

BioShake 3000 elm

Operating Manual



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1 SAFETY

Safety of the user and ease of use are clearly a priority for us.

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

The following symbols mean:















Caution: Read these operating instructions fully before use and pay particular attention to sections containing this symbol!














Caution: Surfaces can become hot during use!

Always observe the following safety precautions:





GENERAL SAFETY

-  Use only as specified in the operating instructions provided.
-  The unit is an electrical device
-  The unit must be stored and transported in a horizontal position (see package label).
-  After transport or storage allow the unit to dry out (2-3 hrs) before connecting it to the supply voltage. During drying out the intrinsic protection may be impaired.
-  The unit should be placed and carefully mounted on a horizontal solid work space by using mounting points and screws as recommend.
-  The unit should be saved from shocks or drops.
-  The unit should be placed in sufficient distance to heat registers or radiators to ensure ambient temperature conditions in accordance with the technical specifications.
-  Use only standard qualitative tubes, microplates or vials
-  Before using any cleaning or decontamination method except those recommended by the manufacturer, check with the manufacturer that the proposed method will not damage the equipment. Clean the unit only with a damp cloth, do not use chemical cleaning agents.
-  Do not make any mechanical or electrical modifications to the design of the unit.
-  Never do anything else with the unit as intended in this manual.
Noncompliance of the safety instructions may lead to device damage, loss of warranty and may cause serious personal injury as well as death.
-  Please use the original accessories recommended by QInstruments.



ELECTRICAL SAFETY

-  Use the normal care and precaution one would use with any electrical appliance.
Danger! Electric shock from damage to power supply / power cable.
-  Caution: Please keep all electrical installation away from hot surfaces.
-  Connect only to a power supply with a voltage corresponding to that on the serial number label.
-  Connect only to a power supply, which provides a safety earth (ground) terminal.
-  Ensure that the mains switch and external power supply are easily accessible during use.
-  Do not plug the unit into the mains outlet without grounding, and do not use extension lead without grounding.
-  Before moving the unit, disconnect it from the power supply socket or mains outlet.
-  To turn off the unit, disconnect the external power supply from the mains outlet.
-  Caution! Damage to electronic components caused by spilled liquids. Damage to electronic components from condensation.
-  If liquid is spilt inside the unit, disconnect it from the external power supply and have it checked by a competent person.
-  As parts of the device may generate electric, magnetic or electromagnetic fields, keep parts away that may be affected (e.g. data storage units).












ENVIRONMENTAL SAFETY

-  Do not use the unit in an explosive atmosphere.
-  Do not operate the unit in environments with aggressive or explosive chemical substances or mixtures.
-  Danger! Do not use this device to process any flammable, aggressive, explosive, radioactive or highly reactive substances.
-  Danger! Do not use this device to process any substances, which could create an flammable, implosive or explosive atmosphere.







POWER FAILURE SAFETY

-  In case of a power failure during reprogramming of the device or any other unexpected incidents, that invalidates the running program, the BioShake unit stops without any delay.
-  In case of unintended power on, the BioShake unit will perform its reboot routine, and switch into standby mode awaiting the users interactions.

OPERATION SAFETY

-  Use extreme caution at all times.
-  Do not leave the operating unit unattended.
-  Do not impede the platform motion during operation.
-  Do not operate the unit if it is faulty or been incorrectly installed.
-  For indoor use only. Do not use outside laboratory rooms.
-  Use extreme caution at all times.
-  Caution: Surfaces can become hot during use.
-  Never leave your unit accessible to others when it is hot.
-  Caution! Injury from rapidly rotating holder. Injury from rapidly rotating imbalance compensation. Injury from flying tubes and plates. As the unit is producing shaking or rotational movement, be aware of the surface that the unit will be placed upon.
-  When setting mixing frequency, start mixing from slower to faster speed settings to avoid overloading.
-  Only mix in sealed tubes and plates. Sample material can be flung out of open, inadequately sealed or unstable tubes and plates.

