Oroboros O2k-Manual

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O2k-Manual: user information

[1]**Oroboros Instruments**
High-Resolution Respirometry
Schöpfstrasse 18, A-6020 Innsbruck, Austria
Email: instruments@oroboros.at
www.oroboros.at

Section

PLEASE READ THIS MANUAL CAREFULLY BEFORE ATTEMPTING TO USE THIS INSTRUMENT. The Oroboros O2k, O2k-MultiSensor Modules, Titration-Injection microPump (TIP2k) and Oroboros DatLab software constitute a modular integrated scientific equipment, collectively abbreviated as the O2k-System or O2k.

1. About the O2k-Manual

This document provides the users of the Oroboros O2k system with instructions for setting up the instrument, performing experiments and

evaluation data with the O2k system. This manual comprises different chapters that may be available (printed or in electronic form) together or seperately. The term manual as used herein refers to all documents available as printed material, or provided on the USB flash drive 'Oroboros O2k-Course on HRFR', and updated on the websites of Oroboros Instruments.

» www.oroboros.at

» http://wiki.oroboros.at/index.php/OROBOROS_info

O2k-Manual:
»wiki.oroboros.at/index.php/MiPNet22.11_O2k-FluoRespirometer_manual

2. General introduction

The O2k-Manual describes the safe and appropriate handling of the O2k. The mentioned safety indications and instructions as well as the safety regulations have to be followed.

Before starting to operate the machine, every person going to handle the O2k has to read the O2k-User manual carefully and get used to the operation of the device before using the instrument. This is also true for persons already working with similar machines or persons who have received an introduction to the instrument by the producer.

The knowledge of the content of the O2k-User Manual is required to protect the employees from hazards as well as to avoid mistakes to guarantee safe and undisturbed operation of the instrument.

The O2k-User manual is an integral part of the O2k and should be kept near the machine to be available to every person who is going to work with the machine in case of doubt. The instruction manual has to be delivered to all persons working with the O2k.

3. Scope of application

The O2k-System is not intended for *in vivo* applications, except for considering living cells as *in vivo* models. In particular, the TIP2k is not to be used for infusion on humans and live animals.

The O2k is tested in a wide range of measurements *in vitro*, with particular emphasis on high-resolution detection of changes of oxygen concentration in the O2k-Chambers. The TIP2k is intended for automatic titrations and injections into the O2k. For applications beyond this scope of applications and without following the necessary instructions and safety precautions, no warranty is granted and no responsibility is assumed by Oroboros Instruments GmbH (Corp).

Applications of the Oroboros O2k beyond the scope of applications described above are not allowed and are classified as not in accordance with the regulations.

4. Warranty

The company Oroboros Instruments warrants the appropriate function of the O2k-System within the limits of specifications, if no manipulations are effected on the instrument (mechanics, electronics and DatLab software), if the specified types of PC, voltage, and syringes are used, and all instructions

of the operation manual (O2k-Manual) are observed. These include instructions and warnings, adherence to which is essential for proper function and secure conditions of the O2k-System.

While every reasonable effort has been made in the preparation of this manual, Oroboros Instruments cannot assume any responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this document.

DatLab Limited Warranty: If you report, in writing, a significant defect in the DatLab software which cannot be corrected within 90 days of the date of the report, you may return the program and be refunded the purchase price of the program. Defective USB flash drives will be replaced at no charge within 90 days of the date of purchase.

5. Important safety information

To guarantee safe operation of the O2k-System, it is absolutely necessary to follow the instructions of the O2k-Manual.

Prior to start of operation, take notice of the instructions for installation and operating instructions. Furthermore, check the technical intactness as well as the operating reliability of the machine before starting the instrument.

The mentioned safety indications and instructions of the O2k-User Manual may be followed to avoid injury of employees as well as damage to property when handling the maschine. Nonobservance of these indications and instructions can endanger employees and damage or destroy the instrument.

Noncompliance of the safety indications and instructions of this user manual as well as the accident prevention regulations and safety regulations of the scope of application will eliminate the claim for liability and damage towards the producer.

