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QIAquant™ 384 User Manual

For Molecular Biology Application. Not for use in diagnostic procedures.

Contents

1	Introduction	4
1.1	About this user manual	4
1.2	Conventions	5
1.3	Intended use of QIAquant 384	5
1.4	Warranty and liability	6
2	Safety Information	8
2.1	Symbols and signal words used	8
2.2	Safety symbols on the QIAquant 384	10
2.3	Technical condition	10
2.4	Requirements for the operating personnel	11
2.5	Safety instructions, transport, and installation	12
2.6	Safety instructions – operation	13
2.7	Behavior during emergencies.....	16
2.8	Standards and directives.....	16
3	Installation Conditions.....	19
3.1	Environmental conditions.....	19
3.2	Power supply.....	19
3.3	Space requirement	20
4	Function and Setup.....	21
4.1	Fluorescence spectrometer.....	21
4.2	PCR thermocycler	22
5	Installation Procedures	23
5.1	Connections and control elements	23
5.2	Setting up the QIAquant 384.....	26
6	Operating Procedures.....	28
6.1	Switching the QIAquant 384 on.....	28
6.2	Switching off the QIAquant 384	28

6.3	Inserting samples/starting the PCR analysis.....	29
7	Maintenance and Care.....	31
7.1	Cleaning the housing.....	31
7.2	Cleaning the sample block.....	31
7.3	Disinfecting the device.....	32
7.4	Exchanging fuses.....	33
8	Troubleshooting.....	34
8.1	General information.....	34
9	Technical Specification.....	35
10	Transport and Storage.....	37
10.1	Transport.....	37
10.2	Placing the transport lock.....	37
10.3	Return.....	38
10.4	Moving the QIAquant 384 in the laboratory.....	38
10.5	Storage.....	39
11	Disposal.....	40
Appendix	41
	Declaration of Conformity.....	41
	Certificates.....	42
	Waste Electrical and Electronic Equipment (WEEE).....	43
	Liability Clause.....	44
Index	45
Document Revision History	46

1 Introduction

The QIAquant 384 is intended for operation by qualified specialist personnel observing this user manual.

The manual informs about the design and function of the unit and provides personnel familiar with PCR technology with the necessary know-how for the safe handling of the equipment. The manual also provides notes on the maintenance and caring for the unit.

1.1 About this user manual

This user manual provides information about QIAquant 384 in the following sections:

1. Introduction
2. Safety Information
3. Installation Conditions
4. Function and Setup
5. Installation Procedures
6. Operating Procedures
7. Maintenance and Care
8. Troubleshooting
9. Technical Specification
10. Transport and Storage
11. Disposal

1.1.1 Technical assistance

At QIAGEN® we pride ourselves on the quality and availability of our technical support. Our Technical Services Departments are staffed by experienced scientists with extensive practical and theoretical expertise in molecular biology and the use of QIAGEN products. If you have any questions or if you experience any difficulties regarding QIAquant 384 or QIAGEN products in general, do not hesitate to contact us.

QIAGEN customers are a major source of information regarding advanced or specialized uses of our products. This information is helpful to other scientists as well as to the researchers at QIAGEN. We therefore encourage you to contact us if you have any suggestions about product performance or new applications and techniques.

For technical assistance and more information, please see our Technical Support Center at support.qiagen.com.

1.1.2 Policy statement

It is the policy of QIAGEN to improve products as new techniques and components become available. QIAGEN reserves the right to change specifications at any time.

To produce useful and appropriate documentation, we appreciate your comments on this user manual. Please contact QIAGEN Technical Services.

1.2 Conventions

Instructions for action that occur in chronological order are numbered and combined into action units and furnished with the corresponding results.

Lists that are not in chronological order are shown as itemized lists; sublistings, as bullet points.

Safety notes are indicated by pictographs and signal words. The type and source of the danger are stated together with notes on preventing the danger. The meaning of the pictographs and signal words used is explained in "Symbols and signal words used", page 8.

The elements of the control and analysis program are indicated as follows:

- Program terms are identified with bold text, e.g., the **File** menu
- Menu items are separated by arrows (>), e.g., **File > New**

1.3 Intended use of QIAquant 384

QIAquant 384 is a thermal cycler for amplifying DNA by way of polymerase chain reaction (PCR) licensed for real-time PCR experiments. The license is limited to applications for research use only.

The integrated detector enables the measurement of the sample fluorescence in up to 5 spectral channels during the PCR. The specifications of the color modules match the properties of a broad range of commonly used fluorescence dyes for the detection of fluorescent PCR products.

QIAquant 384 is an open platform that can be used in different applications, such as expression analyses, genotyping, and the detection of pathogens.

QIAquant 384 is fully controlled from the PC using the QIAquant 384 Software. The QIAquant 384 Software provides the following functions:

- Device control and monitoring
- User administration
- Context-sensitive help functions
- Design real-time PCR experiments and data analysis
- Storage of methods (templates) and measuring results (projects)
- Planning and analysis of
 - Absolute quantifications
 - Relative quantifications
 - $\Delta\Delta C_t$ analyses
 - DNA melting curves
 - Genotyping
 - End-point analyses
- Results printout
- Results export to MS Excel® or as a CSV file
- Results export to external programs for the analysis of real-time PCR data (e.g., GenEx, qBASE)

A detailed description of the QIAquant 384 Software is available in the software manual.

We recommend the following scientific publication for an intensive introduction into the real-time PCR analysis techniques and applications:

- Logan, J., Edwards, K., and Saunders, N. (Eds.). (2009) *Real-time PCR: Current Technology and Applications*. Norfolk, UK: Caister Academic Press.

QIAquant 384 is to be used in a laboratory setting by trained personnel. QIAquant 384 is intended for molecular biology applications. This product is not intended for the diagnosis, prevention, or treatment of a disease.

1.4 Warranty and liability

The warranty and liability periods comply with the legal requirements and the provisions in the General Terms and Conditions of QIAGEN.

Deviations from the intended use described in this manual result in limitations of warranty and liability in the event of damage.

Warranty and liability claims are excluded for personal injury and property damage due to one or several of the following causes:

- Use of the QIAquant 384 other than intended
- Improper installation, operation, and servicing of the device
- Modifications of the equipment without prior consultation with QIAGEN
- Unauthorized intervention in the equipment
- Operation of the device with faulty safety equipment
- Use of other than original spare parts, wearing parts, or consumables
- Improper repairs
- Improper transport and storage of the device
- Faults due to the non-observance of this manual

2 Safety Information

Before installing or using QIAquant 384, it is essential that you carefully read the user manual and pay attention to the safety information. The instructions and safety information in this user manual must be followed to ensure safe operation of the instrument and to maintain the instrument in a safe condition.

