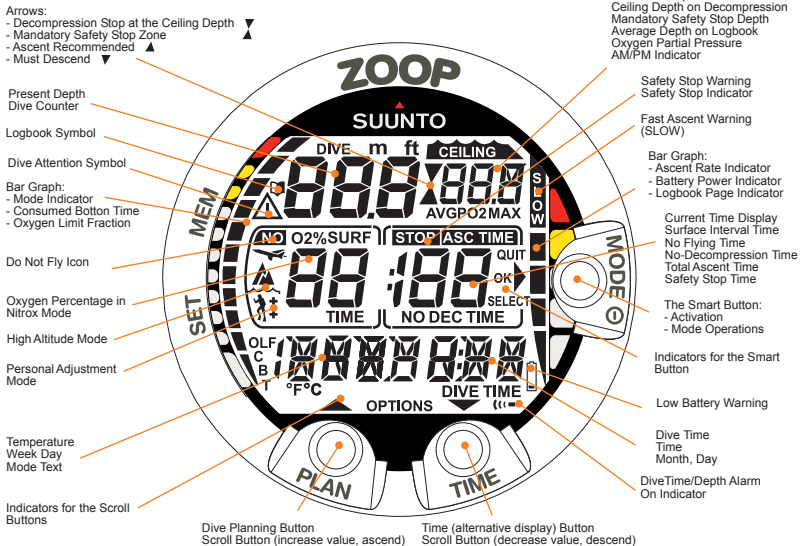


SUUNTO ZOOP

USER'S GUIDE

Quick reference guide ZOOP



INTELLECTUAL PROPERTY AND CONFORMANCE STATEMENTS

TRADEMARK

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PATENT NOTICE

Patents have been issued or applied for one or several features of this product.

CE


The CE mark is used to mark conformity with the European Union EMC directive 89/336/EEC.


EN 13319


EN 13319 is a European diving depth gauge standard. Suunto dive computers are designed to comply with this standard.

EN 250 / FIOH


The tank pressure gauge and dive instrument parts used in measuring the tank pressure meet the requirements set in the section of the European Standard EN 250 that concern tank pressure measurements. FIOH, notified body no.0430, has EC type-examined this type of personal protective equipment.

 **WARNING** *YOU MUST READ the leaflet and user guide for your dive computer. Failure to do so may lead to improper use, serious injury or death.*


 **WARNING** is used in connection with a procedure or situation that may result in serious injury or death.




 **CAUTION** is used in connection with a procedure or situation that will result in damage to the product.






 **NOTE** is used to emphasize important information.

 **NOTE!** *You can change from Air mode to Nitrox mode at any time. It is however not possible to revert back to Air mode from Nitrox mode before the instrument has counted down the no-flying time.*


When planning both air and nitrox dives during the same dive series, you should set the instrument in Nitrox mode and modify the gas mix accordingly.


 **WARNING** *ALLERGIC REACTIONS OR SKIN IRRITATIONS MAY OCCUR WHEN PRODUCT IS IN CONTACT WITH SKIN, EVEN THOUGH OUR PRODUCTS COMPLY WITH INDUSTRY STANDARDS. IN SUCH EVENT, STOP USE IMMEDIATLY AND CONSULT A DOCTOR.*


-  **WARNING** *NOT FOR PROFESSIONAL USE! Suunto dive computers are intended for recreational use only. The demands of commercial or professional diving may expose the diver to depths and exposures that tend to increase the risk of decompression illness (DCI). Therefore, Suunto strongly recommends that the device not be used for commercial or professional diving activity.*
-  **WARNING** *ONLY DIVERS TRAINED IN THE PROPER USE OF SCUBA DIVING EQUIPMENT SHOULD USE A DIVE COMPUTER! No dive computer can replace the need for proper dive training. Insufficient or improper training may cause a diver to commit errors that may lead to serious injury or death.*
-  **WARNING** *THERE IS ALWAYS A RISK OF DECOMPRESSION ILLNESS (DCI) FOR ANY DIVE PROFILE EVEN IF YOU FOLLOW THE DIVE PLAN PRESCRIBED BY DIVE TABLES OR A DIVE COMPUTER. NO PROCEDURE, DIVE COMPUTER OR DIVE TABLE WILL PREVENT THE POSSIBILITY OF DCI OR OXYGEN TOXICITY! An individual's physiological make up can vary from day to day. The dive computer cannot account for these variations. You are strongly advised to remain well within the exposure limits provided by the instrument to minimize the risk of DCI. As an added measure of safety, you should consult a physician regarding your fitness before diving.*

-  **WARNING** *SUUNTO STRONGLY RECOMMENDS THAT SPORT DIVERS LIMIT THEIR MAXIMUM DEPTH TO 40 M [130 FT] OR TO THE DEPTH CALCULATED BY THE COMPUTER BASED ON THE SELECTED O₂% AND A MAXIMUM PO₂ OF 1.4 BAR! Exposure to greater depths increases the risk of oxygen toxicity and decompression illness.*
-  **WARNING** *DIVES WITH REQUIRED DECOMPRESSION STOPS ARE NOT RECOMMENDED. YOU SHOULD ASCEND AND BEGIN DECOMPRESSION IMMEDIATELY WHEN THE DIVE COMPUTER SHOWS YOU THAT A DECOMPRESSION STOP IS REQUIRED! Note the blinking ASC TIME symbol and the upward pointing arrow.*
-  **WARNING** *USE BACK-UP INSTRUMENTS! Make sure that you use back-up instrumentation including a depth gauge, submersible pressure gauge, timer or watch, and have access to decompression tables whenever diving with the dive computer.*
-  **WARNING** *PERFORM PRECHECKS! Always activate and check the device before diving in order to ensure that all Liquid Crystal Display (LCD) segments are completely displayed, that the device has not run out of battery power, and that the oxygen, altitude and personal adjustments are correct.*
-  **WARNING** *YOU ARE ADVISED TO AVOID FLYING ANY TIME THE COMPUTER COUNTS DOWN THE NO-FLY TIME. ALWAYS ACTIVATE THE COMPUTER TO CHECK THE REMAINING NO-FLY TIME PRIOR*


TO FLYING! Flying or travelling to a higher altitude within the no-fly time can greatly increase the risk of DCI. Review the recommendations given by Divers Alert Network (DAN). There can never be a flying after diving rule that is guaranteed to completely prevent decompression illness!


 **WARNING** *THE DIVE COMPUTER SHOULD NEVER BE TRADED OR SHARED BETWEEN USERS WHILE IT IS IN OPERATION! Its information will not apply to someone who has not been wearing it throughout a dive, or sequence of repetitive dives. Its dive profiles must match that of the user. If it is left on the surface during any dive, the dive computer will give inaccurate information for subsequent dives. No dive computer can take into account dives made without the computer. Thus, any diving activity up to four days prior to initial use of the computer may cause misleading information and must be avoided.*


 **WARNING** *DO NOT EXPOSE ANY PART OF YOUR DIVE COMPUTER TO ANY GAS MIX CONTAINING MORE THAN 40% OXYGEN! Enriched air with greater oxygen content presents a risk of fire or explosion and serious injury or death.*

 **WARNING** *THE DIVE COMPUTER WILL NOT ACCEPT FRACTIONAL PERCENTAGE VALUES OF OXYGEN CONCENTRATION. DO NOT ROUND UP FRACTIONAL PERCENTAGES! For example, 31.8% oxygen should be entered as 31%. Rounding up will cause nitrogen*

percentages to be understated and will affect decompression calculations. If there is a desire to adjust the computer to provide more conservative calculations, use the personal adjustment feature to affect decompression calculations or reduce the PO_2 setting to affect oxygen exposure according to the entered $O_2\%$ and PO_2 values.

 **WARNING** *SET THE CORRECT ALTITUDE ADJUSTMENT MODE! When diving at altitudes greater than 300 m [1000 ft], the Altitude Adjustment feature must be correctly selected in order for the computer to calculate the decompression status. The dive computer is not intended for use at altitudes greater than 3000 m [10000 ft]. Failure to select the correct Altitude Adjustment setting or diving above the maximum altitude limit will result in erroneous dive and planning data.*


 **WARNING** *SET THE CORRECT PERSONAL ADJUSTMENT MODE! Whenever it is believed that factors that tend to increase the possibility of DCI exist, it is recommended that you use this option to make the calculations more conservative. Failure to select the correct Personal Adjustment setting will result in erroneous dive and planning data.*


 **WARNING** *DO NOT EXCEED THE MAXIMUM ASCENT RATE! Rapid ascents increase the risk of injury. You should always make the Mandatory and Recommended Safety Stops after you have exceeded the maximum recommended ascent rate. If this Mandatory Safety Stop is not completed the decompression model will penalize your next dive(s).*

 **WARNING** *YOUR ACTUAL ASCENT TIME MAY BE LONGER THAN DISPLAYED BY THE INSTRUMENT! The ascent time will increase if you:*

- *remain at depth*
- *ascend slower than 10 m/min [33 ft/min] or*
- *make your decompression stop deeper than at the ceiling.*


These factors will also increase the amount of air required to reach the surface.


 **WARNING** *NEVER ASCEND ABOVE THE CEILING! You must not ascend above the ceiling during your decompression. In order to avoid doing so by accident, you should stay somewhat below the ceiling.*


 **WARNING** *DO NOT DIVE WITH A CYLINDER OF ENRICHED AIR IF YOU HAVE NOT PERSONALLY VERIFIED ITS CONTENTS AND ENTERED THE ANALYSIS VALUE INTO YOUR DIVE COMPUTER! Failure to verify cylinder contents and enter the appropriate O₂% into your dive computer will result in incorrect dive planning information.*


 **WARNING** *DO NOT DIVE WITH A GAS IF YOU HAVE NOT PERSONALLY VERIFIED ITS CONTENTS AND ENTERED THE ANALYZED VALUE INTO YOUR DIVE COMPUTER! Failure to verify cylinder*

contents and enter the appropriate gas values where applicable into your dive computer will result in incorrect dive planning information.

