ENVITEC
by Honeywell

OxiQuant S

Operating Instructions

P/N: 46-00-0021

EnviteC-Wismar GmbH
A Honeywell Company

Alter Holzhafen 18, D-23966 Wismar, Germany
Tel.: +49-(0)-3841-360-1
Fax: +49-(0)-3841-360-222
E-Mail: info@envitec.com
http://www.envitec.com

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1. Introduction

The Oxiquant S oxygen meter is used to determine oxygen concentrations in gas mixtures. It can be used to monitor gas supply equipment in industry and hospitals or to check breathing mixtures in diving systems (nitrox and trimix mixtures).
Its compact dimensions, low weight, easy handling and calibration make the device particularly suitable for mobile application.

The OxiQuant S is neither designed for personal protection nor for monitoring medical breathing air in direct contact with patients. It must not be used for the preparation of gas mixtures, but to monitor them.

2. Assembly

← **OxiQuant S**

← **Oxygen sensor OOI103**

← **Flow diverter**

Attach new oxygen sensor

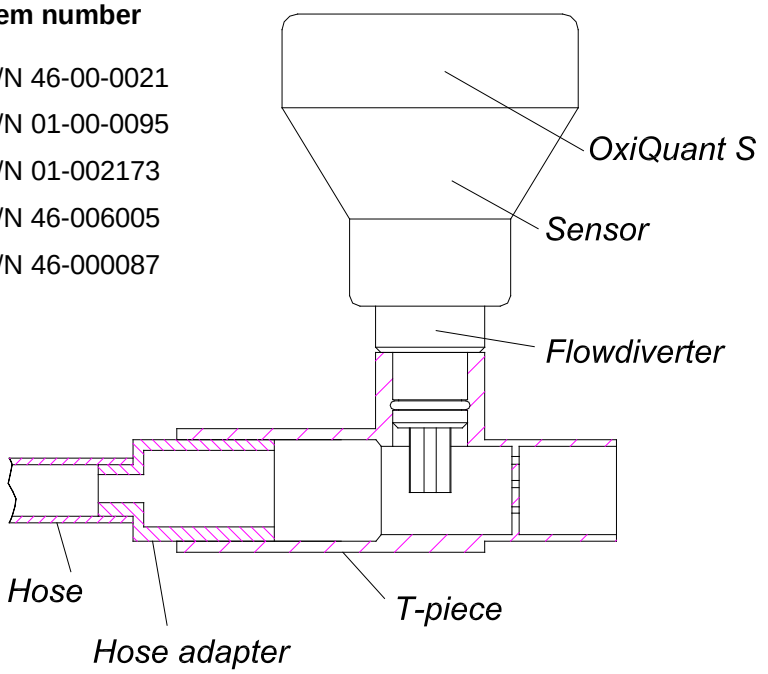
- Turn the upper part of the device clockwise on the sensor
- Switch on the OxiQuant S and check its function.

If the device can be calibrated to 20.9% O_2 in clean ambient air, it is ready to be used for measurement. (-> see Point 4 / Calibration)

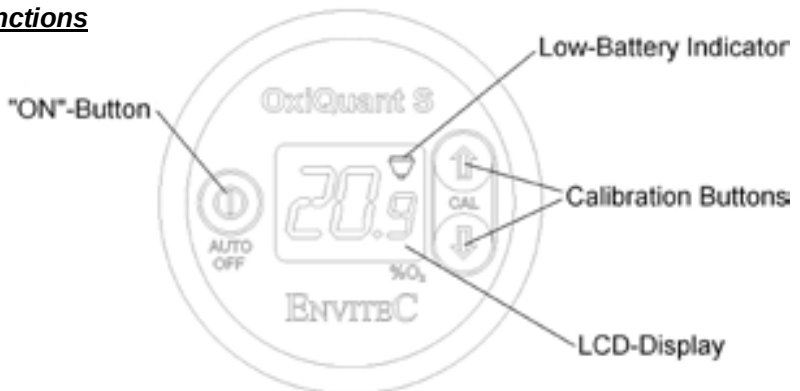
Removing a used oxygen sensor

- Turn the upper part of the device anti-clockwise until it it separates from the sensor
- Dispose of sensor → *Caution! - Sensor contains electrolyte and lead! -> see Chapter 7 / Safety Data Sheet*
- Connect new sensor and check function

Item	**Item number**
OxiQuant S	P/N 46-00-0021
O_2 sensor OOI103	P/N 01-00-0095
Flow Diverter	P/N 01-002173
T-piece	P/N 46-006005
Hose adapter	P/N 46-000087
Hose	



3. Properties and Functions



LCD display
A three-digit display directly shows the oxygen concentration between 0-100% O_2. The display does not show anything when the OxiQuant S is in Auto Off.