2.1 Symbols and signal words used

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

<p>WARNING</p> 	<p>Indicates a potentially hazardous situation.</p> <p>If it is not prevented, death or most serious injuries (incapacitation) can result.</p>
<p>CAUTION</p> 	<p>Indicates a potentially hazardous situation.</p> <p>Unless avoided, light or minor injuries may result.</p>
<p>CAUTION!</p> 	<p>Hot surface!</p> <p>Touching the hot surface can cause burns.</p>
<p>WARNING!</p> 	<p>Danger of electric shock if touched!</p> <p>Electrical voltages present a danger of electrical shock.</p>

<p>WARNING!</p> 	<p>Biological hazard!</p> <p>Indicates that precautions must be taken when working with potentially infectious material.</p>
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<p>NOTICE</p> 	<p>Indicates a potentially hazardous situation which might cause material or environmental damage.</p>
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In this manual, on the product itself, and on the packaging, the following symbols are used to present important information to the customer, regardless of which language they speak.



CE marking



Manufacturer of the product, including address



Manufacturing date of the product



Order number of the product



Temperature limit



Serial number of the device



Observe operating instructions



Caution
In combination with the symbol above:
Attention! Note the accompanying documents



Symbol for waste disposal in accordance with WEEE directive:
Do not dispose of in household waste

2.2 Safety symbols on the QIAquant 384

The QIAquant 384 is fitted with safety symbols, the content of which must always be observed. Damaged or missing safety symbols can cause incorrect actions leading to personal injury or material damage! The safety symbols must not be removed! Damaged safety symbols must be replaced without delay!

The following safety symbols are attached to the QIAquant 384 and accessories:

Warning symbol
(on heated lid)



Warning against a
hazard location



Warning against hot
surface

Mandatory action signs
(on equipment backplate)



Before opening the device, always
disconnect the mains plug

The following notice sign is attached to the rear of the QIAquant 384:



Vor Oeffnen Netzstecker ziehen !
Unlock power cable before opening !

2.3 Technical condition

The QIAquant 384 corresponds in its design and construction to the current state-of-the-art technology. Unauthorized modifications or changes, especially such that affect the safety of the staff and the environment, are generally not allowed.



Observe the following:

- Any manipulation of the safety equipment is prohibited! In case of an accident, manipulations of the safety equipment will be interpreted as deliberate!
- The operator must only operate the device in a sound and operationally safe condition. The technical condition must always comply with the legal requirements and regulations.
- Prior to every use, the device must be checked for damage and sound condition.
- Any changes in the device affecting its safety must be reported by the operating personnel to the operator without delay.

2.4 Requirements for the operating personnel

The QIAquant 384 must only be operated by qualified specialist personnel instructed in the use of the device. The instructions also include imparting the contents of this manual.

In addition to the safety-at-work instructions in this manual, the generally applicable safety and accident-prevention regulations of the respective country of operation must be observed and adhered to. The operator must ascertain the latest version of these regulations.

The operating and service personnel must have access to the manual at any time!



Observe the following:

- The device must only be installed, operated, and serviced by trained personnel instructed in technical safety.
- The operation or servicing of the device by minors or individuals under the influence of alcohol, drugs, or medication is not permitted.
- It must be ensured that only authorized personnel work at the device. The operating personnel must be familiar with the dangers arising from samples and excipients. Suitable personal protection equipment must be worn.
- Prior to pauses or at the end of the work, appropriate skin cleaning and protection measures must be carried out.
- Eating, drinking, and smoking at the location of the device is prohibited!



- The device must be handled with the appropriate care and kept clean in accordance with laboratory standards to prevent contamination of the device (e.g., on the heatable lid). Observance of these laboratory rules reduces the risk of being contaminated with potentially infectious material and the risk of cross-contamination of the samples. Wear protective gloves and/or take other safety measures if there is a chance that your skin may come into contact with infectious material when handling the device.
- The operator must decontaminate the device if the housing or the sample block were contaminated with hazardous substances. For suitable disinfection agents and procedures, see “Disinfecting the device”, page 32. Other disinfection agents that are not included in the list shall only be used after consultation with QIAGEN.

2.5 Safety instructions, transport, and installation



Observe the following:

- Only transport the device in its original packaging and with the transport lock in place! Make sure that the device is empty and no sample vessels are in the sample block.
- Please verify that the delivery is complete on receipt of the QIAquant 384 and check for possible transport damage. If the delivery is incomplete or the device was damaged during transport, please contact QIAGEN.
- To prevent health damage, the following must be observed when moving the device in the laboratory (lifting and carrying):
 - For reasons of safety, 2 persons are required to transport the device and must 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.
 - The guide values and statutory limits for lifting and carrying loads without auxiliary equipment must be observed and adhered to.

The QIAquant 384 can be installed by the QIAGEN customer service or trained specialist personnel authorized by QIAGEN.

2.6 Safety instructions – operation

2.6.1 General

The operator of the QIAquant 384 must make sure before each installation that the condition of the device, including the safety equipment, is sound.



Observe the following:

- Free access to the power switch on the back of the enclosure has to be ensured during operation.
- The ventilation fittings at the rear of the device must be unobstructed and operational. Covered vents or ventilation slits etc. may cause the device to break down or may cause damage to it.
- Be careful to avoid crushing or pinching injuries when closing the device.
- The use of oil between the samples and the sample block is not necessary to achieve an improved heat exchange. However, if you still want to use oil, you should use mineral oil. Do not use silicone oil.



- The thermal block, the samples, and the heated lid reach high temperatures. There is a risk of burns during contact.
- Ensure that the lid is securely closed before starting the program! Do not touch the heated lid!
- The rapid heating of the thermal block can cause liquids to boil explosively. Always wear safety goggles during operation!
- Do not touch hot sample vessels or plates and do not open them or boiling liquid may escape!
- Only use plates and vessels that are suitable for high temperatures (up to 100°C), fit well into the thermal block (no shaking), and whose lids seal tightly!

