

BioShake iQ

Operating Manual



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1. CONVENTIONS USED IN THIS MANUAL

Symbols used in this manual have the following meaning



WARNING: This signal word indicates a possibly imminent danger, which can result in slight to severe injuries or even death.



CAUTION: This signal word indicates a possibly imminent danger, which can result in slight to serious injuries.



CAUTION: Surface can be hot.



Information of special interest: Text marked with this symbol describes procedures or conditions that could damage or cause the device to malfunction. Therefore, users should pay particular attention.

2. SAFETY

The device is designed with safety in mind and no danger is known if the device is intact, installed and operated as described in the manual. Only use the device in the way as it is described in the intended use.

Independent investigations from TÜV services and CE certifications guarantee the highest security standards.

The most important prerequisites for use, operation, and safety are explained to ensure smooth operation. No warranty or liability claims will be covered if the instrument is used in ways other than those described or if the necessary prerequisites and safety measures are not observed.



The instrument may only be operated by persons who read the manual and following the safety instructions.

General safety notes



CAUTION: Electrical shock

While connected to the power the electric parts in the device can give the user an electric shock.

- ▶ Do not open the device.
- ▶ Make sure that no liquids run into the device.
- ▶ Only use the delivered power supply or one that meets all electrical specifications.
- ▶ Use a mains outlet and if required an extension lead with grounding.



CAUTION: Risk of injury due to rotating elements

Parts of device can move at high frequencies. The rotating device parts itself and mounted elements can cause injuries when touched while moving.

- ▶ Do not impede the platform motion during operation.
- ▶ Always stop device before any personal interaction.
- ▶ Never move or carry the unit while shaking.
- ▶ Operate the unit in a designated environment with appropriate safety measurements.

	<p>CAUTION: Risk of injury due to sling away of parts or liquids</p> <p>Parts of device can move at high frequencies which leads to a rotational force to all elements that are connected to this parts. If the devices is not used properly this can lead to injuries due to sling away of parts or liquids.</p> <ul style="list-style-type: none"> ▶ Ensure sound fastening of rotating elements. ▶ Only use accessories recommended by QINSTRUMENTS and standard qualitative tubes, microplates or vials. ▶ Ensure liquid vessels are closed or the liquid fill level is low enough so no liquid is spilled. Pay special attention when working with hazardous, toxic and pathogenic samples ▶ Never move or carry the unit while shaking. ▶ Wear personal safety gear (gloves, clothing, glasses, ...) and ensure the device is operated in a designated environment with appropriate safety measurements.
	<p>CAUTION: Risk of burning injuries</p> <p>Parts of the device can reach temperatures (high or low) that can lead to burn injuries if touched.</p> <ul style="list-style-type: none"> ▶ Wait until device reached room temperature before any personal interaction. ▶ Wear personal safety gear (gloves, clothing, glasses, ...) and ensure the device is operated in a designated environment with appropriate safety measurements.
	<p>WARNING: Magnetic fields can influence active medical devices (like pacemaker, defibrillator) that can cause severe injuries up to death</p> <p>Strong permanent magnets in the device can influence active medical devices (like pacemaker, defibrillator) that can cause severe injuries up to death if hold up close.</p> <ul style="list-style-type: none"> ▶ Do not open the device or conduct any maintenance tasks that require this, if you are wearing active medical device.

3. PRODUCT DESCRIPTION

3.1 INTENDED USE

The BioShake iQ is a heating shaker used for microplates, tubes and vials for lab bench purpose. It is intended to be used in a laboratory environment by trained laboratory employees. The device is not intended to be used in environments with an aggressive or explosive atmosphere. It is required that the user ensures that not such environment is created due to the usage of the device.

It is required that the user qualifies the performance of the device in regard to his specific circumstances and demands.

3.2 FEATURES

INNOVATION FOR SMART LABORATORIES

The BioShake iQ is a high-speed lab shaker that lets you perform all your standard runs with a minimum of adjustments, and offers outstanding performance to handle a wide range of applications across biotechnology, pharmaceutical and academic research.

The simple yet powerful device control via a state-of-the-art keypad enables fast realization of simple task and defining multiple step programs intuitively.

BEST IN CLASS FEATURE PERFORMANCE

Superior mixing

The BioShake iQ is designed for reliable mixing of vials, tubes and microplates. The unique and patented technique of planar orbital motion offers an ultra-efficient, 2-dimensional shaking process with a constant orbit of 2.0 mm. In that way the sample is mixed gentle but thoroughly in a fraction of time of competing systems. Fully adjustable from **200 up to 3.000 rpm**, it guarantees optimal mixing results for samples in **96 to 384-well plates**.

Temperature controlled up to 99 °C

Within the BioShake iQ thin, large-area heating elements and sensors are integrated. The implemented control logic guarantees an optimal heat up process. The temperature can be set **from ambient to 99 °C in steps of 1 °C** and reaches a uniformity of **temperature distribution better than ± 0.5 °C at 45 °C** across the heating surface.

ADAPTABLE TO YOU NEEDS

Exchangeable adapters for a wide range of vial, tubes and microplates are available from stock. Perfect shaped adapters allow an optimal fit for standard tubes, lysis tubes, glass vials and other sample vessels. The **replacement of the adapters is straightforward**. Especially in applications with frequently changes of the sample container this feature provides unmatched benefits.

SECURE and STYLISH

The first-class finished, stylish aluminum housing gives the BioShake iQ its essential functionality. Its sealed housing provides a high amount of security, device stability, protects mechanical and electronic components and therefor ensures a **long service-free lifetime**.

To prevent laboratory fires, all units feature an over temperature circuit which switches off if an over temperature situation occurs. Thermal damage to any unit is minimized or prevented, due to the fire resistant aluminum housing.

MADE IN GERMANY

A perfectly harmonious blend of high-tech and handmade is what we strive for. "Made in Germany" has always been a recipe for success for QINSTRUMENTS. That is why 100% of QINSTRUMENTS development and production takes place in Germany.

The company focus is on human diligence combined with an environmental friendly approach to deliver outstanding constant high-quality products. For more than 20 years we have used only high-quality materials to ensure sustainable production, applied innovative thinking and undertaken research in a future-oriented way.

