

TiltStation

Operating Manual

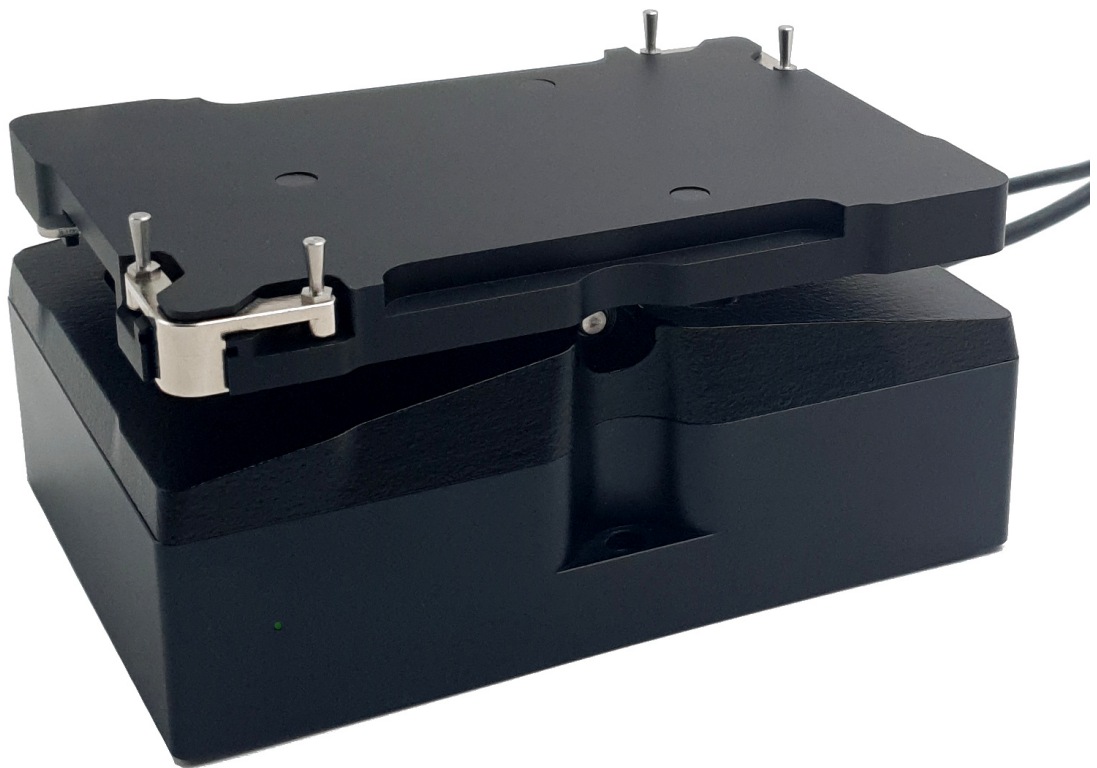


TABLE OF CONTENTS

Table of Contents	2
1. Conventions used in this manual	3
2. Safety	3
3. Product Description	5
3.1 Intended Use	5
3.2 Features	5
3.3 Technical Specification	7
3.4 Delivery Parts	9
3.5 Device Description	10
3.6 Maintenance and cleaning	11
4. Installation	12
4.1 Device	12
5. Operation	13
5.1 Introduction	13
5.2 Error handling	13
6. Accessories	14
6.1 Hardware / Software	14
7. Test Software	15
7.1 QCOM 1	15
8. Warranty	16
9. European Declaration of Conformity	16
10. Notes	17
11. Support	20

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.



Information of special interest: All sections / passages that are marked with this symbol describe procedures and / or conditions that could damage or lead to a malfunction of the device. Therefore the user 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.

