

Operating manual

Biometra TRobot II

Automated thermal cycler



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General information <http://www.analytik-jena.com>
This operating manual is valid from software version ME 2.00 – RE 2.00

For a proper and safe use of this product follow the instructions.

Keep the operation manual for future reference.

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1 Basic information

1.1 Notes on this operating manual

Biometra TRobot II is intended for operation by qualified specialist personnel observing this operating manual and the operating manual for the Biometra TRobot II software.

There are three different Biometra TRobot II models available. In the text below these devices are collectively referred to as Biometra TRobot II. Differences are explained in the corresponding chapters.

This operating manual contains information about the design and operation of Biometra TRobot II and provides personnel familiar with PCR technology with the necessary know-how for the safe handling of the device and its components. The operating manual further includes notes on the maintenance and servicing of the device and potential causes and remedies of any faults.

This operating manual applies to all Biometra TRobot II devices from software version ME 2.00 – RE 2.00.

Furthermore, the terms protocol and program are used synonymously, with both describing one or more temperature steps programmed in succession with different or identical hold times and cycles.

Conventions

Instructions for actions which occur in chronological order are numbered and combined in action units.

Safety instructions are indicated by pictographs and signal words. The type and source of the hazard are stated together with notes on preventing the hazard.

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

- Program terms are identified with SMALL CAPS (e.g., Menu FILE).
- Buttons are shown by square brackets (e.g., [OK] button)
- Menu items are separated by arrows (e.g., FILE ► OPEN).

Symbols and signal words used

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



WARNING

Indicates a potentially hazardous situation which might cause fatal or very serious injuries (deformities).



CAUTION

Indicates a potentially hazardous situation which might cause light or minor injuries.

**NOTE**

Provides information on potential material or environmental damage.

1.2 Intended use

Biometra TRobot II is an automated end-point thermal cycler. Biometra TRobot II was specially developed for integration into automation systems, e.g., in liquid handling systems. For space-saving integration on robotic decks, the thermal cycler is divided into a block module and a separate controller. The block module is placed on or next to the robotic platform, the controller, which is connected by cable, usually under the platform.

Biometra TRobot II can be operated from an automation platform software. For this purpose, Biometra TRobot II comes with a software library (dll file) that can be integrated into the automation software.

Alternatively, Biometra TRobot II can be controlled via the Biometra TSuite computer software included in the scope of delivery.

To facilitate automatic work flows, the thermal cycler lid opens and closes automatically, allowing a robot arm to place the sample plate on the block and remove it again after the program has been completed. To ensure the plate can be removed smoothly, even after many heating and cooling cycles which may have caused the PCR plate to shrink slightly or become distorted, Biometra TRobot II features a patent-pending plate lifting mechanism: When the lid is opened, the plate is slightly lifted up by four small pins that move out of the block, thus detaching it from the block. This allows a robot arm to easily remove the plate from the block.

A status LED at the front of the block module indicates the respective status of the thermal cycler by means of color and luminous frequency.

Like a typical thermal cycler, the Biometra TRobot II automated thermal cycler is also primarily designed to amplify nucleic acids by repeated heating and cooling cycles using DNA polymerases in a PCR reaction. Other incubation of liquid samples in PCR tubes or plates is also possible.

The thermal cycler is developed for Research Use Only (RUO).

2 Safety instructions

2.1 General notes

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



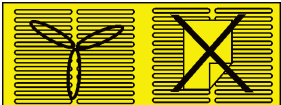
Besides the safety instructions in this operating manual and the local safety regulations that apply to the operation of the device, the general applicable regulations regarding accident prevention, occupational health and safety, and environmental protection have to be observed and complied with.

References to potential hazards do not replace the work protection regulations which must be observed.

2.2 Safety markings on Biometra TRobot II

Damaged or missing safety symbols can cause incorrect actions leading to personal injury or material damage. Do not remove safety symbols! Replace damaged safety symbols immediately!

The following safety symbols are attached to the inside of the heated lid and the rear of the device:

Symbol	Meaning	Notes
	Caution! Hazard point	This symbol is located on the inside of the heated lid and on the rear of the device. Proceed with due care when handling samples and working with Biometra TRobot II.
	Caution! Risk of burns	This symbol is located on the inside of the heated lid and on the rear of the device. There is a risk of burning at the heated lid, the thermal block, the samples, and the rear of the device.
	Ensure ventilation slots are unobstructed	This sign is attached to the underside of the device. Ensure that the ventilation slots on the underside and at the rear of the device are unobstructed. Make sure that there are no objects underneath the device (e.g., paper) that may be sucked against the ventilation slot and thus interfere with ventilation. Biometra TRobot II must not be placed with the device feet in recesses in higher base plates as it will cause ventilation from the underside of the device to be restricted. Recesses for the device feet as positioning aids on a platform may be max. 1 mm deep.

2.3 Technical condition

Biometra TRobot II has been built and certified according to safety standard EN 61010-1. Do not modify the device in any way. Any modification made to the device will lead to a loss of warranty and the EN 61010-1 certificate and poses a potential risk.

The following has to be observed:

- 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

Biometra TRobot II must only be operated by qualified specialist personnel instructed in the use of the device. The instruction also includes imparting the contents of this operating manual.

In addition to the safety at work instructions in this operating 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 manual must be accessible to the operating and service personnel at all times.

2.5 Safety instructions: transport and installation

The following has to be observed:

- Drain the sample block before transporting Biometra TRobot II. Make sure there are no sample tubes in the block.
- Only send Biometra TRobot II in its original packaging.
- On receipt of Biometra TRobot II, please verify that the delivery is complete and check for possible transport damage. In the event of a claim, please contact Analytik Jena.
- The Biometra TRobot II is designed for indoor use only and not for installation and operation in a wet environment.

2.6 Safety instructions – during operation

2.6.1 Summary of safety instructions

Before each commissioning, the operator of Biometra TRobot II must make sure that the condition of the device including the safety equipment is sound.

The following has to be observed:

- Free access to the main power switch on the rear panel of device must always be ensured during operation.
- The ventilation fittings at the rear of the device must be unobstructed and operational. Covered ventilation grilles or slots etc. may cause the device to break down or may cause damage to it.
- 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.
- Be careful to avoid crushing or pinching injuries when closing the device.

Biometra TRobot II may cause burns. The following has to be observed:

- 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 tubes or plates and do not open them or boiling liquid may escape!
- Only use plates and tubes that are suitable for high temperatures (up to 100 °C), fit well into the thermal block (no wobbling), and whose lids seal tightly!
- Modifications and extensions to the device may only be carried out after consultation with Analytik Jena. Unauthorized changes can limit the operating safety and lead to restrictions in warranty and access to customer service.

2.6.2 Safety instructions: protection against explosion and fire

Biometra TRobot II must not be operated in an explosive environment. Biometra TRobot II must not be operated with flammable, explosive, or volatile substances.

2.6.3 Safety instructions: electrical equipment

Work on the electrical components of Biometra TRobot II may only be performed by a qualified electrical technician in accordance with the applicable electrical engineering rules. Life-threatening electrical voltages may occur in the interior of Biometra TRobot II!

