O'Dive sensor
Complete instruction manual
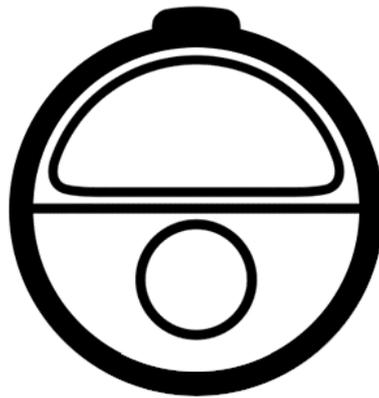
Updated on 25/02/2021

Download of the O'Dive app is required

https://www.o-dive.com

WARNING

The O'Dive sensor is an ultrasonic Doppler acoustic device connected to an application designed to measure and control over time the decompression procedures' adequacy to the diver.

Although relying on the measurement of physiological parameters to produce a result, O'Dive technology does not provide medical advice and does not fall into the category of medical devices (ANSM audit report - October 2020).

The features of the service imply practicing diving in a club or individually. O'Dive is not a medical device and does not provide medical advice.

Any advice or other items available in our service are intended solely for general information purposes. They are not intended to serve as a unique reference or to substitute professional medical advice based on the personal situation of the user.

Azoth Systems disclaims any responsibility for actions taken by the user because of advice and information provided by the service. In particular, if the user has not consulted a medical doctor and does not have a medical certificate authorizing him to practice diving.

Direction of use

For a given dive (depth, duration and decompression stops), it is recognized by the scientific community that a decompression procedure resulting in no or a few microbubbles is more recommended than a procedure generating high levels of bubbles.

The O'Dive solution assists the diver in this view to help him adapt and improve his practice, limiting his bubble level, and therefore increasing his diving safety level.

The sensor measures the microbubble rate in the diver venous system following a dive. Combined to the diving parameters, these measurements allow the calculation of a parameter reflecting the quality of the decompression procedure used.

If the procedure is not optimal, the O'Dive app put at the diver's disposal a customized simulator allowing him to visualize the effects of several possibilities to improve the quality of his procedure while making progress in his practice.

By using regularly O'Dive technology, the diver will improve his self-understanding. He will therefore be more likely to wisely adjust his decompression procedures and diving practice **towards more safety**.

Decompression sickness (DCS) are intrinsically related to the dissolved gas charge in the diver's body. The O'Dive solution is designed to help the diver advance his practice by better understanding the effects of decompression. It does not claim in any case, even when the quality index is 100%, that no risk of DCS is incurred by the diver. Zero risk does not exist. The only way to avoid exposure to DCS is not to dive.

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O'DIVE Perimeter and usage restriction

Cases not handled by O'Dive

When using the O'Dive app, limits are set for the validation of the dives, because the intrinsic risk is considered too high beyond these.

The following cases are not handled by O'Dive:

- Open circuit:
    - Air dives beyond 60m
    - Trimix/Heliox dives beyond 125m
    - Dives where the bottom PpO_2 exceeds 1.6 bar
    - Dives where the decompression PpO_2 exceeds 1.65 bar

- Closed circuit:
    - Dives with Air diluent beyond 50m
    - Dives with Trimix/Heliox diluent beyond 125m
    - Dives with PpO_2 bottom above 1.6 bar
    - Dives with PpN_2 bottom above 4.7 bar
    - Dives with PpO_2 deco above 1.65 bar

Data input

For any version of the O'Dive app, the dive parameters can be entered either:

- by **manual input**: the user must manually enter the different parameters of his dive (depth, total time, decompression time, gases breathed, ...)
- by **data import** (from a Shearwater or Mares Genius dive computer, Subsurface cloud or Suunto cloud): the exact profile of the dive is imported, and the user must then fill in the missing fields.

Fields that are not filled in correctly can lead to results that do not reflect the actual quality of the decompression.

Open-circuit – Air/Nitrox

*The following section applies to **open circuit** dives where the bottom gas is **Air** or a **Nitrox** mix, with or without the use of oxygen-enriched mix(es) during stops.*

- Manual input:

    Multi-level dives are handled. They are approximated by an equivalent square dive based on the parameters entered by the diver on the app: maximum depth, total dive time and actual decompression time indicated by the dive computer. Any additional stops that the diver may have followed are considered to evaluate their benefit with respect to the severity of the exposure.

    Successive and multiple dives, i.e. with a surface interval less than 12 hours, can be analyzed (e.g. cruise with several dives per day). The residual gas load is considered from the moment the diver uses the same computer for his various dives.

