Optical dissolved oxygen probe
BAMOX 453

USER MANUAL

BAMO INTERNATIONAL
22, Rue de la Voie des Bans · Z.I. de la gare · 95100 ARGENTEUIL
Tel **+33 (0)1 30 25 83 20** **Web** **www.bamo.eu**
Fax +33 (0)1 34 10 16 05 E-mail export@bamo.fr

SUMMARY

BAMO INTERNATIONAL
22, Rue de la Voie des Bans · Z.I. de la gare · 95100 ARGENTEUIL
Tel **+33 (0)1 30 25 83 20** **Web** **www.bamo.eu**
Fax +33 (0)1 34 10 16 05 E-mail export@bamo.fr

1. PRECAUTIONS

- Installation, commissioning and maintenance operations must only be performed by qualified personnel.
- Connect the device to a suitable supply voltage as indicated in the technical features.
- Never open or handle the cable coupling of the output cable.
- Turn off the main supply before any installation and maintenance works.
- Operate the device only in accordance with the conditions described in this manual.

2. APPLICATIONS

- Urban wastewater treatment (nitrification / denitrification)
- Treatment of industrial effluents
- Monitoring of open-air waters, coastal waters, aquariums
- Fish farming, aquaculture (fresh water, sea water)
- Drinkable water

3. DESCRIPTION

The probe BAMOX 453 for dissolved oxygen integrates a sensor for optical luminescence measurement (Technology approved by ASTM International Method D888-05).

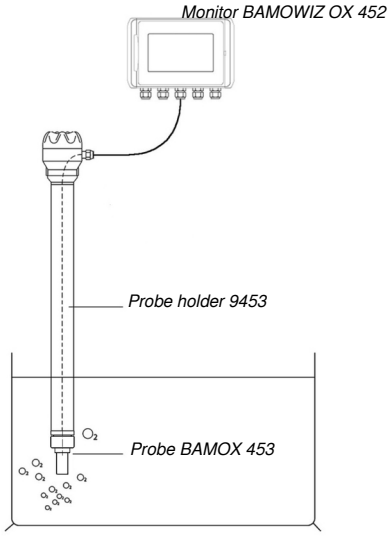
This method confers advantages:
- Accurate and reliable measurements even with low concentrations of oxygen.
- Low operating costs: Quick tasks, interchangeable probe end.
- Optimized maintenance
- Easy to operate
- Suitable for all applications: No oxygen consumption
- Easy commissioning: No flow requested.

The probe integrates its own pre-amplifier with digital output signal and so is highly resistant to electrical noise. The measured value of dissolved oxygen is automatically compensated for temperature, pressure and salinity, then transmitted to the monitor BAMOWIZ OX 452 (data-sheet 452-01)

The sensor end is easily replaced. The compact and robust probe is available in AISI 316 L (passivated) or in titanium (for applications in seawater and other corrosive environments).

To facilitate installation on the basins and measurement in immersion, we recommend the use of the 9453 probe holder.

Note: By default, the optical dissolved oxygen sensor takes a measurement every 10 seconds. The monitor BAMOWIZ OX 452 allows the measurement to be averaged over a time interval.



Complete system

4. TECHNICAL FEATURES

Measurement

Principle	Optical luminescence measurement
Ranges	0.00 to 20.00 mg/l 0.00 to 20.00 ppm 0to 200 %
Resolution	0.01
Accuracy	± 0.1 mg/l ± 0.1 ppm ± 1 %
Response time	90 % of value within 60 seconds
Water flow	No flow required
Operating temperature	0 ... +50 °C
Temperature compensation	Via built-in NTC sensor *Compensation in the range 0 ... 40 °C*
Accuracy	± 0.5 °C
Interface	MODBUS RS485 for BAMOWIZ OX 452 digital input
Power supply	5 ... 12 V DC (provided by monitor)

BAMO INTERNATIONAL
22, Rue de la Voie des Bans · Z.I. de la gare · 95100 ARGENTEUIL
Tel **+33 (0)1 30 25 83 20** **Web** **www.bamo.eu**
Fax +33 (0)1 34 10 16 05 E-mail export@bamo.fr

Probe

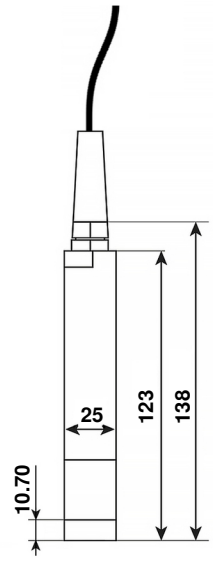
Mass	450 g for stainless steel version (cable included) 300 g for titanium version (cable included)
Material	Body: or passivated AISI 316L or titanium
Pressure limit	5 bar
Extension cable	4-wire shielded cable, PUR sheathed (Max 100 metres)
Protection	IP 68

EC Conformity: The instrument meets the legal requirements of the current European Directives.

