

# OXY SMART

**. SIMPLE .**

**. FAST .**

**. RELIABLE .**

**ESPECIALLY DESIGNED  
AND MANUFACTURED  
FOR THE ANALYSIS  
OF BINARY AND  
TERNARY GAS  
MIXTURES LIKE**

**NITROX  
TRIMIX  
HELIOX**



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**OXYGEN ANALYZER  
OXY SMART**



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**INSTRUCTION  
MANUAL**

## Discharge of Liability

Before operating and installing please read this manual carefully. This manual is an integral part of the BTA OXY SMART oxygen analyzer. The use of this instrument implicates total acceptance of the present section. All warranties relevant to this instrument are void if BTA OXY SMART is not operated and maintained in accordance with this manual.

BTA disclaims every responsibility for the improper, wrong or incorrect use of this computer. Before use, it is necessary to receive a proper training on mixed gas diving and gas mixtures analysis for diving applications. It is dangerous to breathe mixed gas with any percentage of oxygen different from 21%. Sport end mixed gas diving is a potentially hazardous and dangerous activity which may lead to death if practiced incorrectly. Manipulating mixed gas with oxygen is dangerous and requires special training and oxygen dedicated equipment.

**The present instrument does not replace the necessary notional and practice training for these activities.**

The data displayed are a mathematical elaboration based on physical laws but they are not representative of the complexity of human physiology and of the different psycho-physical situation of use by customers.

**BTA is not liable for any damage or injury including death which may result from BTA OXY SMART utilisation.**

**The operator of this instrument is responsible for any damage or injury resulting from improper use, unauthorized repair, improper maintenance, or damage by anyone other than BTA.**

The N.O.A.A. (National Oceanic and Atmospheric Administration) oxygen partial pressure and exposure time limits table are available on world-wide literature. BTA, whose policy is one of continuous quality improvement, reserves the right to modify the technical characteristics of the instrument and manual without prior notice.

## General Specifications

Thank you for buying the BTA OXY SMART analyzer. It represents the simplest and up-to-date measurement instrument for the analysis of oxygenated mixed gas for mixed gas diving. It has been especially designed and manufactured for the analysis of binary and ternary gas mixtures like Nitrox, Heliox and Trimix.

BTA OXY SMART comprises in just one integrate device the oxygen sensor, the electronic board and the battery. The electrochemical sensor gives a proportional electrical signal with the oxygen percentage in the mixed gas. On the unit's display, this signal is transformed in easy-to-read oxygen percentage information given in real time.

**Main features:**

- Display of oxygen percentage in the range 0.0 - 100.0%.
- Low battery indicator.
- Manual calibration.
- Simple battery and sensor replacement.
- Very innovative cover design.
- Direct connection to the mixed gas flow.

## On-Off and calibration procedure

For switching on the unit press the **On-Off** key: BTA OXY SMART starts to read the electrical signal of the integrated oxygen sensor. Wait for at least 30 seconds, afterwards BTA OXY SMART is ready to be calibrated at the known oxygen percentage. If you need to calibrate it in pure air, leave the instrument in air and rotate the calibration trim until you will read on the display a value in the range 20.8 - 21.0%.

Pay attention not to cover the two holes near the hose connection.

If you need to calibrate BTA OXY SMART with pure oxygen or other known sample mixed gas, connect the hose connection in the rear of the instrument to the oxygen flow, wait for 30- 60 seconds, then rotate the calibration trim until you will read on the display the correct value (ask to your mixed gas supplier for the real oxygen percentage of the calibration gas mix).

**Warning:** During the calibration procedure, pay attention not to cover the two holes near the hose connection in the rear of the instrument. The unit must be exposed to the known sample mixed gas (such as air or pure oxygen) and calibrated consequently. If you calibrate with mixed gas flow, the flow must range between 2 and 4 litres/min at atmospheric pressure, or BTA OXY SMART will yield a wrong gas analysis. The unit must be kept steady and must not be shaken. Avoid change in temperature between calibration gas and analysis gas.

The closest the calibration value is to the mixed gas percentage to be analyzed, the best and the fastest is the BTA OXY SMART performance.

**Warning:** Whatever error in the calibration procedure will make mistake in the subsequent analysis.

Only at the point BTA OXY SMART is ready to correctly analyze mixed gas. To switch off BTA OXY SMART after use press the **On-Off** key and then release it.

## Mixed Gas Analysis

Before doing mixed gas analysis, connect the mixed gas hose (not supplied) to the adapter in the rear of the instrument and let the gas flow fluxes the internal oxygen sensor. The sensor, when coming in contact with the mixed gas flow, gives an electrical signal. This signal is transmitted to the central unit and processed to display the oxygen percentage information on the display. The oxygen analysis is made by comparing the calibration value to the analysis value. The mixed gas flow that comes in contact with the sensor, must range from 2 to 4 litres/min at the same calibration pressure, or a wrong gas analysis will occur (preferably use a flow regulator with meter connected to the mixed gas tank).

Whatever error in the calibration procedure will make mistake in the subsequent analysis.