	<p>CAUTION: Risk of injury due to sling away of parts or liquids</p> <p>Parts of device move which leads to a 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 moving 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 moving.▶ 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 squeeze injuries</p> <p>The mechanism of the device tilts the upper part of the unit. This movement opens and closes gaps. If parts of the body are caught in the movement of the mechanism, they may be squeezed.</p> <ul style="list-style-type: none">▶ If possible use the software to control the mechanics to ensure no movement happens while interaction with the device.▶ If the mechanism is controlled manually keep distance from the moving element of the mechanic.

3. PRODUCT DESCRIPTION

3.1 INTENDED USE

The TiltStation is a module used for microplates for lab automation purposes. 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.

The device is designed to be a module in a laboratory automation system and it is expected that it is a part of a surrounding workflow or assay. It is required that the user qualifies the performance of the device in regard to his specific circumstances of implementation and demands.

3.2 FEATURES

INTEGRATION DONE RIGHT

The TiltStation is optimized to seamlessly be integrated into automation platforms.

The simple and over all our devices standardized command set allows you to easily set and control process parameters and read out sensor values.

Through the integrated microelectronics no other external components or control devices are necessary. All units are designed for continuous 24 hour hands-free operation when utilizing sound scientific methods

Providing long term stable hard- and software interfaces, paves the way to a superior level of lab automation. Due to the outstanding integration support we are happy to call the leading providers for lab automation our partners.

BEST IN CLASS FEATURE PERFORMANCE

Adaptable Tilt motion

The TiltStation is designed for reliable tilting of microplates. The see-saw motion can be adjusted over a wide range to perfectly match you probe handling requirements. Set speed from 2 to 100 oscillations and decide wether to process continuously, for a defined time or loop count.

ELM - Edge Locking Mechanism

The Edge Locking Mechanism (elm) is our patented answer for repeatable and accurate positioning of microplates on a robotic deck. It locks the microplates quickly and safely at the center of the module with a **variation in position as little as ± 0.1 mm**. This feature makes also demanding automation workflows a breeze.

The "universal" pin design is perfect for all types of plates: from low profile to deep-well; from 96- to 1536-well.

SECURE and STYLISH

The first-class finished, stylish aluminum housing gives the TiltStation its essential functionality.

It sealed housing provides a high amount of security, device stability, protects mechanical and electronic components and therefor ensures a **long service-free lifetime**.

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

Tilt	
Description	The TiltStation realizes a continuous see-saw (tilt) motion with adjustable speed, time or loop counter. With the three defined and locked positions, a reliable plate transfer and media exchange can be realized.
Tilt frequency range	2 to 100 oscillation per minute with 1 oscil/min increment resolution
Tilt angle	$\pm 8^\circ$
Maximum weight	500 g
Accel. / Decel. range	1 - 30 seconds with 1 second increment resolution
Positions	3 locked positions: West Home East with accuracy of $\pm 0.2^\circ$
ELM positioning	
Description	Patented Edge Locking Mechanism (elm) for repeatable and accurate positioning of micro-plates on a liquid handling or automation platform. With the elm, labware can either easily be exchanged manually/automatically or it is strongly fixed in a diagonal centered position.
ELM position accuracy	± 0.1 mm
Device control	
Description	Required electronic for remote control is build in the device. No external controller required.
Operation control	Remote controlled as described in the Integration Manual
Peripheral interface	EIA-232 / RS-232 interface (2 m cable with RS-232 plug-in connector) optional: USB via USB-Serial Adapters (Rec. DIGITUS DA-70156) or USB via MOXA USB-to-Serial Hub
Status	LED in front (GREEN = ok RED = error)
Electrical	
Operating voltage	24 V DC I _{max} : 0.4 A P _{max} : 10 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*	Prewired cable length 2 m barrel connector ID 2.5 mm x OD 5.5 mm
<i>* Only use the device with the delivered power cord. If another power cord is used ensure the wire diameter is adequate.</i>	
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, whereby the 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
Floor base requirements	stable (resonance free) horizontal dry inside buildings even
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 99 x 83.4 mm 5.59 x 3.9 x 3.28 inch
Weight	1.35 kg 2.65 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