"ON" switch / Auto Off
Hold down the "ON" button for three seconds to switch on the OxiQuant S. When the "ON" button is pressed, the display shows the oxygen concentration for about three minutes before switching itself off automatically. While it is on, the device can be switched off manually by holding the "ON" button pressed down for three seconds.

Calibration buttons
By pressing the Up ↑ and Down ↓ buttons the value corresponding to the known concentration of oxygen can be shown on the display. *-> see also Chapter 4 / Calibration*

Battery indicator
The battery powering the OxiQuant S is integrated in the sensor.
When the battery indicator appears continuously, the sensor should be replaced, as the battery will not supply the necessary voltage for much longer. When the indicator flashes, the integrated battery in the sensor is exhausted. If, when the device is switched on, only the battery indicator flashes briefly before the device immediately switches itself off, the battery is entirely discharged and the device can no longer be used (***-> Replace sensor !***).

Over Range
At oxygen concentrations above 99.9% the concentration is displayed without a decimal figure or decimal point.

For example:	100	-> corresponds to 100% O_2
	101	-> corresponds to 101% O_2
	102	-> corresponds to 102% O_2
	103	-> corresponds to 103% O_2

Display values greater than 100% O_2 result from the effects of pressure and temperature. It is recommended in such cases that the device be calibrated.

4. Calibration

Calibration using ambient air

1. Switch on the OxiQuant S
2. Hold the OxiQuant S with the sensor side away from the body
3. Read the oxygen concentration, and set to 20.9% O_2 by pressing the calibration buttons. The value is increased by pressing Up ↑ and it is decreased by pressing Down ↓.

The concentration of oxygen in ambient air is 20.95 %O_2. This is why the calibration value is set to 20.9% O_2. Ambient pressure, humidity and temperature can have an effect on the displayed value. See Chapter 6.

4. → The device is ready to take measurements!

Calibration to 100% O_2

At high oxygen concentrations (50-100% O_2) it is recommended that the calibration be performed using a calibration gas consisting of 100% O_2 . In such a case it is necessary to ensure that the connection between the OxiQuant S and the inlet when supplying gas to the sensor is tight enough to prevent any possibility of ambient gases entering the mixture.

1. Connect the "T" piece to the oxygen supply and insert the OxiQuant S into the "T" piece
2. Adjust the oxygen flow to the recommended 2 l/min at the oxygen supply
3. Read the oxygen concentration and set 0.0% O_2 by pressing the calibration buttons. The value is increased by pressing Up ↑ ,and it is decreased by pressing Down ↓.
4. Remove the OxiQuant S from the supply and check using clean, ambient air that a value of 21% O_2 is displayed after about 60 seconds. Hold the OxiQuant S away from the body when doing this (away from breath!) and wave it around (unscrew the Flow Diverter if necessary).

5. → The device is ready to take measurements!

Note:
The relevant calibration process should be checked and, if necessary, repeated before each new measurement!
If the calibration cannot be carried out correctly, see Chapter 5 / Errors During Calibration and Measurement or contact your dealer.

5. Errors During Calibration and Measurement

→ Measurement fluctuates by more than 1 volume % O_2

- The sensor should be in approximate thermal equilibrium with the environment
- Note sensor response time
- The sensor opening should be clean and dry
- Gases mixed with ambient air during calibration
- Internal electrical fault in device → inform your dealer!

→ The device does not display the expected measurement

- Calculation of the gas mixture is faulty
- Manometer is faulty
- Device is not calibrated
- Sensor not in thermal equilibrium with the environment
- Sampled gas mixed with ambient gas

→ Device shows "*ERR*" for approx. 6 seconds after being switched on

- Electronic fault -> Device must be returned to dealer to be checked!

→ Display goes out soon after switching the device on or does not come on at all
- Battery is discharged → Replace sensor!

Note!
The oxygen sensor is subject to ageing and the remaining service life reduces even when the device is switched off. The sensor must be replaced if it is not possible to achieve either 20.9% O_2 or 100% O_2 as appropriate during calibration or if the measurement is not plausible after checking the possible causes of error described above.