Join QINSTRUMENTS - "Join the Bio-convergence revolution"

3.3 TECHNICAL SPECIFICATION

Thermo-adapter plates for different labware

Description	An adapter is required for optimal temperature transfer to and/or optimal fixation of labware and needs to be purchased separately. The adapter can be exchanged by the user.
Microplates	All microplates according ANSI-SLAS format 4-, 6-, 8-, 12-, 24-, 48-, 96-, 384-, and 1536-well microplates, deep well plates, PCR plates
Tubes and Vials	0.2, 0.5, 1.5, 2.0 ml standard tubes 2.0, 4.0, 6.0, 8.0, 10.0 ml cylindrical shaped vials
Others	Custom made adapter on request

Temperature control

Temperature range*	RT to 99 °C (RT to 211.82 F) with a resolution of 1 °C		
Temperature accuracy	± 0.1 °C		
Temperature uniformity*	±0.5 K at 45 °C	±0.7 K at 75 °C	±1.0 K at 95 °C
Heating speed above RT*	~ 7 K/min (10 min from 21 to 95 °C)		

* Value depends on the used thermo-adapter. Conditions for values: RT=21 °C, Adapter=2016-1041 (96-well PCR), Temperature measured in the adapter

** Sensor resolution=0.008 °C

Mixing

Frequency range	200 to 3000 rpm with 50 rpm increment resolution		
Maximum frequency*	< 80 g: 3000 rpm	< 120 g: 2500 rpm	< 150 g: 2200 rpm
	< 300 g: 1800 rpm	< 500 g: 1500 rpm	> 500 g: 1000 rpm
Orbit	constant 2.0 mm diameter		
Regulation accuracy	± 25 rpm		
Short-Mix function	Yes		

* Feasible frequency heavily depends on load weight **and** height. **Always** start with low frequencies and iterate upwards.

Device control

Description	Device control is realized via a 10 button keypad. The parameters Time Mixing frequency Temperature can be set directly.
Display	2x 16 digits blue LCD with backlight
Status	All status information are shown on the LCD
Timer setting	1 min - 99 h automatic switch to stand-by optional audible alarm at process end
Programming	2 separate programs with 3 steps each can be defined and saved in the internal memory

Electrical

Operating voltage	24 V DC I _{max} : 4.5 A P _{eff} : 85 Watt P _{max} : 108 Watt
Power supply	Input: 100 - 240 V AC 50 - 60 Hz Output: 24 V DC I _{max} : 5.0 A P _{max} : 120 Watt External power supply unit (CE/UL/CSA approved, 85-264 V AC, 47-63 Hz, IEC/EN60320-1 C14 Degree of protection: IP20)
Power connection*	Hollow connector (ID 2.5 mm x OD 5.5 mm)

* Only use the device with the delivered power cord. If another power cord is used ensure the wire diameter is adequate.

General properties

Housing material	Aluminum anodized
Degree of protection	IP20 (Protected against solid objects up to 12 mm No protection against water)
Pollution degree	1 (no contamination or only dry, non-conductive contamination contamination has no influence)
Airborne sound emission	< 70 db (A)

Operating, transport and storage conditions

Operating range	5 °C - 45 °C (41 - 113 F) 10 - 80 % RH up to 2000 m above sea level non-condensing
Operating conditions	stable (resonance free) horizontal dry inside buildings even well ventilated and no direct exp. to sunlight
Transportation and storage	-10 °C - 60 °C (14 - 140 F) 10 - 80 % RH non-condensing

Dimension and weight

Dimensions	(W x D x H) 142 x 169 x 88 mm 5.59 x 6.65 x 3.46 inch
Weight	2.8 kg 6.2 lbs
Packaging size	(W x D x H) 347 x 252 x 131 mm 13.66 x 9.92 x 5.16 inch cardboard box
Packaging weight	3 kg 6.61 lbs

Drawing

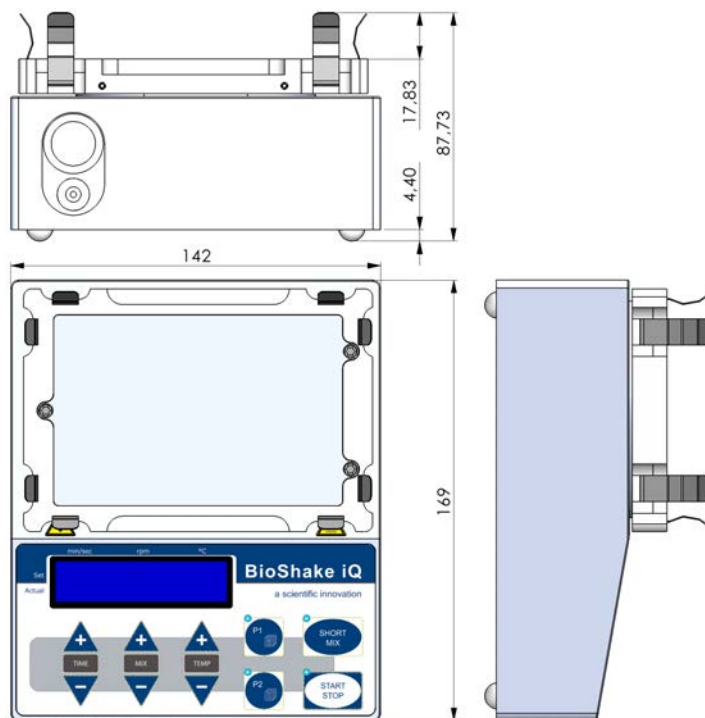


Figure 1 Technical drawing of device



Technical specifications are subject to change.

3.4 DELIVERY PARTS



Figure 2 Image showing the delivery parts

Part 1	BioShake iQ
Part 2	External power supply 24 V DC, 120 W (CE/UL/CSA approved, 85-264 VAC, 47-63 Hz, IEC/EN60320-1 C14)
Part 3	Power cords Europe & US (IEC/EN 60320-1 C13)
Add. parts	Calibration certificate, Operating Manual