-  **WARNING** *Diving with gas mixtures exposes you to risks that are different from those associated with diving with standard air. These risks are not obvious, and require training to understand and avoid. Risks include possible serious injury or death.*

-  **WARNING** *Traveling to a higher elevation can temporarily cause a change in the equilibrium of dissolved nitrogen in the body. It is recommended that you acclimatize to the new altitude by waiting at least three hours before diving.*

-  **WARNING** *WHEN THE OXYGEN LIMIT FRACTION INDICATES THAT THE MAXIMUM LIMIT IS REACHED, YOU MUST IMMEDIATELY TAKE ACTION TO REDUCE OXYGEN EXPOSURE. Failure to take action to reduce oxygen exposure after the warning is given can rapidly increase the risk of oxygen toxicity, injury, or death.*

-  **WARNING** *Suunto also recommends that you receive training in Free diving techniques and physiology before conducting breath hold dives. No dive computer can replace the need for proper dive training. Insufficient or improper training may cause a diver to commit errors that may lead to serious injury or death.*




-  **WARNING** *Using the Suunto Dive Planner software is not a substitute for proper dive training. Diving with mixed gases has dangers that are not familiar to divers diving with air. To dive with trimix, triox, heliox and nitrox or all of them, divers must have specialized training for the type of diving they are doing.*
-  **WARNING** *Always use realistic SAC rates and conservative turn pressures during dive planning. Overly optimistic or erroneous gas planning can result in the exhaustion of breathing gas during decompression or in a cave or a wreck.*
-  **WARNING** *ENSURE THE WATER RESISTANCE OF THE DEVICE! Moisture inside the device or battery compartment will seriously damage the unit. Only an authorized SUUNTO dealer or distributor should do service activities.*

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1. INTRODUCTION

Congratulations on your purchase of the SUUNTO ZOOP dive computer. The ZOOP builds on the Suunto tradition of delivering feature-rich easy-use dive computers. Push button controls access a wide selection of choices and the display is optimized for the dive mode chosen. This dive computer is a compact and sophisticated multipurpose dive instrument, designed to give you years of trouble-free service.

Choice of Operating Modes and Set-up Options

User options for the ZOOP are selected using the push buttons.

Pre Dive configuration and setup options include:

- Choice of operating mode - Air / Nitrox
- Choice of unit - Metric / Imperial
- Maximum depth alarm
- Dive time alarm
- Clock, calendar
- Mix Oxygen fraction % (Nitrox mode only)
- Maximum PO₂ (Nitrox mode only)
- Altitude adjustment
- Personal adjustment

Continuous Decompression with Suunto RGBM

The Suunto Reduced Gradient Bubble Model (RGBM) utilized in the ZOOP predicts both dissolved and free gas in blood and tissues of divers. It is a significant advance on the classic Haldane models, which do not predict free gas. The advantage of Suunto RGBM is additional safety through its ability to adapt to a variety of situations and dive profiles.

In order to optimize how to respond to different added risk situations an additional category of stop, referred to as a Mandatory Safety Stop, has been introduced. Also a countdown for the Recommended Safety Stop is included. The combination of stop types will depend on the specific dive situation.

To get the most from the safety benefits be sure to read the summary of the Reduced Gradient Bubble Model in chapter 6.2.

1.1. SAFETY PRECAUTIONS

Do not attempt to use the dive computer without reading this instruction manual in its entirety, including all the warnings. Make sure that you fully understand the use, displays and limitations of the instrument. If you have any questions about the manual or the dive computer, contact your SUUNTO dealer before diving with the dive computer.

Always remember that **YOU ARE RESPONSIBLE FOR YOUR OWN SAFETY!**

When used properly, the dive computer is an outstanding tool for assisting properly trained, certified divers in planning and executing sport dives. It is **NOT A SUBSTITUTE**

FOR CERTIFIED SCUBA INSTRUCTION, including training in the principles of decompression.

1.1.1. Emergency Ascents

In the unlikely event that the dive computer malfunctions during a dive, follow the emergency procedures provided by your certified dive training agency or, alternatively,

STEP 1: Assess the situation calmly and then move promptly to less than 18 m [60 ft].

STEP 2: At 18 m [60 ft], slow down your ascent rate to 10 m/min [33 ft/min] and move to a depth between 3 and 6 meters [10 to 20 ft].

STEP 3: Stay there as long as you assess your air supply will safely allow. After reaching the surface stay out of the water for at least 24 hours.

1.1.2. Dive Computer Limitations

While the dive computer is based on current decompression research and technology, you must realize that the computer cannot monitor the actual physiological functions of an individual diver. All decompression schedules currently known to the authors, including the U.S. Navy Tables, are based on theoretical mathematical models, which are intended to serve as a guide to reduce the probability of decompression illness.

2. GETTING ACQUAINTED

2.1. FUNCTIONS

The Suunto ZOOP can be set to function as a regular air dive computer or as a nitrox dive computer.

The ZOOP features two dive computer models (AIR, NITROX), three main operating modes (TIME/STAND-BY, SURFACE, DIVING), two menu based main modes (MEMORY, SET) and seven menu based submodes (review separate Quick Reference Guide). You can scroll through the modes using the push buttons. The mode indicator at the left side and the mode text at the bottom of the display indicate the selected mode.

The timekeeping display is the default display of the instrument (Fig. 2.1.). If a button is not pressed within 5 minutes, the dive computer beeps and returns to the timekeeping display automatically (except in Diving mode). The timekeeping display shuts off after two hours, but pressing the PLAN or TIME button activates it.

Making the ZOOP Personal

For best use of the ZOOP take some time and make it YOUR computer.

Set the correct time and date. Read this manual. Set dive alarms and make all the other settings listed in the introduction in this manual. Install the ZOOP in your console or fit it on to your wrist.

All this so you know your computer and have it set up as you want it before getting into the water.

2.2. PUSH BUTTONS

The ZOOP has easy-to-use push buttons and an advisory display, which guides the user. The SMART (MODE) button is the key to the system. The two scroll buttons, PLAN and TIME, are used for scrolling up and down the menus and to show the alternative displays. The dive computer is controlled with these three push buttons as follows (see Fig. 2.2.).



Fig. 2.1. Timekeeping display. Pressing PLAN or TIME button activates display.

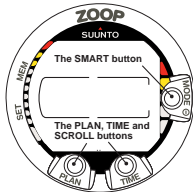


Fig. 2.2. Push buttons of the dive computer.

Press the SMART (MODE) button

- To activate the dive computer.
- To change from the Surface Mode to the menu based modes.

- To select, confirm or quit a submode (short press).
- To immediately exit any submode to the Surface Mode (long press).

Press the arrow up scroll (PLAN) button

- To activate the timekeeping display, if the display is blank.
- To activate the Dive Planning in the Surface Mode.
- To make a special bookmark in the profile memory during a dive.
- To scroll up the options (▲, increase).

Press the arrow down scroll (ALTER) button

- To activate the timekeeping display, if the display is blank.
- To activate the alternative display(s).
- To scroll down the options (▼, decrease).

The dive computer is controlled with the **SMART (MODE/On/Select/OK/Quit)** and the **PLAN ▲** and **TIME ▼** push buttons and with the water contacts as follows:

Activation *press the SMART (On) button or immerse the instrument in water for five (5) seconds.*

Dive Planning *in the Surface Mode, press the PLAN (s) button.*

Menu Modes *press the SMART (MODE) button.*

2.3. WATER CONTACTS

The water contacts control the automatic activation of the Dive Mode.

The water and data transfer contacts are located on bottom of the case (Fig 2.3.). When submerged the water contacts are connected to the push buttons (which are the other pole of the water contact) by the conductivity of the water. The “AC” text (Active Contacts, Fig. 2.4.) will appear on display. The AC text will be shown until the water contact deactivates or the dive computer enters the Dive Mode automatically.

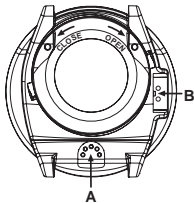


Fig. 2.3. Depth sensor (A), water/data transfer contacts (B).

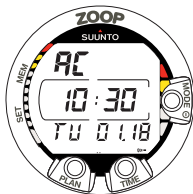


Fig. 2.4. Active water contacts are indicated by the text AC.

3. DIVING WITH THE ZOOP

This section contains instructions on how to operate the dive computer and interpret its displays. You will find that this dive computer is easy to use and read. Each display shows only the data relevant to that specific diving situation.

3.1. BEFORE DIVING

3.1.1. Activation and Prechecks

The dive computer will activate if submerged deeper than 0.5 m (1.5 ft). However, it is necessary to turn on the Dive Mode before diving to check the altitude and personal adjustment settings, battery condition, oxygen settings etc. Press the SMART (Mode) button to activate the instrument.

After activation all display elements will turn on showing mostly figure 8's and graphical elements (Fig. 3.1.). A few seconds later the battery power indicator is shown and the buzzer is activated (Fig. 3.2. display a, b, c or d depending on the battery voltage). If set to Air mode the screen will enter the Surface mode (Fig. 3.3.) and if set to Nitrox mode the essential oxygen parameters are shown with the text NITROX (Fig. 3.20.) before the Surface mode.

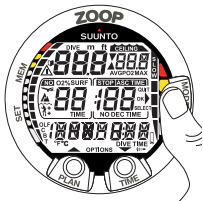


Fig. 3.1. Startup I.
All segments shown.