The following has to be observed:

- Any work on the interior of the device may only be carried out by the Analytik Jena service department 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.
- Before opening the device it must be switched off at the main power switch and the power plug must be disconnected from the power outlet!
- Biometra TRobot II must be switched off immediately using the main power switch (on the rear panel of the controller) and the power plug disconnected from the power supply if any faults occur in the electric components.
- Do not operate the device near sources of strong electromagnetic radiation (e.g., a non-shielded, 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 hazardous substances. For details contact the safety officer responsible for your location. When handling hazardous 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 safety data sheets of the manufacturers for the auxiliary and operating materials.

The following has to be observed:

- Protective goggles and rubber gloves have to be worn when handling reagents.
- If only a few samples are to be treated, two (empty) tubes of the same height must additionally be placed in the corner positions of the block. If the number of samples in the block is too low, there is a risk of the tubes being damaged and sample liquid leaking out.
- For your own safety, please consider the potential risk of infection of the examined biological material.

2.7 Safety instructions – maintenance and repair

Biometra TRobot II is usually repaired by the Biometra/Analytik Jena service department or by authorized and trained specialist personnel. Unauthorized repairs can damage the device. Therefore, the operator may generally only carry out the tasks listed in chapter "Maintenance and care" p. 32.

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.
- Any maintenance on the device may usually only be carried out in the switched-off condition (unless stated otherwise).
- Use only original spare parts or consumables. Only these parts are tested and guarantee safe operation.

2.8 Behavior during emergencies

During hazardous situations, Biometra TRobot II must be switched off immediately by operating the main power switch at the rear left of the controller. Disconnect the power plug from the power supply!

3 Function and setup

3.1 Fields of application

Developed in 1983 by Kary Mullis, PCR (polymerase chain reaction) is a common and indispensable technique used in medical and biological research laboratories for a broad variety of applications. Biometra TRobot II is an end-point thermal cycler designed to amplify nucleic acids by repeated heating and cooling cycles using DNA polymerases in a PCR reaction. Due to the high heating and cooling rates, the thermal cycler is suitable for fast PCR applications, thereby helping to reduce program runtimes. Biometra TRobot II is also ideally suited for the creation of DNA libraries for next generation sequencing (NGS) applications in automated systems. In general, incubation of liquid samples in PCR tubes or plates is possible. All three models include a gradient function that can be used to easily determine the optimal annealing temperature of the respective PCR when introducing new protocols.

The device was developed with the objective of combining the latest technology with a device design optimized for integration into an automation system and an integration-friendly software control.

3.2 General description

The Biometra TRobot II thermal cycler is available in three models:

- Biometra TRobot II 96 G, with a 96-well aluminum block for 0.2 ml tubes, plates or strips
- Biometra TRobot II 96 SG, with a 96-well silver block for 0.2 ml tubes, plates or strips
- Biometra TRobot II 384 G, with a 384-well aluminum block for 384-well plates

All three models include a temperature gradient function.

If the control is integrated via the Biometra TRobot II software library (dll file), the thermal cycler is completely controlled by the automation software. Alternatively, Biometra TRobot II can be controlled via the Biometra TSuite computer software included in the scope of delivery, independent of the automation system's scheduler software. This is particularly useful for the optimization of protocols, e.g., using the gradient function, or if the cycler has not yet been integrated in the automation system.

PCR programs, run log files and other files generated by the thermal cycler can usually be stored in the internal memory of the controller or on the computer or server of the control software. Details can be found in the software description section.

In addition to operating the thermal cycler, the Biometra TSuite application software can also be used to exchange PCR programs between different Biometra thermal cyclers in the same network. The Biometra TSuite software can also be used to save run log or service information files.



Fig. 1 The Biometra TRobot II thermal cycler: Controller and block module

The Biometra TRobot II thermal cycler has an automatic restart feature following a power failure. If a power failure occurs during the run, the device will continue the run as soon as power is restored. In the event of a longer-term power failure (longer than 30 minutes), the device will maintain the sample block temperature at 4 °C (freeze step) after power is applied, allowing the user to decide to repeat the run with the same samples or to discard them.

3.3 GLP compliance

Three different user levels are available by default: administrators, users with general rights, and users with restricted rights. In a convenient menu, the administrator can configure the settings for each user individually by activating or deactivating individual rights. In combination with the password protection for user accounts, access to the device can be restricted to authorized persons and unwanted changes to the system settings and PCR protocols can be prevented.

With each system start, Biometra TRobot II performs an initial self-test. The software also offers an extended self-test that can be initiated by the user. The results of the extended self-test are summarized in a protocol and stored by the device. In addition to the self-test functions, the device creates and stores log files for each single run. For long-term storage, the log files and extended self-test protocols can be exported as a proprietary file format.

3.4 Special features

3.4.1 High speed thermoblock

The Biometra TRobot II thermal cycler is available with different block formats. The two 96-well models can be used with standard 0.2 ml PCR tubes, plates, or strips. The 384-well block for high-throughput applications is compatible with 384-well PCR plates.

A special seal on the heated lid forms an encapsulated space around the sample block as soon as the lid is closed. The closed space is used to improve temperature uniformity

and avoids the formation of condensed water at the final PCR cooling step. Furthermore all blocks are perfectly sealed to prevent condensed water from penetrating into the Peltier elements underneath the sample block and other parts of the electronics. The sealing protects the Peltier elements and prolongs the lifetime of the device.

One of the two 96-well blocks and the 384-well block are made of aluminum and offer high heating and cooling rates for fast protocol runtimes. In addition, to achieve ultimate performance, a 96-well block made of silver is available. Due to its excellent heat conductivity, silver equilibrates extremely quickly, thus providing maximum speed and temperature uniformity. To protect the valuable silver block against corrosion, the block surface is gold plated.

3.4.2 Gradient function with function for linear gradients

For optimizing new primer pairs in a single run, all Biometra TRobot II models are equipped with a gradient function. Finding the best primer annealing temperature is crucial for the specificity and efficiency of PCR reactions. Often the optimization of experiments is conducted to a limited extent only, which can lead to unspecific byproducts or reduced PCR sensitivity. By using the gradient function, new primer pairs with unknown annealing temperatures can be tested quickly and optimized in a very short time.

There are two ways to set a temperature gradient over the long side of the block:

When using standard gradient programming, enter two temperatures for the first and last lane of the block. The thermal cycler automatically calculates the effective temperatures of all other lanes in between.

The "Linear Gradient Function" can be used for results that are particularly easy to evaluate: After the entry of the assumed annealing temperature in the middle lane of the block and the entry of a desired temperature difference between the lanes, the thermal cycler creates a gradient which is as linear as possible over the block.

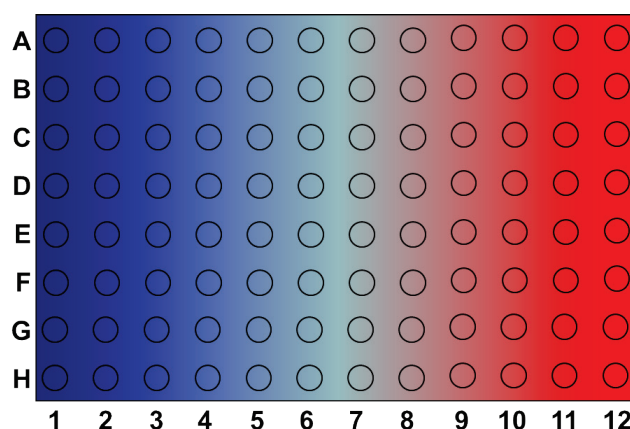


Fig. 2 Temperature gradient on a 96-well sample block. In a specific lane all wells have the same temperature but the temperature differs from lane to lane. The temperature gradient can be applied in both directions; the highest temperature can be either in lane 1 or lane 12.