3.5 DEVICE DESCRIPTION

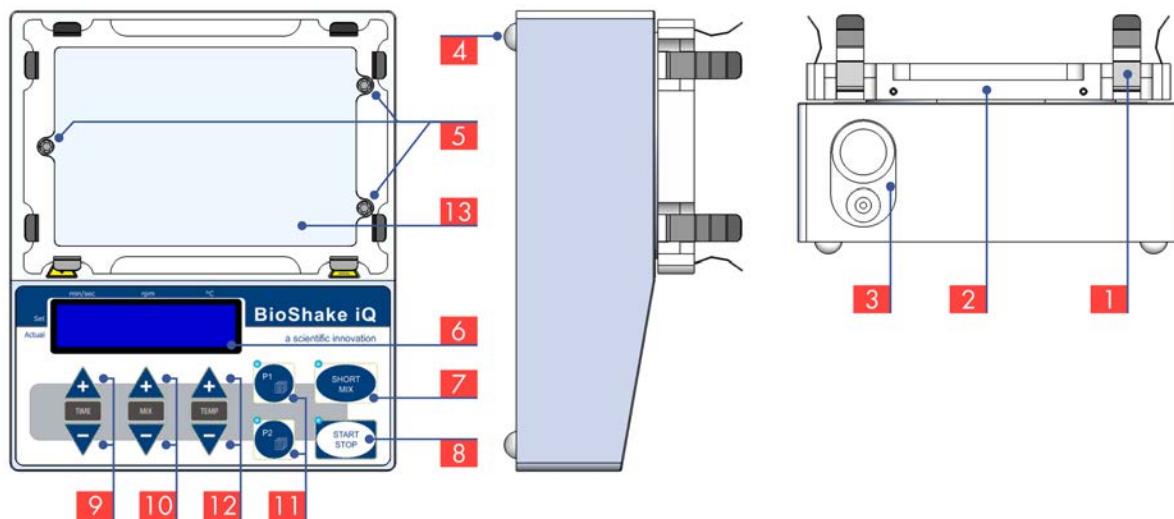


Figure 3 Device image which highlights important device elements

- 1 8x Universal spring clamps for microtiter plates
Easy fixation from skirted microplates up to deep well plates holding the microplate in place even at highest mixing frequencies. For flexible and deformable PCR plates we recommend using of the related PCR adapter.
- 2 Tablar (upper device part)
Further information: ["Mixing Process" on page 14](#)
- 3 On / Off switch and Power supply socket
- 4 4x Rubber pads
Reduce transfer of device vibrations and ensure safe and slippery free positioning.
- 5 3x M3 Thread to mount adapters
Further information on adapter installation: ["Adapter" on page 25](#)
- 6 LCD
For all settings and status information the display is used. Further information: ["Operation" on page 14](#)
- 7 Keypad Button: SHORT MIX
Simple on-button control for short mixing procedures. Further information: ["Mix with device settings" on page 19](#)
- 8 Keypad Button: START - STOP
Start / stop a program or mixing with set parameters. Further information: ["Mix with device settings" on page 19](#)
- 9 Keypad Buttons: + TIME | - TIME
Increase / Decrease time parameter [sec | min]
- 10 Keypad Buttons: + MIX | - MIX
Increase / Decrease mixing speed parameter [rpm]
- 11 Keypad Buttons: P1 | P2
Select or define program 1 and 2. Further information: ["Mix with Program" on page 19](#)
- 12 Keypad Buttons: + TEMP | - TEMP
Increase / Decrease temperature parameter [°C].
- 13 Contact area to the adapter to transfer heat
Further information: ["Heating Process" on page 16](#)

3.6 MAINTENANCE AND CLEANING

The device is maintenance-free for standard use purposes.

Cleaning should be done with a wet but not soaked cloth using a mild soap solution and water or an alcohol-based disinfectant in the following steps:

- Disconnect the power cord



CAUTION: Ignition

While connected to the power the electric parts could have a malfunction that could lead to an ignition when a inflammatory cleaning solution is used.

- ▶ Disconnect the power cord
- ▶ Do not use inflammable cleaning solution if not required

- If applicable, wait until the heating area/adapter is cooled down.



CAUTION: Surface can be hot

If the device was used right before maintenance, surfaces of the device could be hot which could lead to severe burns if not cautious.

- ▶ Make sure that the temperature at the contact surface is below +40 °C.

- When cleaning the device make sure no liquid enters the device.



CAUTION: Electronic malfunction

Cleaning solution that enters the device can damage the device electronics and lead to an electronic malfunction.

- ▶ Use a wet cloth

- Make sure all surfaces are dry before continue to use the device
- Connect device to power

If you have any questions about cleaning please contact your distributor or directly QINSTRUMENTS. Should it become necessary to repair the equipment, it should be returned to an authorized servicing agent. The equipment must be clean and free from harmful substances. Always ship the device well-packed, preferably in the original shipping container in order to avoid damages.

4. INSTALLATION

4.1 DEVICE

Unpack and carefully check the instrument. Report any damage or missing items to your distributor. The device should be mounted on a:

- horizontal, even surface
- sufficient stable (resonance free) table
- well ventilated location and with no direct exposure to sunlight to assure stable heating

Before the first run it is mandatory to mount an adapter on the device (see next chapter).

Plug the external power supply into the 24 V barrel socket at the rear side of the device and plug the power cable into the wall socket. Use the On/Off button at the rear side to switch on the instrument.

The instrument will do a self test and the LCD will show the current parameter values when the device is ready and free of errors. Now the instrument is ready to accept commands.



It is advisable to carry out a short test run to ensure that the device does not move while mixing. Further information on mixing and how to proceed are available at "[Mixing Process](#)" on page 14

4.2 ADAPTER

All adapters for all lab bench devices (BioShake iQ and XP) are mounted in the same way and use the same interface.



If the security cover plate or an adapter plate is already mounted, please remove it first!



Heavier blocks may limit the heating / cooling and mixing speed. See chapter "[Mixing Process](#)" on page 14 and "[Heating Process](#)" on page 16 for more details.