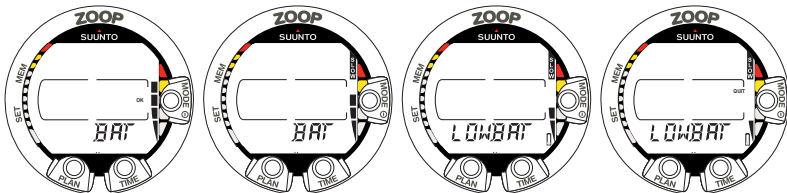


Fig. 3.2. Startup II. Battery power indicator.

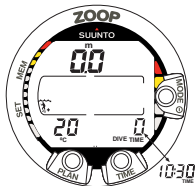


Fig. 3.3. Startup III.
Surface mode. Depth and dive time are zero, current temperature, 20°C. Pressing TIME button activates alternative display of current time.

At this time, perform your prechecks making sure that:

- the instrument operates in the correct mode and provides a complete display (Air/Nitrox modes)
- the low battery indicator is not on
- the altitude and personal adjustment settings are correct
- the instrument displays correct units of measurement (Metric/Imperial)
- the instrument displays correct temperature and depth (0.0 m [0 ft])
- the buzzer beeps

And if set to Nitrox mode (refer to chapter 3.4 Diving in Nitrox mode), make sure that:

- the oxygen percentage is adjusted according to the measured Nitrox blend in your cylinder
- the oxygen partial pressure limit is set correctly.

The dive computer is now ready for diving.

3.1.2. Battery Indication

3.1.2.1. Battery Power Indicator

This dive computer has a unique graphic Battery Power Indicator designed to give you an advance notice of impending need to change the battery.

The Battery Power Indicator can always be seen when the Dive Mode is activated. The following Table and Figure show the various warning levels.

TABLE 3.1. BATTERY POWER INDICATOR

Display	Operation	Figure 3.2
BAT + 4 segments + OK	Normal, full battery.	a
BAT + 3 segments	<p>Normal, battery power is getting low or the temperature is low.</p> <p>Battery replacement is recommended if you are going to colder conditions or if you are planning to make a dive trip.</p>	b
LOWBAT + 2 segments + low battery symbol	Battery power is low and the battery replacement is recommended. The battery symbol is displayed.	c
LOWBAT + 1 segments + QUIT + low battery symbol	Change the battery! Returns to the Time display. Activation and all functions are disabled.	d

Temperature or an internal oxidation of the battery affects the battery voltage. If the instrument is stored for a long period, the low battery warning may be displayed even though the battery has enough capacity. The low battery warning may also be displayed at low temperatures, even though the battery has enough capacity in warmer conditions. In these cases repeat the battery check procedure.

After battery check the Low Battery Warning is indicated by the battery symbol (Fig. 3.4.).

If the battery symbol is displayed in the Surface mode or if the display is faded or weak, the battery may be too low to operate the dive computer and battery replacement is recommended.

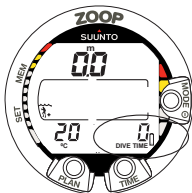


Fig. 3.4. Low Battery Warning. Battery symbol indicates that the battery is low and battery replacement is recommended.

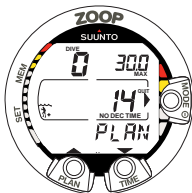



Fig. 3.5. Dive Planning. Planning mode is indicated by PLAN text. No-decompression time limit at 30.0 m [100 ft] is 14 minutes in A0/P1 mode.

3.1.3. Dive Planning [PLAN]

To enter Planning Mode, press the PLAN button at any time during Surface Mode. After showing the text “PLAN” (Fig. 3.5.), the display will show the no-decompression limit for the depth of 9 m [30 ft]. By pressing the down arrow (▼) (TIME) button, the

dive computer will calculate and show the next deeper no-decompression limits in 3 m [10 ft] increments ending at 45 m [150 ft]. By pressing the up arrow (▲) (PLAN) button, the next shallower depth will be shown again.

The Planning Mode is canceled by pressing the SMART (QUIT) button.

 **NOTE!** *The Planning mode is disabled in Error mode (see section 3.8. “Error Conditions”).*

Higher Altitude and conservative Personal Adjustment Modes will shorten the no-decompression time limits. These limits at different Altitude and Personal Adjustment Mode selections are shown in Table 6.1 and 6.2 in section 6.1. “Operating Principles”.

The Planning mode also accounts for the following information from previous dives:

- any calculated residual nitrogen
- all dive history for the past four days
- oxygen toxicity (Nitrox mode)

The no-decompression times given for different depths will therefore be shorter than before your first “fresh” dive.

DIVE NUMBERING SHOWN DURING DIVE PLANNING

Dives belong to the same repetitive dive series if the instrument was still counting down the no-fly time at the beginning of the dive.

The surface interval must be at least 5 minutes for a dive to be considered a repetitive dive. Otherwise, it is considered a continuation of the same dive. The dive number will not change and the dive time will continue where it left off (see also section 3.5.2. “Dive Numbering”).

3.1.4. User Definable Functions and Alarms

The ZOOP has several user definable functions and depth and time related alarms that you can set according to your personal preference.

The dive computer model (Air/Nitrox) can be set in the MODE- SET- MODEL submode. The dive alarms can be set under MODE- SET- SET ALARMS, the time and date settings in MODE-SET-SET TIME, and the units (metric/imperial) as well as personal adjustments in the MODE- SET- SET ADJUSTMETS submode. Setting of the user definable functions and alarms are explained in detail in section 4.2. “Set Modes”.

3.2. SAFETY STOPS

Safety stops are widely considered “good diving practice” and are an integral part of most dive tables. Reasons to perform a safety stop include a reduction in sub clinical DCI, microbubble reduction, ascent control, and orientation before surfacing.

The ZOOP displays two different types of safety stops: Recommended Safety Stop and Mandatory Safety Stop.

The Safety Stops are indicated by:

- STOP label, when in the depth range 3 m - 6 m [10 ft - 20 ft] = Recommended Safety Stop Countdown
- STOP+ CEILING label, when in the depth range 3 m - 6 m [10 ft - 20 ft] = Mandatory Safety Stop Time display
- STOP label, when deeper than 6 m = Mandatory Safety Stop scheduled

3.2.1. Recommended Safety Stop

With every dive over 10 meters the instrument has a three minute countdown for the recommended safety stop, to be taken in the 3 - 6 meter [10 ft - 20 ft] range. This is shown with the STOP sign and a three-minute countdown in the center window instead of the no-decompression time (Fig. 3.9.).

The Recommended Safety Stop, as the name implies, is recommended. If it is ignored, there is no penalty applied to the following surface intervals and dives.

3.2.2. Mandatory Safety Stop

When the ascent rate exceeds 12 meters/min [40 ft] momentarily or 10 meters/min [33 ft] continuously the micro-bubble build-up is predicted to be more than allowed for in the decompression model. The Suunto RGBM calculation model responds to this by adding a Mandatory Safety Stop to the dive. The time of this Mandatory Safety Stop will depend on the severity of the ascent rate excess.

The STOP sign will appear in the display and when you reach the depth zone between 6 m to 3 m [20 ft to 10] also the CEILING label, ceiling depth and the calculated Safety

Stop time appear in the display. You should wait until the Mandatory Safety Stop warning disappears (Fig. 3.13.).

The Mandatory Safety Stop time always includes the three minute Recommended Safety Stop time. The total length of the Mandatory Safety Stop time depends on the seriousness of the ascent rate violation.

You must not ascend shallower than 3 m [10 ft] with the Mandatory Safety Stop warning on. If you ascend above the Mandatory Safety Stop ceiling, a downward pointing arrow will appear and a continuous beeping starts (Fig. 3.14.). You should immediately descend to, or below, the Mandatory Safety Stop ceiling depth. If you correct this situation at any time during that dive, there are no affects on the decompression calculations for future dives.

If you continue to violate the Mandatory Safety Stop, the tissue calculation model is affected and the dive computer shortens the available no-decompression time for your next dive. In this situation, it is recommended to prolong your surface interval time before your next dive.

3.3. DIVING WITH THE ZOOP

The ZOOP has two operating modes: Air mode for diving with standard air only and Nitrox mode for diving with oxygen enriched (EANx) mixtures. The Nitrox mode is enabled in the MODE-SET-MODEL.

3.3.1. Basic Dive Data

The dive computer will remain in the Surface mode at depths less than 1.2 m [4 feet]. At depths greater than 1.2 m the instrument will go into the Diving mode (Fig. 3.6.).

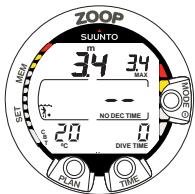


Fig. 3.6. Dive starts.

All information on the display is labeled (Fig. 3.6). During a no-decompression stop dive, the following information will be displayed:

- your present depth in meters [ft]
- the maximum depth during this dive in meters [ft], indicated as MAX
- the available no-decompression time in minutes in the center window as NO DEC TIME and as a bar graph on the left side of the display. It is calculated based on the five factors described in section 6.1. “Operating Principles”.
- the water in temperature in °C [°F] in the lower left corner
- the elapsed dive time in minutes, shown as DIVE TIME in the lower right corner

- the Altitude Adjustment setting on the left side of the center window with a wave and mountain symbols (A0, A1, or A2) (see Table 3.4.)
- the Personal Adjustment setting on the left side of the center window with a diver symbol and + signs (P0, P1, or P2) (see Table 3.5.)
- Diver Attention Symbol if there is micro-bubble buildup, and surface interval should be prolonged (see Table 3.3.)

Alternative displays by pressing the TIME button (Fig. 3.7.):

- the current time, shown as TIME



NOTE!

In Dive Mode the alternative display switches back to the main display after 5 seconds.