BIOLOGICAL SAFETY

-  It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilt on or inside the equipment.
-  Caution! Injury from sample material being flung out. Injury from incorrect vortexing.
-  Caution! Poor safety due to missing operating manual. Caution when using aggressive chemicals.
-  Danger!! General hazard point. It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilt on or inside the equipment.
-  Danger! When working with hazardous, toxic and pathogenic samples, always comply with the nationally specified safety environment.
-  Pay particular attention to personal safety gear (gloves, clothing, glasses etc.), the extraction hood and the safety class of the laboratory.

2 GENERAL INFORMATION

SMALL . LIGHT . EFFICIENT . QUIET

If you need to quickly and precisely mix samples in microplates on a robotic deck – go no further.

The **BioShake 3000 elm** plate mixer provides high-speed mixing action for the most demanding robotics applications. The module is only slightly larger than a standard microplate, and with its patented vibration-free shaking, you'll be amazed that the **BioShake 3000 elm** can blend samples in a wide variety of microplates up to 96 / 384 well format.

Fully adjustable between 200 rpm and 3,000 rpm, well beyond the speeds of most other brands, guarantees fast, splatter-free, mixing for all microplates.

It is completely equipped for hands-free operation with an extensive remote command set for easy software integration. Through the integrated microelectronics no other external components and control devices are necessary.

Integration in robots

The BioShake can be operated via RS232 user interface. An automatic initialization will start after turn on. A simple command set allows you to easily control hardware and sensors.

The process parameters are controlled and read out.

A self-setting zero position of the shaker plate after turning off makes the timeconsuming electrical tracking unnecessary.

These features ensure a maximum of operating security also in the unmonitored continuous operation.

Ideal use for 96 well microplates

The **BioShake 3000 elm** is designed exclusively for mixing of 96-well microplates.

Especially in HTS applications with frequently and automatic plate changes provides the BioShake 3000 elm safe and unmatched benefits.

Gentle mixing of samples by planar orbital motion

German designed and manufactured, **BioShake 3000 elm** plate mixer offer an ultra-efficient, 2-dimensional shaking axis so that samples mix completely in a fraction of the time of competing systems. The mixing orbit of 2.0 mm is always constant. The orbital shaking is precisely controlled, in fact, that you need never spin down your plates after mixing. Even deep well plates or low sample volumes offer no obstacle for these precision tools.

Sensor-controlled zero-positioning

In time adjustable stopping operations a defined zero position is automatically extended and locked with an accuracy of 0.1 mm. An integrated sensor monitors this zero position and its accuracy.

This ensures and simplifies the loading and removal processes and allows accurate pipetting.

Edge Locking Mechanism (ELM) – A scientific innovation for automatic positioning

Many robotic applications require precise dimensional spacing of pipet tips and robotic grippers relative to a microplate. The Edge Locking Mechanism (elm) is the complete answer for repeatable and accurate positioning of microplates on a robotic deck. It consists of 2x2 stainless steel pins and a 2-point electromechanical mechanism to lock down microplates safely in the center of the module. For gripping of microplates the ELM opens the clamping automatically. This “universal” design is perfect for all types of plates: from low profile to deep-well; from 96- to 1536-well. And when “locked” into place, the microplate varies by as little as +/- 0.1 mm making demanding manipulations a breeze.

Stylish aluminum housing

The first-class finished aluminum housing gives the **BioShake 3000 elm** its essential functionality. It provides a high amount of security, device stability and ensures a long service life.

Years of trouble free operation

The sealed housing to protect mechanical and electronic components increases the lifespan of many years on average of well maintained equipment.



All units are designed for continuous 24 hour operation when utilizing sound scientific methods.

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, as all models come with a fire resistant aluminum housing.

3 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.

THIS EXPRESS WARRANTY EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PURPOSE. QINSTRUMENTS GMBH SHALL NOT BE LIABLE FOR WARRANTY IN ANY AMOUNT EXCEEDING THE PURCHASE PRICE OF THE GOODS. QINSTRUMENTS SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTRACT, TORT, OR OTHERWISE.

The buyer acknowledges that he/she is not relying on the seller's skill or judgment to select or furnish goods suitable for any particular purpose and that there are no warranties that extend beyond the description on the face hereof.

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.



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.

