only use sample vessels and microtiter plates that are suitable for a PCR application.
- Seal the samples. Use the sample vessels with lids and adhesive foil for microtiter plates.
- The optical transparency of the foils affects the fluorescence signal directly. Use only clear adhesive foils and optical lids as offered for real-time PCR.

Sample blocks in 96-well SBS format are suitable for use with 0.2 mL individual tubes, 8-well strips and 96-well microtiter plates.

Sample block in 384-well SBS format are only suitable for use with standard PCR plates with 384 wells.

These and other consumables can be ordered from Analytik Jena.

Regardless of the sealing method used, thanks to the lid technology, the same pressure is always applied to the consumables for absolutely reproducible conditions.

The device is not limited to specific detection reagents or the plastic products of a specific manufacturer.

4.2.5 Software

The device can be controlled via the qPCRsoft software on an external PC or an integrated tablet.

Desktop software

The desktop software provides the following functions:

- Device control and monitoring
- Design of real-time PCR experiments and their evaluation
- Storage of methods (templates) and measuring results (projects)
- User management
- Planning and evaluation of
  - Absolute quantifications
  - Relative quantifications
  - ΔΔCt analyses
  - DNA melting curves
  - Genotyping
  - End point analyses
- Results export to MS EXCEL or as CSV file
- Results printout
- Results export to extended programs for the analysis of real-time PCR data (e.g. GenEx)

Software installed on the integrated tablet

The software installed on the integrated tablet offers the following functions:

- Device control and monitoring
- Design of real-time PCR experiments and their evaluation
- Monitoring the measurement
- Calculating the Ct value
- Storage of methods (templates) and measuring results (projects)
- Results export to MS EXCEL or as CSV file
- Results export to extended programs for the analysis of real-time PCR data (e.g. GenEx, qBASE)
- Data transfer to the desktop PC software via USB stick

A detailed description of the software can be found in the software manual.

4.3 Protective devices

The device is equipped with protective devices. The protective devices ensure safe operation of the device and must not be bypassed. The following table lists the available protective devices and their functions.

Protective device	Function
Housing	Enclosure of the electrical and optical components. Enclosure of surfaces that become hot during measurement.
Locking pins	Locking of the lid opening while a measurement is underway.
Stray light detection	Termination of the heating process in case of stray light detection due to opening of the lid.

4.4 Type plate

The type plate is located on the rear of the device. It provides the following information shown in the figure:

- Manufacturer and address
- Protection class of the housing
- Safety symbols (Caution: Observe the accompanying documents!
- Device number
- Year of manufacture
- Disposal instructions (Do not dispose of as domestic waste!)
- Conformity and test sign
- Electrical connection data
- Serial number
- Order number
- Device type and model

5 Installation

5.1 Installation location requirements

Ambient conditions

The climate conditions for the installation location are listed in the technical specifications Ambient conditions. If required, ensure that the room is temperature-controlled.

Installation location requirements

- This laboratory device is designed for indoor use.
- Do not use the device in wet and damp environments. Keep the device surface clean and dry.
- Avoid direct sunlight and radiation from heaters onto the device. If necessary, provide air conditioning.
- Place the device on a heat-resistant and acid-resistant surface.
- Do not locate the device near sources of electromagnetic interference.
- Avoid mechanical shocks and vibrations.
- Do not use the device in explosion-hazard environments.
- Place the device on a stable surface.
- The installation site must be free of drafts, dust and caustic fumes.
- Keep the ventilation slits free and do not obstruct them with other devices.

5.1.1 Spatial requirements

NOTICE

When opening the device, the upper device hood tilts back. Provide adequate space for this.

The opened device has a spatial requirement of 61.3 cm x 30.4 cm x 47.7 cm (H x W x D). In addition, keep a safety distance of at least 10 cm to other equipment or walls.

Additional space is required next to the device for the PC, monitor and possibly a printer. The PC, monitor and printer may also be placed on a separate table.

PC, monitor and printer are optional if you control the device via an integrated tablet.

5.1.2 Power supply

WARNING

Risk of electric shock!

The device may only be connected to a properly earthed power outlet in accordance with the voltage specifications on the type plate.

The device operates on single-phase alternating current. Prior to making the connection check that the voltage selection switch of the device is set to the correct value.

