Dräger

OXYgauge
PPO2 Sauerstoff-Monitor
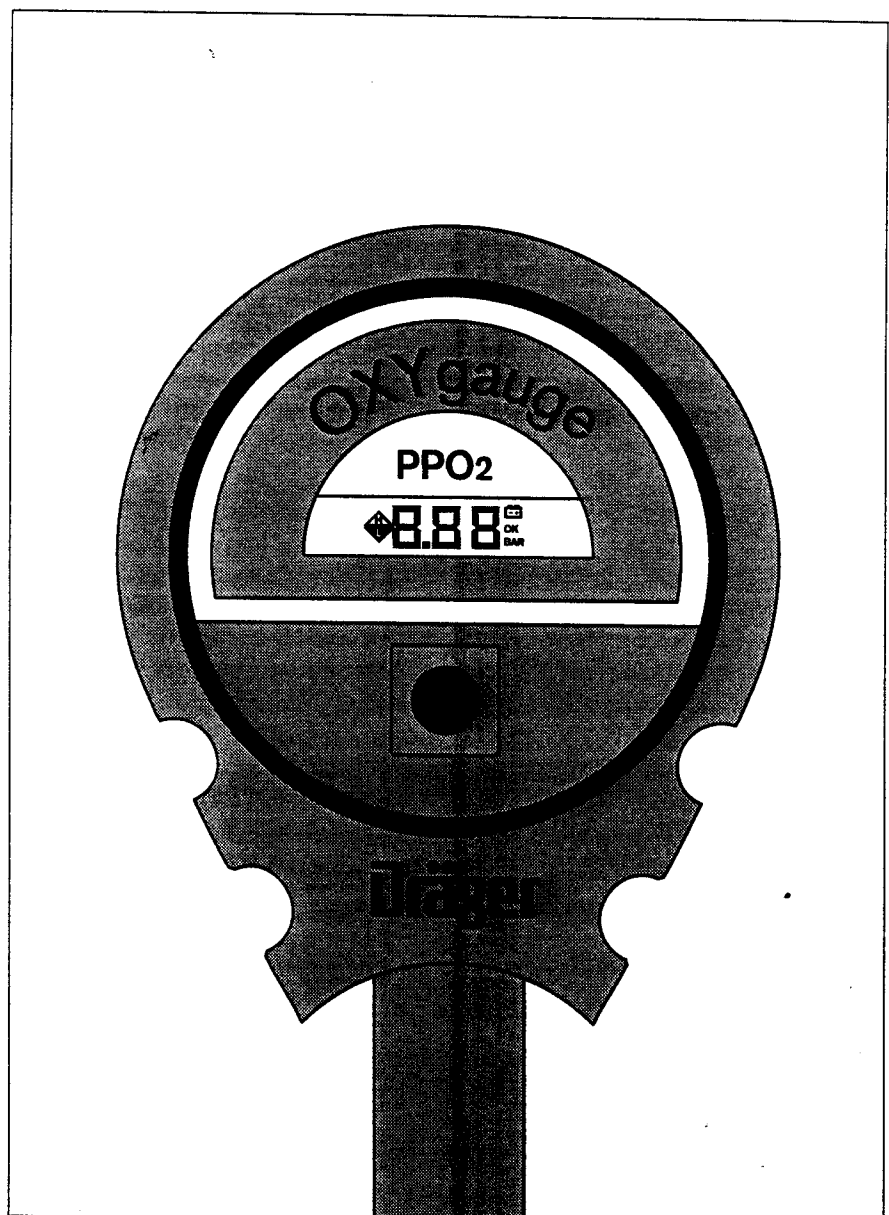## PPO2 Oxygen Monitor

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For your safety

Strictly follow the Instructions for Use

Any use of the apparatus requires full understanding and strict observation of these instructions. The apparatus is only to be used for purposes specified here.

Maintenance

The apparatus must be inspected and serviced regularly by trained service personnel (and a record kept).
Repair and general overhaul of the apparatus may only be carried out by trained service personnel.
Only authentic Dräger spare parts may be used for maintenance. Observe chapter "Maintenance Intervals".

Accessories

Do not use accessory parts other than those in the order list.

Liability for proper function or damage

The liability for the proper function of the apparatus is irrevocably transferred to the owner or operator to the extent that the apparatus is serviced or repaired by personnel not employed or authorized by DrägerService or if the apparatus is used in a manner not conforming to its intended use.

Dräger cannot be held responsible for damage caused by non-compliance with the recommendations given above. The warranty and liability provisions of the terms of sale and delivery of Dräger are likewise not modified by the recommendations given above.

Dräger Sicherheitstechnik GmbH

> ⚠ Before using the OXYgauge, read through the entire Instructions for Use until you fully understand how to operate the instrument. The information contained in this manual is essential to your personal safety.

> ⚠ Diving with rebreathers and their accessories, such as the OXYgauge, requires that divers adhere strictly to the basic rules of thorough theoretical training, attention to detail, responsibility and regular practical training.

Intended use

The OXYgauge has been specially designed for use with the Dräger Atlantis, Dolphin and DrägerRay semi-closed-circuit nitrox rebreathers.

The OXYgauge constantly monitors the partial pressure of oxygen (PPO2) in the Dräger Atlantis, Dolphin and DrägerRay breathing circuit. This information is then displayed to the diver on the liquid crystal display.

NOTE

The OXYgauge shows all numeric PPO2 displays in bar, not ATA. One bar corresponds to 14.5 PSI. To convert the displayed value to ATA, multiply it by 0.986.

Preset audible and visual alarms warn the driver when the low or high PPO2 limits are exceeded. These alarm levels are described in the section on "Alarm conditions during PPO2 monitoring".

The OXYgauge provides you with the following information to help you control your dive:

● Partial pressure of oxygen in the breathing circuit of the scuba.