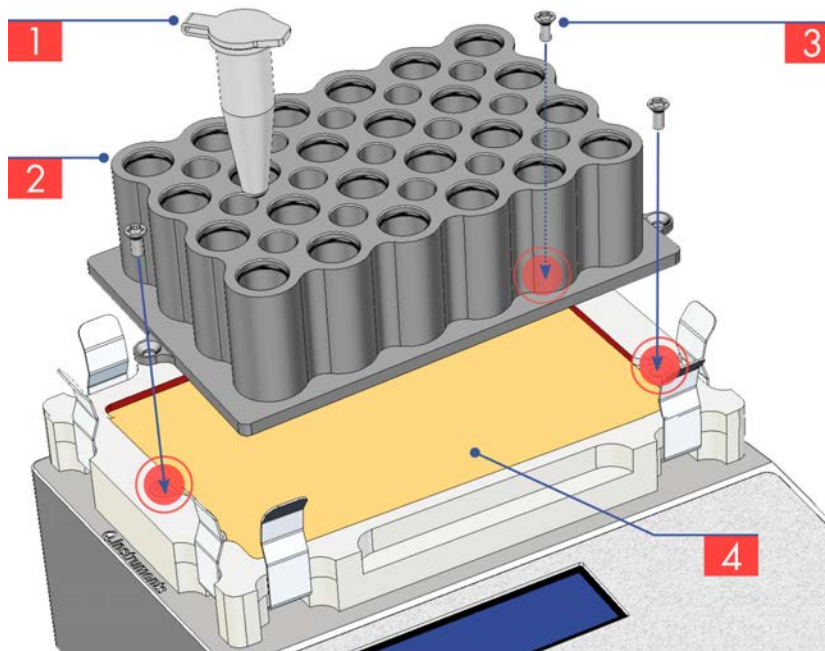




Figure 4 Illustration of adapter installation

Step	Instruction
1	Switch OFF the power supply of the instrument
	 Wait until the adapter has cooled down, if applicable.
2	Remove all sample carriers (tubes, vials, microplates etc.) [1]
3	Loosen (rotate left) the three torx screws [3] by using the supplied screwdriver (Torx size 8) and take off the current mounted adapter [2] or if it's the initial installation, the 2.0 mm thick safety cover, straight up and put it on a clean, soft surface.
4	Ensure the mounting area [4] on the device and the downside of the adapter are clean and particle free.
5	Insert the new adapter plate straight into the impression of the mounting area [4] and check if the adapter reached a fixed horizontal position.
6	Fix all three torx screw using clockwise rotation
	 Take care to realize a uniform tightening of the screws to ensure a good fit.
7	Ready to apply the proper sample carriers (tubes, vials, microplates etc.). Only use the fitting carriers to ensure a tight fit.
8	Turn on the power supply of the instrument.
9	The device will recognize and display the recognized adapter category. See: " Device settings " on page 17

5. OPERATION

5.1 INTRODUCTION

In the next chapters the available operations that the device is designed to execute are described. It is intended to give the user an understanding of some underlying principles and is therefore advised to be read before using the device. With the information the user should be able to reasonably evaluate how to optimally use the device and if the device is used in its given specifications.



It is required to test the device under the specific circumstances of implementation and assay demands to ensure that the expected outcome and performance is met.

5.2 MIXING PROCESS

Introduction

Please keep in mind that the applications, test setups and environmental conditions in which the devices are used differ immensely. This means for example that it is not always the goal to realize the most intense mixing in the fluid. This is however mostly the intention of the described activities in the following explanation. It is hereby assumed that the user has an understanding of the needs of his process and the ability to evaluate the impact of the mixing parameters. It is strongly encouraged to invest time in optimizing the mixing process. This section is also meant to sensitize the user for the amount and complexity of parameters that might have an impact on the mixing result.

It is strongly recommended to initially evaluate the desired mixing frequency. This could be done by using the pure buffer or water and raising the frequency step by step until the desired mixing behavior is observed. Using the desired liquid for this initial experiment is advised as the surface tension has a major impact on the fluid movement in the cavity. Depending on the buffer that is used, water could show a significantly different mixing behavior. Additionally the mechanical limits of the device need to be considered. Overloading the device and set inappropriate mixing frequencies will damage the device and will lead to errors.



Because the impact of all parameters can not be estimated easily it is recommended to start with a low frequency and iterate upwards towards a satisfying result.

Device parameters

Parameter	Notes
Frequency	<p>The frequency or speed of mixing is the foremost important parameter. It defines the amount of liquid in motion in the cavity. The amount of liquid in motion should normally be maximized.</p> <p>If the frequency is to low no real turbulence appears in the fluid and the consequences will be bad and also not reproducible results.</p> <p>It can however happen that the frequency is to high. In this case the fluid can not follow the moving vessel and will move chaotically. This will likely result in unreproducible results, and spillage is more likely to occur.</p>
Time	<p>The mixing time heavily depends on the process. Identifying the required time for a process step is crucial and is related to the settings of the other two parameters</p>

Influencing factors

The given list is not complete but only shows the common factors that should be taken into account when setting the device parameters. Depending on the process further parameters for example temperature or particles in the fluid can have a major impact.



The weight and type of load is the most important factor in regard to limiting the maximal speed of mixing. Although the device is normally not damaged if the frequency is too high a proper result will not be achieved without a constant shaking movement.

Overloading is not detected by the device.

Defects resulting from overloading are not covered from the warranty.

Param	Notes																																																							
Load	<p>Besides the actual weight of the load the height is important. With increasing height the center of mass rises, which leads to a rising force, generated from the rotating load.</p> <p>Recommended maximum frequencies</p> <table border="1"> <thead> <tr> <th rowspan="2">Max. weight [g]</th> <th colspan="6">Maximal mixing frequency [rpm]</th> </tr> <tr> <th>1,000</th> <th>1,500</th> <th>1,800</th> <th>2,200</th> <th>2,500</th> <th>3,000</th> </tr> </thead> <tbody> <tr> <td>80</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> </tr> <tr> <td>120</td> <td></td> <td></td> <td></td> <td></td> <td>X</td> <td></td> </tr> <tr> <td>150</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> </tr> <tr> <td>300</td> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> </tr> <tr> <td>500</td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>> 500</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Max. weight [g]	Maximal mixing frequency [rpm]						1,000	1,500	1,800	2,200	2,500	3,000	80						X	120					X		150				X			300			X				500		X					> 500	X					
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Cavity	<p>The cavity diameter plays an important role on mixing efficiency. With small diameters the surface tension has more influence on the mixing behavior and it gets harder to set the fluid in motion. Smaller diameters will need higher frequencies for proper mixing.</p> <p>The cavity height sets the limit for the maximal fluid height while mixing. Together with the working volume it limits the frequency.</p> <table border="1"> <thead> <tr> <th></th> <th>Diameter[mm]</th> <th>Height[mm]</th> </tr> </thead> <tbody> <tr> <td>96-Well plat</td> <td>6.9</td> <td>10.67</td> </tr> <tr> <td>384-Well plate</td> <td>3.8</td> <td>8</td> </tr> <tr> <td>1536-Well plate</td> <td>1.5 - 1.7</td> <td>4.8</td> </tr> </tbody> </table>		Diameter[mm]	Height[mm]	96-Well plat	6.9	10.67	384-Well plate	3.8	8	1536-Well plate	1.5 - 1.7	4.8																																											
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Sample	<p>The sample has many properties that are influencing its mixing behavior. A great impact is related to the sample density, viscosity, and surface tension.</p> <table border="1"> <thead> <tr> <th></th> <th>Density [kg/m³]</th> <th>Viscosity [mPas]</th> <th>Surface Tension [mNm]</th> </tr> </thead> <tbody> <tr> <td>Ethanol</td> <td>789</td> <td>1.19</td> <td>22.5 at 20°C</td> </tr> <tr> <td>Aqua</td> <td>999.75</td> <td>0.89</td> <td>72.3 at 20°C</td> </tr> <tr> <td>Glycerin</td> <td>1260</td> <td>1480</td> <td>-</td> </tr> </tbody> </table>		Density [kg/m ³]	Viscosity [mPas]	Surface Tension [mNm]	Ethanol	789	1.19	22.5 at 20°C	Aqua	999.75	0.89	72.3 at 20°C	Glycerin	1260	1480	-																																							
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5.3 HEATING PROCESS

Introduction

The heating feature of the device is used heat up the sample to a defined temperature. To reach the desired temperature reliable the following information should be used. Please be aware that the given explanations are a simplification to get a rough understanding of the subject. The actual physics and measurements behind temperature spreading and transmission in materials and over gaps, the impact of environment factors and so on are much more complex and far beyond the scope of this text.