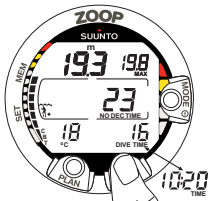


Fig. 3.7. Fig. 3.7. Diving display. Present depth is 19.3 m [63 ft] and no-decompression stop time limit is 23 minutes in A0/P1 mode. Maximum depth during this dive was 19.8 m [65 ft], water temperature is 18°C [64°F], elapsed dive time is 16 minutes. Alternative display of current time 10:20 [10:20 am] is shown for 5 seconds after pressing TIME button.

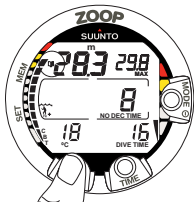


Fig. 3.8. Bookmark activation. An annotation, Bookmark, is placed in the profile memory during a dive by pressing PLAN button. Note Logbook symbol.

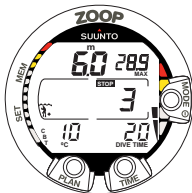


Fig. 3.9. A three minute Recommended Safety Stop.

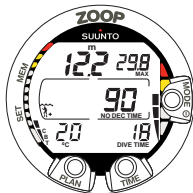


Fig. 3.10. Ascent Rate Indicator. Three segments.

3.3.2. Bookmark

It is possible to make special marks in the profile memory during a dive. These Bookmarks will be shown as a blinking dive log symbol when scrolling the profile memory on the computer display. To make a bookmark on the profile memory during a dive press the PLAN button (Fig. 3.8.).

3.3.3. Consumed Bottom Time (CBT)

The available no-decompression stop time is also shown visually in the multi-function bar graph on the left side of the display (Fig. 3.7. and 3.8.). When your available no-

decompression time decreases below 200 minutes, the first (lowest) bar graph segment appears. As your body absorbs more nitrogen, more segments start to appear.

White Zone - As a safety precaution Suunto recommends you should maintain the no-decompression bar graph within the green zone. Segments start to appear when the available no-decompression time decreases below 100, 80, 60, 50, 40, 30 and 20 minutes.

Yellow Zone - As the bars reach the yellow zone, your no-decompression stop time is less than 10 or 5 minutes and you are getting very close to no-decompression limits. At this point, you should start your ascent towards the surface.

Red Zone - As all of the bars appear (red zone), your no-decompression stop time has become zero and your dive has become a decompression stop dive (for more information see section 3.3.5. "Decompression dives").

3.3.4. Ascent Rate Indicator

The ascent rate is shown graphically along the right side of the display as follows:

TABLE 3.2. ASCENT RATE INDICATOR

Ascent Rate Indicator	The equivalent ascent speed	Example in Fig.
No segments	Normal, full battery.	3.7
One segment	4 - 6 m/min [13 - 20 ft/min]	3.8
Two segments	6 - 8 m/min [20 - 26 ft/min]	3.9
Three segments	8 - 10 m/min [26 - 33 ft/min]	3.10
Four segments	10 - 12 m/min [33 - 39 ft/min]	3.11
Four segments, the SLOW segment, blinking depth reading, the STOP sign and an audible alarm	Above 12 m/min [39 ft/min] or continuously above 10 m/min [33 ft/min]	3.12

When the maximum allowed ascent rate is exceeded, the fifth SLOW warning segment and the STOP sign appear and the depth reading starts to blink, indicating that the maximum ascent rate has been exceeded continuously or that the current ascent rate is significantly above the allowed rate.

Whenever the SLOW warning segment and the STOP sign appear (Fig. 3.12.), you should immediately slow down your ascent. When you reach the depth zone between 6 m to 3 m [20 ft to 10 ft] the STOP and CEILING depth labels will advise you to make

a Mandatory Safety Stop. Wait until the warning disappears (Fig. 3.13.). You should not ascend shallower than 3 m [10 ft] with the Mandatory Safety Stop warning on.

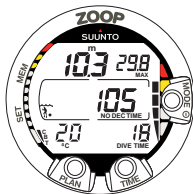


Fig. 3.11. Ascent Rate Indicator. Maximum allowed ascent rate. Four segments.

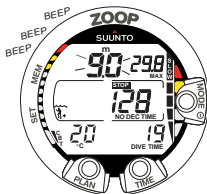


Fig. 3.12. Ascent Rate Indicator. Blinking depth reading, SLOW and four segments are shown together with an audible alarm: ascent rate is more than 10 m/min [33 ft/min]. This is a caution to slow down! STOP sign means that you are advised to make a Mandatory Safety Stop when you reach a depth of 6 m [20 ft].

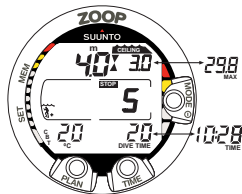



Fig. 3.13. A Mandatory Safety Stop. You are advised to make a Mandatory Safety Stop in the depth zone between 6 m and 3 m [20 ft and 10 ft]. Pressing TIME button shows alternative display.

 **WARNING** *DO NOT EXCEED THE MAXIMUM ASCENT RATE! Rapid ascents increase the risk of injury. You should always make the Mandatory and Recommended Safety Stops after you have exceeded the maximum recommended ascent rate. If this Mandatory Safety Stop is not completed the decompression model will penalize your next dive(s).*

3.3.5. Decompression dives

When your NO DEC TIME becomes zero, your dive becomes a decompression stop dive, i.e. you must perform one or several decompression stops on your way to the surface. The NO DEC TIME on your display will be replaced by an ASC TIME notation and the maximum depth will be replaced by a CEILING notation and an upward pointing arrow (Fig. 3.15.).

If you exceed the no-decompression limits on a dive, the dive computer will provide decompression information required for ascent. After this, the instrument will continue to provide subsequent interval and repetitive dive information.

Rather than requiring you to make stops at fixed depths, the dive computer lets you to decompress within a range of depths (Continuous Decompression).

The ascent time (ASC TIME) is the minimum amount of time needed to reach the surface in a decompression dive. It includes:

- the time needed to ascend to the ceiling at an ascent rate of 10 m/min [33 ft/min] plus

- the time needed at the ceiling. The ceiling is the shallowest depth to which you should ascend
plus
- the time needed at the Mandatory Safety Stop (if any)
plus
- the 3 minute Recommended Safety Stop
plus
- the time needed to reach the surface after the ceiling and safety stops have been completed.

 **WARNING** *YOUR ACTUAL ASCENT TIME MAY BE LONGER THAN DISPLAYED BY THE INSTRUMENT! The ascent time will increase if you:*

- remain at depth
- ascend slower than 10 m/min [33 ft/min]
or
- make your decompression stop deeper than at the ceiling.

These factors will also increase the amount of air required to reach the surface.

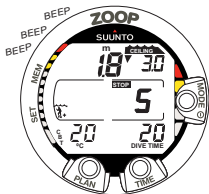


Fig. 3.14. Violated Mandatory Safety Stop. Downward pointing arrow and an audible alarm indicate you should descend to ceiling zone.

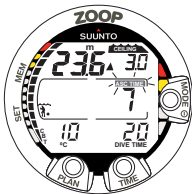


Fig. 3.15. Decompression dive, below floor. Upward pointing arrow, blinking ASC TIME label and an audible alarm tell you to ascend. Minimum total ascent time including safety stop is 7 minutes. Ceiling is at 3 m [10 ft].

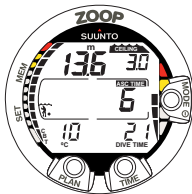


Fig. 3.16. Decompression dive, above floor. Upward pointing arrow has disappeared and ASC TIME label has stopped blinking, which means that you are in the decompression range.

CEILING, CEILING ZONE, FLOOR AND DECOMPRESSION RANGE

When in decompression, it is important that you understand the meaning of ceiling, floor, and decompression range (Fig. 3.19.):

- The ceiling is the shallowest depth to which you should ascend when in decompression. At this depth, or below, you must perform all stops.
- The ceiling zone is the optimum decompression stop zone. It is the zone between the minimum ceiling and 1.8 m [6 ft] below the minimum ceiling.

- The floor is the deepest depth at which the decompression stop time will not increase. Decompression will start when you pass this depth during your ascent.
- The decompression range is the depth range between the ceiling and floor. Within this range, decompression takes place. However, it is important to remember that the decompression will be very slow at, or close to, the floor.

The depth of the ceiling and floor will depend on your dive profile. The ceiling depth will be fairly shallow when you enter the decompression mode, but if you remain at depth, it will move downward and the ascent time will increase. Likewise, the floor and ceiling may change upwards while you are decompressing.

When conditions are rough, it may be difficult to maintain a constant depth near the surface. In this case it will be more manageable to maintain an additional distance below the ceiling, to make sure that the waves do not lift you above the ceiling. Suunto recommends that decompression takes place deeper than 4 m [13 ft], even if the indicated ceiling is shallower.

**NOTE**

It will take more time and more air to decompress below the ceiling than at the ceiling.

**WARNING**

NEVER ASCEND ABOVE THE CEILING! You must not ascend above the ceiling during your decompression. In order to avoid doing so by accident, you should stay somewhat below the ceiling.

DISPLAY BELOW THE FLOOR

The blinking ASC TIME and an upward pointing arrow indicate that you are below the floor (Fig. 3.15.). You should start your ascent immediately. The ceiling depth is shown on the right top corner and the minimum total ascent time on the right side of the center window.

DISPLAY ABOVE THE FLOOR

When you ascend above the floor, the ASC TIME display stops blinking and the upward pointing arrow disappears (Fig. 3.16.). Decompression will now begin, but is very slow. You should therefore continue your ascent.

DISPLAY AT THE CEILING ZONE

When you reach the ceiling zone, the display will show you two arrows pointing at each other (the “hour glass” icon, Fig 3.17.). Do not ascend above this zone.