Unsuitable **ascending speeds** cannot be detected with the manual data entry mode offered by **O'Dive Sport** and **O'Dive Advanced**. Thus, the results sent to the diver do not consider this additional risk factor for these versions.

The **ascending speeds** are entered using the manual data entry mode offered by **O'Dive CCR** and **O'Dive Technical**. Thus, unsuitable ascending speeds are considered in the results sent back to the diver.

Sawtooth profiles cannot be detected with the manual input mode proposed by O'Dive. Thus, the results sent back to the diver do not consider this additional risk factor.

- Data import:
  Multi-level dives are handled.
  Successive dives are not yet handled. An upcoming version allowing to manage them is currently under development.
  Unsuitable **ascending speeds** are considered in the results sent back to the diver.
  Sawtooth profiles cannot be detected. Thus, the results sent back to the diver do not consider this additional risk factor.

Open-circuit – Trimix/Heliox

*The following section applies to **open circuit** dives where the bottom gas is a **Trimix** or a **Heliox** mix, with or without the use of oxygen-enriched mix(es) during stops.*

- Manual input:
  This mode is reserved for **square dives**, i.e. dives in which the amplitude of variation of the bottom depth is small compared to the maximum depth reached (+/-5m), such as wreck diving.
  Successive dives, i.e. with a surface interval less than 12 hours, are not handled yet. An upcoming version allowing to manage them is currently under development.
  Unsuitable **ascending speeds** are considered in the results sent back to the diver.
  Sawtooth profiles cannot be detected. Thus, the results sent back to the diver do not consider this additional risk factor.

- Data import:
  Multi-level dives are handled.
  Successive dives, i.e. with a surface interval less than 12 hours, are not handled yet. An upcoming version allowing to manage them is currently under development.
  Unsuitable **ascending speeds** are considered in the results sent back to the diver.
  Sawtooth profiles cannot be detected. Thus, the results sent back to the diver do not consider this additional risk factor.

Closed-circuit – Air/Trimix/Heliox diluent

*The following section applies to **closed-circuit** dives where the diluent gas is **Air**, or a **Trimix** or a **Heliox** mix, with or without the use of oxygen-enriched mix(es) during stops.*

- Manual input:
  This mode is reserved for **square dives**, i.e. dives in which the amplitude of variation of the bottom depth is small compared to the maximum depth reached (+/-5m), such as wreck diving.
  Successive dives, i.e. with a surface interval less than 12 hours, are not handled yet. An upcoming version allowing to manage them is currently under development.
  Unsuitable **ascending speeds** are considered in the results sent back to the diver.
  Sawtooth profiles cannot be detected. Thus, the results sent back to the diver do not consider this additional risk factor.

- Data import:
  Multi-level dives are handled.
  Successive dives, i.e. with a surface interval less than 12 hours, are not handled yet. An upcoming version allowing to manage them is currently under development.
  Unsuitable **ascending speeds** are considered in the results sent back to the diver.
  Sawtooth profiles cannot be detected. Thus, the results sent back to the diver do not consider this additional risk factor.

Step-by-step guide for using O'Dive

Step 1 – Charging the sensor

Before each use of the sensor, it is important that it is sufficiently charged in order to have the necessary autonomy to the realization of your measurements.
IMPORTANT: It is strongly advised to make sure that the sensor is properly charging before leaving it on its charging base, in order to avoid discharging and deterioration of the battery.

• Connect the induction charger to a 5V-2A adapter or to a USB port.
• Position the O'Dive sensor on the charger, face with markings in contact with the induction charger. When the sensor is in the right position, the sensor LED will flash in green, indicating that the sensor is charging (and the charging pad goes to steady green for a few seconds before switching off). If the battery is full enough, the LED will flash rapidly 5 times, then slowly 2 times, and will stop.

• If the sensor LED does not flash in green, adjust the sensor position on the charger.
• If the sensor LED is flashing in yellow, remove the sensor from the charging base, let it cool down, then put it back and adjust the sensor position on the charger.
• If the sensor LED is flashing in red, remove the sensor from the charging base, then put it back and adjust the sensor position on the charger.
• If the sensor starts (vibration + blue flashing), remove the sensor from the charging base and turn it off, then put it back and adjust its position on the charging base.
• At the end of the charge (maximum duration of 6 hours), the LED will stop. Your sensor is then ready to be used.

Step 2 – Downloading the O'Dive app

The sensor is operating with the O'Dive app, available on the Apple Store and on Google Play.