6. Specification and Characteristics

All specifications apply to standard conditions:1013 hPa, 25°C dry ambient air

Measuring range:	0-100% oxygen
Display resolution:	0.1% oxygen
Precision:	< 1% vol. O_2, when calibrated at 100% vol.O_2
Offset:	< 1% vol. O_2 in 100% N_2
Response time:	< 13 sec. to 90% of final value
Linearity error:	< 3% relative
Drift:	< 1% vol. O_2 over 8 hours
Cross-sensitivity:	< 1% vol. O_2 in reaction to: 10% CO_2, rest N_2 80% N_2O, rest N_2 7.5% halothane, rest N_2 7.5% isoflurane, rest N_2 7.5% enflurane, rest N_2 9% sevoflurane, rest N_2 20% desflurane, rest N_2
Effect of humidity:	< 1% O_2 between 0 and 100% RH at 25°C
Effect of pressure:	Proportional to the change in oxygen partial pressure
Sensitivity to impact:	< 1% relative after falling from a height of 1m
Operating temperature:	0°C – 50°C
Temperature compensation:	Integrated NTC compensation
Operating humidity:	0 – 99% RH
Storage temperature:	-20°C – 50°C
Recommended storage:	5°C – 15°C
Battery low display:	Device switches off immediately
Battery service life:	approx. 1100 operating hours (battery integrated in sensor)
Weight:	Approx. 90 g

The OxiQuant S uses an original **ENVITEC** oxygen sensor of type OOI103. This has a fast response time, is very reliable and offers stable performance.

The functional principle of the oxygen sensor

The oxygen sensor for measuring the partial pressure of oxygen operates on the principle of a galvanic fuel-cell, generating a current from the reductive reaction of oxygen that can be used as a measurement signal.

The function of the oxygen sensor can be simply described as follows:

1. The measured gas diffuses through a synthetic membrane and dissolves in the oxygen sensor electrolyte.
2. The electrolyte contains two electrodes with different metals, connected together externally through a resistor network.
3. The proportion of dissolved oxygen is reduced at the working electrode (cathode). Oxidation takes place in a complementary reaction at the second electrode (anode).
4. The resulting internal ion current drives an external electrical current proportional to the conversion of oxygen.
5. The diffusion of gas molecules is a temperature-dependent process. To compensate for this dependency, the current is converted into a temperature-compensated voltage by means of a thermistor resistance network.

Gas pressure and measured gas humidity

The oxygen sensor measures the partial pressure of oxygen in the gas being measured, but the device displays the concentration of oxygen and must therefore be calibrated.

The calibration process equates the partial pressure of oxygen in ambient air to a volume concentration of 20.9% O_2. Depending on the absolute humidity of the gas being measured, the proportion of oxygen (partial oxygen pressure) in the gas fluctuates slightly. The effect of humidity can be ignored as the difference between absolutely dry and saturated gas is less than 1% O_2 over the entire working temperature range.

Calibration should generally be implemented at the measurement pressure to compensate for the effect of pressure differences.

The measurement pressure conditions are that of the gas being measured or the current atmospheric pressure, which must take into account the altitude of the measuring location.

Ambient temperature

The oxygen concentration display is largely independent of the working temperature, because of the temperature-compensating resistance network in the oxygen sensor. Note that this only applies to an equilibrium state, i.e. the instrument and the oxygen sensor should both be at ambient temperature and the gas being measured should also have the same ambient temperature where possible. Disturbances to the thermal equilibrium can temporarily impair the precision of the measurement.

Water

The device should not be allowed to get completely wet as this can affect the function of the evaluating electronics. Water on the gas-sensitive surface of the oxygen sensor can also affect the measured result. If the instrument does get wet, it can be dried on the outside with a cloth. It is recommended that the instrument is not switched on until it is dry.

Service Life

The OxiQuant S consists of a display unit and a sensor unit. Because the batteries and the oxygen sensor wear out during use, the sensor unit should be exchanged when the supply voltage and measured signal display no longer function. The battery and sensor are designed so that an average service life of approx. two years is provided in normal use.

The following ageing influences must be noted:

1. The battery can power the device for 1100 hours. Because the device has an automatic switch-off function – Auto OFF – that switches off the display unit after three minutes, this corresponds to it being switched on 22,000 times, that is equivalent to 30 times per day over a service life of two years.
2. The oxygen sensor ages independently of the length of time for which the device is switched on, dependent on temperature and the partial oxygen pressure on the sensor's gas-sensitive surface.

2.1 The minimum service life of the oxygen sensor equates to 1 oxygen percent x hours, i.e. 500,000 $\%O_2h$. The sensor therefore wears out after 2½ years of use in ambient air or less if it is stored or used at higher partial oxygen pressures.

