

Recreational Nitrox Calculator

Version 3.0

Overview

The Recreational Nitrox Calculator is a tool for divers to calculate various diving related parameters when diving on air or Nitrox and is designed to run on PCs running Windows operating systems. It accepts the following user inputs, which are restricted to the recreational limits shown:

- The oxygen percentage ($O_2\%$) between 21% and 40%
- Maximum O_2 partial pressure (PO_2) between 1.0 and 1.4 ata (1.6 ata contingency)
- Maximum Operating Depth (MOD) to 40 metres (130 ft)

Given any two of the above parameters the third can be calculated and the tool is arranged into three separate calculators as follows:

- Input $O_2\%$ and PO_2 to calculate MOD
- Input MOD and PO_2 to calculate $O_2\%$
- Input MOD and $O_2\%$ to calculate PO_2

The tool will also give the following parameters for each calculator:

- The Equivalent Air Depth (EAD)
- The percentage of nitrogen in the mix ($N_2\%$)
- Maximum nitrogen partial pressure (PN_2) – (i.e. at the MOD)
- Maximum ambient pressure (AP) – (i.e. at the MOD)

The first two calculators are the most useful. Normally the max PO_2 would be left at the default value of 1.4 ata; the maximum partial pressure limit for enriched air diving. The first calculator will give the maximum depth for a given Nitrox blend whilst the second calculator will give the maximum oxygen percentage for a given depth. The third calculator has been added for completeness, allowing the calculation of the PO_2 for given MOD and $O_2\%$ values.

Installation

Download, unzip and save the tool to a suitable location on your computer. Go into the “Recreational Nitrox Calculator ver3.0” folder and click on the setup.exe file. The program will be installed on your machine and will appear on your Start menu under “All programs”. It may be removed by using the Windows “Add or Remove programs” utility found in the “Control Panel”.

Using the tool

Entering values

The tool will cater for both metric and imperial units by selecting “Metres” or “Feet” as appropriate under the “Units” setting. Changing this setting will result in the tool being reset.

Under the “Water” setting select either “Salt” or “Fresh” water. Due to their slightly different specific gravities small differences in the results will occur. The specific gravity of salt water has been set at 1.03, which is a fairly widely accepted value for sea water worldwide. Changing this setting after performing a calculation will dim any values that will need to be recalculated; click on the appropriate “Calculate” button to update the results.

Select the required calculator depending on which parameter you wish to calculate. O₂% values of between 21% (air) to a maximum of 40% can be entered.

O₂ Partial pressure values of between 1.0 and 1.4 ata can be entered, PO₂ values above this up to 1.6 ata can also be entered but this is for contingency use only. **DO NOT PLAN DIVES USING PO₂ VALUES ABOVE 1.4 ata.** This facility has been added purely for information use only and if values above 1.4 ata are selected the colour of the value in the menu will turn amber as a warning.

MOD values can be entered to a maximum depth of 40 metres or 130 feet.

The “Reset” buttons will clear all displayed results and reset input values to their defaults, “Reset all” will clear the whole tool. The “Calculate” buttons, when clicked, will check that inputted values are acceptable and then calculate and display results. Any inputted values out-of-range will result in a warning alert and the mouse cursor will select the incorrectly entered value.

Click “Exit” to close the program.

Displayed results

Although the values entered above are restricted to recreational values some calculated values may be outside of this range. In these cases the colour of the displayed values will change as follows:

- Amber: value is in the contingency range.
- Red: value is beyond contingency range and beyond recreational diving limits.

Valid values will be shown in the Windows default colour (black). Only dive if all the shown values are black.

Terminology

Oxygen percentage (O₂%): The percentage of oxygen in the blend.

Oxygen partial pressure (PO₂): The pressure of the fractional part of the oxygen in the blend at a given depth.

Maximum Operating Depth (MOD): The planned (or actual) maximum depth of the dive.

Equivalent Air Depth (EAD): The depth at which compressed air exerts the same partial pressure of nitrogen as the nitrox blend under discussion. The EAD is always shallower than the actual depth for recreational diving. For a given depth, blends with higher oxygen content than air will exhibit lower nitrogen partial pressures than for compressed air.

Nitrogen percentage (N₂%): The percentage of nitrogen in the blend.

Maximum Nitrogen partial pressure (Max PN₂): The pressure of the fractional part of the nitrogen in the blend at depth. The partial pressure is dependent on the fraction of nitrogen in the blend and the ambient pressure.

Max Ambient pressure (Max AP): The maximum ambient pressure for the MOD of the dive. This is approximately 1 atmosphere (atm) for every 10 metres (33 feet) of sea water plus 1 atm due to the weight of the atmosphere at sea level.

Blend: A given mixture of nitrogen and oxygen.

Disclaimer

The Recreational Nitrox Calculator must **NOT** be used to plan dives without resort to conventional dive tables or a dive computer; it is not intended to replace either. The tool does not take into account the build up of oxygen within the body and it's affects on the body. Oxygen toxicity may cause a diver to convulse underwater and may lead to drowning. The user accepts the results of this tool and the programmer is not responsible for any inaccuracies in it. If you don't agree to these terms then don't use the tool. All information is given in good faith.

Version

The Recreational Nitrox Calculator was completely re-written for version 3.0 to update the tool for newer Windows operating systems and features a cleaner looking user interface. The tool now requires to be installed on the user's machine.

Please contact me for any errors or inaccuracies to: stevecain@o2.co.uk

Comments or requests for improvements or additions are welcome.