The device may only be used with the supplied power cable or a power cable with the same specification (1.5 m length, shielded, with grounding conductor).

Electrical connection requirements

Operating voltage	100 / 115 / 230 V (AC) ± 10 %
Line frequency	50/60 Hz
Power consumption	≤ 850 W
Device fuse	2 x 10 AT / 250 V

5.2 Installation

WARNING

Risk of electric shock!

Check that the mains connection conditions match those indicated on the type plate on the rear of the device.

Before connecting the device to the mains network set the correct operating voltage at the voltage switch on the underside of the device.

NOTICE

Unsuitable packaging material may cause damage to the device! Keep the original packaging and transport lock for subsequent transports.

The following steps are required during the installation of the device:

- Checking the set operating voltage and correcting it if it does not match the voltage supplied at the site
- Connect the device to the PC and install the software on the PC. This step is optional for models with an integrated tablet.
- Connecting the device to power

Proceed as follows for the installation:

- Remove the device, the connection cables and the operating manual from the transport packaging. For models without an integrated tablet, also remove the installation CD or USB stick from the transport packaging.
- Wait until the device has reached room temperature for commissioning.
- Verify that the delivery is complete. Check the device and accessories for transport damage.
  In the event of an incomplete delivery or transport damage, please contact Analytik Jena.

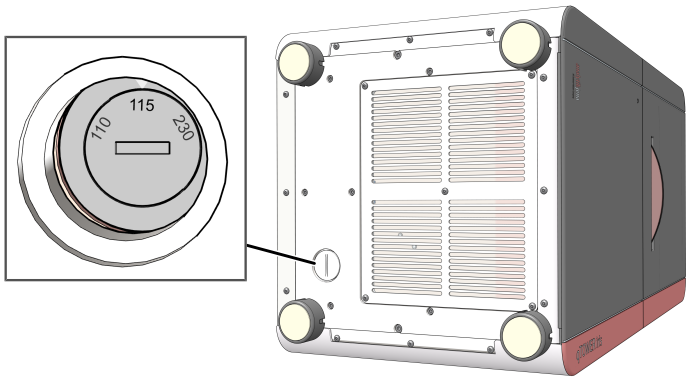


Fig. 6 Voltage selection switch on the bottom of the device

- Set the operating voltage:
  - Place the device on its side. Remove the cover from the voltage selection switch on the bottom.
  - Adjust the switch using a screwdriver or a coin so that the arrow points in the direction of the mains voltage available on site.
  - Replace the cover on the selection switch and put the device back on its feet.

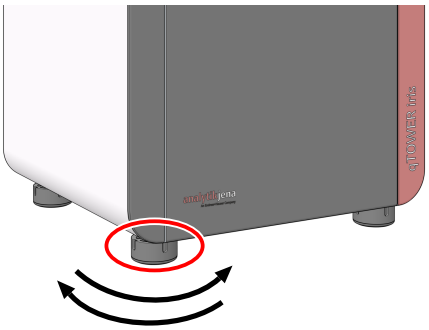


Fig. 7 Rotating feet on the bottom of the device

- If the surface where the device is being installed is not level: The device has adjustable feet that can be unscrewed. Unscrew the adjustable feet so that the device is horizontal.
- Open the lid of the device. To do so, press in the red handle on the front until the lock clicks open. Fold back the upper part of the device.
- Remove the transport lock and put it aside for later transports.
- Connect the connection cable to the device interface and to the PC. This step is optional for models with an integrated tablet.
- Make sure that the power switch of the device is switched off. Connect the power cable to the device. Insert the plug of the power cable into the power socket.
  - ✓ The device is ready for commissioning.

NOTICE! Ensure that the power switch and the power cable can be easily accessed. This is important in the event that the device needs to be disconnected from the supply voltage.

Control via external PC

- Switch on the PC. Install the software on the PC. Observe the information in the software manual for this.
- Switch on the device via the mains switch.
  When first switched on, the device is detected as a connected device. After the drivers install automatically, the device is ready for operation. If the drivers are not installed automatically, you can complete the installation via the Windows routine. The drivers can be found on the installation CD or USB stick.
- Start the software.
  - ✓ The device is ready for operation.