It is important to understand that the set temperature, is the temperature the heating area [3] will reach. In most cases the set temperature will be higher than the adapter temperature [2] and the adapter temperature will be higher than the sample temperature [1]. As the sample temperature is the relevant temperature for the user it is important to know this offset, so the temperature of the heating area can be set accordingly.

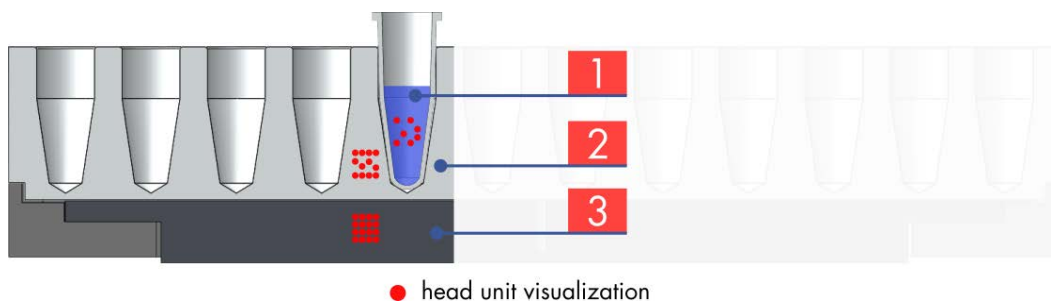


Figure 5 Visualization of heat reduction that takes place going from the heating area to the sample volume

Furthermore the user should be aware of the time that is required to heat up the adapter and subsequently the sample. Again it is important to realize that the temperature that is reported from the device is the temperature of the heating area and not the sample.



Because the impact of all parameters can not be estimated it is recommended to directly or indirectly (process result) determine if the sample temperature is correct.



The efficiency to heat up the sample can be increased if the sample is mixed while heating.

Influencing factors

The following parameters are considered to be the main factors that are influencing the offset and required time to head up the sample. Normally the impact on the factors are proportional. Meaning a higher offset will also lead to an increased head up time and vice versa.

Parameter	Notes
Adapter	The taller the adapter the bigger the offset will be. Also the shape of the adapter is important as it defines how well the it is able to maximize the contact surface to the vessel. The more contact surface the better the heat transfer will be.
Temperature	The higher the target temperature is the bigger the thermal radiation of the adapter will be. This will lead to an increased offset.
Sample/ Vessel	The amount of sample, the vessel material, shape and if the Vessel is closed or open has an impact.

5.4 DEVICE SETTINGS

Time, Speed and Temperature value



Use the TIME, MIX and TEMP keypad buttons to set the desired operation time, speed and temperature. The set parameters are displayed in the first/upper line of the LCD.

When the shaker starts to run, the actual values for time, speed, temperature will be shown in the second/lower line of the display.



If no time is set, pressing START STOP will cause a continuous operation of the shaker.



CAUTION: Depending on the material microplates melt at different temperatures. For example microplates made of polystyrene should not be heated above 70 °C

Speed limitation due to adapter category

All QINSTRUMENTS adapters are automatically detected after mounting on the instrument. The detection result is shown in the display. The allocation of the adapter to a particular category determines the properties.

```



A D A P T E R   C A T . :   0 1
M A X .   S P E E D :   3 0 0 0
  
```

Figure 6 LCD showing the result of the adapter detection after mounting



Adapter Category	Max. speed [rpm]	Available adapters
		Order no. Description
01	3,000	A) Without adapter (heating function not available) B) All non classified adapter (heating function not available)
02	1,800	1808-1061 Adapter for tubes - 24x 2.0 ml or 15x 0.5 ml 1808-1062 Adapter for tubes - 24x 1.5 ml or 15x 0.5 ml 1808-1063 Adapter for tubes - 40x 0.5 ml or 28x 0.2 ml 1808-1067 Adapter for lysis vials - 35x 0.5-2.0 ml 1808-1069 Adapter for cylindrical vials - 35x 2.0 ml Ø 10.8 mm 1808-1071 Adapter for cylindrical vials - 30x 2.0 ml Ø 12 mm 1808-1072 Adapter for cylindrical vials - 20x 4.0 ml Ø 15 mm 1808-1073 Adapter for cylindrical vials - 20x 4.0 ml Ø 17 mm 1808-1074 Adapter for cylindrical vials - 20x 6.0 ml Ø 19 mm 1808-1085 Adapter - 24x Alere® ArrayTubes 1.5 ml 1808-1121 Adapter for Deep Well Plate . Eppendorf® 96/1000 µl 1808-1131 Adapter for Deep Well Plate . Eppendorf® 96/500 µl 1808-1141 Adapter for Deep Well Plate . BRAND® 96/1100 µl U-bottom 1808-1151 Adapter for Deep Well Plate . NUNC® Axygen® 96/2000 µl 1808-1161 Adapter for Deep Well Plate . Axygen® 96/0.6 ml, 96/2 ml 1808-1171 Adapter for Storage Plate . Abgene® 96/2.2 ml, 96/0.8 ml 1808-1181 Adapter for Mega Block . Sarstedt® Megablock 96/2.2 ml 1808-1191 Adapter for Storage Plate . HJ-Bioanalytik® 96/1.2 ml low profile 1808-1201 Adapter for Storage Plate . Corning® 96/320 µl V-bottom 1808-1211 Adapter for Masterblock . Greiner® 96/1.0 ml U-bottom
03	2,200	1808-1041 Microplate adapter - 96 well standard PCR plate, universal 1808-1064 Adapter for tubes - 96x 0.2 ml
04	3,000	1808-1021 Microplate adapter - Flat bottom standard 1808-1022 Microplate adapter - Flat bottom High Base 1808-1024 Microplate adapter - Flat bottom Low Base 1808-1023 Adapter - Alere ArrayStrip (12 stripes), flat bottom 1808-1031 Microplate adapter - 96 well round bottom, type 1 1808-1032 Microplate adapter - 96 well round bottom, type 2

05	1,000	1808-1093	Adapter for Falcon® tubes . 4x 50 ml
		1808-1094	Adapter for Falcon® tubes . 12x 15 ml
07	2,500	1808-1051	Microplate adapter - 384 well standard PCR plate, universal
10	1,800	1808-1081	Adapter - Alere ArrayStrip (5 stripes)

Change time unit



OPEN MENU  +  Press: **TEMP (+)** and **P1** and hold for at least 3 seconds, to open the menu

TCMo	TUnit		
Temp	min		

CHANGE VALUE   Press: **MIX (+)** or **MIX (-)** to change the TUnit value and switch between **minutes** and **seconds**

TCMo	TUnit		
Temp	min		

TCMo	TUnit		
Temp	sec		

SAVE & EXIT MENU  +  Press: **P1** and **TEMP (+)** and hold for at least 3 seconds, to save and close the menu

	0s		0	28.0
	-		-	24.2





After the time unit was changed it is necessary to newly define the programs.