During the decompression stop, ASC TIME will count down towards zero. When the ceiling moves upwards, you can ascend to the new ceiling. You may surface only after the ASC TIME and CEILING labels have disappeared, which means that the decompression stop and any Mandatory Safety Stop has been completed. You are advised, however, to stay until the STOP sign has also gone. This indicates that the three minute Recommended Safety Stop has also been completed.

DISPLAY ABOVE THE CEILING

If you ascend above the ceiling during a decompression stop, a downward pointing arrow will appear and a continuous beeping starts (Fig. 3.18.). In addition, an error

warning Er reminds you that you have only three minutes to correct the situation. You must immediately descend to or below the ceiling.

If you continue to violate the decompression, the dive computer goes into a permanent Error Mode. In this mode the instrument can only be used as a depth gauge and timer. You must not dive again for at least 48 hours (see also section 3.8. “Error Conditions”).

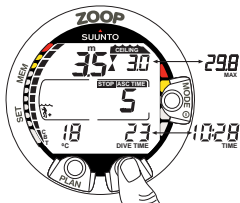


Fig. 3.17. Decompression dive, at ceiling zone. Two arrows point at each other (“hour glass”). You are in the optimum ceiling zone at 3.5 m [11 ft] and your minimum ascent time is 5 minutes. Pressing TIME button activates alternative display.

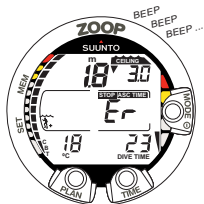


Fig. 3.18. Decompression dive, above ceiling. Note downward pointing arrow, Er warning and an audible alarm. You should immediately (within 3 minutes) descend to or below ceiling.

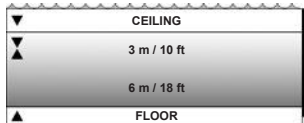



Fig. 3.19. Ceiling and Floor Zones. The Recommended and Mandatory Safety Stop zone lies between 6 m and 3 m [20 ft and 10 ft].


3.4. DIVING IN NITROX MODE

3.4.1. Before Diving

The ZOOP can be set for diving with standard air only (Air mode) or it can be set for diving with Enriched Air Nitrox (Nitrox mode). If you are educated for nitrox diving and you plan to make nitrox dives, it is recommended that you set the dive computer permanently to its NITROX Mode. The Nitrox mode can be enabled by accessing MODE-SET-MODEL (see chapter 4.2. “Set Modes”).

If set to Nitrox mode, the correct oxygen percentage of the gas in your cylinder must always be entered into the computer to ensure correct nitrogen and oxygen calculations. The dive computer adjusts its mathematical nitrogen and oxygen calculation models according to the entered $O_2\%$ and PO_2 values. Calculations based on Nitrox use result in longer no-decompression times and shallower maximum depths than diving with air. When the dive computer is set in Nitrox mode the Dive Planning modes calculates with the $O_2\%$ and PO_2 values that are currently in the computer.

 **WARNING** *DO NOT DIVE WITH A CYLINDER OF ENRICHED AIR IF YOU HAVE NOT PERSONALLY VERIFIED ITS CONTENTS AND ENTERED THE ANALYSIS VALUE INTO YOUR DIVE COMPUTER! Failure to verify cylinder contents and enter the appropriate $O_2\%$ into your dive computer will result in incorrect dive planning information.*

 **WARNING** *The dive computer will not accept fractional percentage values of oxygen concentration. Do not round up fractional percentages. For*

example, 31.8% oxygen should be entered as 31%. Rounding up will cause nitrogen percentages to be understated and will affect decompression calculations. If there is a desire to adjust the computer to provide more conservative calculations, use the personal adjustment feature to affect decompression calculations or reduce the PO_2 setting to affect oxygen exposure according to the entered $O_2\%$ and PO_2 values.

**NOTE**

As a safety precaution the oxygen calculations in the computer are made with an oxygen percentage of 1% + set $O_2\%$.

DEFAULT NITROX SETTINGS

In the NITROX Mode, when set to standard air (21% O_2), the instrument can be used as an air dive computer. It remains in this air mode until the $O_2\%$ setting is adjusted to any other percentage of oxygen (22% - 50%).

**NOTE**

The computer will automatically revert to the air (21% O_2) setting when a new dive series is started, if it is not set to any other mix during the last two hours. When the oxygen percentage is set for air, the computer will retain this setting.

Manually entered values for oxygen percentage are retained for about two hours after the setting if a dive series has not started. In case a dive series is started, the set value is retained until a new dive series is started or a new value is entered manually.

The default setting for maximum oxygen partial pressure is 1.4 bar, however you are able to set it between the range of 1.2 - 1.6 bar.

3.4.2. Oxygen Displays

If set to Nitrox mode the NITROX display, with all labeled oxygen information and the label NITROX, is shown after activation, and before the Dive Planning Mode. The Nitrox display shows (Fig. 3.20.):

- the oxygen percentage, labeled with $O_2\%$, is shown in the left side of the center window
- the set oxygen partial pressure limit, labeled with PO_2 , is shown in the upper right display
- the maximum allowed depth based on the set oxygen percentage and partial pressure limit
- the current oxygen toxicity exposure shown with an Oxygen Limit Fraction (OLF) bar graph along the left side of the display (instead of the CBT).

In Dive mode, the oxygen percentage labeled with $O_2\%$ and the current oxygen toxicity exposure shown with an Oxygen Limit Fraction (OLF) bar graph are shown (Fig. 3.21. and Fig. 3.22.). During a dive, the oxygen partial pressure, labeled with PO_2 , is also shown instead of the maximum depth in the upper right display, if the partial pressure is greater than 1.4 bar or the set value (Fig. 3.23.).

By pressing the TIME button during a nitrox dive, the alternative display appears, which includes (Fig. 3.24.):

- current time
- Consumed Bottom Time
- maximum depth (during decompression stop dive).

After five seconds the display will automatically revert to the original display.

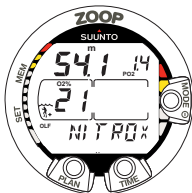


Fig. 3.20. Nitrox display. Maximum depth based on set $O_2\%$ (21%) and PO_2 (1.4 bar) is 54.1 m [177 ft].

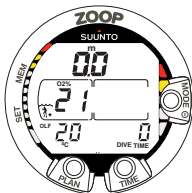


Fig. 3.21. Surface display in the Nitrox mode.

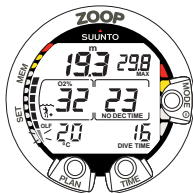


Fig. 3.22. Diving in Nitrox mode. The $O_2\%$ is set to 32%.

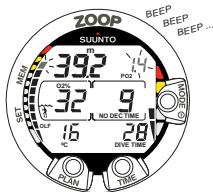


Fig. 3.23. Oxygen partial pressure and OLF displays. There is an audible alarm as oxygen partial pressure is greater than 1.4 bar or set value, and/or the OLF has reached 80% limit.

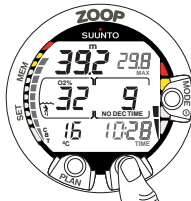


Fig. 3.24. Alternative display. Pressing TIME button displays current time, maximum depth, temperature, CBT and O₂%.

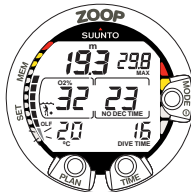


Fig. 3.25. The lowest bar graph blinks to indicate that the OLF value shown relates to OTU.

3.4.3. Oxygen Limit Fraction (OLF)

In addition to tracking the diver's exposure to nitrogen, the instrument tracks the exposure to oxygen, if set to Nitrox mode. These calculations are treated as entirely separate functions.

The dive computer calculates separately for Central Nervous System oxygen toxicity (CNS) and Pulmonary Oxygen toxicity, the latter measured by the addition of Oxygen Toxicity Units (OTU). Both fractions are scaled so that the maximum tolerated exposure for each is expressed as 100%.

The Oxygen Limit Fraction (OLF) has 11 segments, each representing 10%. The OLF bar graph displays only the value of the higher of the two calculations. When the OTU value meets and exceeds the CNS value then in addition to displaying its percentage the lowest segment blinks to indicate that the value shown relates to OTU (Fig. 3.25.). The oxygen toxicity calculations are based on the factors listed in section 6.3. “Oxygen Exposure”.

3.5. AT THE SURFACE

3.5.1. Surface Interval

An ascent to any depth shallower than 1.2 m [4 ft] will cause the DIVING display to be replaced by the SURFACE display, giving the following information (Fig. 3.26.):

- maximum depth of last dive in meters [ft]
- present depth in meters [ft]
- no-flying warning indicated by an airplane icon (Table 3.3)
- Altitude Adjustment setting
- Personal Adjustment setting
- Diver attention symbol indicates surface interval time should be prolonged (Table 3.3)
- STOP label for 5 min, if the Mandatory Safety Stop was violated
- Er, if the decompression ceiling was violated (= Error Mode) (Fig. 3.29, Table 3.3)
- the current temperature with °C for Centigrade [or °F for Fahrenheit]
- dive time of last dive in minutes, shown as DIVE TIME.

Or when the TIME button is pressed:

- the current time, shown as TIME instead of the DIVE TIME
- the surface time in hours and minutes (separated by a colon), telling the duration of the present surface interval (Fig. 3.27.)
- the desaturation/no-flying time in hours and minutes is shown next to the airplane in the center window of the display (Fig. 3.28.).

If set to Nitrox mode, the following information will also be shown:

- the oxygen percentage labeled with O₂% is shown on the left side of the center window
- the current oxygen toxicity exposure shown with an Oxygen Limit Fraction (OLF) bar graph along the left side of the display.

3.5.2. Dive Numbering

Several repetitive dives are considered to belong to the same repetitive dive series when the dive computer has not counted the no-flying time to zero. Within each series, the dives are given individual numbers. The first dive of the series will be numbered as DIVE 1, the second as DIVE 2, the third as DIVE 3, etc.