3.4.3 "Smart Tune Lid" motorized heated lid

The Biometra TRobot II's heated lid has been designed so that it heats up particularly quickly and thus helps to reduce protocol runtimes. Moreover the heated lid fulfills two other important functions: It prevents the formation of condensation at the reaction

tube portion located above the block surface level and it ensures reliable contact between the reaction tubes and the thermoblock by applying constant pressure.

The contact pressure can be set individually via software in a range from approx. 4 to 12 kg. During the closing process, the device ensures that the lid presses on the plasticware with the preset contact pressure, independent of the height of the respective plasticware. As a result, a reproducible and uniform pressure is always exerted on the reaction tubes. The combination of the heated lid shape and the reliable contact pressure ensures even temperature distribution between samples, thus significantly improving temperature uniformity across the block.

The heated lid is closed automatically and opened automatically at the end of the protocol. The lid first lifts vertically and then curves back until the block is completely accessible so that a robot arm can remove the sample plate. The sample block is freely accessible from three sides when the lid is open.

The lid is designed in such a way that there is no risk of injury when it is opened or closed. This is ensured by both the safety frame (see section 3.4.4) and appropriately designed distances and slot sizes, e.g., in the opening mechanism.



Fig. 3 Side view of Biometra TRobot II, completely open

3.4.4 Safety frame on the lid

The thermal cycler's lid is closed automatically. The safety frame integrated in the lid (see section 5.1, figure 7, point 6) ensures that users cannot be crushed if they unintentionally still have their fingers in the lid's movement path, for example. If the safety frame encounters a resistance during the closing process, the closing process is stopped immediately and the lid moves back a little. The lid is then completely opened once before the lid is closed again.

3.4.5 Compact footprint

For space-saving integration on robotic decks, the thermal cycler is divided into a block module and a separate controller. The block module is placed on or next to the robotic platform, the controller, which is connected by cable, usually under the platform.

3.4.6 Motorized plate lifters

Removing the sample plate from a thermal cycler block without disruption can be a challenge because the sample plate is firmly seated on the sample block and air escapes between the sample block and the plate as a result of the heating and cooling cycles. In addition, less stable plates tend to change their shape slightly.

To reliably avoid disruptions in the work flow caused by plates getting stuck, Biometra TRobot II is equipped with four small, motor-controlled lifters at the edge of the block. With this patent-pending lifting system, four round pins automatically extend slightly from the block surface when the lid is opened so that they reach under the edge of the skirted microplate and lift the plate a few millimeters. After this release operation, the pins retract completely back into the block leaving the plate sitting loosely on the block surface. As soon as the lid is fully open, the plate can be easily removed by a robot arm.



Fig. 4 Extended lifting pins lifting the sample plate with the lid already slightly open

For the use of semi-skirted microplates there is an optionally available adapter frame which is placed over the thermal cycler block. The pins of the lifting system underneath lift the adapter frame together with the semi-skirted plate.

3.4.7 Operation

All of the Biometra TRobot II's functions are operated by external software. Three connection options are available for communication with the thermal cycler: a serial RS232 interface, USB2.0 via an RS232 to USB adapter or Ethernet.

The operation of the automated thermal cycler is usually integrated into the robot software of an automation system via a software library (dll file). The driver file is created accordingly to ensure easy integration into other software environments. Alternatively, Biometra TRobot II can also be operated via the Biometra TSuite computer software included in the scope of delivery.

Details on how to integrate the dll file or how to use the Biometra TSuite computer software can be found in the corresponding software operating manual.

3.4.8 Consumables – open system philosophy

Biometra TRobot II is an open system regarding consumables and reagents.

Plastic tubes/plates

Depending on the sample block, the system can be used with single tubes, strips or plates. PCR plates can have a standard profile or "low profile" and they can be skirted,

half-skirted or non-skirted. Biometra TRobot II can handle all of these types of plates. Since Biometra TRobot II has been designed for automated operation, users will, in the majority of cases, use PCR plates that are particularly suitable for robotic operation. This includes properties such as good plate stability with a firm frame (usually with a skirted edge) so that the plate can be gripped and positioned securely by the robot arm.

When semi-skirted plates are used, the corresponding Biometra TRobot II adapter frame must be used to ensure full functionality of the plate lifting mechanism. Non-skirted plates, which however are rarely used in automated applications, cannot be removed from the block with the plate lifting mechanism.

For optimum sample temperature control, it makes sense for the sample plates, especially the wells themselves, to fit particularly well into the thermal cycler blocks and to fit closely to the well recesses in the thermal cycler block. Since there are no global specifications for the design of PCR sample plates, it may happen that some plates are not optimally suited for the Biometra thermal cycler blocks in terms of their fit.

Sealing systems

In order to avoid evaporation during the application, it is generally important that the plates are well coordinated with the sealing material. The plasticware can be sealed with domed or flat lids, sealing foil or other technologies. The use of sealing mats suitable for robots is also possible. For individual tailored solutions, please contact our application support team at <https://www.analytik-jena.com/service-support/application-support/>.

Regardless of the sealing method used, thanks to the software-controlled adjustable lid contact pressure, the same pressure is always applied to the consumables, creating absolutely reproducible conditions.

Reagents

The Biometra TRobot II thermal cycler is not limited to reagents from a specific manufacturer and can be used with any kind of polymerase. Regardless of whether isothermal, hot start or non-hot start polymerases are used, Biometra TRobot II will produce reliable results. By programming a pause step for the initial denaturation, for example, the system can be used for manual hot start applications. After inserting the samples into the heating block, the PCR protocol can be started.

3.4.9 Internal memory

Biometra TRobot II has an internal memory organized into 10 subfolders. Programs can either be started directly from this memory. Alternatively, programs can be copied from other thermal cyclers or from an external storage location (end device) to the thermal cycler and started.

3.5 Order numbers

Model	Block material	Order number
Biometra TRobot II 96 G	Aluminum	846-x-070-901
Biometra TRobot II 96 SG	Silver	846-x-070-902
Biometra TRobot II 384 G	Aluminum	846-x-070-903

Abbreviations:

x = 2 for 230 V, 4 for 115 V, 5 for 100 V

4 Device installation and commissioning

4.1 Scope of delivery

- Thermal cycler: PCR module + controller
- Power cable
- 1 supply cable and 1 signal cable, fixed to the controller
- 1 RS232 cable
- Screwdriver for opening the lid manually in the event of a power failure
- Biometra TRobot II setup instructions (print)
- Biometra TRobot II operating manual, Biometra TSuite software operating manual, BiometraLibrary manual (electronic, on Biometra TRobot II USB stick)
- Biometra TSuite computer software (on Biometra TRobot II USB stick)
- Biometra TSuite single license as USB copy protection key

4.2 Unpacking and inspection

Unpack the device and check that it is complete and undamaged. Immediately report any damage to Analytik Jena/Biometra.



WARNING

Do not commission the device if there are any signs of damage.

Keep the original packaging for return transport in the event that servicing is required. The shipping box for the Biometra TRobot II thermal cycler contains specially developed molded parts for the safe transport of high quality electronic devices.