Change time counting mode



The time counting mode defines when the countdown of the time, that is defined in a program or set for the START STOP operation, starts. Two time counting modes are available.

Time mode Time counting begins immediately when START STOP button is pressed, respectively a step of a program starts.

Temp mode The Temp control mode is the standard mode. Time counting starts when the nominal temperature value has been reached.



OPEN MENU  +  Press: **TEMP (+)** and **P1** and hold for at least 3 seconds, to open the menu

TCMo	TUnit		
Temp	sec		

CHANGE VALUE   Press: **TIME(+)** or **TIME(-)** to change the TCMo value and switch between **Temperature** and **Time**

TCMo	TUnit		
Temp	sec		

TCMo	TUnit		
Time	sec		

SAVE & EXIT MENU  +  Press: **P1** and **TEMP (+)** and hold for at least 3 seconds, to save and close the menu

	0s		0	28.0
	-		-	24.2



After the time counting mode was changed it is necessary to newly define the programs.

5.5 MIX WITH DEVICE SETTINGS

Continuous mixing





By pressing the START STOP button, the shaker will start to mix with the set parameters for time and speed. If the shaker is running the START STOP button will stop the shaker immediately.

When the shaker starts to run the actual values for time and speed will be shown in the lower line of the display.

If a temperature is set, the setting of the **time counting mode** (see: "[Device settings](#)" on [page 17](#)) defines when the time starts to count down.

How the device acts at the end of the run (if a time was set) is defined by the **concatenation mode** of [page 1.2](#) in program 1 (see: "[Define a program](#)" on the next [page](#))

The default setting is the **continuous mode** (symbol: ) where 3 buzzer signal chime and mixing and heating stops at the end.

In the **interactive mode** (symbol: ) mixing stops but heating stays active and the device is kept at the defined temperature. Every 10 seconds a buzzer signal chimes until the user presses the START STOP button.



If no time is set, pressing START STOP will cause a continuous operation of the shaker.

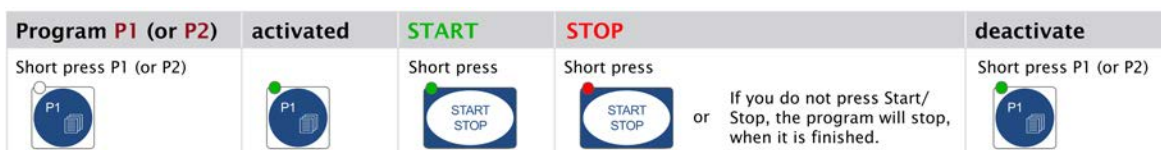
Short mixing



By pressing the SHORT MIX button, the shaker starts with the set parameters. Releasing the SHORT MIX button stops the shaker.

5.6 MIX WITH PROGRAM

Selecting and starting a defined program is simple and is described in the following flow diagram.

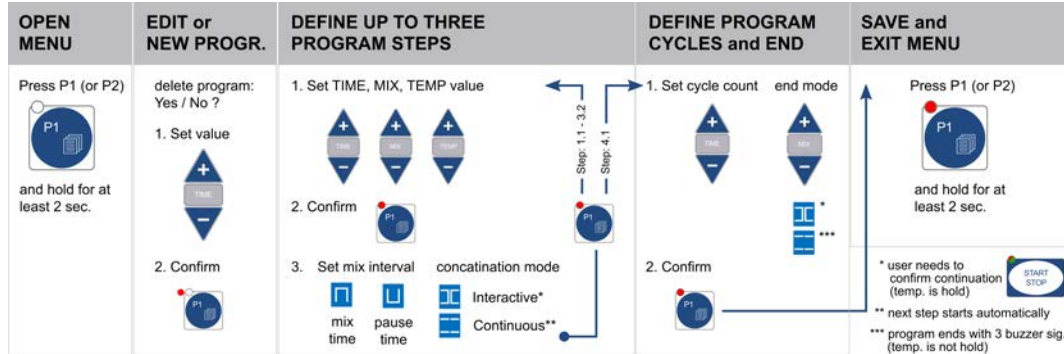


At the end of the program the BioShake will stop automatically and emit 3 buzzer signals or continue to heat and wait for the user to stop the process manually by pressing the START STOP button (see program basic in "[Define a program](#)" on the next [page](#)).

5.7 DEFINE A PROGRAM

OVERVIEW

With the BioShake iQ it is possible to define two programs that run automatically. The features of both programs are the same. A schematic overview of how to define a program is shown below. The steps are described in detail below.



OPEN MENU



The menu for defining a program is opened by pressing and holding the P1 | P2 (Px where x = 1 or 2) button for at least 3 seconds.

EDIT or NEW PROGRAM



Initially the user needs to decide if he wants to define a new program from scratch (yes) or change the parameters of the current definition of the program (no).

DEFINE UP TO THREE PROGRAM STEPS

Program Menu navigation basic

- The definition of the parameters for a program is separated in pages. One page is one LCD view. Each page has a number which is displayed in the second LCD row.
- In total there are 8 pages defining the whole program.
The page numbers are: 1.1 | 1.2 | 2.1 | 2.2 | 3.1 | 3.2 | 4.1 | 4.2
- By pressing the Px button the next page is shown and the settings are saved. At the end of all pages the first page will be shown again. So if you forgot or missed a parameter in one page, press Px as long as the page that was missed appears again.
- The Program Menu can be closed every time by pressing and holding the Px button for at least 3 seconds.
- If there are program parameters that are not set when leaving the Program Menu the default values will be used. The default values define a step where nothing happens.

Program definition basics

- A program has 3 steps
- In each step the total step time | speed | temperature value can be changed.
- As an option the total step time for each step can be divided into **mix intervals**.
For an interval the **interval mixing time** (Symbol: ) and the **interval pause** (Symbol: ) needs to be defined. The temperature value can not be changed in an interval.
- A further option is the definition of the **concatenation mode**, which defines the transition from one step to the next.

II Interactive mode (default): The user needs to interact with the Shaker by pressing the START STOP button before the next step is started respectively the program comes to an end. The temperature control stays active while waiting. The necessary interaction is indicated by a buzzer signal every 10s.

III Continuous mode: The next step starts respectively the program ends automatically. No buzzer signal between transition of steps however, 3 buzzer signals are triggered at the end of the program.