The application is initially in the *Sport* version. After having entered the sensor number and made a blank synchronization (see steps 4 and 6), the application automatically upgrades to the correct version (*Advanced*, *CCR* or *Technical*).

Step 3 – Taking in hand the sensor

Starting the sensor

To start the sensor, **press for 1 second** the button located on its top. The sensor vibrates and the LED will flash rapidly in blue (1 flash per second for 90 seconds) signaling the possibility of pairing a phone.

A **red flashing** LED indicates a low battery level. In this case, the sensor has to be charged as soon as possible. (see step 1).

button + LED
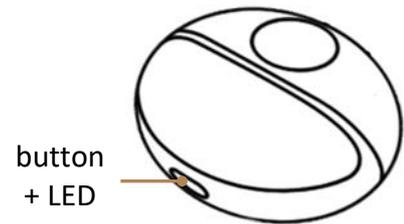
Turning the sensor off

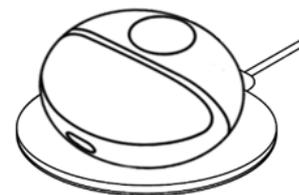There are 3 ways you can turn off your sensor:

| - Press the on/off button for 3 seconds (the flashing LED stops and the sensor vibrates) | - Disable the WIFI connection on your smartphone | - Place the sensor on the induction charging station (see step 1) |

OFF

Technical Characteristics

Mass	Less than 0.5 kg
Sensor dimensions (L x W x H)	Ø74 x 34.6 mm
Doppler frequency	2MHz
Endurance	2.5 hours in continuous emission
Battery	Rechargeable LiPo (Lithium Polymer)
Battery power	7.4V – 600mAh
Recharge	Induction – 2A
Wireless connection	Wi-Fi
Operation temperature range	0°C – 40°C
Storage temperature range	-35°C – 65°C
Humidity	35% - 85% RH
Conformity	CE

The sensor can be cleaned with a damp cloth after use.

Step 4 – Registering / Logging in

- Before using the sensor, you need to create an account on the app.
- Open the app and press the button Register. If someone is already logged in, press the button Account on the top right corner of the home, then press the button Register.
- Follow the steps.
- In case you always use the same sensor, fill the field 'Sensor number' (you can scan the QR code on the tag, type the number with the keyboard, or select the sensor Wi-Fi - on Android only).
- Do not forget to accept the Terms of Use (TOU).

If you already have an account, press Log in and fill in your email address and password.

Step 5 – Taking measurements

> **IMPORTANT:**
> It is strongly advised to **watch the video tutorials on the app** to fully understand how to position the sensor.
> An incorrect sensor positioning under the clavicle will result in bad measurements and, therefore, an impossibility to analyze the signals.
> Please **practice positioning of the sensor** in front of a mirror **before your first dives** with the O'Dive sensor.

Measurements must be undertaken after diving, when the rate of gas microbubbles in the blood is potentially the highest.

Four measurements (each 20 seconds long) will be carried out:
• **30 minutes following the dive***: one under the left clavicle then one under the right clavicle;
• **60 minutes after the dive**: one under the left clavicle then one under the right clavicle.
*For dives with a helium fraction higher as the nitrogen one, we recommend performing the first series of measurements as soon as possible after surfacing, **without, however, making additional efforts through possible precipitation**.*
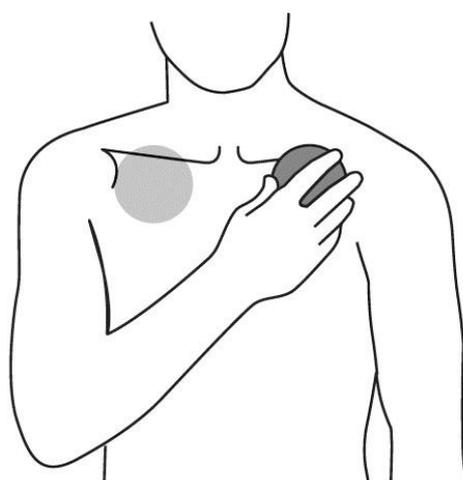

Relax the arm

Do not move

Do not talk

Before any measurement, make sure that your name is displayed on the top of the screen.
If it is not the case, press Account and log in or register (see step 4).