5.1. Technical requirements for safe operation

The O2k is built according to the safety regulations for electronic instruments, control devices and laboratory equipment and is operationally reliable as long as no manipulations are effected on the instrument (mechanics, electronics and DatLab software). Furthermore, the operating safety is only ensured under the intended usage of the instrument.

The accessories used in conjunction with the O2k must be those specified or delivered by Oroboros Instruments, in particular the syringes for the TIP2k and injection needles which have to be maintained clean. For the control with a computer, a registered version of the Oroboros software DatLab must be used, else no warranty will be given for the specified quality of performance.

During application of the O2k, any condition of the instrument which could lead to damage of material or respiratory irritation of humans must be avoided. The instrument can only be operated with the components shipped with the O2k.

5.2. Qualified personnel

The O2k can be hazardous for untrained persons due to inappropriate handling which is not in accordance with the regulations of the machine.

The chapters of this O2k-User Manual comprise precise safety indications, marked with specific symbols, to avoid hazards to all persons dealing with the O2k. The O2k described in this documentation may be operated only by personnel qualified for the specific task in accordance with

the relevant documentation for the specific task, in particular its warning notices and safety instructions. Qualified personnel are those who,

a) based on their training and experience, are capable of identifying risks and avoiding potential hazards when working in a labarory environment in general and with the described system in particular;
b) are able to read and understand this manual (which implies a working knowledge of English);
c) have familiarized themselves with this manual and the safety precautions outlined in it.

The appropriate handling of the instrument includes the observation of the conditions of operation as well as the information and instructions included in the O2k-User Manual.

5.3. Safety symbols and terms

WARNING with a safety alert symbol: explains dangers that could result in severe personal injury or death if proper precautions are not taken.

CAUTION with a safety alert symbol: explains hazards that could result in minor personal injury if proper precautions are not taken.

CAUTION without a safety alert symbol: explains hazards that may result in damage to the instrument or other property.

CAUTION: Electrostatic discharge may result in damage to electronic equipment: Observe general electrostatic discharge (ESD) protection procedures.

Warning: Wear safety goggles! This symbol indicates that safety goggles have to be worn to avoid a specific hazard of the O2k system. Independent of the O2k system, general laboratory safety procedure that may require to wear safety goggles have to be observed at all times.

6. Electrostatic discharge (ESD): Damage and protection

What is ESD? General electrostatic discharge (ESD) protection procedures should be observed when handling any kind of electronic equipment, including the OROBOROS Oxygraph-2k. While just slightly unpleasant or even unrecognizable to us, ESD sparks may cause severe damage to integrated circuits and other electronic devices.

The best known experience of an ESD is feeling a spark when touching some object or another person. ESD is the sudden and momentary electric current that flows between two objects at different electrical potentials. Such a potential difference may commonly build up by

- Walking across the floor,
- Handling packaging material such as styrofoam and other plastic materials,
- Removing adhesive tape from a roll or container,
- Transporting equipment on trays or carts,
- Sliding items on a work bench.

More details: http://en.wikipedia.org/wiki/Electrostatic_discharge

Potential Damage of the Oxygraph-2k by ESD

Within the stainless steel Oxygraph-2k housing, internal electronic components are well protected from ESD. However, during chamber assembly, membrane change, or trouble shouting, the polarographic oxygen sensor (POS) has to be disconnected from the POS connector and the POS connector is disconnected from the main unit. This means that one or both electric connections of the POS connector are exposed to the environment and ESD damage is possible.

During such operations special care must be taken to observe ESD prevention procedures.

For oxygraphs with MultiSensor extension the additional channels by definition open up additional routes how an ESD discharge can reach the inside of the oxygraph. BNC type connectors are used frequently for attaching potentiometric electrodes (pH) and therefore also used for the pX channel in the MultiSensor extension. By the nature of the BNC plug it is possible for the operator to touch the outside channel and thereby cause an ESD.

ESD Protection Procedures: The simplest and most effective way to prevent damage by ESD is to get rid of your electric charge before handling the POS connector, the BNC plug of the pX channel or other electronic connections. Preventive ESD is achieved simply by touching a well grounded object, such as the stainless steel ***housing*** of the O2k. Touching the O2k housing does not cause any damage, and should be done ***before*** handling the electrical connectors. This will be sufficient in most cases to prevent damage.