4 DELIVERY PARTS



- | | |
|--------|---|
| Part 1 | BioShake 3000 elm
incl. 1x 24 VDC cable (<i>prewired cable, length 2 m</i>)
incl. 1x RS-232 cable (<i>prewired cable, length 2 m</i>) |
| Part 2 | Standard Power supply (<i>on request</i>) |
| Part 3 | Power cord (<i>1x Europe and 1x country specific design</i>) |
| Part 4 | Operating manual, calibration certificate, allen key, integration manual (no picture) |

5 INSTALLATION

Unpack and carefully check the instrument. Report any damage or missing items your distributor. If no damage is found place and mount the device up on a stable horizontal surface carefully by using mounting points and screws as recommend.

Plug in the EAI 232 cable (former RS232) into a free port of your computer.
Plug the external power supply (2) into the 24 V socket of the BioShake.
Plug the power cable (3) into the power supply (2) and into the wall socket.

The instrument will do a self test. Now the instrument is ready to accept data's from the computer.



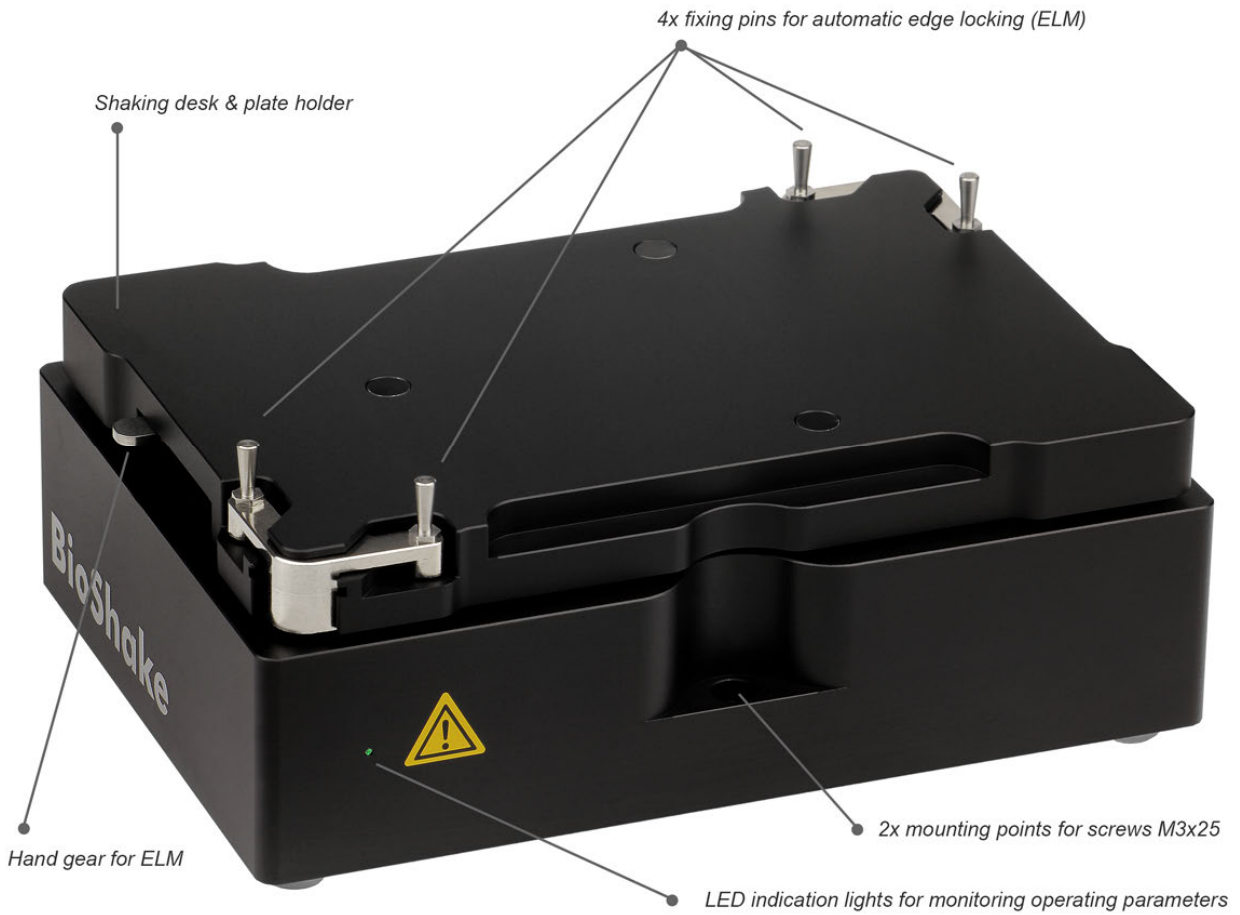
To integrate the instrument into a robotic system, please refer to the document "**Integration Manual for BioShake**".