2.6.2 Safety instructions – protection against explosion and fire



- The QIAquant 384 must not be operated in an explosive environment.
- The operating personnel must be familiar with the location of the fire-fighting equipment in the operating room of the device.
- The QIAquant 384 must not be operated with flammable, explosive, or volatile substances.

2.6.3 Safety instructions – electrical equipment

Work on electrical components of the QIAquant 384 may only be carried out by a qualified electrician in accordance with the applicable electrical engineering rules. Life-threatening electrical voltages may occur in the interior of the QIAquant 384!



Observe the following:

- Any work on the interior of the device may only be carried out by the customer service of QIAGEN and specially authorized technicians.
- The electrical components must be checked regularly by a qualified electrician. Any defects, such as loose connections, faulty or damaged cables, must be repaired without delay.
- Do not replace the removable mains cable of the device by a mains cable that does not meet the specifications (without protective ground conductor).



- Before opening the device, it must be switched off from the power switch and the mains connector must be disconnected from the mains outlet!
- The QIAquant 384 must be switched off immediately using the power switch and the power supply disconnected from the mains if there is any interference with the electric components.
- The QIAquant 384 fulfills the corresponding requirements for interference emission and resistance from the IEC 61326 series. Assess the electromagnetic environment of the device before operation.
- Do not operate the device near sources of strong electromagnetic radiation (e.g., unshielded, deliberately operated high frequency source) as these may affect proper operation of the device.

2.6.4 Handling of samples, auxiliary and operating materials

The operator is responsible for the selection of substances used in the process, as well as for their safe handling. This is particularly important for radioactive, pathogenic, infectious, poisonous, corrosive, or otherwise dangerous substances. For details, contact the safety officer responsible for your location. When handling dangerous substances, local safety codes and guidelines must be observed. The following general notes do not replace the specific local regulations or the regulations in the EC safety data sheets of the manufacturers for the auxiliary and operating materials.



Observe the following:

- The relevant regulations and the notes in the EC safety data sheets of the manufacturers have to be observed and complied with, with regard to storage, handling, use, and disposal, for all auxiliary and operation materials used during the operation of the device.
- Auxiliary and operation materials may never be placed in containers or vessels for food. The approved containers for the relevant material are to be used, and these have to be labeled accordingly. The notes on the labels have to be observed!
- Protective goggles and rubber gloves have to be worn when handling reagents.
- Auxiliary and operating materials, as well as their containers, may not be disposed in domestic waste or enter the sewage system or the soil. The applicable regulations for disposal of these materials must be meticulously observed.
- Ensure good room ventilation in working rooms.
- If only a few samples are treated, an (empty) vessel of the same height must additionally be placed at each corner position of the block. If the number of samples in the block is too low, there is a risk of the vessels being damaged and sample liquid leaking out.



- For your own safety, please observe the potential infectious qualities of the examined biological material.

2.6.5 Safety instructions – service and repair

On principle, maintenance of the QIAquant 384 is performed by the customer service department of QIAGEN or its authorized and trained specialist personnel. Unauthorized maintenance can damage the device. Therefore, the operator may generally only carry out the tasks listed in chapter “Maintenance and Care”, page 31.



The following has to be observed:

- The exterior of the device may only be cleaned with a damp – not dripping – cloth after the device has been switched off.
- Do not use alcohol (e.g., methanol or ethanol), organic solvents, or abrasives to clean the device.
- Any maintenance on the device may usually only be carried out in the switched-off condition (unless stated otherwise).

2.7 Behavior during emergencies

In case of danger or accidents, immediately switch off the QIAquant 384 using the main switch on the equipment backplate. Disconnect the power plug from the power supply!

Because a rapid response can save lives during an emergency, the following has to be ensured:



- The operating staff must be familiar with the location of safety equipment, accident and danger alarms, as well as first aid and rescue equipment, as well as their handling.
- The operator is responsible for the respective training of the operating staff.
- All equipment for first aid (first-aid kit, eyewash bottles, stretcher, etc.), as well as equipment for fire fighting (fire extinguishers), must be within reach and easy to access. All equipment has to be in a sound condition and should be checked regularly.

2.8 Standards and directives

Safety class and safety type

The QIAquant 384 features protection class I.

The casing features protection type IP 20.

Device safety

The QIAquant 384 complies with these safety standards:

- EN 61010-1:2010
- UL 61010-1:2012
- CAN/CSA-C22.2 No. 61010-1-12:2012

EMC compatibility

The QIAquant 384 has been tested for radio interference suppression and interference resistance and meets these requirements:

- EN 61326-1:2013 Interference resistance
- EN 61326-1:2013 Interference emission

The QIAquant 384 complies with the applicable requirements of EMC directive 2014/30/EU and low voltage directive 2014/35/EU.

Environmental compatibility

The QIAquant 384 has been tested for environmental compatibility and meets these requirements:

- DIN EN 60068-2-1, Ab, 2008-01
- DIN EN 60068-2-2, Bb, 2008-01
- DIN EN 60068-2-78, Cab, 2014-02
- DIN EN 60068-2-6, Fc, 2008-10
- DIN EN 60068-2-64, Fh, 2009-04
- DIN EN 60068-2-27, Ea, 2010-02
- DIN EN 22248
- DIN EN 22206

EU directives

The QIAquant 384 is designed and tested in accordance with standards meeting the requirements of EU directives 2014/35/EU and 2014/30/EU.

Interference-causing Equipment Standards (Canada only)

This device complies with Canadian ICES-001/NMB-001.

Guidelines for China

The QIAquant 384 contains restricted substances (according to directive “Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products”). QIAGEN guarantees that those hazardous substances may not leak out during the next 25 years when the instrument is used in accordance with its intended purpose.

The device leaves the manufacturer in a pristine and technically safe state. To ensure safe operation, the operator must strictly observe the safety and operating instructions contained in this manual. For accessories which have also been supplied, and system components from other manufacturers, their operating instructions should be referred to.

Beside the safety instructions in this manual and the local safety regulations that apply to the operation of the QIAquant 384, the general applicable regulations regarding accident prevention, occupational health and safety, and environmental protection have to be observed and complied with. References to potential dangers do not replace the work protection regulations that must be observed.

3 Installation Conditions

3.1 Environmental conditions

The following requirements are placed on the climatic conditions in the operating room of the QIAquant 384:



	Operation	Transport	Storage
Temperature range	+15°C to +35°C	-25°C to +60°C	+5°C to +40°C
Max. humidity	70%	75%	75%
Air pressure	0.7 bar to 1.06 bar		
Permissible altitude	max. 2000 m		

The laboratory atmosphere must be free of draft, corrosive vapors, and vibration.