**Warning:** Pay attention not to cover the two holes near the hose connection in the rear of the instrument. The mixed flow must range between 2 and 4 litres/min at the same calibration pressure (i.e. the gas flow must not increase the pressure over the sensor), or BTA OXY SMART will yield a wrong gas analysis. The unit must be kept steady and must not be shaken. Avoid change in temperature between calibration gas and analysis gas.

During gas analysis, the oxygen percentage of the mixed gas being analyzed is available on the display. It is possible to make more gas analysis without intermediary calibration.

**Warning:** When battery is nearly exhausted BAT or a row appears on the display. In this case oxygen analysis is not be reliable anymore.

**Warning:** NOAA and medical studies recommend not to expose to an oxygen partial pressure higher than 1.6 (ata) because of serious personal injury including death.

Expose the sensor to the same gas pressure during setting and analysis.

## Replacement of the Battery and of the Oxygen sensor

BTA OXY SMART requires one 9 Volt alkaline battery (not supplied). It must be replaced when BAT or a row appears on the display.

**To replace battery:**

- Switch off BTA OXY SMART with the **On-Off** key.
- Remove the three closing screws and carefully open the instrument.
- Remove the old battery and replace it with the new one.
- Do not throw anyway the old battery.
- Check the correct recycling procedure.
- Close the instrument screwing the three closing screws.
- Switch on the instrument with the **On-Off** key and check the battery level.

**Warning:** Don't leave battery inside the instrument if you do not use it for a long time. The oxygen sensor must be replaced when unable to calibrate or to correctly analyze mixed gas. The sensor life is about 6-12 months or more under normal operating conditions.

**Warning:** Replace the oxygen sensor when the unit is unable to calibrate or to correctly analyze mixed gas. The use of an exhausted sensors may cause dangerous analysis and lead to death.

**To replace the oxygen sensor:**

- Switch off BTA OXY SMART with the **On-Off** key.
- Remove the three closing screws and carefully open the instrument.
- Unplug the sensor plug connection.
- Remove the old sensor by unscrewing it and replace it with the new one.
- Connect again the plug to the sensor.
- Do not throw away the old sensor. Check the correct recycling procedure.
- Close the instrument screwing the three closing screws.
- Switch on the instrument with the **On-Off** key and check the unit.

**Warning:** Do not try to disassemble the sensor. Sealed unit contains caustic liquid (KOH) which can cause severe burns to skin and eyes. In case of contact, flush 15 minutes with water. For contact to eyes also get medical attention.

## Central Unit and Oxygen Sensor Specifications

BTA OXY SMART contains delicate electronic devices, hence it is absolutely necessary to:

- Avoid shock (greater than 2g) or vibrations.
- Avoid exposure to environmental temperature higher than 40°C (104 F) and lower than 5°C (41 F).
- Delicately manage the key and the trimmer with your fingers and don't use any kind of tools.
- Avoid exposure to spray liquids and to corrosive gas, don't submerge.
- For cleaning, use a soft dry brush not soaked with any liquid.
- Don't try to remove screws from BTA OXY SMART or to open it. For any problem call BTA.

**The oxygen sensor specifications are:**

- Galvanic cell type.
- Measurements range 0+100% of oxygen.
- No effect with gas like CO, CO<sub>2</sub>, NO<sub>x</sub>, N<sub>2</sub>, H<sub>2</sub>, Ar, He.
- Operating humidity from 0 to 95% non condensing. Prevent condensation on the surface of the sensing surface.
- Operating temperature range from 5°C (41 F) to 40°C (104 F).
- Storage temperature range from -15°C (5 F) to 50°C (122 F).
- Do not expose sensor to a biased voltage or to a short circuit.
- Response Time <15 sec for 90% response at 23°C.
- Accuracy ±2% over full scale.
- Linearity within ±2% over full scale.
- Stability <1% drift in 8 hours at constant temperature and pressure.
- Output voltage 11±3 millivolt at 21% oxygen at 23°C (74 F) and 60% RH and at 1 ata.
- Sensor life: 6- 12 months under normal operating conditions. Sensor must be replaced when unable to calibrate or to analyze mixed gas correctly.

**Warning:** Do not try to disassemble the sensor. Sealed unit contains caustic liquid (KOH) which can cause severe burns to skin and eyes. In case of contact, flush 15 minutes with water. For contact to eyes also get medical attention.

## Warranty

BTA warrants that its OXY SMART computer will be free from defects on material and workmanship for a period of twelve (12) months from the date of delivery, with the exception of sensor that is not manufactured in-house and that is warranted for six (6) months, provided that the warranty Registration Card is filled in and returned to BTA at the time of delivery.

Warranty will be void by failure to install, use or maintain BTA OXY SMART according to BTA instructions.

To avail oneself of the warranty, send the product with carriage prepaid to BTA.

THESE WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR LEGAL.

BTA MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

Buyer's exclusive remedy shall be the replacement of any BTA OXY SMART oxygen analyzer or sensor therefore that fails to comply with above warranty. Under no circumstances will BTA be liable for economic, special, incidental or consequential damages of any kind whatsoever.

This warranty does not cover any damage due to accidental events (ex. impact or falls) or natural events (ex. fires calamities).