It is advisable to carry out a test run at maximum speed to ensure that the device does not move while mixing.

6 OPERATION

The BioShake can be operated via RS232 user interface. An automatic initialization will start after turn on. A simple command set allows you to easily control hardware and sensors. The process parameters are controlled and read out.

A self-setting zero position of the shaker plate after turning off makes the timeconsuming electrical tracking unnecessary. This ensures a maximum of operating security also in the unmonitored continuous operation.



7 ERROR HANDLING

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

In case of failure the error list could read out via RS232 command **getErrorList<CR>**, to help detect the error more precisely.

To improve the functional testing during installation and visualizing the operating status, all BioShake units are equipped with a smart LED light in front. This indication light allows a quick function test and error control. It has a green, yellow or red status.



Boot process when switching on or reset	●	RED light
Failure-free operation	●	GREEN light
In case of first-time failure of one function	●	YELLOW light
In case of failure	●	RED light

All these features enable installers, integrators, maintenance staff, and owners to improve the unit performance and reduce maintenance costs by increasing system uptime and resolving faults more quickly.

Error values for invalid mixing function

Error value	Description
Mixing function	
101	Error by the DC motor controller. Please CALL the service line.
102	Error due speed failure, for example happens through mechanical locking
103	Errors caused by an uninitialized shaker or incorrect initialization parameters after switch on. Please see the service manual to start a special initialization routine for optimization of motor parameters
104	Errors caused by unsuccessful initialization routine. Please see the service manual.
105	Errors caused by not achieving of the home position at the stop command / routine. Please CALL the service line.
106	Errors caused by over speed. Please CALL the service line.

Error values for invalid mixing function

Error value	Description
Mixing function	
300	General error. Please CALL the service line.
301	IC-Driver error. Please CALL the service line.
303	Verification error by the unlock position. Please RESTART the system.
304	Error caused by unsuccessful reach the lock position (timeout). Please RESTART the system.
305	Error caused by unsuccessful reach the unlock position (timeout). Please RESTART the system.
306	Error caused by unsuccessful reach the lock position (over current). Please RESTART the system.
307	Error caused by unsuccessful reach the unlock position (over current). Please RESTART the system.



For detailed description of error list and values, please refer to the document “**Integration Manual for BioShake**”.

It is advisable to carry out a test run at maximum speed to ensure that the device does not move while mixing.

8 TIPS FOR SHAKER OPERATION

A wide variety of well plates are commercially available. To ensure that the plates are positioned securely in the plate holder, they must correspond with the *ANIS/SBS Standard for Microplates*.

If the filled plate has a weight of more than 80 g, then the maximum rated shaking frequency of 3,000 rpm may not be attainable with a safety stand. Select a lower shaking frequency in this case.

However, there is no risk of damage to the BioShake – even if the weight is too high then the shaking action stops due to excessive weight or excessive shaking frequencies. As soon as you reduce the frequency, the unit will stand firm.

Sir Isaac Newton (anno 1687)

$$\omega = 2\pi f$$

$$F = m\omega^2 r$$

Angular frequency ω , orbital mixing radius r and centripetal force F are important values for efficient mixing.

Maximum shaker platform load: 500 g (filled well plate).

The shaker is driven by a maintenance-free brushless motor, which enables silent operation and constant shaking speed independent of the load.

IMPORTANT NOTES:



Please start even with minimal mixing frequencies to avoid overloading.

Only mix in sealed tubes and plates. Sample material can be flung out of open, inadequately sealed or unstable tubes and plates.

When working with hazardous, toxic and pathogenic samples, always comply with the nationally specified safety environment.