The location of the QIAquant 384 must meet these requirements:

- Do not place the device near a door or window.
- Place the device on a heat-resistant and acid-resistant surface.
- Do not place the device near sources of electromagnetic interference.
- Avoid placing the device where it can be hit by direct sunlight or radiation from heaters; if necessary, ensure air conditioning.
- Never cover the air vents of the backplate of the device with other equipment or installations!

3.2 Power supply

WARNING! 	Observe the mains connection! The QIAquant 384 may only be connected to a properly grounded mains outlet in accordance with the voltage specifications on the type plate.
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The QIAquant 384 is operated with single-phase alternating current.

Switching-on conditions

Power supply	
Operating voltage	100 V, 115 V, 230 V
Line frequency	50/60 Hz
Power consumption	max. 850 W

Instrument fuses

Mains voltage	Instrument fuses
100 V, 115 V, 230 V	2 x 10 AT/250 V

3.3 Space requirement

NOTICE	
	When opening the QIAquant 384, the upper device hood tilts back. Allow adequate space for this.

QIAquant 384	Height (cm)	Width (cm)	Depth (cm)
Closed	59	27.5	27.5
Open	70	27.5	50

The open device has a space requirement of 70 cm x 27.5 cm x 50 cm (H x W x D). Allow adequate space for placement of the device. In addition, keep a safety distance of at least 10 cm to other equipment or walls!

Additional space may be required next to the QIAquant 384 for a PC, a monitor, and possibly a printer. The PC, monitor, and printer may also be placed on a separate table.

4 Function and Setup

The QIAquant 384 combines a PCR thermocycler with a patented fluorescence spectrometer.



Figure 1. Layout of the QIAquant 384. 1: Upper part with fluorescence spectrometer, 2: heated lid, 3: sample block, and 4: thermal cycler.

4.1 Fluorescence spectrometer

A 16-channel Epifluorescence spectrometer with fiber multiplexer and mechanical scanning device is used as detector.

Light for exciting the dyes is emitted by 4-color LED in blue, green, white, and red. The light is passed through optic fibers to collimator lenses, bundled, and then transferred to the excitation filter of the color modules fitted to a rotating filter wheel. The light is deflected via a beam divider and passed through additional optic fibers to a lens array in a shuttle system scanning the sample block in columns. The light excites the fluorescence dyes in the reaction mix.

The fluorescence dyes then emit a light of longer wavelength that is bundled through the lenses in the shuttle system and passed via the optic fibers back to the color modules. In the color modules, the light passes the beam divider followed by 2 emission filters and is then transferred to the photomultiplier (PMT) for detection.

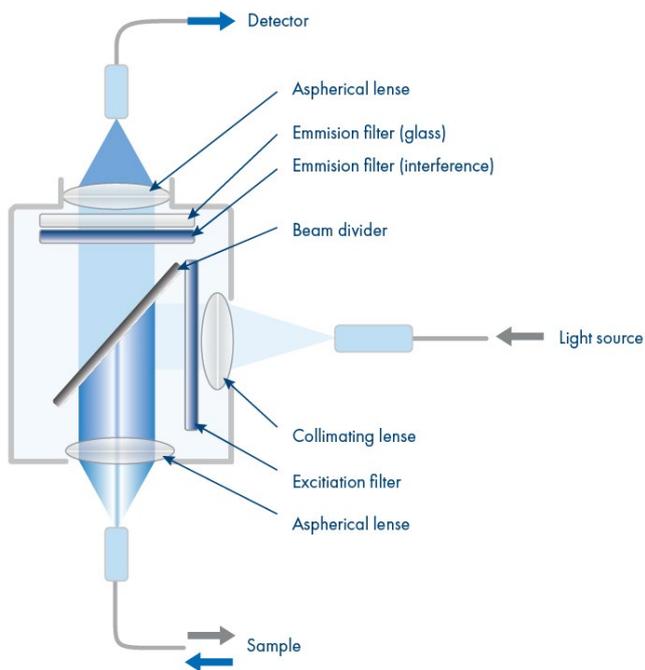


Figure 2. Schematic structure of the Epi Fluorescence Spectrometer.

4.2 PCR thermocycler

The QIAquant 384 is equipped with a thermal block with 384 wells. The thermal block consists of very good heat-conducting aluminum. This achieves 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.

The QIAquant 384 is also equipped with a gradient function. The maximum temperature span of the gradient is 24°C with 24 columns. This means that the device is particularly well prepared for establishing new primary pairs.

To avoid condensation or potential sample loss, the QIAquant 384 is equipped with a motorized heated lid. This can be adjusted up to 110°C and provides an optimum contact pressure on the sample vessels during the entire real-time PCR run process irrespective of the consumables used.

5 Installation Procedures

Prior to installation, check that all requirements are fulfilled at the installation location (see section “Installation Conditions”, page 19).

5.1 Connections and control elements



Figure 3. QIAquant 384, open. 1: Heated lid, 2: sample block, and 3: twist locks.

The QIAquant 384 is opened by folding back the upper part and the cover for the sample block it contains and the fluorescence spectrometer. 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.

The mains connection, mains switch, and USB interface for PC connection are on the rear of the device.