It provides the following warnings:

● PPO2 low and high limit violations, with both visual and audible alarms

● Low battery voltage (battery low), by visual indicator

It gives the driver the choice between:

● Altitude groups, which compensate for the modified PPO2 found at higher altitudes.

> ⚠ **You must know the physiological limits for partial pressures of oxygen. Exceeding 1.6 bar (abs.) PPO2 can result in severe injury or death.**

> ⚠ **All divers must be fully aware that no technical process and no oxygen monitor – even when used in accordance with the manufacturer's instructions – can totally prevent the possibility of hypoxic or hyperoxic conditions within the breathing circuit of the scuba. Each dive involves the risk of contracting some form of decompression sickness or of exceeding the recommended PPO2 limits in the breathing circuit. The only way to guarantee maximum safety is to plan your dive and to dive your plan.**

An O2 monitor is no substitute for proper training and common sense. You should never rely on the oxygen monitor as your sole means of planning and monitoring a dive. Use backup equipment, and check it regularly. The purpose of this manual is to teach you how to use the OXYgauge. It is your own responsibility to know, understand and apply safe diving principles.

As an added safety precaution, calculate your maximum dive depth (MOD = Maximum Operating Depth) for oxygen toxicity on the basis of the oxygen concentration in the nitrox mix of the cylinder, not the value measured in the breathing circuit.

Construction / Description

The OXYgauge consists of the display unit, the sensor unit and the cable that transmits the information from the sensor unit to the display unit.

NOTE

To use the OXYgauge with the Atlantis or Dolphin rebreather, a breathing bag with 4 ports is required (part number T 52 004). The fourth connector of this breathing bag allows the OXYgauge to be connected to the breathing circuit (see Figure 1).

The OXYgauge Upgrade Kit (part number T 52 256) includes a 4-port breathing bag for upgrading your Atlantis or Dolphin rebreather if it has an older breathing bag with 3 ports and a dummy connector.

To use the OXYgauge with the DrägerRay Rebreather, the instrument must be connected to the soda lime container (see Figure 2).
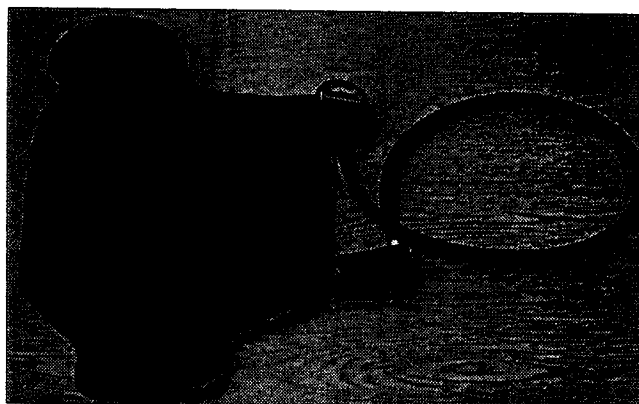**See also the Instructions for Use of the DrägerRay.**

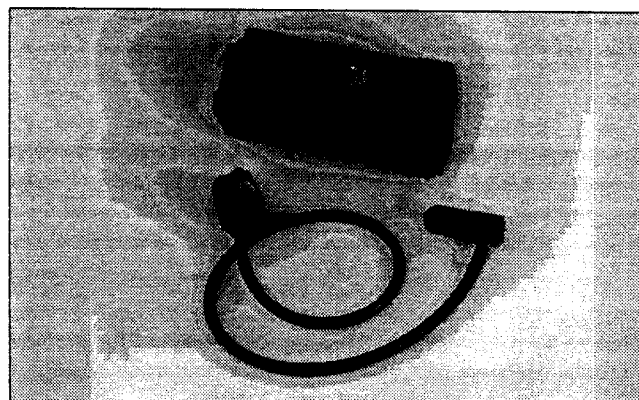Figure 1: OXYgauge with 4-port breathing bag
(part number T 52 004)

Figure 2: OXYgauge with soda lime container

Display unit

The display unit is the brain of the OXYgauge. The electronic module is contained in a plastic case. An LCD display provides a digital display of the PPO_2 in the breathing circuit during the dive and also shows the diver specific information during surface mode and calibration. A control button is located on the lower section of the display unit and allows the user to switch the unit on and to scroll through specific screens for calibrating the instrument, adjusting the altitude settings and deactivating alarms. Press the button to scroll through the various OXYgauge functions (see the section on the "Control button"). The back cover of the OXYgauge houses the alarm buzzer and permits access to the user-replaceable battery. For added protection, the display unit is mounted in a rubber boot (see Figure 3).
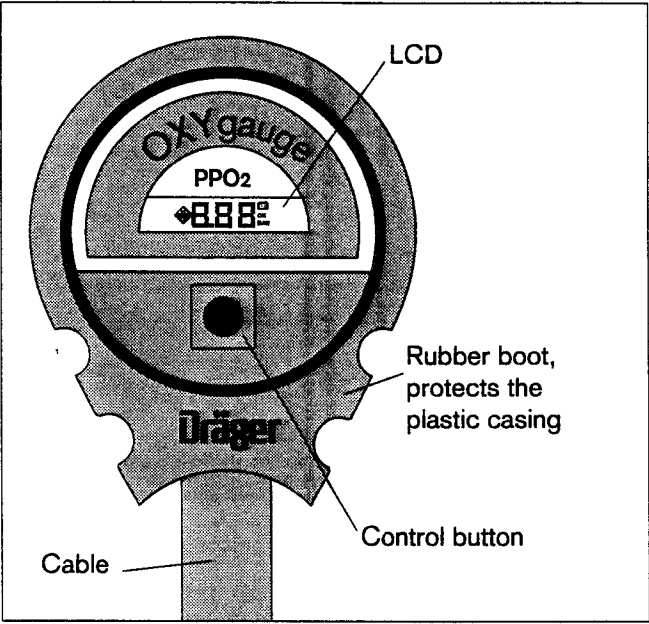
Figure 3: Display unit

Cable

A sturdy rubber hose contains the electronic cable that transmits the PPO_2 information to the display unit. The cable is long enough to pass the display unit over the diver's right shoulder. Do not unscrew the hose from the sensor housing.