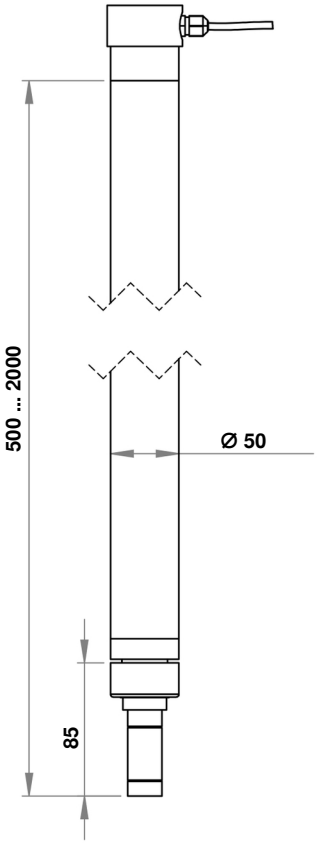
5. CODE NUMBERS AND REFERENCES

Code	Reference	Description
453 001	BAMOX 453 I	Stainless steel version
453 002	BAMOX 453 Ti	Titanium version
Accessories		
453 010	9453	Probe holder, PVC, Ø 50 (2 m long)
130 112	9358 PE	PE Adjustable flange, Ø 50 for probe holder 9453
453 110	C4B	Extension cable (4-wire; shielded) per metre
Spare parts		
453 911	BAMOX 453 I/Sp	probe end for AISI 316 version
453 912	BAMOX 453 Ti/Sp	Probe end for titanium version

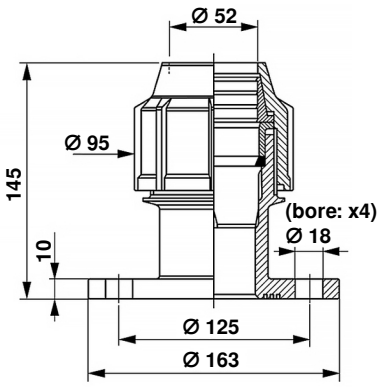
6. DIMENSIONS [mm]



Probe BAMOX 453



Probe holder 9453



Flange (code 130112)

BAMO INTERNATIONAL
22, Rue de la Voie des Bans · Z.I. de la gare · 95100 ARGENTEUIL
Tel **+33 (0)1 30 25 83 20** **Web** **www.bamo.eu**
Fax +33 (0)1 34 10 16 05 E-mail export@bamo.fr

7. IDENTIFICATION

1: Data of your device
2: Serial Number: SN-PODOx-yyyy
x = Version
yyyy = To complete identification
3 : CE label

Marking on the body indicates the serial number of the sensor and the CE label.

8. DETAILED DESCRIPTION

(1) Dismountable probe end, with diaphragm (DO DISK); Tip is or in stainless steel, or in titanium.
(2) Seal
(3) Body, which integrates all the electronic parts
(4) Cable sleeve on cable gland
(5) Output cable

9. ELECTRICAL CONNECTIONS

The electrical connection of the probe is directly to the BAMOWIZ OX 452.
Refer to the end-user manual ((msa452-01) of the monitor BAMOWIZ 452 for the terminal assignments.

10. INTERFERENCES ON THE MEASUREMENTS

The solubility of oxygen in water depends on: temperature, salinity and pressure. These compensation parameters being managed by the probe, the dissolved oxygen concentration (mg/l) transmitted digitally is therefore already compensated.

10.1 Temperature compensation

Temperature compensation is automatic and managed directly by the probe via its integrated temperature sensor (NTC).

10.2 Atmospheric pressure

With the most frequently used calibration method (100 % in air saturated with water vapor) the air pressure must be taken into account. For this purpose, the atmospheric pressure value is transmitted to the probe by the monitor BAMOWIZ OX 452. This compensation is managed via a MODBUS interface between the monitor BAMOWIZ and the probe BAMOX.

Default value is 1013 hPa, may be modified on the BAMOWIZ 452 (manually or automatically, see the manual of the monitor).

10.3 Salinity

Default value of salinity is 0 g/kg, may be modified on the BAMOWIZ 452. It is possible to provide a salinity value via the BAMOWIZ 452. This compensation is managed via a MODBUS interface between the monitor BAMOWIZ and the probe BAMOX.