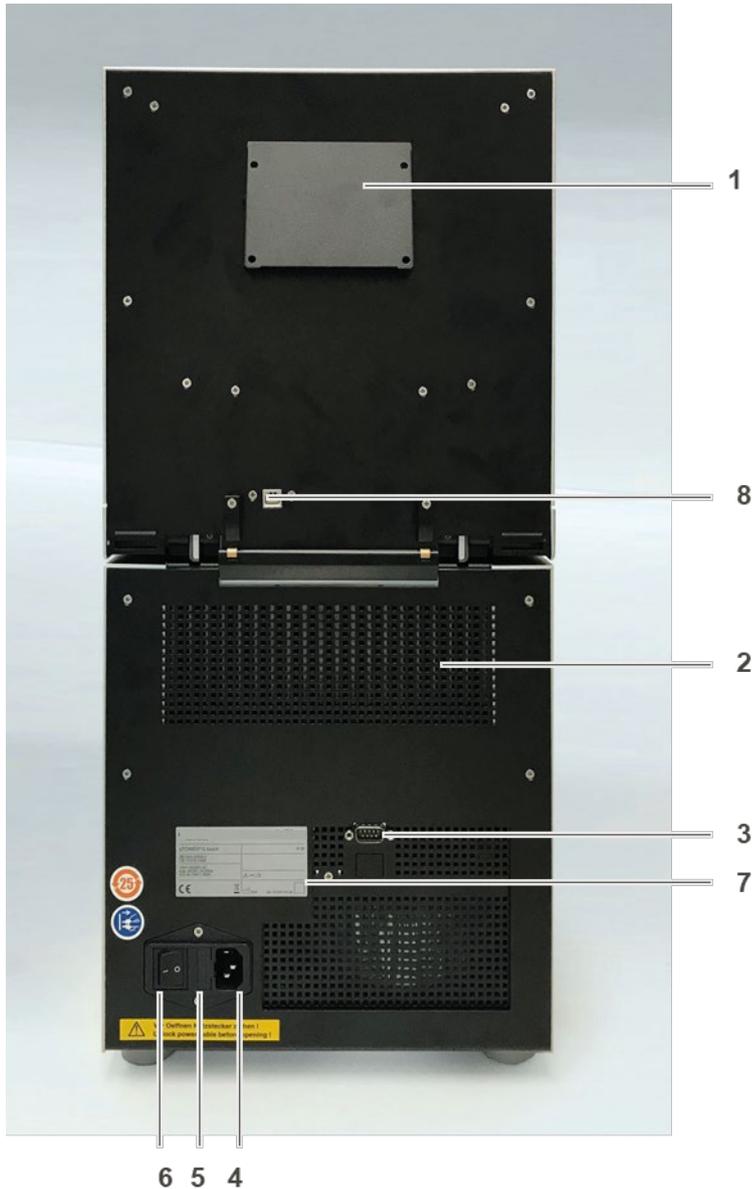


Figure 4. QIAquant 384 rear view. 1: Ventilation for fluorescence spectrometer, 2: ventilation grille for the thermal cycler, 3: service connection, 4: mains connection, 5: fuse holder for instrument fuses, 6: mains switch, 7: type plate, 8: USB port for PC connection.

The type plate is also located on the rear of the device. The type plate shows the serial number of the device and the electrical connection data.

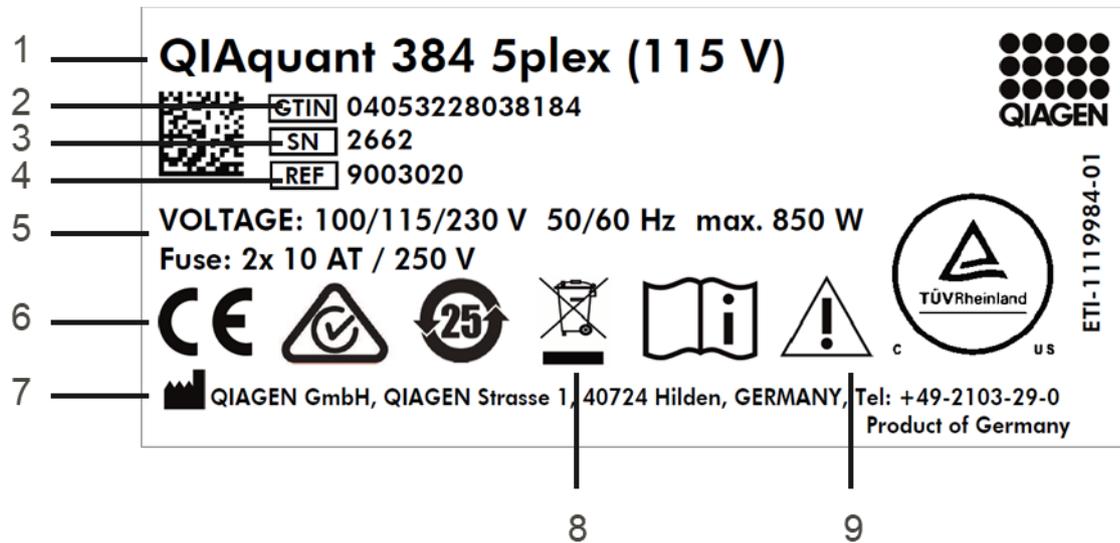


Figure 5. Type plate.

- | | | | |
|---|--|---|---|
| 1 | Device type and model | 6 | CE mark |
| 2 | Device number | 7 | Manufacturer and address |
| 3 | Serial number | 8 | Disposal instructions
(Do not dispose of as domestic waste!) |
| 4 | Order number | 9 | Safety symbol
(Attention! Note the accompanying documents!) |
| 5 | Electrical connection data:
Voltage, max. power consumption, frequency,
and instrument fuses | | |

- Mains and connection cable
- CD with QIAquant 384 Software program, including manual for software and device
- Operating instructions and software manual
- Packaging and packaging instructions

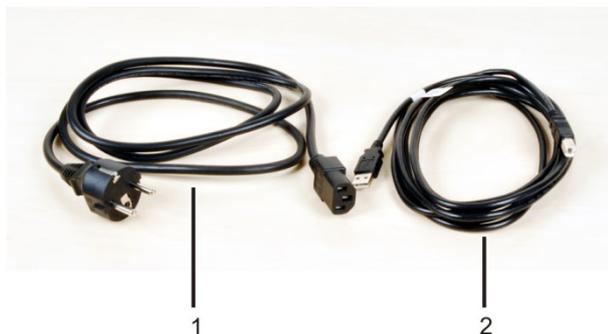


Figure 6. Mains and connection cable. 1: Mains cable and 2: USB cable for PC connection.

Use only the supplied mains cable.

5.2 Setting up the QIAquant 384

<p>WARNING!</p> 	<p>Risk of electric shock! Do not touch!</p> <p>Check that the mains connection conditions match those on the type label on the device backplate.</p> <p>Before connecting the device to the mains network, set the correct operating voltage at the voltage switch on the underside of the device.</p>
<p>NOTICE</p> 	<p>Unsuitable packaging material may cause damage to the device! Keep the original packaging for subsequent transports.</p>

The following steps are required during the installation of the QIAquant 384:

- Connect the device to the mains and the PC
 - Install the QIAquant 384 Software program on the PC
1. Remove the QIAquant 384, connection cable, and operating manual with the installation CD from the transport packaging. Wait until the device has reached room temperature (15–25°C).
 2. Verify that the delivery is complete. Check the device and accessories for transport damage.
 3. Connect the USB cable to the USB interface of the QIAquant 384 (**Figure 4**, page 24) and to the PC.
 4. Connect the mains connection to the QIAquant 384. Insert the plug into the mains socket.
 5. Switch on the PC. Install QIAquant 384 Software on the PC. Pay attention to the information in the software manual.
 6. Switch on the QIAquant 384 with the mains switch.