4.3 Commissioning

4.3.1 Setting up the device

- Place the Biometra TRobot II thermal cycler on a solid, non-flammable surface in a secure and dry environment. The ambient conditions can be found in the technical data (→ "Specifications" p. 41).
- Allow the Biometra TRobot II thermal cycler to equilibrate to room temperature before switching it on.
- Ensure adequate ventilation around the device, otherwise the device's performance may be impaired. A minimum distance of 20 cm should be maintained behind the thermal cycler between the rear of the device and a wall or other objects.
- If several thermal cyclers stand next to each other and are operated simultaneously, we recommend a lateral distance of at least 10 cm between the devices.

- Make sure that the power switch on the controller and the power cable are easily accessible. This is important if the device needs to be disconnected from the power supply.
- Make sure that the ventilation slots at the sides and the bottom of the device are unobstructed.

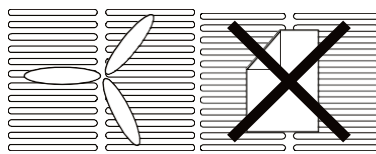


Fig. 5 PCR module rear view



Fig. 6 Controller rear view

- Make sure that there are no objects underneath the device (e.g., paper) that may be sucked against the ventilation slot and thus interfere with ventilation.



Insufficient ventilation may cause the device to overheat.

Biometra TRobot II must not be placed with the device feet in recesses in higher base plates as it will cause ventilation from the underside of the device to be restricted.

Recesses for the device feet as positioning aids on a platform may be **max. 1 mm deep**.

- Before switching on the device, make sure that the power supply corresponds to the device setting (see section "Setting the operating voltage" p. 21).

4.3.2 Connecting the cables

- Connect the Biometra TRobot II thermal cycler controller to a grounded power outlet using the power cable supplied. The cable must not be replaced by an inadequately dimensioned power cable.
- Connect the supply cable (DSub 25) and the signal cable (DSub 24W7), which are fixed to the controller, to the connectors on the rear of the PCR module. Both cables are 3 m long. It is not possible to mix up the connectors inadvertently, as the two connectors are different.



Fig. 7 Cables and connectors for connecting the PCR module to the controller.
Left: DSub 24W7 signal cable, right: DSub 12 supply cable (cable colors may vary)

- Connect the controller directly to the computer if you want to use the **RS232 connection**.
- If your computer does not have an RS232 interface, you can use a **USB-to-RS232 adapter** together with the enclosed RS232 cable. As this connection is a point-to-point connection, it is very insensitive to interference.
- Alternatively, you can also connect the controller to a computer via your home **network**. The Biometra TRobot II is configured on delivery to a network connection with a DHCP server.

An Ethernet cable is required for this (minimum requirements: performance class Cat 5e, cable structure STP, max. length 30 m).

- You connect the Biometra TRobot II and the computer via the ethernet cable and a router **with a DHCP server** (e.g. such a device <https://www.tp-link.com/us/home-networking/wifi-router/tl-wr841n/>), alternatively you can connect the computer and Biometra TRobot II to the **company network** if this is allowed according to your company IT regulations.
- For an **alternative direct connection** of the device (exclusively with a computer via a network cable), the device must be changed via Biometra TSuite either to a network connection with DHCP or via a serial connection to a network connection with a fixed IP (e.g. IP 192.168.0.30, subnet mask 255.255.255.0). See also Manual Biometra TSuite Software for support.
- The network card must also be changed to a fixed IP(V4) (e.g. IP 192.168.0.10, subnetmask 255.255.255.0) via the network adapter settings under Windows.
- The PC network card should comply with the auto-crossover standard IEEE 803.2ab_1999, otherwise a crossover network line is required. Newer network cards usually meet this standard.
- An Ethernet cable and a USB-to-R232 adapter are available as optional accessories.
- Check the operating voltage before switching on the device!

4.4 Setting the operating voltage

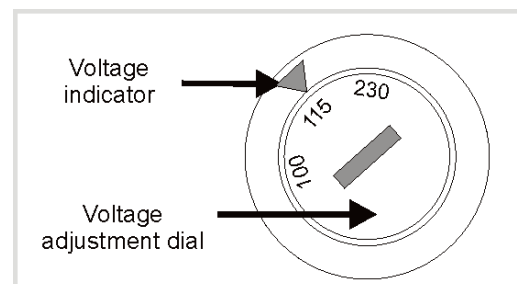


WARNING

Danger of electric shock! Before commissioning the device, make sure that the voltage selector setting on the underside of the device corresponds to the power supply in your laboratory.

The Biometra TRobot II thermal cycler can be operated at 100, 115 or 230 volts. The current setting is indicated on the voltage selector switch on the underside of the controller.

- To change the operating voltage, switch off the device and unplug the power plug.
- Use a coin or other round object to rotate the voltage selector switch slot and adjust the new operating voltage.



5 Functional elements

5.1 Biometra TRobot II PCR module front view

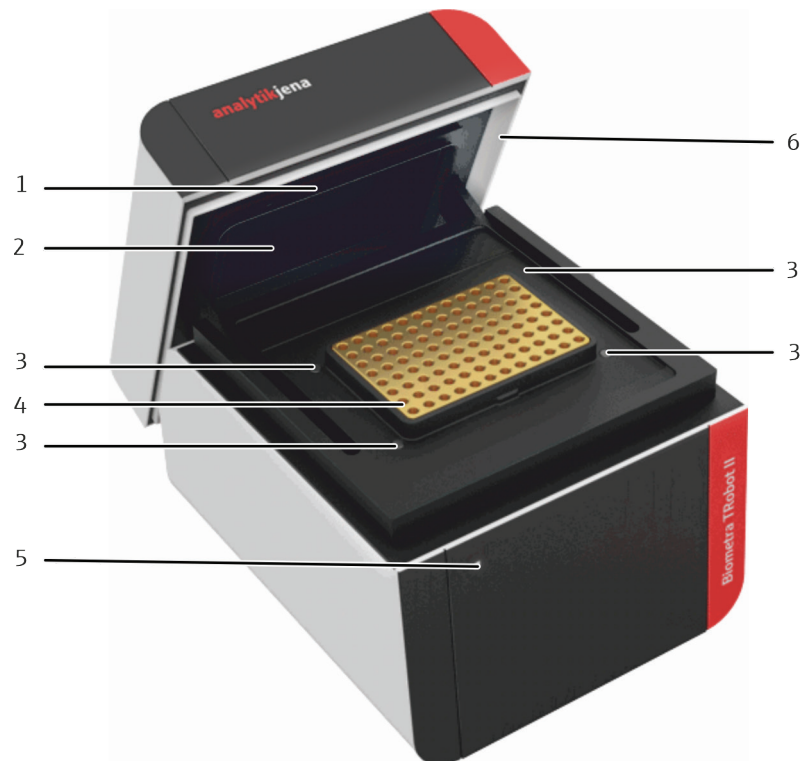


Fig. 8 Biometra TRobot II PCR module front view

- | | |
|---------------------------------|----------------|
| 1 Seal for the block | 5 Status LED |
| 2 Heated lid | 6 Safety frame |
| 3 Plate lifter | |
| 4 Sample block (96-well/silver) | |

■ LED light signal in the PCR module front

The status LED at the front of the PCR module indicates the respective status of the PCR module by its color and luminous rhythm, without the need to look at the software interface.

The following statuses are displayed:

Status	Color	Action
Switched off	-	Does not illuminate
Switched on, ready	Green	Permanently illuminated
Application active	Green	Slow fading
Application paused	Green	Flashing rapidly
Application finished	Green	Permanently illuminated
Device error that prevents the application from being continued.	Red	Flashing rapidly
Software update	Red	Slow fading

5.2 Biometra TRobot II PCR module rear view

At the rear of the Biometra TRobot II there are the connectors for the DSub 24W7 signal cable and for the DSub 12 supply cable.