Leaving POC connectors attached to the main unit while cleaning or servicing them and while membrane mounting will, to a certain degree, also protect the electronics inside from damage by ESD. Protecting POS connectors from ESD is especially important for oxygraphs Series A to C, because more electronic modules are in these connectors.

Do not touch the BNC plug of oxygraphs equipped with a MultiSensor extension, unless necessary. Hypothetically an ESD might also transmitted via the pX channel by touching the needles of the TIP syringes while a electrode in the chamber is connected to the pX electronics. Therefore the oxygraph housing should be touched before touching the TIP syringes when working with an electrode attached to the pX channel (pH, TPP^+, Ca^{2+}).

For oxygraph Series A to C requiring a MultiSensor Conntector, the guidelines also apply to the BNC port on the MultiSensor Connector.

It is general good laboratory practice to avoid excessive build-up of electrostatic charges. If you experience frequent sparks while touching objects or other persons in your lab, it might be a good idea to consult an electronic expert in your institution, to protect all kind of electronic equipment with preventive measures. The magnitude of the ESD problem depends strongly on conditions in a lab, such as floor material or humidity on one hand and clothing - especially footwear - on the other.

A special topic are the shoes known as “Crocs” and similar products. With these shoes it is possible to generate extremely high potentials. In some hospitals such shoes have already been banned, because they apparently destroyed a lot of expensive equipment. Therefore, such shoes should not be worn in any laboratory.

7. Maintenance

Maintenance and repairs may be carried out only by qualified personnel. Repairs beyond the maintenance described in the O2k-Manual may be carried out only by the producer or service authorized by Oroboros Instruments. The stainless steel instrument housing must not be opened, otherwise any warranty claims will be rejected.

8. Disclaimer

The O2k is a tool intended to be used by trained professionals only. The DatLab software is not a substitute for your personal professional judgement. This software has been carefully designed. In such an elaborate computer program, defects cannot be completely ruled out. Under no circumstances may this software be used for tasks involving human safety. Persons using this software are responsible for the supervision, management, and control of this software. This responsibility includes, but is not limited to, the establishment of independent procedures for testing the reliability and accuracy of any program output.

9. Insurances

Oroboros Instruments GmbH holds product and public liability insurances with worldwide coverage.

10. Limitation of liability

The manufacturer and distributor of this software will not be held liable for damages including loss of data, lost profits, or other special, incidental or consequential or indirect damages arising from the use or inability to use the O2k.

11. Copyright and software license

12. International O2k-Workshops

Although the O2k-Manual provides necessary and sufficient information on application of the O2k-System, it is highly recommended to register for an International O2k-Workshop organized by Oroboros Instruments.

13. Cooperation and feedback in science

Since product development and improvement is a continuous process, Oroboros Instruments reserves the right to make changes in the specification without notice.

O2k-Network Reference Laboratories build a WorldWide Network. O2k-Network Reference Laboratories may be contacted for local technical advice on applications of the Oroboros O2k and High-Resolution FluoRespirometry. The O2k-Network is an initiative for combining the expertise of various laboratories to a joint development for expansion of the O2k into the O2k-MultiSensor System, from prototypes to series production.

MiPNet Application Notes and publications in scientific journals provide information about current developments complementary to the O2k-Manual.

If you have any comments on the O2k and the O2k-Manual, we will be pleased to receive them at:

Oroboros Instruments
Schöpfstrasse 18
A-6020 Innsbruck, Austria
Tel: +43 512 566796 | Fax: +43 512 566796 20 | instruments@oborobos.at
http://www.oroboros.at

Oroboros O2k: Development – Production - Distribution

Oroboros Instruments, Schöpfstrasse. 18, A-6020 Innsbruck, Austria; instruments@oroboros.at

Development of O2k High-Resolution FluoRespirometry in collaboration with:

- Philipp Gradl, WGT-Elektronik GmbH & Co KG, A-6114 Kolsass/Tirol, Austria. Electromechanics development and production of the Oroboros O2k, TIP2k, ISS, and polarographic oxygen sensor (OroboPOS).
- Lukas Gradl, software security networks, A-6020 Innsbruck, Austria. Software development: DatLab.

O2k-WorldWide - User innovation – the O2k-Network
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