⚠️ The cable is factory-assembled to the display unit and sensor unit. It cannot be dis- assembled from these parts. Any attempt to remove the cable from the display unit or sensor unit may damage the cable or internal electronic components.

Sensor unit

The opposite end of the cable is connected to the sensor unit, which consists of an oxygen sensor and a snap-in connector for connection to the breathing circuit.
A temperature compensation network is built into the snap-in connector to ensure that the sensor can measure PPO$_2$ accurately even at extreme temperatures. The sensor unit is connected to the breathing bag of the rebreather by snap-in connector. When using the DrägerRay rebreather, the sensor unit is connected to the soda lime container (see Instructions for Use of the DrägerRay rebreather).

The oxygen sensor is an electrochemical transducer for measuring the partial pressure of oxygen in gas mixtures. It is designated as a galvanic cell or sensor, and it is capable of generating an electric current. The current flowing through the sensor is proportional to the oxygen concentration of the monitored gas.
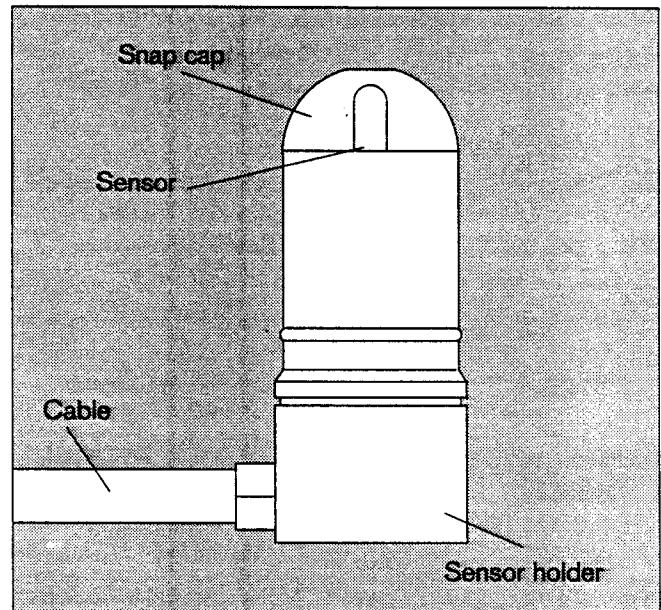
Figure 4: Sensor unit

Using the OXYgauge – Predive preparations

Control button

The OXYgauge has a control button located at the lower end of the display unit. Pressing the button in a defined sequence enables the diver to switch on the display, carry out the calibration procedure, set the altitude above sea level and switch off the display (see Figure 5).

Operating conventions

- Press the button twice to start or confirm a function. Remember this as "O-K".

- Press the button three times to cancel a function. Remember this as "Not O-K".

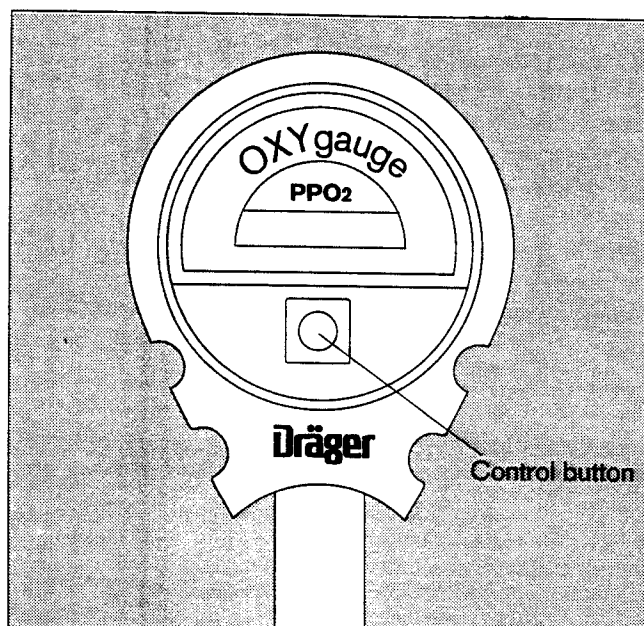- Press the button six times to enter a new operating mode.

Figure 5: Control button

Activation and setup

Function	Description	Display
Confirm activation	Press the button two times: the LCD shows the message "On". The backlight is lit. Press the button another two times to confirm that you want to switch on the monitor. **Note: this screen is skipped just after battery installation.**	`On`
Start up: Self test	All display segments are lit for 3 seconds. The audible signal is sounded for 3 seconds; the backlight remains on for 10 seconds until the start of normal measurement.	`8.8.8`
Start up: Alarm setting & Software version	After installing the battery, immediately after the self-test display, the alarm setting and the software version are displayed alternately. The alarm beeps once per second. The instrument remains in this mode for 15 seconds or until the control button is pressed once. After a normal activation (when the battery is already installed), the alarm setting is displayed for 3 seconds, followed by the software version (for 3 seconds).	`L 14` `1.01`
Start up: Altitude range	The present altitude range is displayed for 3 seconds.	`r 1`
Start up: Acknowledging the Low PPO$_2$ main alarm	The display now shows the partial pressure of oxygen to a precision of 1/100 bar, up to a limit of 2.50 bar. At sea level, the display will normally read 0.21 bar in ambient air. The unit will therefore already be in alarm mode! This is normal. To mute the alarm, press the control button once. However, as a safety precaution, once the PPO$_2$ has reached 0.25 bar or more, the Low PPO$_2$ main alarm can no longer be cancelled unless the instrument is switched off and back on again.	`0.2 1`

> ⚠ The OXYgauge will NOT emit an audible Low PPO2 alarm if the diver has muted the alarm during start-up and the sensor has not yet been exposed to a partial pressure of oxygen > 0.24. Therefore, you will NOT be audibly alerted to low PPO2 in the breathing circuit if you forget to open the nitrox supply valve before entering the water.