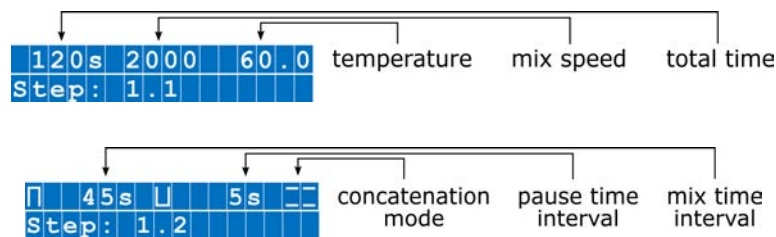
- It is required to define all 3 steps. The device, when executing a program, always goes through all 3 steps.
- To use less than 3 steps, set the time value of step 3 and/or step 2 to 0 seconds. This means nothing happens in this step. However, the chosen **concatenation mode** for the step will be evaluated.



The **concatenation mode** defined in the first step (page: 1.2) is used for the runs that are started with START STOP. (see: ["Mix with device settings" on page 19](#))

Define a program step

- One program step is defined in 2 pages. On the first page the mixing speed and time for the step is set. On the second page the optional definition of the interval is defined.
- The interval is defined by the interval mix time and interval pause time. The mix interval feature provides the option to apply an additional alternation between mixing and pause, during the total time span one step. Therefore, the interval mix time defines the time for the mixing activity, which is followed by a period of non-mixing, defined by the interval pause time.



- All three steps are defined in consecutive pages

DEFINE PROGRAM CYCLES

After the pages for the three steps (1.1 - 3.2), another page (Step: 4.1.) with two further parameters, the cycle counter and the program end mode, opens.

The **cycle counter parameter** defines how often the 3 steps should be repeated. If the cycle counter is set to 1, the program is executed once. Any other number will result in the successive execution of the program accordingly to the set amount.

The **program end mode** is comparable to the concatenation mode (see basics above). It however defines the device behavior at the end of the program and not the transition between two steps.



No configuration can be done in step 4.2.

SAVE and EXIT PROGRAM MENU

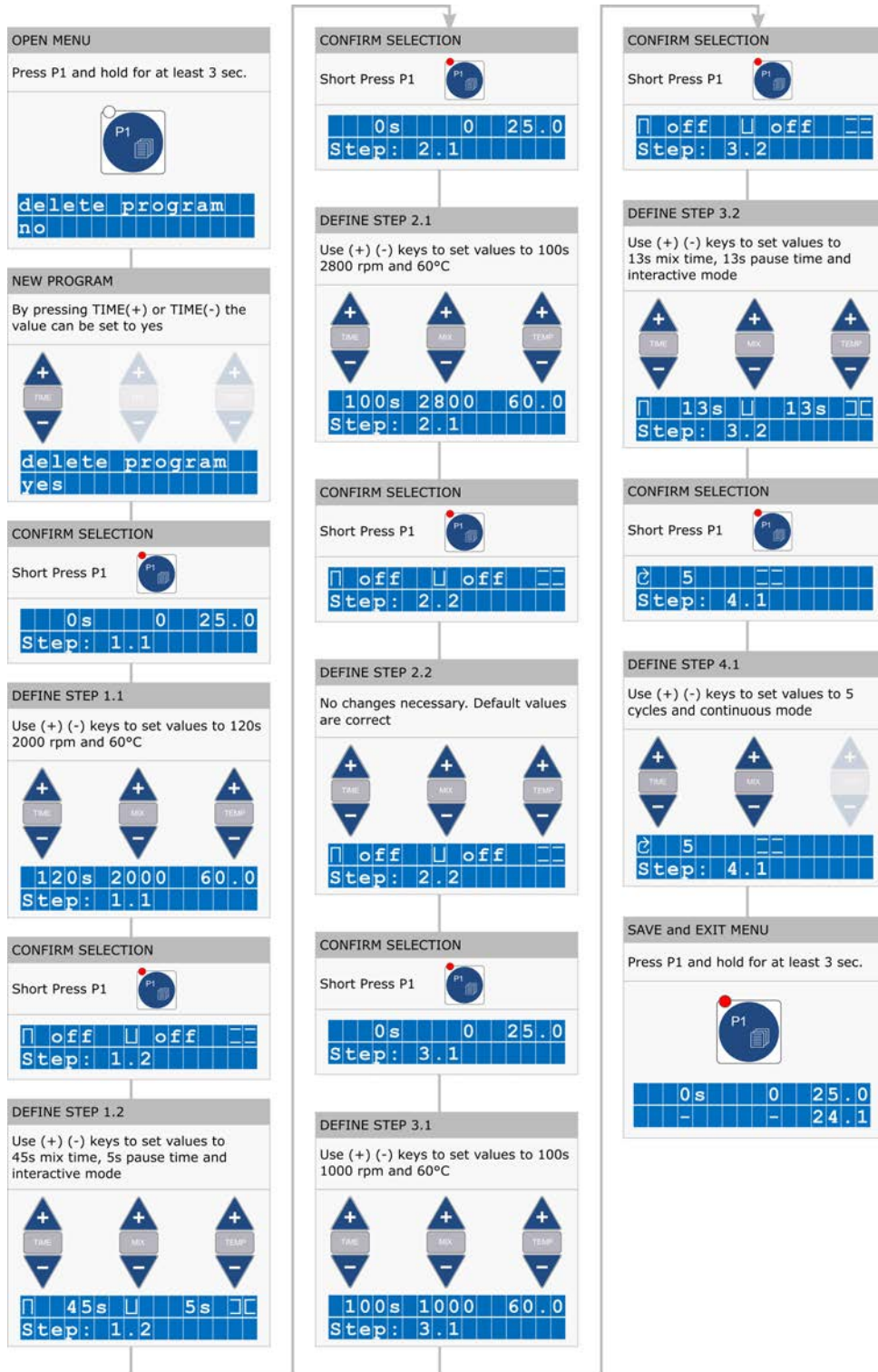


The menu for defining a program is closed by pressing and holding the P1 | P2 (Px where x = 1 or 2) button for at least 3 seconds.

EXAMPLE

In the following step-by-step description, a P1 program with three steps is created. The steps have the following parameters.

- The first step will take 120 s and mix with 2000 rpm at 60 °C. During the 120 s mixing period the mixing will switch on and off. 45 s on, at 2000 rpm followed by a 5 s pause without mixing. After step one the user needs to confirm continuation to proceed with step two by pressing START STOP.
- The second step will take 100 s and mix with 2800 rpm at 60 °C. Without interruption/required interaction the third step will be carried out.
- The third step will also take 100 s with a mix interval of 13 s mix time and 13 s pause time. The mixing speed is set to 1000 rpm and the temperature keeps 60 °C.
- The 3 steps program will run 5 times and will end without user interaction and will therefore not hold the set temperature of 60 °C



In a schematic overview the program will result in the following process.