NOTICE! Devices with an integrated tablet cannot be controlled via the desktop software on an external PC when the tablet software is open. Before attempting to control the device via an external PC: Close the tablet software or shut down the tablet. Leave the qPCR device switched on. Observe the information in the tablet software manual.

Control via integrated tablet

- Switch on the device via the mains switch.
  - ✓ The software starts automatically.
  - ✓ The device is ready for operation.

6 Operation

6.1 Switching the device on and off

NOTICE

Remove the transport lock before commissioning. Keep this for subsequent transports.

- Switch on the device via the mains switch on the rear of the device.
  - ✓ The device is initialized. During this time, the status LED on the front side of the device flashes. The device is ready for operation when the status LED is lit continuously in green.

For models with an integrated tablet, the software starts automatically. The device is ready for operation when the status LED is lit continuously.

When controlling via an external PC, start the software as follows:

- ⇨ The PC is switched on.
- ⇨ The device is switched on and the status LED on the front of the device is continually green.

- Start the software.
- In the "Device selection" window, select the desired device for control.
  - ✓ The software establishes the connection to the device.
  - ✓ The device is connected and can be controlled via the software.

Status LED

The status LED is located on the front of the device next to the device name. It displays the operating state of the device:

- During the device initialization the LED flashes red/green.
- As soon as the device is ready for operation, the LED switches to solid green.
- During a measurement, the LED flashes red/green.
- In case of a device error, the LED will turn red.

Switching the device off

NOTICE

Do not switch off the device during a PCR run!

Keep the device closed even if switched off to prevent the sample block from becoming contaminated. Dust or other contamination can affect the fluorescence measurements.

Once the PCR run is finished, the software can be exited and the device switched off by pressing the power switch.

Close the software for models with integrated tablet via the  button on the start screen and shut down the tablet.

Then switch off the device by pressing the power switch.

6.2 Start real-time PCR

WARNING

Biological hazard!

Exercise caution when working with potentially infectious materials. Wear suitable protective equipment, e.g. protective gloves.

WARNING

Risk of eye injury!

The rapid heating of the thermal block can result in the explosive vaporization of liquids when the thermal block is opened during the PCR run. Always wear safety goggles during operation.

CAUTION

Hot surfaces

The thermal block, the samples, and the heated lid reach high temperatures. There is a risk of burns during contact.

Sample blocks in 96-well SBS format are suitable for use with 0.2 mL individual tubes, 8-well strips and 96-well micro titer plates.

Sample block in 384-well SBS format are only suitable for use with standard PCR plates with 384 wells.

These and other consumables can be ordered from Analytik Jena.

The recommended plastic products from other manufacturers are listed in the corresponding section of this operating manual.

Measurement of fewer samples for devices with 96-capacity sample block

NOTICE! The force of the lid contact pressure was designed for a fully populated block. If only a few samples are used in the block, ensure that the lid contact pressure is distributed symmetrically. Otherwise the sample vessels or the heated lid may become damaged from excess contact pressure.

When inserting only a few sample, proceed as follows:

- When using few individual tubes, also insert additional (empty) tubes of the same height in the four corner positions of the block.

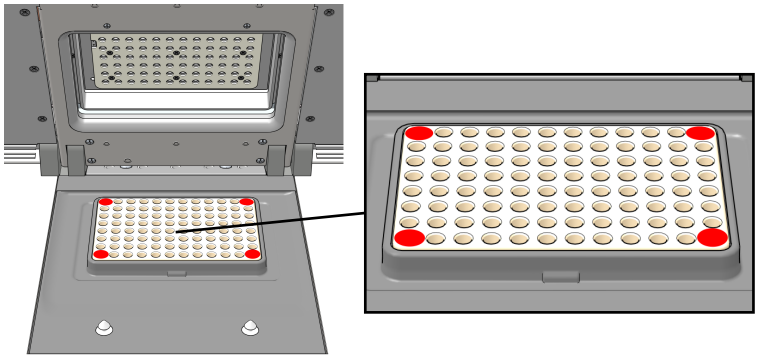


Fig. 8 Positions for additional individual tubes when measuring with few samples

- When using few well strips, place one strip on each side of the sample block.