The drivers are on the installation CD. During first startup, the QIAquant 384 will be detected as a USB device. After successful automatic driver installation, the QIAquant 384 is ready for operation. If the drivers are not installed automatically, you can complete the installation via the Windows routine.

-
7. Start the QIAquant 384 Software program.
 8. Open the lid: Press the blue handle on the front until the lock opens with a click, and then fold back the upper part of the device.
 9. Remove the red transport lock and put it aside for later transports.

The QIAquant 384 is ready for operation.

The operation of the QIAquant 384 is controlled by the QIAquant 384 Software. The settings for detection and cycling conditions can be found in the software manual.

6 Operating Procedures

6.1 Switching the QIAquant 384 on

Observe the following sequence when switching on the device:

1. Switch on the QIAquant 384 using the mains switch on the back of the device.
2. Start the QIAquant 384 Software program.

The blue status LED lights up. The QIAquant 384 is ready for operation.

If you have started the QIAquant 384 Software before switching on the device, e.g., to first prepare a real-time PCR project, you must link the QIAquant 384 to the PC.

1. Start the QIAquant 384 Software program.
2. Switch on the QIAquant 384 with the mains switch.
3. Call up the **Extras > Device Identification** menu command.

The blue status LED lights up. The QIAquant 384 is ready for operation.

4. The status LED is located at the front of the device. During the device initialization, the LED flashes blue.
 - As soon as the device is ready for operation, the LED switches to steady blue.
 - During a measurement, the LED flashes blue/red.
 - In case of a device error, the LED will turn red.

6.2 Switching off the QIAquant 384

NOTICE



Do not switch off the QIAquant 384 during a PCR run!

Keep the QIAquant 384 closed, even if switched off, to prevent the sample block from being contaminated. Dust or other contamination reaching the wells can distort the fluorescence measurements.

1. Close the lid of the QIAquant 384.
2. Switch off the power of the device using the mains switch on the back.
3. Exit the QIAquant 384 Software program.

The QIAquant 384 is completely switched off.

6.3 Inserting samples/starting the PCR analysis

<p>WARNING!</p> 	<p>Biological hazard!</p> <p>Take great care when working with potentially infectious material. Wear suitable protective equipment, e.g., protective gloves.</p>
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<p>WARNING</p> 	<p>Risk of eye injury!</p> <p>The rapid heating of the thermal block can cause liquids to boil explosively. Always wear safety goggles during operation.</p>
---	---

<p>CAUTION!</p> 	<p>Hot surface!</p> <p>The thermal block, the samples and the heated lid reach high temperatures. There is a risk of burns during contact.</p>
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The QIAquant 384 is equipped with a 384-well SBS sample block. This makes it only suitable for the use of commercially available PCR plates with 384 wells. These and other consumables can be ordered from QIAGEN.

After pipetting the PCR samples into the wells, the plate must be sealed with a transparent optical adhesive film. The optical transparency of the films affects the fluorescence signal directly. Therefore, only use optical adhesive film as offered for real-time PCR.

1. Prepare a real-time PCR project with complete details about the PCR run, fluorescence measurements, and the sample layout of the PCR plate (see the *QIAquant 384 Software User Manual*, www.qiagen.com/HB-2744).
2. Open the lid: Press the blue handle on the front until the lock clicks open, and then fold back the upper part of the device.
3. Place the PCR plates onto the thermal block in such a way that well A1 is on the left-hand side (**Figure 7**). This position corresponds to the well allocation in the QIAquant 384 Software program.

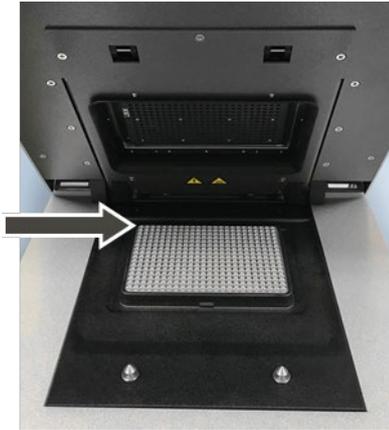


Figure 7. Position A1 on the sample block.

4. Close the lid: Fold the lid forward and press it down from the handle until the lock engages with a click.
5. Start the PCR run in the QIAquant 384 Software program.

7 Maintenance and Care

WARNING! 	Risk of electric shock! Do not touch! Prior to commencing any maintenance or cleaning work, switch off the device and pull the mains plug. Wait until the QIAquant 384 is completely dry before reinstalling it.
--	--

The QIAquant 384 is practically maintenance-free.

The following care and maintenance 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 this scope must only be performed by QIAGEN customer service personnel or persons authorized by QIAGEN. Any unauthorized interference limits warranty entitlements. If the device exhibits any faults or details, please contact the QIAGEN customer service immediately. In order to guarantee sound and safe operation and to ensure laboratory certification, we recommend concluding a maintenance agreement with regular device validation.

7.1 Cleaning the housing

NOTICE 	The use of alcohol, organic solvents, or abrasives can damage the paintwork. When cleaning, please also pay attention to the notes in "Safety instructions – service and repair", page 15.
--	--

Only wipe the housing of the QIAquant 384 with a soft clean cloth which may be wetted with a commercial neutral detergent, if necessary.

7.2 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.

- Blow out the recesses in the sample block with compressed air.
- To remove reagent residue, fill the affected wells with max. 20 µl distilled water or ethanol. Wait for approximately 1 min, and then pipette the liquid out. Repeat the process until the background signal is in the normal range.

