

User Manual PpO₂ Meter U93001



WARNING

This user manual is NOT a substitute for the specialist diver certification for use of rebreathers. Do not use the U93001 ppO₂ meter until you have acquired the specific licence for diving with rebreathers. Failure to comply with these restrictions may result in serious injury or death.



DANGER

We are not responsible for any harm or damage to equipment or any person using the device. Using a device like this requires proper training. As all electronic devices it also may fail once. Always be aware of what you are doing. Any ppO₂ display is always only an extra additional help for the diver, it does nothing but showing the ppO₂!

This O₂ (ppO₂) meters is a simple device to monitor ppO₂ using chemical cells.

There is no need to open the display unless the battery needs to be replaced.

Overview

- timer for automatic turn off (200 minutes)
- turn on by with touching the water contacts
- automatic calibration in air
- after calibration automatic turn off after 200 minutes.
- on surface display shows ppO₂ and time to shut down by altering the display. touching the contacts will reset the timer again to 200 minutes
- optical LED warnings, red LED, right of display
- low alarm at ppO₂ 0.40
- high alarm at ppO₂ 1.50
- reset timer via the water contacts.

Functions:

Switch on:

The unit is turned on by shortcutting the two water contacts with any metal or just wet fingers.



DANGER :

The ppO₂ meter can not be turned on by jumping into the water!! You have to shorten the contacts, release the contacts and wait for the start up process. Always turn unit on in air with 1 bar ambient pressure, wait for proper calibration and start diving then when all is OK. Failure to comply with these restrictions may result in serious injury or death.

After activation the display shows the battery voltage (e.g. "V 3.5"), then "SE" (for sensor exists). If a sensor is connected, it displays the mV of the sensor (e.g. "10.2 mV"). The sensor must have a voltage between 7 to 15 mV. Only within this range an automatic calibration is done. If no sensor is connected "Ser" (sensor error) is displayed and display turns off directly. If sensor is below 7 mV "CAL" is displayed and afterwards "SEL" is shown (sensor low). If sensor is over 15 mV "CAL" is displayed and afterwards "SHE" is shown (sensor high).

"CAL": system is calibrating; "0.21" actual partial pressure O₂. After calibration the sensor should be checked with pure oxygen to see if sensor is linear. Display should show at least 98% in pure O₂. *The check in pure O₂ is only a check to verify linearity of the sensor. It is NOT a second calibration point!*

After successful calibration the display stays on for 200 minutes. After 5 minutes on surface the display changes from ppO₂ to time to shut off (time is running backwards 200->0 min). Touching both water contacts resets the timer back to 200 minutes. Low Alarm must shortly be shown to reset the time). Also after a dive, after 5 minutes display shows ppO₂/timer (running backwards) and turn off after 200 minutes.

Alarm functions under water:

The display has a HIGH (ppO₂ 1.50 bar or higher) and a LOW (ppO₂ below 0.40 bar) ppO₂ alarm. A red LED is flashing to show these alarms; it is possible to send these alarms also to HUD (option). The blinking frequency of the HIGH alarm is two times faster than the LOW alarm.

Calibration:

The system is always calibrated with AIR (21% O₂). After successful calibration the sensor should be checked in pure O₂ to verify capacity and linearity and has to show at least 98% (only a check, not a calibration).

Reset:

The displays timer (shut off) can be reset by bridging the water contacts shortly.



WARNING :

After turn off, the unit must be calibrated in air 21% O₂ with 1 bar ambient pressure!!!

Once the display is turned off then on next turn on it will calibrate again. So be sure the sensor is in air then!!! If you like to make a second dive, take care you touch the contacts before the display turns off to keep actual calibration!!! When

you disconnect the sensor the display turns off directly Also then on next turn on sensor has to be in air with 1 bar ambient pressure as again a calibration starts.

Battery:

If the sensor is connect and sensor is working well the battery status is checked. If battery voltage is too low a warning is shown "Battery" [bA]. The display will work anyway! It will work as long as display can be read! So this is an early warning to make sure you have replacement battery ready. Better change the battery when the voltage is about 2.4 V.

Use:

Now the display is ready to use and will permanently show the ppO₂. If the ppO₂ goes below 0.40 or is higher than 1.50 the LED will flash as a warning. The display itself always shows the actual ppO₂.

The LED flashing is only active below 0.40 and over 1.50 AND when unit is under water.

Even these values are in the "normal range" of allowed ppO₂ the flashing LED is an early warning to check the value and check the system.

In any case, the diver frequently must take a look to verify the ppO₂ on the display. The LED is just an extra emergency warning.

Turn off:

Once the unit is out of water and the water contacts are dry and not bridged anymore. The unit will turn off automatically after 200 minutes. A few minutes before reaching 200 minutes the display will show "OFF" and then turns off.

At any time you can bridge the contacts to extend this time for an other 200 minutes or turn it on when it is sleeping.

Second possibility is to disconnect the sensor. The unit will turn off within 5 seconds. Directly when sensor is disconnected the display shows "OFF" and turn off immediately.

Technical details:

- Auto ON/OFF and manual on/off
- Sensor voltage in air 7mV - 15mV
- Display: 0.00 - 1.99
- Warning LED: Low 0.40, High 1.50
- Sensor: Analytical Industries PSR 11 39 MD3, MHD, TME, MDSX
- All R22D and compatibles (approx 10 mV in air)
- Altitude: 0 - 500 meters (not for high mountains use)
- Battery: life time approx 1000 to 1100 hours, realistic with some LED in use is around 600 to 800 hours
- Battery is easy user replaceable.

Diving at altitude:



WARNING :

The unit is not built to be used in altitude diving!!!

The difference compared to sea level can be seen in the following table.

Altitude in meters, Pressure in mbar, ppO₂ Air in bar

Altitude in Meter	Air pressure	ppO₂ air
0	1013	0,21
300	976	0,20
500	952	0,20
700	928	0,19
1000	984	0,19
1250	866	0,18
1500	840	0,17
1750	814	0,17
2000	789	0,16
2250	764	0,16
2500	741	0,15

Data may change due to software development and updates. Changes and optimizing is a continuous process. Major changes will be published in new manuals of course.

The manual may have errors.