Pay particular attention to personal safety gear (gloves, clothing, glasses etc.), the extraction hood and the safety class of the laboratory.

9 TECHNICAL SPECIFICATION

Microplates	
Types of microplates	Most 24-, 48-, and 96-well microplates or deep well plates that are in accordance with ANSI microplate specifications
Supported microplate flange heights	2.5 mm, 4.0 mm and 6.1 mm
Mixing	
Mixing frequency	200 to 3,000 rpm
Mixing orbit	constant 2.0 mm diameter
Speed setting resolution	linear increments
Mixing regulation accuracy	± 25 rpm
Zero position	Yes, self-positioning, selectable within 1 - 10 sec
Zero position accuracy	± 0.1 mm
ELM positioning	
Open Modus	Free handling with robot gripper
Closed Modus	Strong diagonal centred fixation
ELM position accuracy	± 0.1 mm
Device control	
Electronic control board	Completely accommodated in the shaker (non external components)
Controller	Microcontroller (<i>8-Bit-RISC-Prozessor</i>)
Operation control	Remote controlled
User interface	RS232 interface (<i>2.0 m connection cable</i>)
Electrical	
Operating Voltages	24 VDC input . I _{max} : 3.1 A . P _{eff} : 15 Watt . P _{max} : 75 Watt
Power supply	External power supply unit 100-240 VAC, 50-60 Hz . 24 VDC, 120 Watt
Degree of protection	IP 20
Properties	
Housing Material	Aluminum anodized
Environment operating range	+5°C to 45°C (80 % max. relative humidity)
Dimensions (W x D x H)	142 mm x 99 mm x 48.2 mm . 5.59 x 3.897 x 1.897 inch
Weight	1.5 kg (3.3 lbs)

Special requirements on a power supply unit

Electrical	
Power supply	External power supply unit: 100-240 V AC, 50-60 Hz <i>compliant to applicable Standards and Regulations on EMC and Safety</i>
Operating Voltages	24 V DC output . I _{max} 5.0 A . P _{max} 120 Watt
Degree of protection	IP 20



Technical specifications subject to change!

10 EUROPEAN DECLARATION OF CONFORMITY

Manufacturer name: Quantifoil Instruments GmbH
Address: Loebstedter Str. 101 . 07749 Jena . Germany

Hereby we explain that those corresponds to below designated products in its conception and design as well as in circulation the execution the fundamental safety and health requirements of the Community directive low-voltage brought by us. In the case of a change of the product not coordinated with us this explanation loses its validity.

Product type: Shaker for laboratory

Product name: BioShake 3000 elm **with part no:** 2016-0017

In accordance with relevant EC directives/standards:

2014/30/EU The Electromagnetic Compatibility Directive
2011/65/EU Restriction of Hazardous Substances Directive
EN 61326-1:2013-07
DIN EN 61010-1:2011-07
DIN EN 61010-2-051:2004-07
EN 55011:2009 + A1:2010
EN 50581:2013-02 (based on)

CE was at first applied: 2011

Date of issue: January 1th, 2017

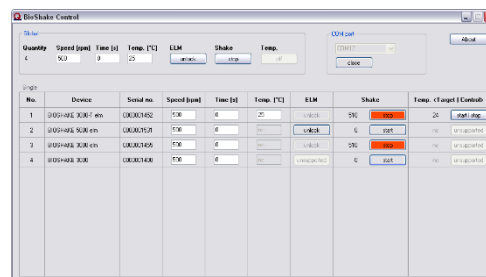
Place of issue: Jena, Germany



The CE certified instrument **BioShake 3000 elm** is identical in construction with all products of the **BioShake 3000** series.

11 BIOSHAKE CONTROL - TEST SOFTWARE

BioShake Control is a small Windows based program for your PC to start using the shaker in moments and to exercise all shaker features.