7.3 Disinfecting the device

<p>WARNING!</p> 	<p>Biological hazard!</p> <p>Clean the QIAquant 384 with particular care after analyzing potentially infectious material. Wear suitable protective equipment, e.g., protective gloves.</p>
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<p>NOTICE</p> 	<p>The only suitable cleaning method for the housing is wipe disinfection.</p> <p>When using spray disinfectants there is a risk that the liquid enters the sensitive electronic system through the air vents. If the disinfectant has a spray nozzle, apply disinfectant to a suitable cloth before using it on the device.</p>
---	--

- Avoid contamination by handling sample substances with care.
- Wipe spilled samples or reagents immediately with an absorbent cloth or piece of paper.
- If the QIAquant 384 is used for the analysis of infectious material, great care must be taken because the QIAquant 384 cannot be decontaminated as a whole device.
- Immediately remove visible contamination by 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
Sample chamber	Descosept AF Meliseptol HBV (cloths)	Dr. Schuhmacher GmbH B. Braun company
Housing	Descosept Spezial	Dr. Schuhmacher GmbH
Device part	recommended disinfectants	Provider
Sample chamber	Descosept AF Meliseptol HBV (cloths)	Dr. Schuhmacher GmbH B. Braun company

Pay attention to the efficacy spectrum of the listed disinfectants with regard to your customer-specific decontamination requirements!

- Only the use of ethanol or isopropanol containing disinfection agents is approved for wipe disinfection. The use of disinfection agents with ingredients or concentrations that differ from the recommended disinfection agents invalidates all warranty claims regarding damage to the device or non-effectiveness.
- If the QIAquant 384 has to be sent to QIAGEN for service, a prior decontamination must be carried out and documented (see "Return" p. 38).

7.4 Exchanging fuses

<p>WARNING!</p> 	<p>Risk of electric shock! Do not touch!</p> <p>Before exchanging fuses, switch off the power switch and disconnect the device from the mains network.</p> <p>Only use the specified fuses. If the wrong fuses are used, there is a risk of fire, injuries, and device damage.</p>
--	---

Mains voltage	Instrument fuses
100 V, 115 V, 230 V	2 x 10 AT/250 V

1. Switch the QIAquant 384 off. Unplug the power cord!
2. Carefully open the fuse holder on the rear of the device. Use a standard screwdriver to do so.
3. Remove the old fuses and replace them with new ones.



Figure 8. Fuse holder on the rear of the device.

If the fuses melt repeatedly, have the QIAquant 384 checked by QIAGEN service personnel or by persons authorized by QIAGEN.

8 Troubleshooting

8.1 General information

The following chapter describes possible errors of the QIAquant 384. There are some error-correction measures that can be performed by the customer. These are listed in the following chapter. All maintenance work and repairs beyond this scope must only be performed by QIAGEN service personnel or by persons authorized by QIAGEN. Any unauthorized interference limits warranty entitlements.

To prevent secondary damage, inform the QIAGEN customer service immediately if the device exhibits any errors or defects.

If an error occurs, the QIAquant 384 Software program outputs error codes that can be allocated to the following malfunctions:

Error code	Cause
$x \leq -100$	Device error in the optical unit of the fluorescence spectrometer
$-99 \leq x \leq -10$	Error in the QIAquant 384 Software program (e.g., in the settings) or data communication error
$-9 \leq x \leq -2$	General device error, e.g., lid open
-1	No error
$x \geq 0$	Device error in the PCR thermocycler

The following errors can be fixed by the customer:

Error code	Cause	Remedy
-	Device cannot be powered on	Check voltage supply. Replace fuses. Replace mains cable.
-	Sample plates are damaged during measurements.	Check suitability of sample plate for use. Insert samples properly (see section 6.3, page 29).
$x = -8$	Lid not closed	Check that the sample are inserted correctly. Close the lid, make sure it clicks into place.
$x = -80$	USB not available	Replace the USB cable. Switch to a different USB port on the PC.
$-99 \leq x \leq -10$	QIAquant 384 Software or data communication error	Check configuration in the software.

If the error still persists after performing these measures, please inform QIAGEN.

9 Technical Specification

Block format	384 wells
Sample volume	2–30 µl (5 to 20 µl recommended)
Lid temperature	30–110°C
Temperature gradient	25°C
Max. heating rate*	max. 4°C/s, Ø 3.8°C/s (depending on consumables used)
Max. cooling rate*	max. 2°C/s, Ø 1.7°C/s (depending on consumables used)
Heating rate adjustment	min. 0.1°C/s
Temperature uniformity (15 s after starting the clock)	±0.15°C at 55°C ±0.25°C at 72°C ±0.50°C at 95°C
Temperature range	3–99°C
Control accuracy	±0.1°C
Temperature increments	min. 0.1°C/cycle
Time increments	min. 1 s/cycle
Heated lid	Manual opening mechanism, automatic contact pressure
Heated lid contact force	comply with 30 kg, automated
Dimensions (H x W x D)	59 x 27.5 x 27.5 cm 70 x 27.5 x 50 cm when opened
Weight	30 kg
Noise level	45 dB
Energy supply	
Operating voltage	100 V, 115 V, 230 V
Line frequency	50/60 Hz
Power consumption (max.)	max. 850 W
Instrument fuses	2 x 10 AT/250 V
Safety circuits	Sensory monitoring of the closure and locking of the sample chamber, over-temperature protection in the heated lid
Operating conditions	Air pressure: 0.7 bar to 1.06 bar Max. permissible altitude: 2000 m Humidity: max. 70% Operating temperature: +15°C to +35°C
 Supported plastic products	384-well PCR plates with optical sealing film
Sensitivity	1 nmol/l FAM at 30 µl sample volume in a 384-well PCR plate
Measuring time	384-well PCR plate (single measurement, 6 colors) approx. 6 s

Ø: the average heating or cooling rate over the whole block.

Measuring range	±130 000 (±17 bit)
Dynamic range	10 log stages
Light source	4-color intensity LED (blue, green, white, red)
Detector	Photo Multiplier (PMT)
Color filter modules	Color modules for all frequently used real-time PCR dyes Color module 1 (465 nm/524 nm) Color module 2 (510 nm/565nm) Color module 4 (560 nm/610 nm) Color module 5 (625 nm/680 nm) Color module 6 (625 nm/710 nm)
Software and PC	
QIAquant 384 Software	Control and analysis program
Analysis methods	Absolute quantification, relative quantification, $\Delta\Delta C_t$ method, allelic discrimination, efficiency calculation, DNA melting curves, POS/NEG analysis in the end point
Export functions	Excel, CSV, LIMS, GenEx, qBase
Data connection	USB
PC software requirements	Minimum Intel i3, 2 GB RAM
Operating system	Win 7/Win 8/Win 10

10 Transport and Storage

10.1 Transport

NOTICE	Use suitable packaging material and transport locks!
	Unsuitable packaging material may cause damage to the device! Only transport the QIAquant 384 in its original packaging and with the transport lock in place! Information on proper packaging is included with the device.