> ⚠ Always check that the nitrox supply is turned on.

Function	Description	Display
Start up: Checking the PPO2 reading in ambient air	To check that the instrument is correctly calibrated, disconnect the gas sensor from the rebreather bag and allow the sensor reading to settle. If the reading matches the known PPO2 for the surface altitude, you may choose to skip calibration. If the reading does not match, please refer to the section on "Calibration".	▼0.2 OK BAR
Start up: Checking the PPO2 in the breathing circuit	Carry out the predive assembly and checks specified in the Instructions for Use of your rebreather. After checking the correct flow rate for the gas mixture, you can check the PPO2 in the breathing bag by observing the OXYgauge.	
Start up: Long-term storage error	On switching on the instrument, the sensor gain factor and the altitude range are loaded from permanent memory into working memory. If the permanent memory is defective, the working memory will be loaded with erroneous values. The "Sto/Err" message indicates that the instrument is defective and must be returned for service. This message may appear just after the self-test during the start-up phase.	Sto Err

Calibration

The OXYgauge must be regularly recalibrated to ensure that it continues providing accurate information throughout its service life. As the sensor ages, its sensitivity gradually declines. During calibration, the OXYgauge compensates for any loss of sensitivity by increasing the signal amplification or "gain". This gain is then stored in permanent memory until the next calibration. Eventually, a point may be reached where the gain has reached its maximum limit. At this point, the sensor will have to be replaced, because it is no longer sensitive enough to give an accurate reading across the entire measuring range.
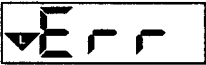
Function	Description	Display
Calibration Enabled Timer	Calibration is only possible within the first two minutes after switching the unit on. The "OK" symbol indicates that calibration is possible. After this time interval, the "OK" symbol is removed, and the instrument can no longer be calibrated until it is switched off and switched back on. **Note: performing a calibration does not extend the amount of time during which calibration is possible. Each calibration for a particular dive must take place within two minutes of starting up the OXYgauge.**	▼0.2 OK BAR
Changing to "Ready for calibration" mode	To carry out calibration, remove the gas sensor from the re-breather bag and allow the sensor reading to settle. In ambient air, the instrument will indicate an alarm condition. This is normal. While still in monitoring mode, press the control button six times in succession. The display switches over to indicating "CAL" and the PPO_2 reading alternately.	CAL 0.2 BAR
Calibrating	Press the control button twice to calibrate the sensor. The "CAL" indication on the display will now remain constant.	

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Function	Description	Display
Aborting calibration	To cancel calibration while in "Cal Ready" mode, press the control button three times in succession. Normal PPO$_2$ monitoring mode will be restored.	
Successful calibration	If the sensitivity calibration was successful, the display indicates "CAL OK" for five seconds and then returns to monitoring mode. A new sensor gain setting is stored in the permanent memory.	CAL OK

During calibration, there are two specific cases where
an error may be detected and displayed on the monitor.
If an error is indicated, you should carefully check your
settings and determine the cause of the problem before
you continue. Never ignore an error during calibration.

Function	Description	Display
Calibration failed Gas too low	If the PPO_2 is lower than expected, the OXYgauge attempts to correct the value by increasing the gain. If the required increase in gain is too high, the message "Err" is displayed, together with the icon "L" ("L" = Lower than expected PPO_2). After 5 seconds, the instrument resumes monitoring mode with the previous gain setting unchanged.	▼Err
	If "Err" is displayed, check that:	
	a. the sensor contacts are clean and that the sensor is correctly installed (see Figure 8).	
	b. the sensor unit is NOT in the rebreather bag with the cylinder gas shut off. The sensor unit must be in ambient air during calibration (see Figure 6).	
	If these checks are positive and "Err" is still displayed, the sensor can no longer be calibrated and must be replaced before the OXYgauge can be used again.	
Calibration failed Gas too high	If the PPO_2 is higher than expected, the OXYgauge attempts to correct the value by reducing the gain. If the required reduction in gain is too high, the message "Err" is displayed, together with the icon "H" ("H" = Higher than expected PPO_2). After 5 seconds, the instrument resumes monitoring mode with the previous gain setting unchanged. If "Err" is displayed, check that: the sensor unit is NOT in the rebreather bag with the cylinder valve open. The sensor unit must be in ambient air during calibration (see Figure 6).	▲Err

> ⚠️ **Never ignore an error display during calibration of the OXYgauge. These errors must be corrected before using the OXYgauge to ensure that the OXYgauge will provide correct information during the dive.**

With regular calibration and proper storage, the sensor has a service life of about 1 to 1.5 years. Although the sensor can operate for a few months without calibration, the frequency of calibration depends on the operating hours of the sensor and on the ambient storage conditions. Regular calibration is necessary in order to ensure safe operation of the OXYgauge and is described in the "Calibration" section above.

Altitude adjustment

Since altitude has a direct influence on the partial
pressure of oxygen, divers should check **BEFORE**
calibrating in ambient PPO_2 that the altitude setting
of the OXYgauge corresponds to the altitude at which
the instrument will be used.