Installation:

1. Download the software from the download area:
<https://www.qinstruments.com/service/downloads>
2. Check the actual version of Windows .Net Framework 4. Use this link for actual version:
www.microsoft.com/en-us/download/details.aspx?id=17718
3. Copy the **BioShakeControl.exe** (1.1 MB) to your PC.
4. Plug in the RS232 cable from the single BioShake or Daisy Chain Box into a free port of your computer. If necessary use a USB/RS232 converter.
5. Plug the external power supply/supplies into the 24 V socket of all used BioShake.
6. Plug the power cord(s) into the power supply/supplies.
7. Switch On all BioShake devices at the same time. The instrument(s) will do a self test.
8. Start the program **BioShakeControl.exe** through a double click.
9. Now the instruments and software are ready to work.
10. Select the right COM port and click the button "open".
11. The software starts the initialization routine for determining all connected devices.
12. Now the user can set parameters, start and stop for a single device.
13. In global section the user can control all devices with global commands.

12 MAINTENANCE AND CLEANING

The device is maintenance-free for standard use purposes.

Before cleaning the BioShake disconnect the power cord and make sure that the temperature at the contact surface is below +40 °C.

If contaminated the device may be cleaned using a mild soap solution and water or an alcohol-based disinfectant. Do not use another cleaning solution!

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 shaker well-packed, preferably in the original shipping container in order to avoid damages.



For more details how to service the device, please refer to the document **“Integration Manual BioShake”** or follow **individual instructions**.

13 ORDERING INFORMATION

BioShake – single modules for automation

Order no.	Description
2016-0016	BioShake 3000
	<p>Description: Universal orbital shaker for robots For using with microplates, tube, glass vials or others Mixing from 200 - 3,000 rpm, orbit diameter 2.0 mm, RS232</p> <p>Scope of delivery*: 1x BioShake 3000, 1x power supply 110-240 VAC / 24 VDC, 2x power cords: Europe & country-specific, 1x 24 VDC cable (fixed, length 2 m), 1x RS232 cable (fixed, length 2 m), 1x documentation 1x calibration certificate</p>
2016-0017	BioShake 3000 elm
	<p>Description: Microplate orbital shaker for robots Automatic Edge Locking Mechanism (ELM) for robotic gripping Mixing from 200 - 3,000 rpm, orbit diameter 2.0 mm, RS232</p> <p>Scope of delivery*: 1x BioShake 3000 elm, 1x power supply 110-240 VAC / 24 VDC, 2x power cords: Europe & country-specific, 1x 24 VDC cable (fixed, length 2 m), 1x RS232 cable (fixed, length 2 m), 1x documentation, 1x calibration certificate</p>
2016-0018	BioShake 3000 elm DWP
	<p>Description: Orbital Shaker for Deep Well Plates (DWP), Specially adapted for 0.5-2.2 ml DWP Automatic Edge Locking Mechanism (ELM) for robotic gripping Mixing from 200 - 3,000 rpm, orbit diameter 2.0 mm, RS232</p> <p>Scope of delivery*: 1x BioShake 3000 elm DWP, 1x power supply 110-240 VAC / 24 VDC, 2x power cords: Europe & country-specific, 1x 24 VDC cable (fixed, length 2 m), 1x RS232 cable (fixed, length 2 m), 1x documentation, 1x calibration certificate</p>
2016-0022	BioShake 5000 elm
	<p>Description: Orbital shaker for 384 & 1536 well microplates Automatic Edge Locking Mechanism (ELM) for robotic gripping Mixing from 200 - 5,000 rpm, orbit diameter 1.2 mm, RS232</p> <p>Scope of delivery*: 1x BioShake 5000 elm, 1x power supply 110-240 VAC / 24 VDC, 2x power cords: Europe & country-specific, 1x 24 VDC cable (fixed, length 2 m), 1x RS232 cable (fixed, length 2 m), 1x documentation, 1x calibration certificate</p>
2016-0025	BioShake D30 elm
	<p>Description: Microplate orbital shaker for robots Automatic Edge Locking Mechanism (ELM) for robotic gripping Mixing from 200 - 2,000 rpm, orbit diameter 3.0 mm, RS232</p> <p>Scope of delivery*: 1x BioShake D30 elm, 1x power supply 110-240 VAC / 24 VDC, 2x power cords: Europe & country-specific, 1x 24 VDC cable (fixed, length 2 m), 1x RS232 cable (fixed, length 2 m), 1x documentation, 1x calibration certificate</p>
2016-0516	BioShake 3000-T
	<p>Description: Universal thermoshaker for robots For using with microplates, tube, glass vials or others Mixing from 200 - 3,000 rpm, orbit 2.0 mm, temperature control from RT - 99°C, RS232</p> <p>Scope of delivery*: 1x BioShake 3000-T, 1x power supply 110-240 VAC / 24 VDC, 2x power cords: Europe & country-specific, 1x 24 VDC cable (fixed, length 2 m), 1x RS232 cable (fixed, length 2 m), 1x documentation, 1x calibration certificate</p>
2016-0517	BioShake 3000-T elm
	<p>Description: Microplate thermoshaker for robots Automatic Edge Locking Mechanism (ELM) for robotic gripping Mixing from 200 - 3,000 rpm, orbit 2.0 mm, temperature control from RT - 99°C, RS232</p> <p>Scope of delivery*: 1x BioShake 3000-T elm, 1x power supply 110-240 VAC / 24 VDC, 2x power cords: Europe & country-specific, 1x 24 VDC cable (fixed, length 2 m), 1x RS232 cable (fixed, length 2 m), 1x documentation, 1x calibration certificate</p>
2016-0518	BioShake D30-T elm
	<p>Description: Microplate thermoshaker for robots Automatic Edge Locking Mechanism (ELM) for robotic gripping Mixing from 200 - 2,000 rpm, orbit 3.0 mm, temperature control from RT - 99°C, RS232</p> <p>Scope of delivery*: 1x BioShake D30-T elm, 1x power supply 110-240 VAC / 24 VDC, 2x power cords: Europe & country-specific, 1x 24 VDC cable (fixed, length 2 m), 1x RS232 cable (fixed, length 2 m), 1x documentation, 1x calibration certificate</p>