Observe the safety instructions in the section “Safety instructions, transport, and installation”, page 12. Transport the QIAquant 384 and its components very carefully to prevent damage from impact or vibration. The device should be transported in such a way that major temperature fluctuations are avoided and the formation of condensate is thus prevented.

10.2 Placing the transport lock

Before packing the QIAquant 384, the transport lock for the upper part that contains the fluorescence spectrometer must be installed. If the transport lock is no longer available, you can place an empty PCR plate in the sample block. The QIAquant 384 must be connected with the PC, and the QIAquant 384 Software program must be started for the installation process. The installation is software controlled:

- Start QIAquant 384 Software and select **Extras > Transport Lock** from the menu. Follow the instructions on the monitor screen.



Figure 9. Transport lock in the QIAquant 384.

10.3 Return

WARNING 	<p>Risk of damage to health due to improper decontamination!</p> <p>Before returning the device to QIAGEN, perform a professional decontamination.</p>
---	--

NOTICE 	<p>QIAGEN must refuse acceptance of contaminated devices. The sender may be liable for any damage caused by inadequate decontamination of the device.</p>
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- Clean all device components from biologically hazardous, chemical, and radioactive contamination (see "Disinfecting the device", page 32).
- The decontamination protocol is provided by the service when the return is registered. Complete the form and attach the signed decontamination declaration to the outside of the shipment.
- Only use the original packaging for the shipment and insert the transport lock. If the original packaging is no longer available, contact QIAGEN or your local distributor.
- Attach the warning note "**CAUTION! SENSITIVE ELECTRONIC DEVICE!**" to the packaging.

10.4 Moving the QIAquant 384 in the laboratory

CAUTION 	<p>Risk of injury if the device falls!</p> <p>Move the QIAquant 384 with great care. Two persons are required to lift and carry the device. They should position themselves on both sides of the equipment.</p> <p>Since the device does not have handles, grip the device firmly with both hands at the lower end, lifting it simultaneously.</p>
---	--

Observe the following when moving the device within the laboratory:

- Disconnect the mains connection and the PC from the device.
- Observe the guide values and adhere to the legally mandated limits for lifting and carrying without auxiliary means!

- For the setup at the new location, observe the notes in section "Installation Conditions", page 19.

10.5 Storage

NOTICE	Possible device damage due to environmental conditions and condensation water.
	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.

The following requirements are placed on the climatic conditions in the storage room of the QIAquant 384:

- Temperature range: +5°C to +40°C
- Max. humidity: 75%

11 Disposal

The operator of the QIAquant 384 must dispose of 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 QIAquant 384 and all its electronic components must be disposed of as electronic waste, in accordance with local regulations.

Appendix

Declaration of Conformity

Name and address of the legal manufacturer:

QIAGEN GmbH
QIAGEN Straße 1
40724 Hilden
Germany

An up-to-date declaration of conformity can be requested from QIAGEN Technical Services.

Certificates

Up-to-date certificates can be requested from QIAGEN Technical Services or from your local QIAGEN representative.

Waste Electrical and Electronic Equipment (WEEE)

This section provides information about disposal of waste electrical and electronic equipment by users.

The crossed-out wheeled bin symbol (see below) indicates that this product must not be disposed of with other waste; it must be taken to an approved treatment facility or to a designated collection point for recycling, according to local laws and regulations.



The separate collection and recycling of waste electronic equipment at the time of disposal helps to conserve natural resources and ensures that the product is recycled in a manner that protects human health and the environment.

Recycling can be provided by QIAGEN upon request at additional cost. In the European Union, in accordance with the specific WEEE recycling requirements and where a replacement product is being supplied by QIAGEN, free recycling of its WEEE-marked electronic equipment is provided.

To recycle electronic equipment, contact your local QIAGEN sales office for the required return form. Once the form is submitted, you will be contacted by QIAGEN either to request follow-up information for scheduling collection of the electronic waste or to provide you with an individual quote.

If you are unclear about how to dispose of your QIAGEN equipment, contact QIAGEN Technical Services (support.qiagen.com).

Liability Clause

QIAGEN shall be released from all obligations under its warranty in the event that repairs or modifications are made by persons other than its own personnel, except in cases where the Company has given its written consent to perform such repairs or modifications.

All materials replaced under this warranty will be warranted only for the duration of the original warranty period, and in no case beyond the original expiration date of original warranty unless authorized in writing by an officer of the Company. Read-out devices, interfacing devices, and associated software will be warranted only for the period offered by the original manufacturer of these products. Representations and warranties made by any person, including representatives of QIAGEN, which are inconsistent or in conflict with the conditions in this warranty shall not be binding upon the Company unless produced in writing and approved by an officer of QIAGEN.

Index

- Air pressure, 19
- Care, 31
- Cleaning the housing, 31
- Cleaning the sample block, 32
- Commissioning, 23
- Control elements, 23
- Decontamination, 32
- Device safety, 17
- Disinfection instructions, 32
- Disposal, 40
- EMC compatibility, 17
- Emergency, 16
- Energy supply, 20, 35
- Environmental compatibility, 17
- Error correction, 34
- Exchanging fuses, 33
- Fluorescence spectrometer, 21
- Function, 21
- Guidelines, 17
- Humidity, 19
- Insert samples, 29
- Interfaces, 23
- Layout, 21
- Liability, 6
- Mains connection, 19, 23
- Maintenance, 31
- Operating temperature, 19
- PCR thermocycler, 22
- Personnel, 11
- Protection type, 16
- Rating plate, 23
- Return, 38
- Safety class, 16
- Safety instructions, 8
 - electrical equipment, 14
 - hazardous substances, 15
 - operation, 13
 - Transport, 12
- Signal words, 8
- Start PCR analysis, 29
- Storage, 39
- Switching off, 28
- Switching on, 28
- Symbols
 - Device, 10
 - Manual, 8
- Technical data, 35
- Temperature
 - Operation, 19
 - Storage, 19
- Transport, 37
 - Placing the transport lock, 37
- Use, 5
- Ventilation, 23
- Warranty, 6

Document Revision History

Date	Changes
03/2020	Initial release

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