Fig. 9 Biometra TRobot II PCR module rear view

- | | |
|----------------|----------------------------------|
| 1 Signal cable | 3 Ventilation slots |
| 2 Supply cable | 4 Slot for lid opening mechanism |

5.3 Biometra TRobot II PCR controller front view

The controller does not have any operating functions other than the power switch located at the rear of the device on the left.



Fig. 10 Biometra TRobot II controller rear view

5.4 Biometra TRobot II Controller rear view



Fig. 11 Biometra TRobot II controller rear view

- | | | | |
|---|----------------------------|---|-------------------------|
| 1 | Serial RS232 port | 5 | Ventilation slots |
| 2 | Signal cable port | 6 | Power switch |
| 3 | Ethernet port | 7 | Power supply connection |
| 4 | Supply port for PCR module | | |

5.5 Motorized lid with heating module – adjusting the contact pressure

In the motorized lid a heating module is integrated which has a spring-loaded connection to the lid.

The heated lid should be in close contact with the sealing of the sample tubes or plates to prevent condensation on the tube or plate lid and evaporation of reaction liquid.

The software generates a defined contact pressure via motor control, independent of the height or shape of the sample tubes. The constant contact pressure ensures reliable contact between the reaction tubes and the sample block. The combination of the heated lid shape and the reliable contact pressure ensures even temperature distribution between the samples and thus supports temperature uniformity across the block.

Depending on the application, the lid contact pressure can be set in the range from approx. 4 to 12 kg. A standard contact pressure is 8 to 10 kg.

The maximum adjustable heated lid pressure is 12 kg.

For information on how to adjust the contact pressure and the software-controlled opening and closing of the lid, refer to the Biometra TRobot II software operating manual.



NOTE

The strength of the lid contact pressure has been designed for a fully populated block. If only a few samples are to be used in the block, place two additional (empty) tubes of the same height in each of the four corner positions of the block (see Fig. 11 Biometra TRobot II controller rear view). Otherwise the sample tubes may be damaged due to excess contact pressure.

Never attempt to close the heated lid with force! This may damage the device.

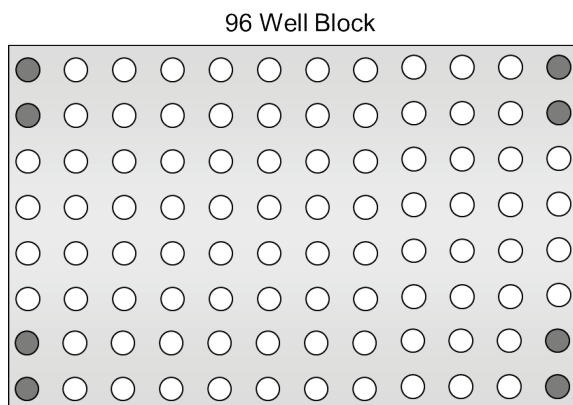


Fig. 12 Support tube positions when using the block with only a few samples

The lid is opened and closed silently. At the end of the closing process, the maximum contact pressure is applied audibly.

Closing the lid

After inserting the sample tubes or sample plate, manually or via a robotic arm, the lid can be closed using the corresponding command in the software. The set contact pressure is applied automatically.

Opening the lid

When the program is finished, the lid can be opened again using the corresponding command in the software.

When the lid is opened, it is lifted slightly upwards after which the 4 pins for detaching the sample plate from the block are extended briefly in a slightly audible manner but still covered from view by the lid. When the lid is opened further, the lifting pins have already retracted into the block.

The lid can also be opened and closed manually in the event of a prolonged power failure or other emergencies that prevent the lid from opening automatically (→ "Manually opening and closing the lid" p. 29).

6 Operation via software

The Biometra TRobot II automated thermal cycler can either be integrated into an automation software and operated via it or it can be operated completely independently of an automation system via the Biometra TSuite software included in delivery.

6.1 Operation via Biometra TSuite software

The Biometra TSuite is a Windows PC based application software.

The Biometra TSuite software is protected by copy protection. Accordingly, the Biometra TSuite Software comes with a USB copy protection device (USB dongle).

The Biometra TSuite software is useful if the automated thermal cycler is not (yet) integrated into an automation system or if the optimization of protocols to be applied later is already to be carried out in advance independently of the automation system.

The following functions, for example, are included in the software:

- Complete operation of one or more thermal cyclers in a network
- Creation, editing, saving, executing, monitoring and exporting of programs, as well as saving and exporting of various log files and service information files
- User management

Information on installing and using the Biometra TSuite software can be found in the separate Biometra TSuite software operating manual.

6.2 Operation via Biometra Library software

The Biometra Library is a .NET-Framework 4.0 DLL, which can be used to control Biometra thermal cyclers connected to the end device.

All functions that can be used via the Biometra TSuite software are also available via this library and can be integrated, for example, in software for automation systems.

A description of the Biometra Library can be found in the corresponding separate operating manual.

7 Adapting programs of other Biometra thermal cyclers

If programs are exchanged between different Biometra thermal cycler models or the sample block is exchanged, programs might need to be adapted prior to the start or during editing. The following table provides an overview of possible program adaptations:

Case	Example	Adaptation
A program with a gradient step is transferred to a non-gradient-enabled device.	The program with the gradient step is started on a sample block without gradient function.	The gradient will be deleted and the average temperature or annealing temperature will be used for this step. If the average temperature or annealing temperature of the programmed gradient is, for example, 60 °C, this value will be used for the step.
The heating and cooling rate is exceeded.	A program for a silver block is to be started on an aluminum block.	The heating and cooling rate will be adjusted to the maximum possible value for the installed sample block type. If the programmed heating and cooling rate is, for example, 5 °C/s, it will be reduced for the aluminum block to 4 °C/s, for example.
The heating and cooling rate is not reached.	A program for an aluminum block is to be started on a silver block.	The heating and cooling rate will be increased to the maximum possible value for the installed sample block type. If the programmed heating and cooling rate is, for example, 4 °C/s, it will be increased for the silver block to 5 °C/s, for example.
User-defined heating and cooling rate.	The heating and cooling rate is lower than the maximum value for a program step.	The user-defined value is maintained and not adjusted.

Note: If programs need to be adapted to the installed sample block, a message is always displayed prior to the start or during editing. The user can confirm or reject the adaptations. If a necessary adaptation is rejected during the attempt to start a program, the program cannot be started by the device.

8 Hints and notes

8.1 Forgetting of passwords

Passwords can be changed by the system administrator(s) and by users with the "Edit user" right (see the software manual).

If the administrator has forgotten his password, use the `FACTORY SETTINGS` function to re-set the system.

8.2 Slow heating and cooling

Biometra TRobot II is equipped with strong fans that remove the heat from the heat sink. The air supply to these fans is located on the underside of the device. Make sure that the inlet is not clogged by dust or other material (e.g., check that no piece of paper has been sucked in under the device by the fan and is restricting the air supply from below). Dirt should be frequently removed from the air supply of the fan with a vacuum cleaner or a brush.

8.3 Auto restart

Biometra TRobot II features an auto restart function. If a power failure occurs during a run, the device will resume the run at the same point as soon as power is restored. In the event of power failures lasting more than 30 minutes, the device will maintain the sample block at 4 °C (freeze step) allowing the user to decide whether the device should resume the run or to dispose of the samples.