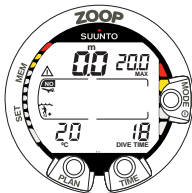


Fig. 3.26. Surface display. You have surfaced from a 18 minute dive, which maximum depth was 20.0 m [66 ft]. The present depth is 0.0 m [0 ft]. Airplane symbol indicates that you should not fly and Diver Attention Symbol indicates that you should prolong your surface interval time because of excess micro-bubbles.



Fig. 3.27. Surface interval, Surface time display. Pressing TIME button once will show surface time display.

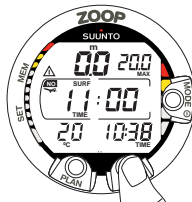





Fig. 3.28. Surface interval, no-flying time. Pressing TIME button twice will show no-flying time, indicated by an airplane symbol.

TABLE 3.3. WARNING SYMBOLS

Symbol on display	Indication
	Diver Attention Symbol - Extend Surface Interval
	Violated Decompression Ceiling
	Do Not Fly Symbol

If you start a new dive with less than 5 minutes of surface interval time, the dive computer interprets this as a continuation of the previous dive and the dives are considered to be the same. The diving display will return, the dive number will remain unchanged, and the dive time will begin where it left off. After 5 minutes on the surface, subsequent dives are, by definition, repetitive. The dive counter displayed in the Planning Mode will increment to the next higher number if another dive is made.

3.5.3. Flying After Diving

The no-flying time is shown in the center window next to the airplane image. Flying or travelling to a higher altitude should be avoided at any time the computer counts down the no-flying time.



NOTE

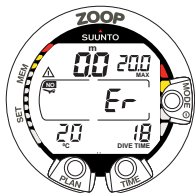
The airplane symbol is not shown on the stand-by display. You should always activate the dive computer and check that the airplane symbol is not displayed prior to flying.

The no-flying time is always at least 12 hours or equivalent to the so-called desaturation time (if longer than 12 hours).

In the permanent Error mode the no-flying time is 48 hours.

Divers Alert Network (DAN) recommends the following on no-flying times:

- A minimum surface interval of 12 hours would be required in order to be reasonably assured a diver will remain symptom free upon ascent to altitude in a commercial jetliner (altitude up to 2400 m [8000 ft]).
- Divers who plan to make daily, multiple dives for several days, or make dives that require decompression stops, should take special precautions and wait for an extended interval beyond 12 hours before flight. Further, the Undersea and Hyperbaric Medical Society (UHMS) suggests divers using standard air cylinders and exhibiting no symptoms of decompression illness wait 24 hours after their last dive to fly in an aircraft with cabin pressure up to 2400 m [8000 ft]. The only two exceptions to this recommendation are:
 - If a diver had less than 2 hours total accumulated dive time in the last 48 hours, then a 12 hour surface interval before flying is recommended.
 - Following any dive that required a decompression stop, flying should be delayed for at least 24 hours, and if possible, for 48 hours.
- Suunto recommends that flying is avoided until all the DAN and UHMS guidelines and the dive computer wait to fly conditions are satisfied.



Diver Attention Symbol



Violated Decompression Ceiling



Do Not Fly Symbol

Fig. 3.29. Surface Mode after a violated decompression dive. Er symbol indicates that you have violated the ceiling for more than three minutes. You must not dive again for at least 48 hours.

3.6. AUDIBLE AND VISUAL ALARMS

The dive computer features audible alarms to advise when important limits are approached or to acknowledge preset alarms.

A short single beep occurs, when:

- the dive computer is activated.
- when the dive computer automatically returns to the TIME mode.

Three single beeps with a two second interval occurs, when:

- the no-decompression dive turns into a decompression stop dive. An arrow pointing upwards and the blinking ascent warning ASC TIME will appear (Fig. 3.15.).

Continuous beeps for 5 seconds occur, when:

- the maximum allowed ascent rate, 10 m/min [33 ft/min], is exceeded. SLOW and STOP warnings will appear (Fig. 3.12.).
- the Mandatory Safety Stop ceiling is exceeded. A downward pointing arrow will appear (Fig. 3.14.).
- the decompression ceiling depth is exceeded. An error warning Er and a downward pointing arrow appear. You should immediately descend to, or below, the ceiling. The instrument will otherwise enter a permanent Error Mode within three minutes, indicated by a permanent Er (Fig. 3.18.).

You are able to preset alarms before the actual dive. The user programmable alarms can be set for maximum depth and dive time. The alarms activate when:

- The preset maximum depth is reached
- continuous beep series for 24 seconds or until any button is pressed.
- the maximum depth blinks as long as the present depth value exceeds the adjusted value.
- The preset dive time is reached
- continuous beep series for 24 seconds or until any button is pressed.
- the dive time blinks for one minute, if no button is pressed.

OXYGEN ALARMS IN NITROX MODE


Three double beeps for 5 seconds occur, when:

- the OLF bar graph reaches 80%. The segments exceeding the 80% limit start to blink (Fig. 3.23.)
- the OLF bar graph reaches 100%.

The blinking of the segments exceeding 80% will stop, when the OLF is not loading anymore. At that point the PO_2 is less than 0.5 bar.

Continuous beeps for 3 minutes occur, when:

- the set oxygen partial pressure limit is exceeded. The maximum depth is replaced with a current blinking PO_2 value. You should immediately ascend above the PO_2 depth limit (Fig. 3.23.).

 **WARNING** *WHEN THE OXYGEN LIMIT FRACTION INDICATES THAT THE MAXIMUM LIMIT IS REACHED, YOU MUST IMMEDIATELY ASCEND UNTIL THE WARNING STOPS BLINKING! Failure to do so may lead to improper use, serious injury or death.*




3.7. HIGH ALTITUDE DIVES AND PERSONAL ADJUSTMENT

The dive computer can be adjusted both for diving at altitude and also to increase the conservatism of the mathematical nitrogen model.

3.7.1. Altitude Adjustment

When programming the instrument for the correct altitude, you need to select the correct Altitude Mode according to Table 3.4. The dive computer will adjust its mathematical model according to the entered altitude mode, giving shorter no-decompression times at higher altitudes (see Section 6.1. “Operating Principles”, Table 6.1. and 6.2.).

TABLE 3.4. ALTITUDE ADJUSTMENT RANGES

Altitude mode	Symbol on display	Altitude range
A0		0 - 300 m [0 - 1000 ft]
A1		300 - 1500 m [1000 - 5000 ft]
A2		1500 - 3000 m [5000 - 10000 ft]

The entered Altitude Adjustment Mode is indicated by mountain symbols (A0, A1 = one mountain, or A2 = two mountains). Section 4.2.4. “ Personal Adjustments” describes how the Altitude Mode is adjusted.

Traveling to a higher elevation can temporarily cause a change in the equilibrium of dissolved nitrogen in the body. It is recommended that you acclimate to the new altitude by waiting at least three hours before making a dive.

3.7.2. Personal Adjustment

There are adverse personal factors for DCI which divers can predict in advance and input into the decompression model. Factors that may affect susceptibility to decom-

pression illness vary between divers and also for the same diver from one day to another. The three-step Personal Adjustment Mode is available, if a more conservative dive plan is desired.




The personal factors which tend to increase the possibility of DCI include, but are not limited to:

- cold exposure - water temperature less than 20°C [68°F]
- the diver is below average physical fitness level
- diver fatigue
- diver dehydration
- previous history of DCI
- stress
- obesity

The Personal Adjustment Mode is indicated by a diver symbol and plus signs (P0 = a diver, P1 = diver +, or P2 = diver ++). Section 4.2.4. “Personal Adjustments” describes how the Personal Mode is adjusted.

This feature should be used to adjust the computer to be more conservative, according to personal preference, by entering the suitable Personal Adjustment Mode with the help of Table 3.5. In ideal conditions, retain the default setting, P0. If conditions are more difficult or other mentioned factors which tend to increase the possibility of DCI exist, select P1 or even the most conservative P2. As a result the dive computer adjusts its mathematical model according to the entered Personal Adjustment Mode, giving shorter no-decompression times (see section 6.1. “Operating Principles”, Table 6.1 and 6.2).

TABLE 3.5. PERSONAL ADJUSTMENT RANGES

Personal mode	Symbol on display	Condition	Desired tables
P0		Ideal condition	Default
P1		Some mentioned factors or conditions exist	Progressively more conservative
P2		Several mentioned factors or conditions exist	

3.8. ERROR CONDITIONS

The dive computer has warning indicators that alert the user to react to certain situations that would significantly increase the risk of DCI. If you do not respond to its warnings, the dive computer will enter an Error Mode, indicating that the risk of DCI has greatly increased. If you understand and operate the dive computer sensibly, it is very unlikely you will ever put the instrument into the Error Mode.

OMITTED DECOMPRESSION

The Error Mode results from omitted decompression, i.e. when you stay above the ceiling for more than three minutes. During this three-minute period the Er warning is shown and the audible alarm beeps. After this, the dive computer will enter a permanent Error Mode. The instrument will continue to function normally if you descend below the ceiling within this three-minute period.

Once in the permanent Error Mode only the ER warning is shown in the center window. The dive computer will not show times for ascent or stops. However, all the other displays will function as before to provide information for ascent. You should immediately ascend to a depth of 3 to 6 m [10 to 20 ft] and remain at this depth until air supply limitations require you to surface.

After surfacing, you should not dive for a minimum of 48 hours. During the permanent Error Mode, the Er text will be displayed in the center window and the Planning Mode will be disabled.

4. MENU BASED MODES

To make yourself familiar with the menu based functions, please use your Quick Reference Guide supplied with the ZOOP together with the information in this chapter.

The main menu based functions are grouped under 1) Memory and 2) Setting modes.