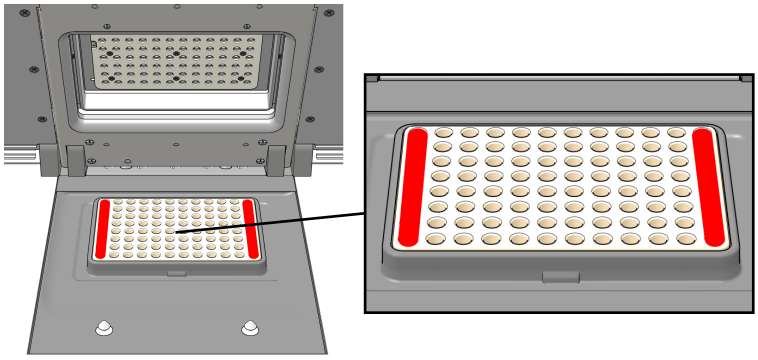


Fig. 9 Positions of additional 8-well strips when measuring with few samples

Start a real-time PCR analysis as follows:

- Pipette the PCR samples into the sample vessels. Close the sample vessels.

NOTICE! Micro titer plates must be sealed with optically transparent adhesive foil (sealing foil). The optical transparency of the foils affects the fluorescence signal directly. For this reason, only use clear adhesive foil such as that provided for real-time PCR. 0.2 mL individual tubes and 8-well strips must be sealed with suitable corresponding optical lids.

- Prepare a real-time PCR project with complete information on the PCR run, floures-cence measurement and sample layout of the PCR plate.

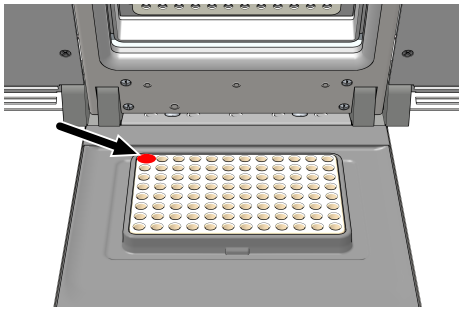


Fig. 10 Position A1 in the sample block

- Open the lid. To do so, press in the red handle on the front until the lock clicks open. Fold back the upper part of the device.
- Place the samples. Observe the information on placing samples when measuring few samples when doing this. When using PCR plates, place these on the thermal block so that well A1 is on the left-hand side (arrow in the illustration below). This position corresponds to the well allocation in the software.
- Close the lid. To do this, fold the lid forward and press it down with the handle until the lock engages with a click.
- Start the PCR run in the software.
  - ✓ The PCR run begins and analysis starts.

7 Error messages

The following chapter describes possible errors of the device. The error correction measures that can be performed by the customer are limited to those listed in the following section.

NOTICE

If you cannot eliminate errors yourself, please contact customer service.

If an error occurs, the software outputs error codes assigned to the following errors:

Error code	Cause
x ≤ -100	Device error in the optical unit of the fluorescence photometer
-99 ≤ x ≤ -10	Software error (e.g., in the settings)
-9 ≤ x ≤ -2	General device error, e.g., lid open
-1	Does not indicate an error condition
x ≥ 0	PCR thermocycler: Device error

For the following errors, check these options for elimination:

Error code	Cause	Remedy
	Device cannot be switched on.	Check the power supply. Replace the fuses. Replace the power cable.
	Sample cups are damaged during measurements.	Check the suitability of sample cups. Insert the sample properly.
x = -8	Lid not closed.	Check that the sample are inserted correctly. Close the lid, ensuring that it engages correctly.
-99 ≤ x ≤ -10	Software or data communication error	Check the settings in the software.
x = 80	USB not available	Replace USB cable Switch to a different USB port on the PC

If these measures do not eliminate the error, or if further errors occur, inform Analytik Jena customer service.

8 Maintenance and care

WARNING

Risk of electric shock! Do not touch!

Prior to commencing any maintenance or cleaning work, switch off the device and unplug the power plug.

The following maintenance and care tasks can be performed by the customer:

- Cleaning and disinfection of the housing and sample block
- Replacing the fuses

All maintenance work and repairs beyond that listed in this chapter may only be performed by Analytik Jena customer service or persons trained and authorized by Analytik Jena. Any unauthorized intervention limits warranty entitlements. If the device exhibits any faults or defects, please contact Analytik Jena customer service immediately.