Note: After an auto restart the user has to log in again. Additional information can be displayed for a limited time.

8.4 Auto restart without an apparent cause

If there are strong fluctuations in the power supply, Biometra TRobot II may be re-started. The device will then react similar to a power failure.

The following messages are displayed:

- A power failure occurred during the run.
- Time and step at which the program was restarted.

In order to avoid strong fluctuations in the supply voltage, do not connect the thermal cycler to a power outlet shared by other very strong consumers (such as refrigerators or centrifuges).

Note: After an auto restart the user has to log in again. Additional information can be displayed for a limited time.

8.5 Mirroring of programs on several thermal cyclers

Complete thermal cyclers can be mirrored using the backup function. Complete users (via user management) and their programs are copied from one thermal cycler to another thermal cycler without having to create each individual user or individual program. The prerequisite is that both cyclers have the same software version (see the software manual).

8.6 Adapting programs of other thermal cyclers

Since the Biometra TRobot II thermal cycler is a very fast device, it may be necessary to reduce the heating and cooling rate when accepting protocols from slower thermal cyclers. Alternatively, the hold times may be extended.

8.7 Recommendations for the use of 384-well sample blocks

- Reduce the temperature of the heated lid

Due to the fact that the heated lid of a 384-well plate is very close to the reaction volume, the lid temperature can have a significant effect on the effective incubation temperature.

For reaction volumes below 10 μl it is recommended to set the lid temperature to 95 $^{\circ}\text{C}$.

If you are working with a reaction volume of 10 μl or more, set the lid temperature to 85 $^{\circ}\text{C}$.

Note: This applies to usual PCR conditions with up to 95 $^{\circ}\text{C}$ for denaturation and with a room air humidity up to 70 %.

In case you are using higher denaturation temperatures than 95 $^{\circ}\text{C}$ or if the local room air humidity is higher than 70 %, then you should set at least the same lid temperature you are using as highest block temperature.

For example:

- Using 96 $^{\circ}\text{C}$ then please set 96 $^{\circ}\text{C}$ lid temperature, independent from sample volume.
- Using 94 $^{\circ}\text{C}$ at air humidity > 70 %, please set 95 $^{\circ}\text{C}$ for sample volumes < 10 μl resp. set 94 $^{\circ}\text{C}$ for sample volumes > 10 μl .

Even with these reduced lid temperatures, condensation will not be a problem. It is recommended to reduce the lid temperature according to the reaction volume. Otherwise sample volumes or amplification yields could be reduced.

8.8 Manually opening and closing the lid

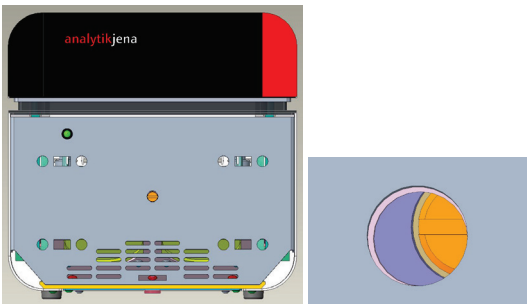
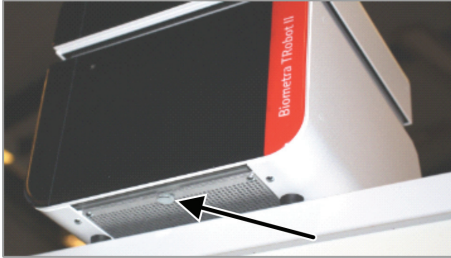
In the event of a power failure or any other fault that prevents the lid from opening automatically, the lid can be opened manually using a screwdriver.

Note: The screwdriver is not included with Biometra TRobot II. It is a standard screwdriver with following specifications and is generally available everywhere: Screwdriver

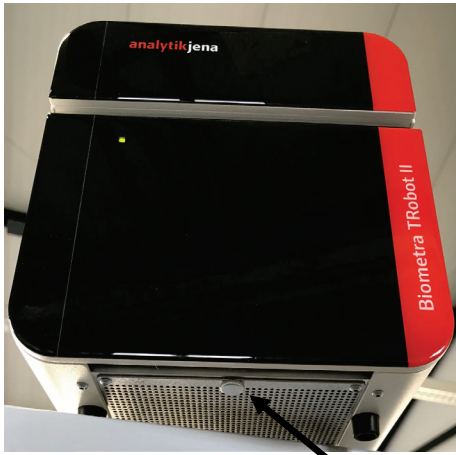
shank length: minimum 140 mm, screwdriver slot width: minimum 6.5 mm, maximum 7.5 mm.

Opening the lid

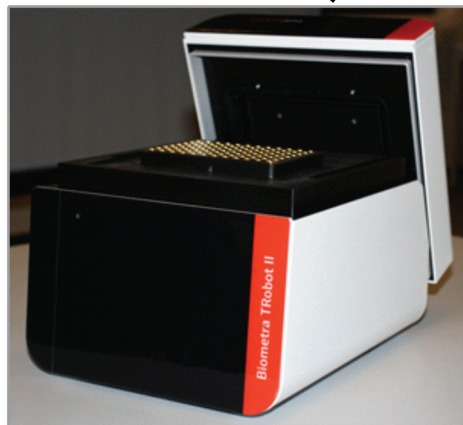
The lid opening mechanism can be accessed from behind the removable block module front. To open the lid manually, proceed as follows:



1. Unscrew the **knurled screw** in the front area of the module on the underside (arrow in the photo on the left).
2. Hold the **front panel** at the top and bottom and pull the front forward to remove it.
3. Insert the supplied **screwdriver** into the hole in the front plate horizontally, in a straight position, so that the screwdriver blade engages in the worm shaft slot.
4. Turn the **screwdriver** in a counterclockwise direction.
 - ✓ This moves the lid **up**.
5. Clip the **front panel** into the front plate from the front.



6. Screw the **knurled screw** into the base again.



✓ The PCR module is open.

Closing the lid

The procedure for manually closing the lid is similar to opening the lid. You can use the photos above as reference.

1. Unscrew the **knurled screw** in the front area of the module on the underside.
2. Pull the **front panel** forward and remove it.
3. Insert the supplied **screwdriver** into the hole in the front plate horizontally, in a straight position, so that the screwdriver blade engages in the worm shaft slot.
4. Turn the **screwdriver** in a clockwise direction.
 - ✓ This moves the lid **down**.
5. Clip the **front panel** into the front plate from the front.
6. Screw in the **knurled screw** on the underside again.
 - ✓ The PCR module is closed.

9 Maintenance and care

9.1 Calibration

The Biometra TRobot II thermal cycler is calibrated by the manufacturer before delivery using a measuring system that is traceable to national standards. The Biometra Quality Management System is certified by BSI to BS EN ISO 9001:2015 and the measuring system is tested and regularly calibrated by an accredited test laboratory in accordance with EN ISO 17025 at prescribed intervals. If the environmental conditions specified in the technical specifications are met at the installation site, temperature validation or calibration after installation is not required.

9.2 Maintenance and repair

Biometra TRobot II is mainly maintenance-free. The care and maintenance tasks which can be performed by the customer are limited to the cleaning and disinfection of the housing and sample block.