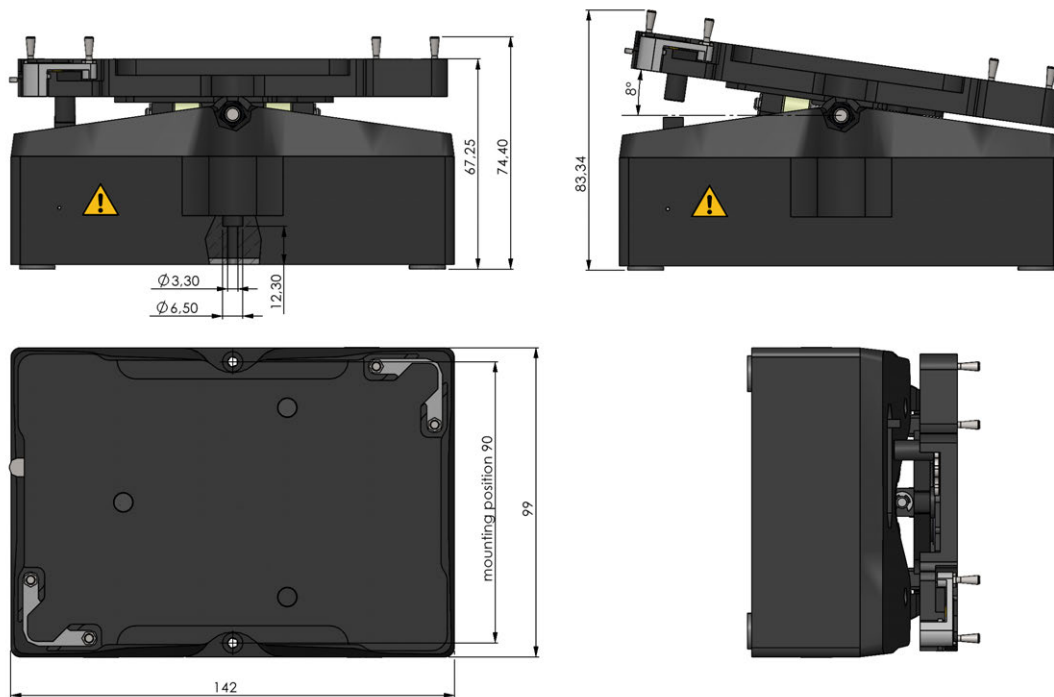


Figure 1 Technical drawing of device



Technical specifications are subject to change.

3.4 DELIVERY PARTS



Figure 2 Image showing the delivery parts

Part 1	<p>TiltStation</p> <p><i>incl. 2 m, 24 V DC, prewired cable</i></p> <p><i>incl. 2 m, RS-232, prewired cable</i></p>
Part 2	<p>External power supply 24 V DC, 120 W</p> <p><i>(CE/UL/CSA approved, 85-264 VAC, 47-63 Hz, IEC/EN60320-1 C14)</i></p>
Part 3	<p>Power cords Europe & US</p> <p><i>(IEC/EN 60320-1 C13)</i></p>
Add. parts	<p>Calibration certificate, Operating Manual, Integration Manual</p>