Function	Description	Display
Switching over to "Set altitude range"	While in "Cal Ready" mode (see section on "Calibration"), press the control button six times in succession to enter "Set altitude" mode.	r 1
Changing the altitude range	While in "Set altitude" mode, the display shows the currently set altitude range. The set altitude range can be incremented by one with each press of the button. On reaching the highest allowed range, a further press of the button will return the display to the lowest altitude range, and the count is then restarted with each further press of the button. Please refer to the table below to find the altitudes represented by each range.	r 2 r 12
Saving the selected altitude range	When you have selected the correct altitude range, you can return to "Cal ready" mode by pressing the control button two times in succession. Alternatively – if you wish to cancel all changes – you can abort "Set altitude" mode by pressing the button three times in succession. Or, again, you can wait until the instrument counts 30 seconds from the last press of the button and automatically exits "Set altitude range". On returning to "Cal ready" mode, the last range displayed will be stored in permanent memory. The instrument may now have to be calibrated to the new ambient PPO_2 level.	CAL ▼0.21 BAR

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Range setting	Altitude in metres	Assumed ambient PPO$_2$, in bar
r1	0 – 300	0,21
r2	301 – 600	0,2
r3	601 – 900	0,19
r4	901 – 1200	0,18
r5	1201 – 1500	0,18
r6	1501 – 1800	0,17
r7	1801 – 2100	0,16
r8	2101 – 2400	0,16
r9	2401 – 2700	0,15
r10	2701 – 3000	0,14
r11	3001 – 3300	0,14
r12	3301 – 3600	0,13

Table 1: Assumed PPO$_2$ in ambient air, as a function
       of the altitude range

⚠️ **Failure to set the correct altitude range before the dive greatly increases the risk of decompression sickness, which can lead to serious injury or death. The instrument does not automatically detect altitude changes. The altitude range must be manually set by the user.**

Predive assembly of the OXYgauge with your Atlantis, Dolphin or DrägerRay Rebreather

The procedure described below includes the installation of the OXYgauge in the rebreather and some of the predive preparations of the rebreather.

However:

Prepare your rebreather carefully and perform all checks in accordance with its specific Instructions for Use. The description below in no way replaces the full description given in the specific Instructions for Use of the apparatus.

- Careful inspection of components: check that all components of the OXYgauge are in good condition and are undamaged. This inspection includes:

  Display unit: display visible and undamaged; no sign of water inside the display housing.

  Cable: securely attached to the display unit and sensor unit.

  Sensor unit: red O-ring undamaged and lightly lubricated; sensor undamaged with clean contacts on both sensor and holder; sensor securely installed in the unit by the plastic snap cap.

- Inspect your rebreather and check that it is complete and in good working condition. Proceed as specified in the Instructions for Use of your rebreather and prepare the Atlantis or Dolphin up to the stage when the breathing bag is mounted on the rebreather. In the case of the DrägerRay, the unit is mounted to the underside of the soda lime canister (see Instructions for Use of DrägerRay).

- After securing the 4-port inhalation bag in the housing, interrupt the normal rebreather assembly procedure, with the rebreather assembled complete with breathing bag but without the pneumatic system (only applies to the Atlantis or Dolphin).

- Then insert the OXYgauge sensor housing through the slot in the outer shell for the medium pressure hoses. Do not plug it into the breathing bag yet (see Figure 6) (only applies to the Atlantis or Dolphin).

- Switch on the OXYgauge and check that the PPO$_2$ reading is correct **"in ambient air"** (see section on "Activation and setup").
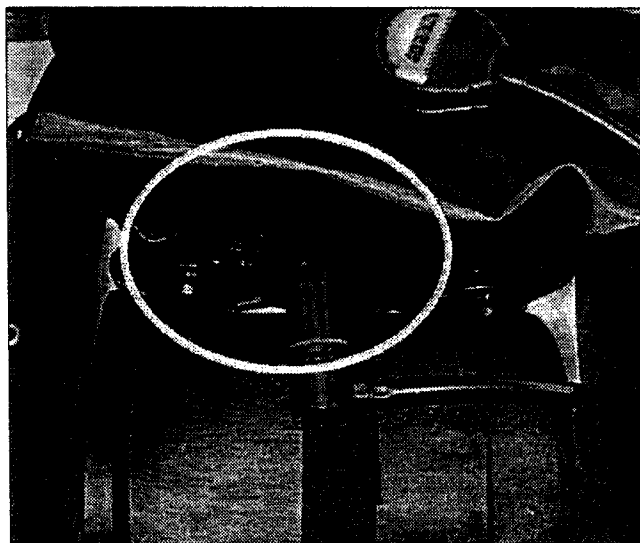

Figure 6: Sensor housing in standby position

- If the OXYgauge is correctly calibrated, continue assembling the rebreather by plugging the sensor housing into the port (see Figure 7).
  If the OXYgauge is not correctly calibrated, it must be calibrated before use.
  To plug the sensor housing into the port, press the button on the bag port and push the sensor housing into the port until you hear it click into place. Check that the connection is secure.

- Now install the pneumatic system on the rebreather as described in the relevant Instructions for Use.

- Perform the flow rate test on the rebreather as specified in the Instructions for Use. Mount the dosage device in the breathing bag and perform all leak tests and operating checks specified in the Instructions for Use of the Atlantis, Dolphin or DrägerRay.

- Make sure that the OXYgauge is properly connected to the rebreather. The sensor unit is connected to the breathing bag of the rebreather by a snap-in connector. Listen for the "click" and pull on the sensor unit to check that it is securely engaged and correctly connected. Check that the rebreather has been correctly assembled.