8.1 Cleaning

WARNING

Risk of short circuit!

The device may come into contact with moisture during cleaning work.

- Switch off the device before all cleaning work and remove the power plug from the socket.
- Do not use any dripping wet cloths for cleaning. Do not spray cleaning agents or disinfection agents directly onto the device; spray onto cleaning cloths instead. No liquids are permitted to enter the device interior. This may lead to personal injury and damage to the device.
- Only put the device back into operation after cleaning when it has completely dried.

WARNING

Biohazard

Clean the device with particular care after analysis of potentially infectious material. Wear personal protective equipment.

NOTICE

Do not use concentrated alcohol, organic solvents, abrasive cleaners or bleach to clean the device. These can cause damage to the device.

8.1.1 Cleaning the housing

If the device becomes contaminated during daily use, cleaning with a damp cloth is sufficient.

Only wipe the housing with a soft, clean cloth which may be wetted with a commercially available neutral cleaning agent if necessary.

8.1.2 Cleaning the sample block

WARNING

Risk of eye injury!

Wear safety goggles when blasting the sample block with compressed air.

Dust or reagent residue in the sample block can cause an increase in the background signal.

- Use compressed air to blow out the recesses in the sample block.
- To remove reagent residue, fill the affected wells with max. 20 µL of distilled water or ethanol. Let the liquid act for approx. 1 min before sucking it out again. Repeat the process until the background signal is in the normal range.

8.1.3 Disinfecting the device

- Avoid contamination by handling samples carefully.
- Wipe spilled samples or reagents immediately with an absorbent cloth or piece of paper.
- The device cannot be decontaminated in its entirety. Take special care when using the instrument to analyze infectious material.
- Remove visible contamination immediately with suitable means. Do not allow solvents to enter the device.
- The sample block is also suitable for wipe and spray disinfection. The only suitable cleaning method for the housing is wipe disinfection.

Device part	Recommended disinfectants	Provider
Housing	Descosept Spezial	Dr. Schuhmacher GmbH
Sample chamber	Descosept Spezial	Dr. Schuhmacher GmbH
	Meliseptol HBV (tissues)	B. Braun

Observe the efficacy spectrum of the listed disinfectants with regard to the customer-specific decontamination requirements!

- Only disinfection agents containing ethanol or isopropanol are approved. Disinfection agents with ingredients or concentrations other than those in the recommended disinfection agents may result in insufficient decontamination or damage to the device.
- Use disinfection agents other than those presented here only after consultation with Analytik Jena.
- If the device must be sent back to Analytik Jena for servicing, first perform decontamination and document this (→ "Return" 🖹 27).

See also

🖹 Return [▶ 27]

8.2 Replacing the fuses

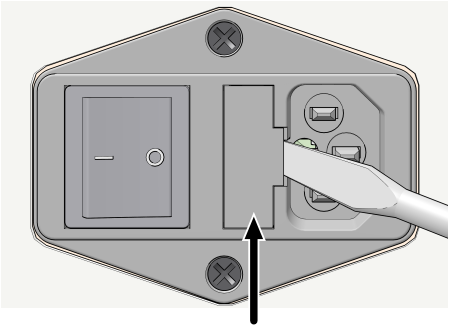
WARNING

Risk of electric shock! Do not touch!

Before exchanging fuses, switch off the power switch and disconnect the device from the mains network.

Only use the specified fuses. If the wrong fuses are used, there is a risk of fire, injuries and device damage.

Mains voltage	Device fuse
100 / 115 / 230 V (AC) ± 10 %	2 x 10 AT / 250 V



- For models with integrated tablet: Exit the software via the button on the start screen and shut down the tablet.
- Switch off the device via the device switch and disconnect the power plug from the socket.
- Open the fuse compartment on the rear of the device with a small flat screwdriver. To do this, insert the screwdriver into the slot and carefully twist it.
- Remove the fuse holder from the compartment.
- Remove the old fuses and replace them with identical types.
- Reinsert the fuse holder into the compartment and close the lid.

If the fuses repeatedly fail, the device must be checked by Analytik Jena customer service, or by personnel trained and authorized by Analytik Jena.