- Select New measurement: a video tutorial reminds you how to take measurements. You can skip this tutorial at any time, and choose not to display it anymore.
- The app creates a new dive and requests you to start your sensor.
- Check that the proposed sensor number is matching your device. If not, press Change sensor, fill the sensor number (see step 4) and validate. Start the measurement again by pressing New measurement then Use current dive.
- When the sensor number is correct, start your sensor (see step 3), then press Connect on the app. The sensor will now pair with your smartphone via Wi-Fi. **Important**: data sharing via Wi-Fi needs to be deactivated.
- When the pairing is done, the LED starts **flashing in green**, the Start button becomes accessible, and the battery pictogram on the top right corner of the screen gets activated.
- Follow the app's steps to perform the two measurements.
- Before starting the recording, a screen allows you to check the correct positioning of the sensor using a spectrogram.
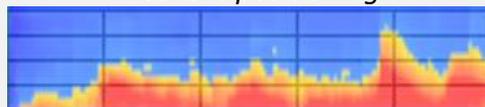

<u>Recommendations:</u>
- The visual objective is to obtain a periodic yellow-red signal whose height and length will be as large as possible.
- To confirm the positioning, stand still for a few seconds and breathe deeply.
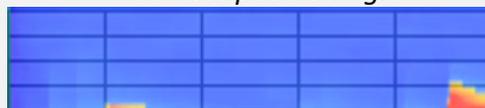- Apply moderate pressure so as not to "chase" the gel off the sides of the sensor.

Correct positioning:
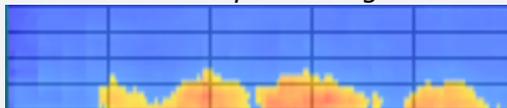
Excellent positioning:

Incorrect positioning:

- When you have found the correct positioning, press Start to launch the measurement. From this point on:
    o Do not try to "improve" the signal by moving the sensor.
    o Breathe very deeply without forcing, following the sinusoid.
    o Do not make any arm or shoulder movements and do not cause muscle contraction.

- If the measurement is unsatisfactory, the application will prompt you to repeat the measurement. Make sure that the sensor is correctly positioned and that you follow the instructions given (no talking, relaxed arm, forced breathing).
- At the end of a series of two measurements (left then right), the sensor switches off automatically.

- To perform the second series of measurements (30 minutes after the first one), select New measurement and press Use current dive so that all measurements are related to the same dive.

Step 6 – Validating dive parameters and uploading data

Once the measurements are done, you must input your dive parameters and upload your data to Azoth Systems' server to get your results.

Note: upload of the data requires a connection to a Wi-Fi or a 4G network.

Inputting your dive parameters
- Go to My dives. Select your dive in the 'To be completed' section. You can then either import the dive profile or do a manual input.
- For importing the profile, press Import data then Import from a dive computer (works with *Shearwater* or *Mares Genius*), Import from Suunto cloud or Import from Subsurface cloud, and select the corresponding dive. Then, fill in the fields left in blank and validate.
  For a manual input*, input your dive parameters and validate.
  *Reminder: Manual input of dive parameters is to be used only for some specific cases (see O'DIVE Perimeter and usage restriction).

> **IMPORTANT:**
> **Fields** that are **not filled in correctly** can lead to **results that do not reflect the actual quality of the decompression**.

Uploading your data on the server
- Once your parameters are input, in the section My dives, press Synchronize on the top right corner of the screen to upload the dives listed under the 'To be sent' section. The dives and the related measurements are uploaded to our servers to be analyzed and are now listed in the 'Awaiting results' section.
- In case there are still some dives in the 'To be completed' section, you must input the dive parameters and press Synchronize one more time.

Step 7 – Evaluating your procedures

A few minutes after the dive, you will receive an email notification indicating that your dive has been analyzed.

- Go to the section My results and press Syncrhonize. The new dives appear on the bar graph and in the 'Dives' section.
- To access the detailed results, click on the bar graph or on the name of the dive in the 'Dives' section.
- A planification tool specific to each version is available to help you see the potential benefits of several factors on the quality of your decompression procedure.

Step 8 – Upgrading the application to another version

The automatic upgrade procedure is currently under development.
For the moment, please contact our team for a manual upgrade: **contact@o-dive.com**

Support - Contact

We are looking forward to hearing from you regarding the quality, functionalities or use of this product.

We are committed to reply to you without delay:

<div align="center">

contact@o-dive.com

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Legal Notice

This product and its battery pack cannot be discarded in the domestic waste. They require separate collection. Ensure that you dispose of your O'Dive electronic product and batteries in a sensible and considerate manner, at a collective recycling point. This valorization of your electrical waste contributes to protect the environment and your health.