* Adapters are not included in delivery and have to be ordered separately.

Accessories / Software

Order no.	Description
2016-9120	USB/RS232 Converter – Digitus DA-70156 USB serial adapter USB 2.0
2016-0071	Moxa 4-port - Connects 1-4 BioShake serial devices via USB-Port to a PC
2016-0072	Moxa 8-port - Connects 1-8 BioShake serial devices via USB-Port to a PC
2016-0073	Moxa 16-port - Connects 1-16 BioShake serial devices via USB-Port to a PC
2016-0200	SILA Driver for BioShake . compliant and approved driver . according SILA standard

Service material and spare parts

Order no.	Description
	Service material
	Please follow individual instructions
	Spare parts
2016-9011	External power supply 24VDC 120W (CE/UL/CSA approved, 85-264 VAC, 47-63 Hz, IEC/EN60320-1 C14)
2016-9101	Power cord Europe (IEC/EN 60320-1 C13)
2016-9102	Power cord Switzerland (IEC/EN 60320-1 C13)
2016-9103	Power cord United Kingdom (IEC/EN 60320-1 C13)
2016-9104	Power cord Italy (IEC/EN 60320-1 C13)
2016-9110	Power cord USA (IEC/EN 60320-1 C13)
2016-9111	Power cord Japan (IEC/EN 60320-1 C13)
2016-9112	Power cord China/Australia (IEC/EN 60320-1 C13)
2016-9113	Power cord South Korea (IEC/EN 60320-1 C13)
2016-9115	Power cord South Africa (IEC/EN 60320-1 C13)



Please use the original accessories recommended by QInstruments.
 Please use the original power supply recommended by QInstruments.
 When replacing faulty parts is required, please use originally spare parts only as recommended by QInstruments.
 Using spare parts or disposables which we have not recommended can reduce the precision, accuracy, safety and life of the BioShake.
 QInstruments do not honour any warranty or accept any responsibility for damage resulting from such action.

14 SUPPORT

We provide a range of technical material (e.g. application notes, bulletins, instruction manuals, and selection and use guides) that support our products and key applications.

All of our technical documents can be viewed and printed. Many documents are available as pdf files, which can be downloaded from our homepage.

Please contact QInstruments for additional information and availability about the BioShake. For this please use our online contact form or contact us directly via phone or email.

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Technical specifications are subject to change without notice.

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Notes