- Once assembly is complete, route the OXYgauge cable over the diver's body so that the display unit is positioned in front of the diver's body. The OXYgauge is clipped to the diver's harness at chest level, to ensure a clear view of the display underwater. Use a retractor or clip to hold the display in position, so that it is easy to locate and does not dangle. Dangling display units can be damaged and can entangle the diver and cause damage to marine life.
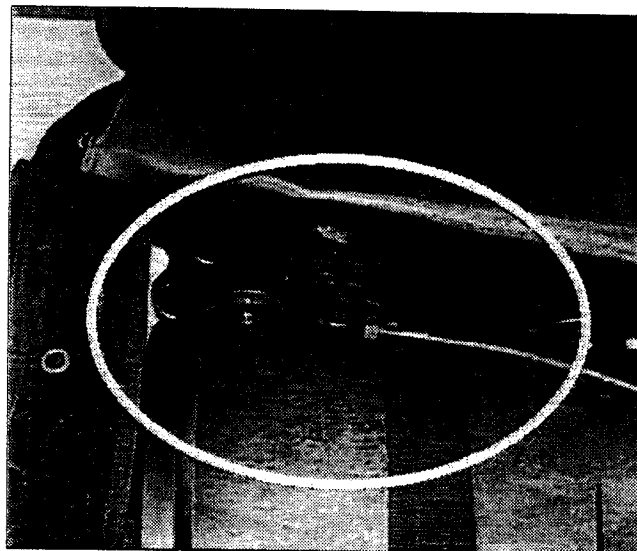

Figure 7: Plugging the sensor housing into place

> ⚠ Positioning the OXYgauge display unit behind the diver or low on the body or in a pocket may reduce the ability of the diver to hear the audible alarm or may otherwise impede easy monitoring of the display unit.

Underwater, the following information is displayed:

- Current PPO$_2$ value
- Battery low

Diving with the OXYgauge

- Activate the OXYgauge before you enter the water. It will not self-activate.

- Monitor the performance of the OXYgauge during the dive. If it does not seem to be functioning correctly, abort the dive and return to the surface following the predetermined ascent procedure.

- It is particularly important to monitor the OXYgauge visually if you are wearing a hood, because hoods can reduce your ability to hear the audible alarms. You should also monitor the OXYgauge visually under conditions of turbulence or loud noise.

- Keep a constant watch on your dive depths, elapsed dive time and remaining no decompression dive time.

- Monitor your gas supply, and keep your buddy informed.

Alarm conditions during PPO2 monitoring

Event	Description	Display
Low PPO$_2$ Pre-alarm	If the PPO$_2$ drops to 0.30 bar or less, the pre-alarm sequence will sound, and the "L" icon will appear. To acknowledge and silence the pre-alarm, press the control button once. The "L" will remain displayed until the PPO$_2$ rises to 0.32 bar or more.	▼0.30 BAR
Low PPO$_2$ Main alarm	If the PPO$_2$ drops to 0.30 bar or less, the pre-alarm sequence will sound, and the "L" icon will appear. To acknowledge and silence the pre-alarm, press the control button once. The "L" will remain displayed until the PPO$_2$ rises to 0.32 bar or more.	▼0.25 BAR
High PPO$_2$ Pre-alarm	If the PPO$_2$ rises to 1.40 bar or more, the pre-alarm sequence will sound, and the "H" icon will appear. To acknowledge and silence the pre-alarm, press the control button once. The "H" will remain displayed until the PPO$_2$ drops to 1.35 bar or less.	1.40

Event	Description	Display
High PPO$_2$ Main alarm	If the PPO$_2$ rises to 1.60 or more, the instrument triggers the main alarm. The diver is in immediate danger. The main alarm will continue to sound until the PPO$_2$ drops to 1.40 bar. This alarm cannot be deactivated by the diver. The "H" icon flashes.	1.60 BAR
Low battery indicator	The battery icon appears when the battery is at 4.5 Volt and needs to be replaced.	0.32 BAR

Always check your gas mix before each dive.

> ⚠ **Some training federations recommend a PPO$_2$ of less than 1.4 bar. Always follow the recommended PPO$_2$ levels of your training federation. Exceeding 1.4 bar can cause serious injury or death.**

Underwater functions of OXYgauge (dive mode)

Once the OXYgauge is mounted in your rebreather and activated, it begins providing a real time display of the partial pressure of oxygen in the breathing circuit. If you were to observe the display during the entire dive, you might see the following displays:

Nitrox cylinder supply "OFF"

- The PPO_2 is very close to 0.21 bar, indicating that the PPO_2 is too low and that the valve must be opened before you can breathe from the rebreather.

- The OXYgauge is in "Low PPO_2" alarm mode.

Nitrox cylinder supply "ON"

Diver not breathing from the rebreather:

- The OXYgauge registers a higher PPO_2, based on the enriched oxygen concentration in the cylinder while the dosing device is filling the breathing circuit with gas.

- The "Low PPO_2" alarm will be triggered again if the PPO_2 falls below 0.25, and audible alarms will again be sounded even if the diver has previously muted them.

Nitrox cylinder supply "ON"

Diver breathing from the rebreather:

- The PPO_2 falls to a value lower than the oxygen' concentration in the cylinder, as a function of the diver's work rate, until it stabilises at a PPO_2 value determined by the work rate.

Nitrox cylinder supply "ON"

Diver slowly descending to the planned maximum depth

- The PPO_2 increases due to the increase in partial pressure caused by the increased hydrostatic pressure.

- At a given depth, the PPO_2 again settles at a level corresponding to the diver's work rate: the higher the diver's oxygen consumption, the lower the PPO_2. If the work rate is reduced, the PPO_2 slowly rises and resettles.

Nitrox cylinder supply "ON"

Diver ascending slowly to the surface:

● The PPO$_2$ decreases due to the reduction in
  hydrostatic pressure, but can also reflect a change
  in the diver's work rate.