9 Transport and storage

9.1 Transport

NOTICE

Use suitable packaging material and transport locks!

Unsuitable packaging material may cause damage to the device! Only transport the device in its original packaging and with the transport lock in place! Information on proper packaging is included with the device.

Please observe the information regarding device transport Safety instructions – transport and installation. Avoid the following during transport:

- Impact and vibration
  Risk of damage due to shock, impact or vibration!
- Large temperature fluctuations
  Risk of condensation!

9.1.1 Inserting the transport lock

Before packing the device, the transport lock for the upper part that contains the fluorescence photometer must be installed. If the transport lock is no longer available, you can place an empty PCR plate in the sample block.

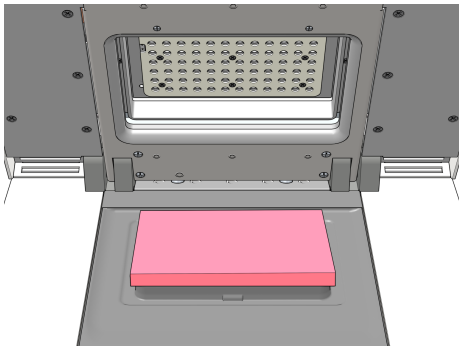


Fig. 11 Inserted transport lock

Fastening of the transport lock is controlled by the software:

Control via external PC

- Place the transport lock on the sample block and close the lid.
- In the software, select menu item **Extras** | **Transport lock** and follow the instructions on the screen.

Control via an integrated tablet

- Place the transport lock on the sample block and close the lid.
- Switch on the device.
  ✓ The software starts automatically.
- On the start screen, tap on the **Options** menu.
  The **Settings** window opens.
- Tap **Transport lock** | **Set**.
  ✓ The device presses the transport lock into place.

- Close the **Settings** window with  .
- Exit the software via the  button on the start screen and shut down the tablet. Switch off the device afterwards.

The transport lock is released automatically when the device is switched on again. Alternatively, you can tap on **Release** to release the transport lock.

9.1.2 Return

WARNING

Risk of damage to health due to improper decontamination!

Perform a professional and documented decontamination of the device before returning it to Analytik Jena. The decontamination report is available from the customer service department when registering the return. Analytik Jena must refuse acceptance of contaminated devices. The sender may be liable for any damage caused by inadequate decontamination of the device.

- Clean all device components of biologically hazardous, chemical and radioactive contamination.
- The decontamination report is available from the customer service department when registering the return. Complete the form and attach the signed decontamination declaration to the outside of the return shipment.
- Only use the original packaging for the shipment and insert the transport lock. If the original packaging is no longer available, please contact Analytik Jena or your local distributor.
- Apply the following warning sign to the packaging:
  "CAUTION! SENSITIVE ELECTRONIC DEVICE!".
- Include a sheet with the following information:
  - Name and address of the sender
  - Name and telephone number of a contact for inquiries
  - A detailed description of the fault, the precise conditions and situations under which the fault occurs

9.1.3 Moving the device in the laboratory

CAUTION

Risk of injury during transport

Dropping the device poses a risk of injury and damage to the device.

- Proceed carefully when moving and transporting the device. Two persons are required to lift and carry the device.
- Grip the device firmly at the bottom with both hands and lift it simultaneously.

Observe the following when moving the device within the laboratory: 2 persons are required to lift and carry the device. They should position themselves on both sides of the equipment.

Since the device does not have handles, grip the device firmly with both hands at the lower end, lifting it simultaneously.

Observe the guide values and adhere to the legally mandated limits for lifting and carrying without auxiliary means!

- Exit the software:
  - For control via an integrated tablet: Exit the software via the  button on the start screen and shut down the tablet.
  - For control via external PC: Exit the software.
- Switch off the device at the mains switch.
- Disconnect the power and the PC from the device.
- Position one person each at the two opposing device sides. Grip the device firmly at the bottom with both hands and lift it simultaneously.
- Observe the information for setting up the device at a new location.

9.2 Storage

NOTICE

Environmental influences and condensate formation can destroy individual components of the device!

The device must only be stored in air-conditioned rooms. The atmosphere must be low in dust and free from aggressive vapors.