The use of the menu based functions

1. Activate the menu based modes by pressing once the SMART (MODE) button in the Dive Mode (Fig. 4.1.).
2. Scroll the mode options by pressing the arrow up/down buttons. When scrolling the options, the label and an equivalent number are shown on the display (Fig. 4.2. – 4.3.).
3. Press the SMART (Select) button once to select the desired option.
4. Scroll the submode options by pressing the arrow up/down buttons. When scrolling the options, the label and an equivalent number are shown on the display.
5. Select the desired option by pressing once the SMART (Select) button. Repeat the procedure, if there are more submodes.
6. Depending on the mode, you are now able to have a look at the memories or make desired settings (use the the arrow up/down buttons). The SMART button is used to Quit or to confirm the settings (OK).

If you do not press any of the buttons for 5 minutes while in a Menu based mode, the instrument beeps and returns to the timekeeping display.

EXIT / QUIT!

By pressing the SMART button for more than 1 second, any menu based function or submode can be quit and the dive computer will return directly to the Dive Mode.

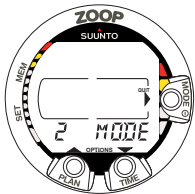


Fig. 4.1. Main menu based Mode options. [2 MODE].

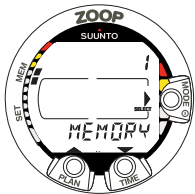


Fig. 4.2. Memory option. [1 MEMORY].

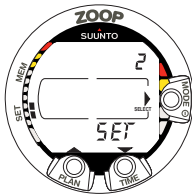


Fig. 4.3. Set option. [2 SET].

THE LIST OF THE MENU BASED MODES

1. MEMORY FUNCTIONS [1 MEMORY]
 1. Logbook and Dive Profile Memory [1 LOGBOOK]
 2. Dive History Memory [2 HISTORY]
 3. PC Settings [3 PC SET]
2. SET MODES [2 SET]
 1. Air or Nitrox Oxygen settings [1 MODEL]
 2. Set Alarms [2 SET ALMS]
 1. Maximum depth alarm setting
 2. Dive time alarm setting

3. Set time and date [3 SET TIME]
 1. Time display, time, date and year settings
4. Personal Adjustments [4 SET ADJ]
 1. Altitude adjustment
 2. Personal adjustment
 3. Dive computer units setting

**NOTE**

The menu based modes cannot be activated until 5 minutes after the dive.

4.1. MEMORY FUNCTIONS [1 MEMORY]

The memory options (Fig. 4.4.) for this dive computer include the combined Logbook and Dive Profile Memory (Fig. 4.5. – 4.11.), Dive History Memory (Fig. 4.12. – 4.13.).

The dive entry time and date is registered in the Logbook memory. Always check before diving that the time and date are correctly set, especially after traveling between different time zones.

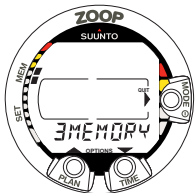


Fig. 4.4. Memory options.
[3 MEMORY].

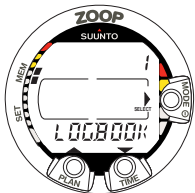


Fig. 4.5. Logbook option.
[1 LOGBOOK].

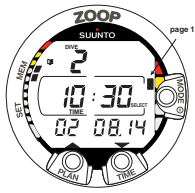


Fig. 4.6. Logbook, page I.
Scroll different pages of
specific dive.

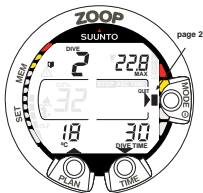


Fig. 4.7. Logbook, page II.
Main dive related data.

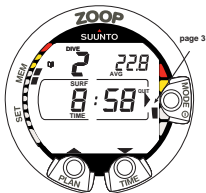


Fig. 4.8. Logbook, page III.
Surface interval time and
average depth

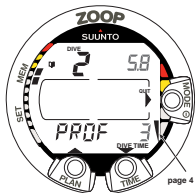


Fig. 4.9. Logbook, page IV.
Profile of specific dive.

4.1.1. Logbook and Dive Profile Memory [1 LOGBOOK]

This instrument has a very sophisticated high capacity Logbook and Profile Memory, with a data recording interval of 30 seconds. Dives shorter than the recording interval are not registered.

To enter the Logbook Memory Mode select MODE- MEMORY- LOGBOOK.

For each dive there are four pages of logbook dive information. Use the scroll buttons to scroll the display between Logbook pages I, II, III and IV. The data of the most recent dive is shown first.

The logbook dives can be scrolled through displaying only the first page of each dive, or scrolling through the 4 different pages of a dive.

When at the first page of a dive use the MODE button to change the scroll sequence. When the arrow icon is next to the Mode button the scroll button will scroll through the first page only of each dive.

When Select is displayed next to the mode button the scroll buttons will scroll through the four pages of the selected dive.

The END text is displayed between the oldest and most recent dive. (Fig. 4.11.)

Note that chronological sequence in the logbook is determined by the date, not by the dive number.

The following information will be shown on four pages:

Page I, main display (Fig. 4.6.)

- dive number in the dive series
- dive entry time and date.

Page II (Fig. 4.7.)

- dive number in the dive series
- maximum depth



NOTE

Due to lower resolution, the reading may differ from the maximum depth reading of the Dive History up to 0.3 m [1 ft].)

- total dive time
- temperature at the maximum depth
- Altitude Adjustment setting
- Personal Adjustment setting
- SLOW label, if the diver has violated the maximum ascent rate
- STOP label, if the Mandatory Safety Stop was violated
- ASC TIME label, if the dive was a decompression stop dive
- Diver attention symbol, if the symbol was displayed when dive was started
- downward pointing arrow, if the ceiling was violated
- oxygen percentage
- maximum OLF during the dive (only in Nitrox mode).

Page III (Fig. 4.8.)

- dive number in the dive series
- average depth
- surface interval time before the dive

Page IV (Fig. 4.9.)

- dive number in the dive series
- the profile of the dive, automatic scrolling during which:
- logbook symbol blinks at the point when the user has pressed the PLAN button for Bookmark
- O₂% during the dive profile
- blinking SLOW label when registered
- blinking ASC TIME label when the dive became a decompression dive.

Press the SMART (Select) button once to change the scroll buttons to scroll the different dives forward and backward (Fig. 4.10.). Press the SMART (>Select) button again to change function of the scroll buttons back to scroll the different pages of the selected dive. When searching the dives, only the page 1 is shown. The END text is displayed between the oldest and the most recent dive (Fig. 4.11.).

The memory will retain approximately the last 50 hours of dive time. After that, when new dives are added, the oldest dives are deleted. The contents of the memory will remain when the battery is changed (assuming that the replacement has been done according to the instructions).



Fig. 4.10. Logbook, page I. Press SMART (Select) button once to be able to scroll between different dives.

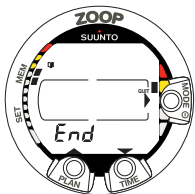


Fig. 4.11. Logbook, end of the memory. END text is displayed between oldest and the most recent dive.

DIVE PROFILE MEMORY [PROF]

The scrolling of the profile will start automatically when the Logbook page IV (PROF) is entered.

With the default setting, the dive profile is recorded and displayed in 30-second increments with each display being shown for about three seconds. The depths shown are the maximum values of each interval.

Pressing any button stops the scrolling of the profile.

**NOTE**

Several repetitive dives are considered to belong to the same repetitive dive series if the no-flying time has not ended.

See "Dive Numbering" in section 3.5.2. for further information.

4.1.2. Dive History Memory [2 HISTORY]

The Dive History is a summary of all the dives recorded by the dive computer. To enter the Dive History Memory Mode select MODE- MEMORY- HISTORY (Fig. 4.12.).

The following information will be shown on the display (Fig. 4.13.):

- the maximum depth ever reached
- the total accumulated dive time in hours
- the total number of dives.

The Dive History Memory can hold a maximum of 999 dives and 999 diving hours. When these maximum values are reached, the counters will start again from zero.

4.1.3. Data Transfer and PC-Interface [3 PC-SET]

The instrument can be connected to a personal computer (PC), using the optional PC-Interface and its software. With the PC-Interface, dive data from the dive computer can be downloaded to a PC. The PC-Interface software can be used for educational and demonstration purposes, for planning dives, and for keeping a complete record of your dive history with the instrument. Complete Logbook data can also be included. Paper copies of your dive log and profiles can then easily be printed.

To enter the Data Transfer select MODE- 1 MEMORY- 3 PC - SET (Fig.4.14)

The data transfer is carried out using the connector on the bottom of the unit.

The following data is transferred to the PC:

- depth profile of the dive
- dive time
- surface interval time
- dive number
- Altitude and Personal adjustment settings
- oxygen percentage setting and maximum OLF (in NITROX Mode)
- tissue calculation data
- temperature at the maximum depth, beginning of the dive, and end of the dive
- dive entry time (year, month, day and time)
- additional dive information (e.g. SLOW and Mandatory Safety Stop violations, Dive Attention Mark, Bookmark, Surfaced Mark, Decompression Mark, Ceiling Error Mark)
- identity number of the dive computer
- personal information.

It is also possible to manually add comments and other personal information to the PC based dive data files. The PC-Interface package comes complete with the interface unit, the software, and an instruction and getting started guide.

 **NOTE**

While in the Data Transfer Mode, the connector/water contacts are used only for the data transfer. The Dive Mode IS NOT automatically activated if the contacts are submerged.

After you have finished the data transfer, press the SMART (Quit) to exit Data Transfer Mode [PC-SET]. If no button is operated or no data is transferred within 5 minutes, the instrument beeps and returns to the timekeeping display automatically.

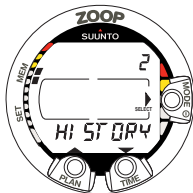


Fig. 4.12. Dive History Memory Mode. [2 HISTORY].