All maintenance work and repairs beyond this scope must only be performed by Biometra GmbH service personnel or authorized and trained persons. Any unauthorized intervention limits warranty entitlements. If the device exhibits any faults or defects, please contact the service department immediately. In order to guarantee sound and safe operation and to ensure laboratory certification, we recommend concluding a maintenance agreement with regular device validation.

9.3 Cleaning the device



WARNING

Risk of electric shock! Prior to commencing any maintenance or cleaning work, switch off the device and unplug the power plug. After cleaning, wait until Biometra TRobot II is completely dry before recommissioning it.

**WARNING**

Observe the relevant safety regulations when working with infectious or pathogenic material. Decontaminate the device in accordance with section "Disinfecting the device" p. 39. The professional decontamination of radioactive contaminations depends on the type of substance used. Contact your radiation protection officer and observe the safety regulations!

**NOTE**

The exterior of the device may only be cleaned with a slightly moistened, non-dripping cloth.

Do not use alcohol (e.g. methanol or ethanol), organic solvents or abrasive cleaners to clean the device. Otherwise, damage to the paint may occur.

- Only wipe the housing of Biometra TRobot II with a soft clean cloth which may be slightly moistened with a commercial neutral detergent, if necessary.
- Clean the ventilation slots on the underside and at the rear of the device with a vacuum cleaner.
- For the lid opening mechanism, there is a slot on both sides next to the sample block. If small amounts of liquid or small particles get into this slot, it is not a problem for the safety and functioning of the device. This space is closed off from areas with electronic components.

This area can be cleaned as part of maintenance by the service department. If it is necessary to remove something from the slot beforehand, a long narrow pair of tweezers can be used to reach inside the slot. Alternatively, when the device is switched off it can be turned over once with the lid open.

9.4 Disinfecting the device



WARNING

Biological hazard! Clean Biometra TRobot II with particular care after analyzing potentially infectious material. Wear suitable protective equipment, e.g., protective gloves.



NOTE

The only suitable cleaning method for the housing is wipe disinfection. If using spray disinfectants there is a risk that the liquid may enter the sensitive electronic system through the ventilation slots. If the disinfectant has a spray nozzle, apply disinfectant to a suitable cloth before using it on the device.

- Avoid contamination by working with samples carefully.
- Wipe spilled samples or reagents immediately with an absorbent cloth or piece of paper.
- If Biometra TRobot II is used for the analysis of infectious material, great care must be taken because Biometra TRobot II 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	Disinfectant	Provider
Sample chamber	Descosept AF	Dr. Schuhmacher GmbH
	Meliseptol HBV (cloths)	B. Braun company
Housing	Descosept Spezial	Dr. Schuhmacher GmbH

9.5 Firmware update

Please contact the Biometra/Analytik Jena service department or your local distributor for the latest firmware version.

To update the firmware, please use the USB interface located behind the removable controller front, please see below.

9.5.1 Requirements

For an update of the device software, a USB stick with a memory size less than or equal to 16 GB is required. The stick must be formatted to FAT16 or FAT32.

To display the update progress, the device is connected to a PC and Biometra TSuite is started.

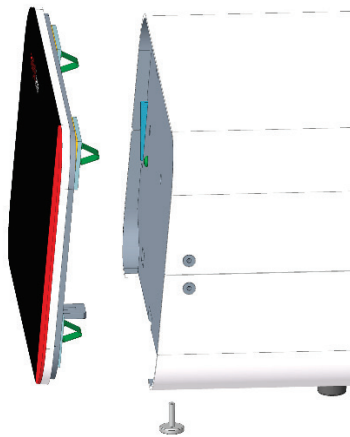
9.5.2 Update of the software



WARNING

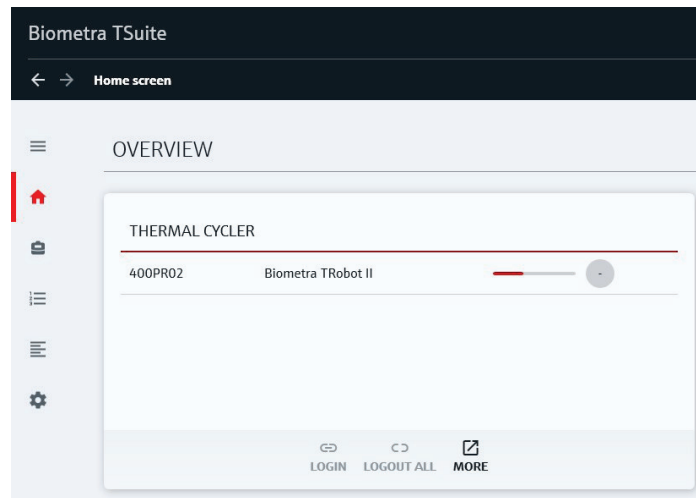
Do not turn off power or remove the USB flash drive until the update process is complete.

1. Unpack the current update file to an empty USB stick. The update "Upd380.bin" must be stored under the folder path "BIOMETRA.TCY\UPDATE".
2. Remove the **controller** front panel. Unscrew the knurled screw at the bottom and pull off the front panel from the front.



3. Insert the **USB** stick into the USB socket at the front of the controller.
4. Switch on **the** controller.

5. Wait until update **is** completed. There are three possibilities for monitoring:
 - Monitor progress via Biometra TSuite when the red progress bar changes to green (recommended).



- The activity indicator (e.g. LED) of the USB stick will be inactive after completion.
 - Using an USB stick without an activity indicator: Wait at least 15 minutes.
6. Switch off **the** controller and remove the USB stick.
 7. Reassemble the front panel and secure it with the knurled screw.
 8. Switch on **the** controller and wait until the status LED on the module indicates ready (continuous green light).
 9. Update of **the** device software is finished.

9.6 Spare parts

Only use original spare parts. Please contact the Biometra/Analytik Jena service department or your local distributor.

10 Service

If there are any problems with the device, please contact the service department or your local Analytik Jena dealer. For the address of the Biometra/Analytik Jena service department, refer to the inside front cover of this operating manual.

Please observe the return information (see chapter "Returning a device" p. 36) if you wish to return a device to Biometra.

10.1 Returning a device



WARNING

Risk of damage to health due to improper decontamination! Perform a professional decontamination before returning the device to Analytik Jena.



NOTE

Biometra GmbH 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 from biologically hazardous, chemical or radioactive contamination (→ "Disinfecting the device" p. 33.)

Download the Declaration of Decontamination as an editable PDF document in German or English from the Internet:

https://www.analytik-jena.de/fileadmin/content/service/customer/Declaration_of_decontamination_de_01.pdf

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, please contact Biometra GmbH or your local dealer.
- Please attach the warning note "CAUTION! SENSITIVE ELECTRONIC DEVICE!" to the packaging.
- Please include a sheet containing the following data:
 - 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
 - If you need to send in your device, the service department will assign you a RAN which you will receive over the phone. This number must be attached to the outside of the packaging so that it is clearly visible. **Devices submitted without a RAN will not be accepted!**

10.2 Packaging the Biometra TRobot II thermal cycler

For dispatch, Biometra uses an extra designed packaging system with inserts of foamed material.



NOTE

The thermal cycler is only protected from transport damage if the original packaging is used and the packing instructions are followed. Biometra is not liable for transport damage due to incorrect packaging.

10.2.1 Packing the PCR module



1. Place the two foam inserts and the cardboard insert in the box as shown.

Abb. 13 Box for PCR module with bottom inserts



2. Pack the PCR module in a foil bag and place it in the cut-outs of the moulded parts.

Abb. 14 Box with inserted PCR module



Abb. 15 Packaged PCR module with attached foam inserts

Now the box can be sealed.