If the device is not installed immediately after delivery or not required for prolonged periods, it should be stored in its original packaging. A suitable desiccant should be added to the equipment to prevent damage from moisture.

Ambient conditions

Refer to the technical specifications for the ambient climate requirements of the device's storage location Ambient conditions.

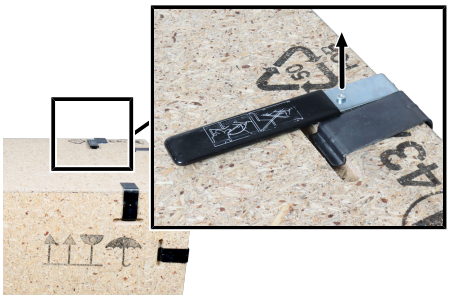
9.3 Packing away

- Place the cover over the device.
- First insert the device into the lower half of the transport packaging and then place the upper half on top.

- Load the transport box as follows:
  - (1) Push the device into the center of the transport box.
  - (2) Insert the accessories supplied with the device into the boxes in the sides. The operating manual list the associated accessories.

- Attach the side panel of the transport box. If necessary, loosen the brackets on the top panel so that the top panel can be lifted and the side panel can be inserted correctly.

The tool required to remove the brackets is screwed to the transport box.



- Unscrew the tool required to remove the brackets from the transport box.

- To open, remove the brackets with the tool. Hold the brackets in place while doing so.

⚠ CAUTION! Hold the brackets firmly when removing them! There is a risk of injury if the bracket jumps away while being removed.

- Re-attach the tool to the box after removing the brackets.

10 Disposal

The operator of the device must dispose the waste materials that occur during measurements (sample materials) in accordance with the statutory and local regulations.

At the end of its service life, the device and all its electronic components must be disposed of as electronic waste in accordance with applicable regulations.

11 Specifications

11.1 Technical data

General data

	Models with 96-capacity sample block	Models with 384-capacity sample block
Dimensions (height x width x depth)	58.7 cm x 30.4 cm x 31.6 cm, 61.3 cm x 30.4 cm x 47.7 cm when opened	
Mass	approx. 30 kg	
Noise level	approx. 60 dB	
Safety circuits	■ Sensor-based monitoring of the closing and locking of the sample chamber ■ Overtemperature protection in the heated lid	
Supported plastic products	96-well microtiter plates with optical sealing foil 8-well strips 0.1 ml or 0.2 ml with optical lids 0.1 ml or 0.2 ml individual vessels with optical lids	384-well microtiter plates with optical sealing foil

Thermal block/heated lid

	Model with 96-capacity sample block	Model with 384-capacity sample block
Sample block	Silver (gold-plated)	Aluminum (special alloy)
Block capacity	96-well microtiter plate	384-well microtiter plate
Sample volume	5 to 100 µl	5 to 20 µl
Heating	Max. 8 °C/s	Max. 4 °C/s
Refrigeration	Max. 5.5 °C/s	Max. 2 °C/s
Temperature setting range	4 to 99 °C	
Heating rate adjustment	Min. 0.1 °C/s	
Temperature uniformity after 15 s	± 0.15 °C at 55 °C ± 0.25 °C at 72 °C ± 0.50 °C at 95 °C	
Temperature control precision	± 0.1 °C	
Temperature increments	Min. 0.1 °C/cycle	
Time increments	Min. 1 s/cycle	
Lid temperature	30 to 110 °C	
Contact pressure	Corresponds to 30 kg, automated	
Time increments/decrements	±1 to 240 s/cycle for 1 s to 99:59 min	
Temperature increments/decrements	± 0.1 to 20 °C/cycle for 4 °C to 99 °C	

Gradient function

	Model with 96-capacity sample block	Model with 384-capacity sample block
Gradient	12 columns: 4 to 99 °C, linear gradient tool	24 columns: 4 to 99 °C, linear gradient tool
Max./min. gradient	40 °C / 0.1 °C	24 °C / 0.1 °C

qPCR application

	Model with 96-capacity sample block	Model with 384-capacity sample block
Sensitivity	1 nmol/l FAM at 30 µl sample volume	1 nmol/l FAM at 10 µl sample volume
Measuring time	approx. 6 s for 96 wells for a single measurement, independent of the number of colors (single-plate readout)	approx. 6 s for 384 wells for a single measurement, independent of the number of colors (single-plate readout)
Measurement range	± 130 000 (± 17 bit)	
Dynamic range	10 log stages	