11. PROBE INSTALLATION

Install the probe BAMOX 453 for operating in immersion or in-line operations (plastic or metallic piping) with our dedicated and suitable accessories.

Mandatory: Hold the probe by the holder probe body and not let them hanging by the cable (damages occur).

For an easiest installation, the probe is already fitted onto the 9453 probe holder and pre-wired (holder to order together with the probe):

Details before factory assembly

Final assembly

Note: The head-housing of holder with terminal blocks insures the connection to the BAMOWIZ 452 via the C4B extension cable.

12. COMMISSIONING

Remove the black protective cap: Hold the probe head down and unscrew this cap.
The sensor is delivered dry and the DODISK (diaphragm) must be rehydrated in order to procure optimal measurements.
After a dry storage period, rehydrate the diaphragm during 12 hours in clear water.

13. SENSOR CALIBRATION ON BAMOWIZ OX 452

The BAMOX 453 probe is calibrated at the factory, however the end-user can proceed to a new calibration. The two-point calibration method (0 and 100%) is recommended for measurements of low oxygen concentrations.
Always calibrate the zero point before the 100 % point.

It is also possible to perform a one-point calibration and only at 100 %

Go to the CALIBRATION menu of the BAMOWIZ OX 452

- **First calibration point: 0 % (offset)**

  In order to determine the 0 %: Immerse the probe in a sodium bisulfite solution (concentration < 2 %)
  (2) Press RETURN
  (3) When the measurement stabilizes, press VALID
  (4) Then rinse the probe with clear water, and, dry it.

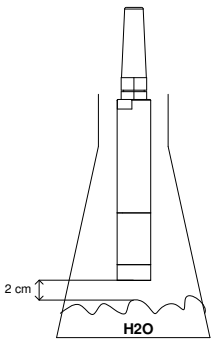
Note: If the offset is greater than 20%, the calibration point cannot be validated.

Caution: Do not leave the sensor in contact with the sulphite solution for more than 1 hour.

- **Second calibration point: 100 % (slope)**

The slope of the measuring scale is determined with the probe inside an environment saturated of oxygen.

(1) Position the probe end in air saturated with water vapour (Example: With the probe end in a humid cloth or close to water surface).
(2) Press RETURN
(3) When the measurement stabilizes, press VALID



Note: If the gap is lower than 80 %, or greater than 120 %, the calibration point cannot be validated.

14. CAUTION

When measuring, watch for the presence of bubbles so that they do not get stuck under the diaphragm.
In the presence of chlorine, the measurement will be falsified (overestimation of the dissolved oxygen level).
When introducing the probe into a new medium, wait until the sensor has stabilized in temperature before taking the measurement into account.
In order to optimize the long-term operation of your probe, we advise you to respect a measurement frequency of 10 seconds. On request, the measuring frequency can be increased to 1 second (factory setting).

Warning:

- The diaphragm must not come into contact with chemicals.
- The diaphagm must not be in contact with the sodium bisulfite solution for more than one hour.
- A damaged diaphragm can lead to false measurements
- Never immerse a probe without its probe-end

15. MAINTENANCE

The probe must always be clean, especially in the area around the diaphragm and the optical part.

Check up:
On a clean sensor, check from time to time the value 0% of dissolved oxygen by immersing the probe end in a sodium bisulfite solution (concentration < 2 %).
If reading is not "0", perform full calibration of the sensor (See chapter SENSOR CALIBRATION)

Service:
The presence of a biofilm on the membrane cap can lead to measurement errors.
In this case, wipe the membrane gently with a soft cloth or absorbent paper (do not use anything abrasive). If necessary, the membrane can be cleaned with warm soapy water before being rinsed with clean water.

Caution: For the titanium version clean the sensor body with acetone (do not use methylated spirits, ethanol or methanol).

16. TO REPLACE THE PROBE END

Mounting a new probe end:
The probe end is considered a consumable part. Its duration of use depends on its operating conditions, can be up to 2 years.

Warning: Do not unscrew the probe end until you have to exchange it.

1) Unscrew the protection, if in place.
2) At the end of the probe, unscrew the sensor end, counterclockwise.
Never touch the internal parts.
3) Screw on the new sensor end, screw it slowly so that the air can escape gently.
Caution: When screwing in, make sure that the optical window keeps clean and dry.
4) Rehydrate the membrane for 12 hours before performing the calibration at points 0 and 100% as described previously.

17. STORAGE

Keep the diaphragm moist using the protection cap and a damp absorbent pad (cotton type).
Storage temperature: Between -10 °C and +60 °C