Nitrox cylinder supply "ON"

**Strenuous exertion by the diver, followed by a direct
ascent to the surface**

● The PPO$_2$ will fall dramatically, because more oxygen
  is being consumed, and at the same time the partial
  pressure is decreasing due to the ascent.

● Divers should remember to purge the breathing circuit
  before commencing the ascent, in order to ensure an
  appropriate PPO$_2$ in the breathing circuit.
  Divers should monitor the OXYgauge closely in
  order to be able to respond rapidly to a sudden
  drop in PPO$_2$.

During the dive, the OXYgauge will attempt to monitor
and alert the diver if the PPO$_2$ is too low or too high. If
these conditions are detected, the OXYgauge alerts the
diver with visual and audible alarms. The diver must then
take appropriate action to correct the cause of the alarm.
Divers must carefully read the "Emergency procedures"
section and continually train in reacting with the
appropriate controlled response to these situations.

Plan for an immediate aborting of the dive, with a safe
and controlled ascent, in the event that the OXYgauge
fails or if the data delivered by the OXYgauge appears
incorrect.

Limitations of the OXYgauge:

● The maximum operating depth of the OXYgauge is 40 metres.

● The OXYgauge must be calibrated at the surface in ambient air.

● The OXYgauge monitors the PPO_2 in the breathing circuit of the rebreather. It cannot be used to monitor the diver's oxygen exposure (i.e. it cannot be used as "oxygen therapy unit", "oxygen tolerance unit" or "oxygen clock").

⚠ The OXYgauge must be switched on by the diver before entering the water. It does not self-activate.

⚠ If you are swimming or working hard as you descend, it is possible to consume so much oxygen that you descend below the maximum operating depth for your nitrox mixture without the high oxygen alarm being activated. However, if you then purge the breathing bag, for example by clearing your mask, the oxygen level will increase sharply as the bag refills. A return to normal activity will also cause the oxygen concentration to rise. An increase in oxygen concentration can cause oxygen convulsion, drowning or death. Always plan your dive based on the oxygen concentration in the cylinder, not on the concentration in the breathing circuit.

Emergency procedures

Emergency situation	Possible cause	Corrective action
"Low PPO$_2$" alarm	1. Gas cylinder empty.	1. Check the pressure gauge: if the nitrox cylinder is empty, switch to the emergency breathing system and abort the dive with the correct ascent procedure. With the DrägerRay Rebreather: breathe calmly and ascend immediately to the surface. Danger of hypoxia. Switch over to the emergency breathing system of your dive buddy.
	2. High oxygen consumption is reducing the O$_2$ in the breathing circuit.	2. Immediately reduce your O$_2$ consumption and exhale several times through the nose to activate the bypass valve.
	3. The system was not purged before the ascent.	3. Before the direct ascent to the surface, immediately reduce your O$_2$ consumption and exhale several times through the nose to activate the bypass valve.
"High PPO$_2$" alarm	1. The maximum depth for the nitrox mixture has been exceeded.	1. Reduce your O$_2$ consumption and ascend to a depth above the maximum operating depth for this gas mixture, in order to reduce the PPO$_2$.
PPO$_2$ display does not vary even with depth changes	1. Moisture in the breathing circuit may be wetting the sensor.	1. Reduce and monitor your work rate.
	2. The breathing circuit is flooded.	2. If the breathing circuit is flooded, switch to the emergency breathing system in order to ascend to the surface.

Switching off the OXYgauge

The OXYgauge can be switched off – or switches itself
off – as follows:

Function	Description	Display
Switching off manually	Press the control button three times in succession: the display will read "OFF". Press the button another two times to switch off the display unit. If the control button is not pressed within five seconds while the display shows "OFF", the instrument will return to PPO_2 monitoring mode.	```OFF```
Automatic cutout	If the instrument registers that the PPO_2 has been stable for the last 3 hours, or if the battery voltage is too low, the message "END" is displayed for one minute on the display. During this period, the instrument beeps once per second. It then switches off automatically.	```End```

⚠ **Never switch off the OXYgauge underwater. If switched off, the OXYgauge cannot emit any visual or audible alarms.**

Care and maintenance of OXYgauge

Post-dive maintenance, cleaning and storage

After use, a few simple maintenance steps will be sufficient to ensure safe operation and longer life of the sensor.

- Rinse the OXYgauge carefully with fresh water and allow it to dry in a cool place away from direct sunlight. Rinsing is particularly important after the instrument has been exposed to salt water.

- To remove dirt, use only a mild detergent and a soft brush.
  Rinse thoroughly with fresh water and allow to dry in a cool place.

⚠️ **Never use solvents or compressed air to clean or dry the OXYgauge. Never clean the sensor in disinfectant solutions or alcohol.**
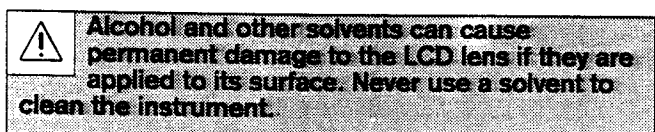
- Check the general condition of the OXYgauge, and make sure that the sensor contacts and the contacts of the sensor holder are clean with no signs of corrosion.

- If the sensor has been exposed to salt water, allow it to soak for 5 to 10 minutes in lukewarm fresh water. Rinse it off and allow it to dry before storage.

- When the sensor is clean and dry and if there are no leaks or corrosion at the contacts, it can be stored in a clean, dry, airtight container.

- Check the O-ring on the sensor holder for cuts or nicks.
  Replace the O-ring if necessary.

- Lightly lubricate the O-ring with Christo-Lube MCG-111 or Molykote 111.

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NOTE

Never mix lubricants. Always fully remove old grease before applying new grease.

● When storing the OXYgauge, avoid exposing it to direct sunlight or other sources of extreme heat.

● Do not drop the OXYgauge.