Fluorescence spectrometer

	Model with 96-capacity sample block	Model with 384-capacity sample block
Measuring principle	Fiber-optic shuttle system with 8-fold scanner and color modules for the excitation and emission filters	Fiber-optic shuttle system with 16-fold scanner and color modules for the excitation and emission filters
Light source	7-chip multi-color power LED	
Color modules	■ 8 color and protein modules ■ 6 positions in the device	
Detector	Highly sensitive PMT (photomultiplier tube)	

Color modules

Description	Excitation	Emission	Dyes (examples)
Color module 1 (blue)	455 ± 15 nm	515 ± 10 nm	FAM™, SYBR®Green, ATTO425, Cyan500
Color module 2 (green)	520 ± 10 nm	560 ± 15 nm	JOE™, HEX™, VIC®, YakimaYellow®, TET
Color module 3 (yellow)	550 ± 15 nm	585 ± 10 nm	TAMRA™, ATTO550
Color module 4 (orange)	580 ± 10 nm	620 ± 15 nm	ROX™, TexasRed®, Cy3.5®, ATTO590
Color module 5 (red)	625 ± 10 nm	670 ± 15 nm	Cy5®, ATTO633
Color module 6 (NIR1)	660 ± 10 nm	710 ± 20 nm	Cy5.5®, ATTO665
Color module 7 (UVA)	375 ± 15 nm	475 ± 15 nm	ATTO390, ATTO425
Color module Protein 1	465 ± 15 nm	580 nm HP	SYPRO® Orange

Electrical connection requirements

Operating voltage	100 / 115 / 230 V (AC) ± 10 %
Line frequency	50/60 Hz
Power consumption	≤ 850 W
Device fuses	2 x 10 AT / 250 V
Overvoltage category	II
Protection type	IP 20
Protection class	I

Minimum PC requirements

Processor	Intel Core 3 or better
Working memory	2048 MB RAM
Display resolution	Min. 1280 x 1024 pixels
Operating system	Windows 10
Interfaces	■ USB port ■ Ethernet interface
Additional interfaces for models with integrated tablet	■ USB port for data export on the front of the device ■ Service port on the rear of the device

Software

qPCRsoft	Control and analysis program
Analysis methods	■ Absolute quantification ■ Relative quantification ■ ΔΔCt method ■ Allelic discrimination ■ Efficiency calculation ■ DNA melting curves ■ POS/NEG analysis in the end point
Export functions	Excel, CSV, LIMS, GenEx, GeneIO

Integrated tablet

Tablet	10", color, with touch screen
Data connection	USB for data transmission via USB stick
Operating system	Windows 10
Storage capacity	32 GB

11.2 Ambient conditions

	Operation	Transport, storage
Temperature range	+15 °C to +35 °C	-10 °C to +55 °C
Max. humidity	70 %	10 % to 30 % Use desiccant!
Max. permissible height	2000 m	
Air pressure	0.7 to 1.06 bar	
Work environment	Only suitable for operation in rooms	
Pollution degree of the intended environment	2	

11.3 Standards and directives

Device safety

The device complies with the following safety standards
- IEC 61010-1
- IEC 61010-2-010

EMC compatibility

The device has been checked for transient emissions and noise immunity.

It meets the requirements for transient emissions according to
- EN IEC 61326-1 (EN 55011 group 1, class B)

The device meets the requirements for noise immunity according to
- EN IEC 61326-1 (requirements for use in a basic environment)

Guidelines for China

The device contains substances subject to regulation (according to the directive GB/T 26572-2011). Analytik Jena guarantees that, if the device is used as intended, these substances will not leak within the next 25 years and therefore will not pose a threat to the environment or health within this time period.

EU directives

The device meets the requirements of the Directive 2011/65/EU.

The device is designed and tested in accordance with standards meeting the requirements of EU directives 2014/35/EU and 2014/30/EU.

12 Revision overview

Version	Effective date	Changes
A	05/2023	First version
B	04/2024	Adaptations (standards and directives)

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