3.5 DEVICE DESCRIPTION

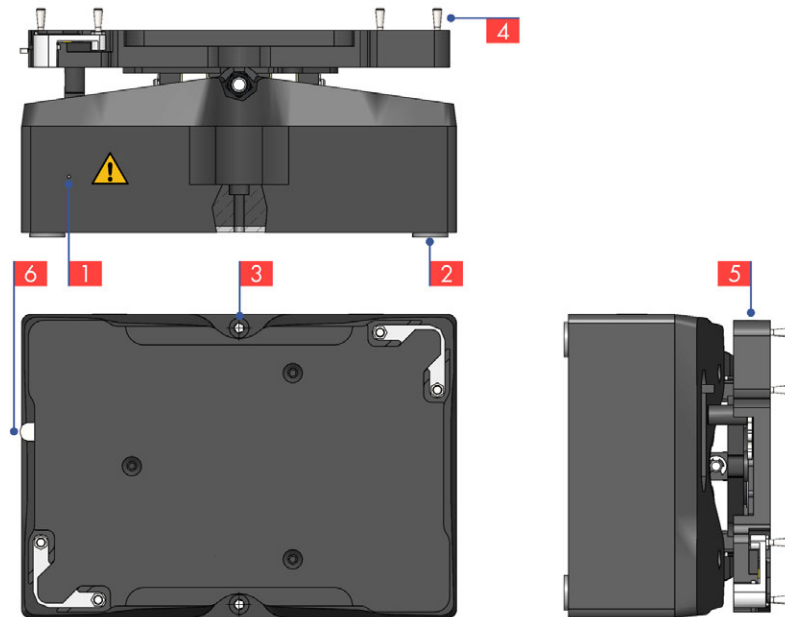


Figure 3 Device image which highlights important device elements

- 1 Status LED
The LED visualizes the operating status. Further information: ["Error handling" on page 13](#)
- 2 4x Adhesive pad
Reduce transfer of device vibrations. Depending on your integration approach they might be removed.
- 3 2x Position to mount device
Further information on device installation: ["Installation" on page 12](#)
- 4 Tablar - tilting desk and plate holder
- 5 Hand gear for ELM

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

- 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 shaker 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

All QInstrument devices are mounted with two screws that are part of the delivery package (2x M3 x | DIN 912). The mounting point positions are the same for all devices. They have a distance of 90 mm and are on the plane that goes through the center of the mounting area.

Plug in the RS-232 into a free port of your computer. Use an USB to RS-232 converter (for example Digitus DA-70156) if required. Connect the DC cable of the device with the external power supply and plug the power cable into the wall socket.

The instrument will do a self test and the LED will turn green when the device is ready and free of errors. Now the instrument is ready to accept commands.

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.

All details regarding device commands, calibration operations and error codes are available in the **Integration Manual**.

5.2 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.

In case a failure is detected a corresponding error code will be written to the internal error list. The list can be read out to help specify the error and find the root cause.



Details on how to read out the error list and further description on error codes is available in the **Integration Manual**.

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

Device Status	LED color
Boot process after switching on or reset	RED
Failure-free operation	GREEN
Error detected	RED

6. ACCESSORIES

6.1 HARDWARE / 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

7. TEST SOFTWARE

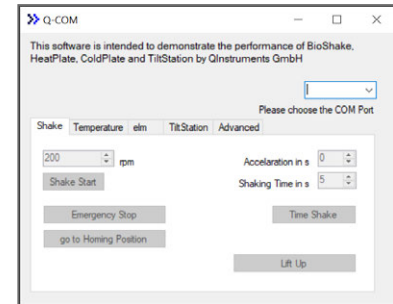
7.1 QCOM 1

QCOM1 is a simple test tool for Windows to start using the shaker in moments and to exercise all shaker features. Plug in the RS232 cable from the single BioShake module into a free port of your computer. If it's necessary, please use a USB/RS232 converter.



Download is available at

<https://www.qinstruments.com/service/downloads/>



8. 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.

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

9. EUROPEAN DECLARATION OF CONFORMITY

The latest version is available at:

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

10. NOTES

NOTES

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11. SUPPORT

We provide a range of technical material (e.g., application notes, poster, bulletin, data sheets) that describes our products and key applications in detail. All of our technical documents are available on our web page in the corresponding product pages. Technical Data Sheet, Operation manual, 2D and 3D drawings and Software can be found in the download area of each product.

Please use the following link to our support form (<https://www.qinstruments.com/service/support/>) in case service or support for your product is needed. Please ensure to provide the serial number, as it is an important information for our support team. Direct contact via phone or email is also possible.

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QINSTRUMENTS is owner of numerous patents worldwide. Please respect our intellectual property.

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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