5.8 ERROR HANDLING

To provide process stability and prevent the unit from damages smart sensors for monitoring and controlling operating parameters are integrated.

Intelligent algorithms continuously track power, voltage and current from all modules and actuators, as well as a range of statistical indicators to detect suboptimal performance or events that require intervention or maintenance.

Any detected errors will be shown on the LCD.

6. ACCESSORIES

6.1 ADAPTER

QINSTRUMENTS offers high precision adapter plates with a perfect fit and optimal thermal performance for all kinds of tubes, vials, microplates, and other different disposables, from stock.

We are also offering to produce custom made adapters, that exactly meet the specifications of your sample container. You will receive your **custom shaped adapter plate** within short period.



Only use the original accessories recommended by QINSTRUMENTS. QINSTRUMENTS does not honor any warranty or accept any responsibility for damage resulting from using 3rd party accessories.

Order no.	Description
Thermo adapter for micro well plates & PCR plates	
1808-1021	Adapter for micro well plate . Flat bottom standard . e.g. Nunc® #269620, Greiner® #781101
1808-1022	Adapter for micro well plate . Flat bottom High Base . e.g. Greiner® HiBase #78407x, 78410
1808-1024	Adapter for micro well plate . Flat bottom Low Base . e.g. Aurora® storage plate, Alere ArrayStrip®
1808-1032	Adapter for micro well plate . 96 well round bottom . e.g. Greiner®, NUNC®, Matrix® plates
1808-1041	Adapter for PCR Plate . 96 well . e.g. Eppendorf twin.tec® #0030-128.672
1808-1051	Adapter for PCR Plate . 384 well . e.g. Eppendorf twin.tec® #0030-128.532
Thermo adapter for deep well plates & storage plates	
1808-1121	Adapter for Deep Well Plate . Eppendorf® 96/1000 µl . #0030-503.209
1808-1131	Adapter for Deep Well Plate . Eppendorf® 96/500 µl . #0030-501.101
1808-1141	Adapter for Deep Well Plate . BRAND® 96/1100 µl U-bottom . #701350
1808-1151	Adapter for Deep Well Plate . NUNC® 96/2000 µl . #278743, 278752
	Adapter for Deep Well Plate . Axygen® 96/2.0 ml round bottom . #P-DW-20-C
1808-1161	Adapter for Deep Well Plate . Axygen® 96/0.6 ml V-bottom . #P-DW-500-C
1808-1171	Adapter for Storage Plate . Abgene® 96/2.2 ml MARK II square well . #AB-09032
1808-1181	Adapter for Mega Block . Sarstedt® Megablock 96/2.2 ml . #82.1972.002
1808-1201	Adapter for Storage Plate . Corning® 96/320 µl V-bottom . #3342, 3347, 3357, 3363, 3894-3898
1808-1211	Adapter for Masterblock . Greiner® 96/1.0 ml U-bottom . #78020x, 78026x
Thermo adapter for deep well plates & storage plates	
1808-1061	Adapter for tubes . 24x 2.0 ml or 15x 0.5 ml
1808-1062	Adapter for tubes . 24x 1.5 ml or 15x 0.5 ml
1808-1063	Adapter for tubes . 40x 0.5 ml or 28x 0.2 ml
1808-1064	Adapter for tubes . 96x 0.2 ml
1808-1067	Adapter for lysis tubes . 35x 0.5-2.0 ml, Ø 10.2 mm
1808-1093	Adapter for FALCON® tubes . 4x 50 ml or 2x 15 ml
1808-1094	Adapter for FALCON® tubes . 12x 15 ml
1808-1069	Adapter for glass vials . 35x 2.0 ml, Ø 10.8 mm
1808-1071	Adapter for glass vials . 35x 2.0 ml, Ø 12 mm
1808-1072	Adapter for glass vials . 20x 4.0 ml, Ø 15 mm
1808-1073	Adapter for glass vials . 20x 4.0 ml, Ø 17 mm
1808-1074	Adapter for glass vials . 20x 6.0 ml . Ø 19 mm



Figure 7 Example images of adapters

7. WARRANTY

QINSTRUMENTS warrants products manufactured by it to be free from defects in material or workmanship under normal use and service for a period of 2 years from date of shipment.

This warranty is specifically limited to the replacement or repair of any such warrantable defects, without charge, when the complete product is returned to QINSTRUMENTS, freight prepaid, at the address shown above. Contact the factory at the address above for a Return Material Authorization (RMA) number before returning the product.

QINSTRUMENTS shall be the sole judge of the warrant ability of alleged product defects. Products that are returned for warranty examination and that are found to be non-warrantable are chargeable and are returned freight collect. A copy of a purchase order with the amount of the charge must be received by QINSTRUMENTS, either by mail or by FAX, before any equipment is returned. Warrantable products are repaired or replaced at no charge and returned freight prepaid.

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This warranty extends only to the original purchaser and shall not apply to any products or parts that have been subject to misuse, neglect, accident, or abnormal conditions or operations. Claims for damage in transit are directed to the freight carrier upon receipt.

QINSTRUMENTS will only accept parts / devices for return that do not pose a threat to the health of our staff. In particular, the devices may not have been used in Biosafety Level 3 and 4 environments or have been exposed to radioactive or radiation materials. Such devices will not be accepted by QINSTRUMENTS for return.



Please use the online form for registration of your appliance and service:

www.qinstruments.com/service/

Your completed data will serve as registered certificate of guarantee for our extended guaranteeing and will assure optimal service.

Please keep your sales slip for a possible warranty case which must be presented then. Your personal data will not be given to third persons

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The latest version is available at:

https://www.qinstruments.com/fileadmin/Article/PUBLIC/S11_ec_declaration_en.pdf

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WO2008135565, US8323588, EP2144716: Sample handling device for and methods of handling a sample

WO2011113858, US9126162, EP2547431: Positioning unit for a functional unit

WO2013113847, US10052598, EP2809436: Cog-based mechanism for generating an orbital shaking motion

WO2013113849, US9371889, EP2809435: Mechanism for generating an orbital motion or a rotation motion by inverting a drive direction of a drive unit

WO2014207243, US20160368003, EP3013480: Application-specific sample processing by modules surrounding a rotor mechanism for sample mixing and sample separation

WO002022128814A1: Laboratory apparatus comprising a fixing mechanism for fixing a slide

WO002022128809A2: Laboratory apparatus comprising a mixing mechanism for mixing a medium of a slide

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