⚠ **Alcohol and other solvents can cause permanent damage to the LCD lens if they are applied to its surface. Never use a solvent to clean the instrument.**

For servicing and maintenance work other than replacing the battery or sensor, please contact your closest dealer:

DrägerDive Vertriebs & Service GmbH
Germany
🏠 Murgtalstraße 28
D-79 736 Rickenbach-Hottingen
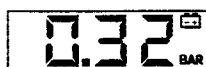☎ +49 77 65 -9 29 80
FAX +49 77 65 -9 28
e-mail: mail@draeger-dive.de

Replacing the battery and sensor

The OXYgauge constantly monitors the battery voltage.

When the computer is in use, low battery voltage is indicated by:

```
0.32
```

A battery icon appears on the display unit. After the low battery icon comes on, the monitor will continue to operate for a few more hours before it becomes inoperable.

Battery specifications

Battery type: DURACELL PX28L, 6 Volt
Service life: approx. 300 hours
Storage: approx. 8 years

Battery replacement

You can replace the battery yourself (see Figure 8).

Open the back cover:

- Remove the display unit from its protective rubber boot by carefully rolling the top of the boot forward over the front of the display unit.

- Rinse off the OXYgauge and dry the outer housing.

- Unscrew the battery cover from the outer housing. Remove the round battery retaining plate.

- Carefully remove the battery from the holder, using a plastic pick.

- Replace the battery. Make sure to match the positive end of the battery with the positive end of the battery compartment, as marked at the bottom of the battery holder.

Reassemble the instrument:

- Do not touch the battery contacts with your fingers. Place the round battery plate over the two contact pins.

- Clean the O-ring and battery cover to make sure that there are no particles on the O-ring or sealing surface.

- Lightly lubricate the O-ring with silicone grease such as Molykote 111.

- Place the O-ring in the groove in the battery cover, and carefully screw the cover onto the outer housing.

- Tighten the cover.

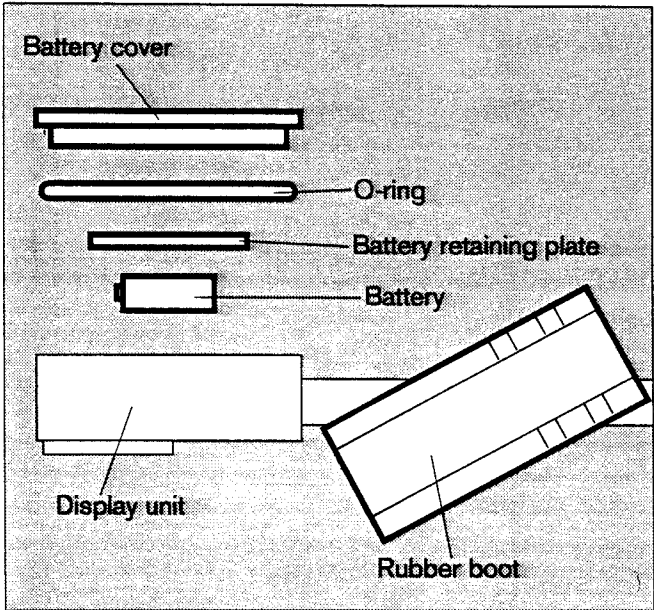- Remount the OXYgauge display unit in the rubber boot; wetting the inside of the boot makes it easier to fit.

⚠ **Failure to follow the above instructions and/or failure to use authentic OXYgauge O rings will void the warranty.**

Figure 8: Battery replacement

Replacement of the oxygen sensor

The sensor must be replaced if it leaks, has corroded contacts or fails to calibrate properly (see Figure 9).

To replace the sensor:

- Remove the sensor holder from the breathing bag.
- Remove the snap-cap from the front of the sensor and remove the old sensor.
- Place the new sensor in the holder, with the gold-coloured rings facing the pins in the holder. Refit the snap-cap.
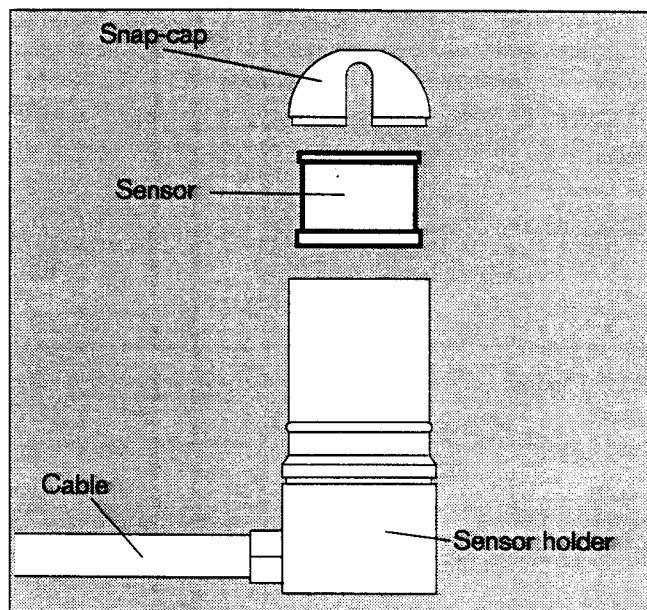

Figure 9: Sensor replacement

Technical data

Depth range:	Max. 40 m
Temperature range:	−10°C to 40°C
Altitude range:	0 − 3500 metres

Battery:
Power source:	DURACELL PX 28 L
Volts:	6
Service life:	approx. 300 hours of diving

Consumables replacement schedule

Sensor:	approx. every 1 − 1.5 years, depending on the operating and storage environment
Battery:	approx. every 300 diving hours
O-rings:	Every 2 years, or when damaged

Ordering information

Description	Part No.
OXYgauge maintenance kit	4055798
Sensor, oxygen	6809977

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