2.2 Temperature accelerates the rate of reaction of the oxygen sensor, and therefore has an effect on its ageing. The simplified relationship that applies here is that the higher the temperature, the shorter the expected service life.

2.3 Very dry ambient conditions also have a negative effect on the service life of the oxygen sensor, as this accelerates evaporation of the electrolytes.

For these reasons, avoid storing the OxiQuant S unnecessarily at high ambient temperatures, in very dry environments or under increased partial oxygen pressures.

Packing and Storage

The oxygen sensor is supplied with a seal over the gas inlet opening. During storage, the sensor consumes the oxygen from the space inside the gas inlet opening. Ageing is therefore reduced while the sensor is stored in the original packing. However, before it is ready to operate, the sensor requires some time after it has been removed from the packaging, depending on the storage period and temperature, before its measurement value becomes stable. This time can be up to 30 minutes. Calibration should therefore be carried out after the sensor has stabilised or should be repeated at that stage. A storage temperature between 5 and 15°C is recommended to reduce the necessary stabilisation time.

6. Safety Data

Material / formulation and company names

Article name: Oxygen sensor
Application: Determination of oxygen concentrations
Type: OOIXXX, XXX – consecutive type number
Manufacturer / supplier data:
Manufacturer: EnviteC-Wismar GmbH, Alter Holzhafen 18, D-23966 Wismar, Germany
Telephone / Fax: +49-(0)-3841 360 1 / +49-(0)-3841 360 222

Composition / component data

Chemical characterisation:
A system of metals and electrolyte in a plastic housing
Hazardous constituents:
Elemental lead, Pb / lead oxide, PbO
Potassium hydroxide solution 20% (by mass), KOH

Possible hazards

Special hazard notes for persons and environment:
Lead/lead compounds: poisonous if swallowed, dust inhalation or skin resorption, protective measures in accordance with TRGS 505 (6/88).
Potassium hydroxide solution: "corrosive" (hazardous materials regulations), skin or eye contact causes burns

First aid procedures

After inhalation:
- Not applicable

After skin contact (if the product is damaged):
- Rinse with plenty of water, remove wet clothing immediately.

After eye contact (if the product is damaged):
- Rinse immediately for 10 to 15 minutes with clean, running water (eye wash bottle), then obtain medical attention

After swallowing (product components):
- Obtain medical attention and identify material.

Fire-fighting procedures

Suitable extinguishing material:
- Water, extinguishing powder, CO_2, sand, foam, depending on environment

Particular hazards arising from products of combustion or gases:
- Not applicable

Procedures in the event of accidental release

Precautions for persons following release or damage of the products:
- Avoid skin contact, use protective gloves and safety goggles

Environmental precautions:
- Do not permit entry into sewers or waterways.

Procedure for cleaning /fixing
- Collect with material that will absorb liquid, neutralise liquids with dilute sulphuric or citric acid

Handling and Storage

Handling:

- Avoid mechanical damage to the housing. Do not use damaged products. Do not use for anything other than the intended purpose.
- Do not use liquid disinfectant.
- Remove soiling with a damp disposable cloth.
- Sterilisation can be carried out with ethylene oxide at a maximum temperature of 50°C.
- Can be disinfected at 45°C in an aseptor.

Storage:

- Temperature range -20°C to 60°C / storage in original packing.

Limits to exposure and personal protective equipment

- When undamaged the product can be considered safe

Physical and chemical properties

Appearance:

- Mechanically stable plastic housing, electrical contacts, gas inlet opening protected from damage by a stainless-steel screen

Safety-relevant properties

- Not relevant

Stability and Reactivity

General:

No reactions are known when the undamaged product is stored and used properly.

Toxicological Data

- Undamaged product can be considered safe

Ecological Data

- Neither the product nor its components should be disposed of in water or the ground.

Notes on Disposal

Product

- Recommendation: dispose in accordance with regulations through incineration in a special waste incineration plant. Local authority regulations must be complied with.
- Do not dispose of in domestic waste.
- EAK/RWC key 160202 and 160606

Packaging

- According to recycling requirements. Packaging should be returned to the recycling system.

Transport Data

- No special restrictions are known

Regulations

To be labelled "Corrosive" according to hazardous materials regulations for the KOH solution component

Other Information

This information only describes the safety requirements relevant to the product and is based on the present state of than knowledge. It does not represent an assurance of any properties of the product described in the sense of statutory warranties. The product properties can be found in the relevant product specifications and data sheets.