10.2.2 Packing the controller



Abb. 16 Box for the controller with foam inserts

3. Place the two foam inserts onto the device from above.

1. Place the two foam inserts in the box as shown.



Abb. 17 Box with inserted controller

2. Pack the controller in a foil bag and place it in the cut-outs in the moulded part.



Abb. 18 Controller with attached foam moulded parts

3. Place the two foam mouldings on the device from above. Pull the two device cables upwards through the moulded part recesses.



Abb. 19 Packaged controller with cardboard cover

4. Place the cardboard insert on the device and place the two device cables in the cardboard space.

Now the box can be sealed.

10.2.3 Shipping the PCR module and the controller together



Abb. 20 PCR module and controller box in outer box

1. The two boxes are placed side by side in the Biometra TRobot II outer box.

The outer box can now be sealed.

11 Disposal

The operator/user of Biometra TRobot II must properly dispose of the waste materials produced during measurements (sample materials) in accordance with statutory and local regulations.

At the end of its service life, Biometra TRobot II and all its electronic components must be disposed of as electronic waste in accordance with valid regulations.

12 Specifications

Block module

Model	Biometra TRobot II 96 G	Biometra TRobot II 96 SG	Biometra TRobot II 384 G
Sample block	Aluminum, special alloy	Silver, gold-plated	Aluminum, special alloy
Block capacity	96 x 0.2 ml tubes, 96-well micro test plate or 8-well strips	96 x 0.2 ml tubes, 96-well micro test plate or 8-well strips	384-well micro test plate
Recommended sample volume	5 - 50 µl	5 - 100 µl	5 - 25 µl
Max. heating ¹	4.0 °C/s	5.0 °C/s	2.4 °C/s
Max. cooling ¹	3.1 °C/s	4.8 °C/s	1.8 °C/s
Temperature uniformity ²	95 °C ± 0.60 °C 70 °C ± 0.30 °C 55 °C ± 0.20 °C	95 °C ± 0.50 °C 70 °C ± 0.25 °C 55 °C ± 0.15 °C	95 °C ± 0.60 °C 70 °C ± 0.30 °C 55 °C ± 0.15 °C
Gradient	Linear Gradient Tool	Linear Gradient Tool	Linear Gradient Tool
Max./min. gradient	24 °C/0.1 °C	30 °C/0.1 °C	18 °C/0.1 °C
Gradient adjustment range	12 lanes 20 °C to 99 °C	12 lanes 10 °C to 99 °C	24 lanes 20 °C to 99 °C

¹ measured within the block

² after 15 s

Block exchange	No
Tempering method	Peltier elements
Standby temperature	Yes, up to 4 °C
Temperature control method	Block control
Temperature setting range	3 °C to 99 °C
Temperature control accuracy	± 0.1 °C
Plate lifter	Motor-driven, direct compatible with full-skirted PCR plates, with optional Biometra TRobot II adapter frame compatible with semi-skirted PCR plates
Consumable compatibility	Low-profile and high-profile plastics with or without skirt, as well for semi-skirt

Lid

Lid type	Motorized lid with heating module, which is connected spring-loaded to the lid
Lid temperature	30 °C to 110 °C
Contact pressure	Constant contact pressure independent of the consumables used, adjustable via software in a range from 4 kg to 12 kg. Typical default setting: 8 kg to 10 kg
Compatible sealing systems	Sealing foils, mats and lids

Operation

Application software	Biometra TSuite computer software
Integration software	BiometraLibrary (dll file) for integration into an automation system's scheduler software
Operating system	Microsoft Windows minimum Windows 8.1, preferably Windows 10
Language	English, German
Data transfer	Via Ethernet, USB2.0 or serial RS232 interface (encrypted transmission of data packets for run log files and service files.)
Data transfer speed	Ethernet: Auto-negotiation, 10BaseT half-duplex, 10BaseT full-duplex, 100BaseTX half-duplex, 100BaseTX full-duplex RS232 interface: 115200 baud, 8 data bits, 1 stop bit, no parity
Auto restart function	Yes
Quick start function	Via dashboard in Biometra TSuite software
Time increment	1 to 240 s/cycle
Temperature increment/decrement	±0.1 to 20 °C/cycle
Memory	Controller: 394 programs of 6 steps in up to 90 user folders. On computer or network: unlimited, depending on memory space
Properties	<ul style="list-style-type: none"> ■ Graphical or tabular programming ■ Protocol templates ■ Linear gradient function ■ Monitoring of programs in graphical and tabular view ■ Incubation mode ■ User administration ■ Log file, detailed run log file ■ Extended self-test

PCR module dimensions

Width	208 mm
Depth	260 mm (maximum depth with the lid open: 332 mm)
Height	209 mm (maximum height with the lid open in the middle opening position: 291 mm)

Required clearance space	20 cm to the rear of the device. When operating several units side by side, an additional 10 cm between the units.
Net weight	9.5 kg
Interfaces to the controller	For DSub 24W7 signal cable and for DSub 12 supply cable

Controller technical data and dimensions

Power supply	100 V, 115 V or 230 V \pm 10 %, 50 – 60 Hz
Fuse	2x 8AT 250 V (special fuse type required). Please contact the Analytik Jena service department.
Power consumption	Max. 550 W
Interfaces to the PC	Serial RS232, USB2.0 via RS232 to USB adapter and Ethernet. 1 RS232 cable included in delivery. The network cable must be at least performance class Cat 5e and the cable configuration has to be STP. Cable lengths \leq 30 m are approved.
Interfaces to the PCR module	DSub 24W7 signal cable, DSub 12 supply cable. Cable lengths: 3 m. The cables are fixed to the controller
Net weight	8.4 kg
Device size (W x D x H)	240 mm x 397 (444 incl. cable ports) mm x 139 mm
Recommended clearance space	10 cm to the rear of the device.

Other technical data

Noise emissions	Max. 45 dB (A)
Operating conditions	15 °C to 30 °C, max. 70 % air humidity, max. 2000 m above sea level, overvoltage category II, pollution degree 2, IP20
Warranty	2 years for the device system

13 Declaration of conformity



EU – Konformitätserklärung EC – Declaration of Conformity

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Göttingen, den 14.02.2020

Biometra erklärt als Hersteller in alleiniger Verantwortung, dass die Produkte
Biometra declares as manufacturer under sole responsibility that the products

Typ/Type:	Biometra TRobot II 96 G	Biometra TRobot II 96 SG	Biometra TRobot II 384 G
Best.-Nr./Order No.:	846-x-070-901	846-x-070-902	846-x-070-903
	x = 2 für/for 230 V, 4 für/for 115 V, 5 für/for 100 V		

den folgenden Europäischen Richtlinien und angewandten harmonisierten Normen entsprechen:
conform to the following European Directives and applied harmonized standards:

Richtlinie Directive	Norm Standard	Ausgabejahr Year of Publication
2014/35/EU Niederspannungsrichtlinie/LVD	EN 61010-1 EN 61010-2-10	2010 2014
2014/30/EU EMV/EMC	EN 61326-1 EN 55011/A1 EN 61000-3-2 EN 61000-3-3	2013 2009/2010 2014 2013
2011/65/EU RoHS	EN 50581	2012

Dr. Juergen Otte
Head of Quality Management

For and behalf of Biometra GmbH