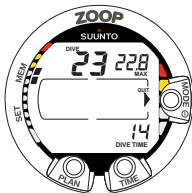


Fig. 4.13. Dive Information. Total number of dives, dive hours and maximum depth.

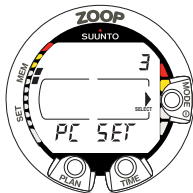


Fig. 4.14. Data Transfer mode. [3 PC SET].

4.2. SET MODES [2 SET]

The Set Mode (Fig. 4.15.) is divided into four submodes: dive computer model setting, alarm settings, time setting and personal adjustments.

4.2.1. Dive Computer Model Settings [1 SET MODEL]

In the Model Setting mode the ZOOP can be set to function in Air or Nitrox model. To enter the model settings select MODE- SET- MODEL (Fig. 4.16). Select AIR if diving with standard air and select NITROX if diving with oxygen enriched air.

4.2.1.1. Nitrox Oxygen Settings

The correct oxygen percentage of the gas in your cylinder must always be entered into the computer to ensure correct nitrogen and oxygen calculations. Also the oxygen partial pressure limit must be set. In the Nitrox Setting mode the equivalent allowed maximum depth based on the chosen values will also be displayed.

To enter the Nitrox/Oxygen Setting Mode select MODE- SET- MODEL- NITROX. The default oxygen percentage ($O_2\%$) setting is 21% (air) and oxygen partial pressure (PO_2) setting 1.4 bar (Fig. 4.17.).

NOTE! The Nitrox settings will revert to default settings 21% (air) and PO_2 1.4 bar after approximately 2 hours.

4.2.2. Alarm settings [2 SET ALMS]

In the alarm settings you can set a dive time alarm and a maximum depth alarm. To enter Alarm settings select MODE - SET - SET ALARMS (Fig. 4.18).

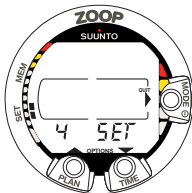


Fig. 4.15. Setting Options.
[4 SET].

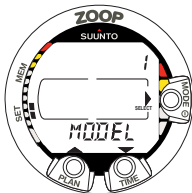


Fig. 4.16. Set Model mode.

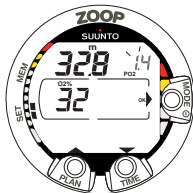


Fig. 4.17. Setting Nitrox parameters, Oxygen percentage is 32%, oxygen partial pressure limit is 1.4 bar. The equivalent maximum depth is displayed as 32.8 m [107 ft]. Press scroll buttons to change oxygen percentage and to set oxygen partial setting value. Accept settings by pressing MODE (OK).

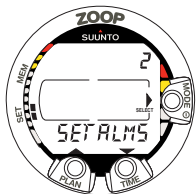


Fig. 4.18. Set Alarms Mode.

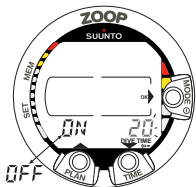


Fig. 4.19. Setting Dive Time Alarm. Press scroll buttons to change alarm on/off and to set dive time value.

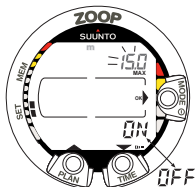


Fig. 4.20. Setting Maximum Depth Alarm. Press scroll buttons to change alarm on/off and to set maximum depth value.

4.2.2.1. Dive Time Alarm Setting

The instrument has one Dive Time Alarm Setting, which can be used for several purposes to add to your diving safety. The alarm can be set, for example, to your planned bottom time.

Set the Dive Time alarm ON or OFF and the alarm time from 1 to 999 minutes. (Fig. 4.19).

4.2.2.2. Maximum Depth Alarm Setting

You can set one depth alarm in the dive computer. The depth alarm is set to 40 m [131 ft] at the factory, but you are able to adjust it according your personal preference or switch it off. The depth range can be set from 3.0 m to 100 m [9 ft to 328 ft] (Fig. 4.20.).

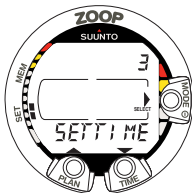


Fig. 4.21. Time Setting Mode.

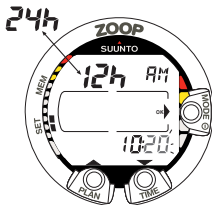


Fig. 4.22. Adjusting Time.

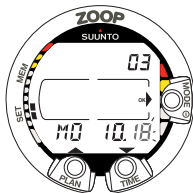


Fig. 4.23. Adjusting Date.

4.2.3. Setting Time and date [3 SET TIME]

To enter the Time Setting Mode select MODE- SET- SET TIME (Fig. 4.21.)

After entering this mode you are able to select between 12 h and 24 hour time formats and set the correct time by using the SMART (MODE) and scroll buttons (Fig. 4.22.). After this you are able to set the correct year, month and day in this order (Fig. 4.23.).

NOTE

- The day of the week is automatically calculated in accordance with the date.
- The date can be set within the range of Jan 1, 1990 to Dec. 31, 2089.

4.2.4. Personal adjustments [4 SET ADJ]

To enter the Personal adjustments mode select MODE- SET- SET ADJ (Fig. 4.24). The adjustments are altitude, personal and dive computer units

The current Altitude and Personal Adjustment modes are shown when diving and at the surface. If the mode does not match the altitude or personal conditions (see section 3.7. “High Altitude Dives and Personal Adjustment”), it is imperative that you enter the correct selection before diving. Use the Altitude Adjustment to select the correct altitude mode (Fig. 4.25.) Use the Personal Adjustment to add an extra level of conservatism (Fig. 4.26.).

Use the units adjustment to choose choose between metric and imperial units (Fig. 4.27.).

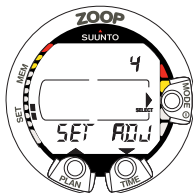


Fig. 4.24. Adjustment Setting Mode.

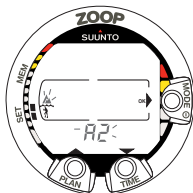


Fig. 4.25. Setting Altitude adjustment. Press scroll buttons to change altitude mode.

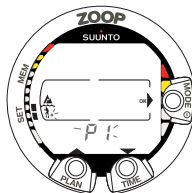


Fig. 4.26. Setting Personal adjustment. Press scroll buttons to change personal mode.

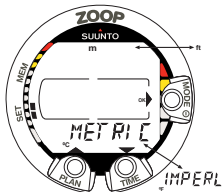


Fig. 4.27. Setting Metric/Imperial units.

5. CARE AND MAINTENANCE OF MY SUUNTO DIVING COMPUTER

The SUUNTO dive computer is a sophisticated precision instrument. Although it is designed to withstand the rigors of scuba diving, you must treat it with the same proper care and caution as any other precision instrument.

• WATER CONTACTS AND PUSH BUTTONS

Contamination or dirt on the water contacts/connector or push buttons may prevent the automatic activation of the Dive Mode and cause problems during the data transfer. Therefore, it is important that the water contacts and push buttons are kept clean. If the water contacts are active (AC text remains on display) or the Dive Mode activates on its own, the reason for this is probably contamination or invisible marine growth, which may create an electric current between the contacts. It is important that the dive computer is carefully washed in fresh water after the day's diving is completed. The contacts can be cleaned with fresh water and, if necessary, a mild detergent and a soft brush. Sometimes it might be necessary to remove the instrument from the protective boot for cleaning.

• CARE OF YOUR DIVE COMPUTER

- NEVER try to open the case of the dive computer.
- Have your dive computer serviced every two years or after 200 dives (whichever comes first) by an authorized dealer or distributor. This service will include a general operational check, replacement of the battery, and water resistance check. The service requires special tools and training. Therefore, it is advisable

to contact an authorized SUUNTO dealer or distributor for the biennial service. Do not attempt to do any servicing that you are not sure of.

- Should moisture appear inside the case, immediately have the instrument checked by your SUUNTO dealer or distributor.
- Should you detect scratches, cracks or other such flaws on the display that may impair its durability, immediately have it replaced by your SUUNTO dealer or distributor.
- Wash and rinse the unit in fresh water after every use.
- Protect the unit from shock, extreme heat, direct sunlight, and chemical attack. The dive computer cannot withstand the impact of heavy objects like scuba cylinders, nor chemicals like gasoline, cleaning solvents, aerosol sprays, adhesive agents, paint, acetone, alcohol, etc. Chemical reactions with such agents will damage the seals, case and finish.
- Store your dive computer in a dry place when you are not using it.
- The dive computer will display a battery symbol as a warning when the power gets too low. When this happens, the instrument should not be used until the battery has been replaced.
- Do not fasten the strap of your dive computer too tightly. You should be able to insert your finger between the strap and your wrist. Shorten the strap by cutting it if you do not expect to need the extra length.

- **MAINTENANCE**

The instrument should be soaked, thoroughly rinsed with fresh water, then dried with a soft towel after each dive. Make sure that all salt crystals and sand particles have been flushed out. Check the display for possible moisture or water. DO NOT use the dive computer if you detect any moisture or water inside. Contact an authorized Suunto dealer for battery replacement or other service.

CAUTION

- Do not use compressed air to blow water off the unit.
- Do not use solvents or other cleaning fluids that might cause damage.
- Do not test or use the dive computer in pressurized air.

• WATER RESISTANCE INSPECTION

The water resistance of the unit must be checked after replacing the battery or after other service operations. The check requires special equipment and training. You must frequently check the display for any sign of leaks. If you find moisture inside your dive computer, there is a leak. A leak must be corrected without delay as moisture will seriously damage the unit, even beyond repair. SUUNTO does not take any responsibility for damage caused by moisture in the dive computer unless the instructions of this manual are carefully followed. In the event of a leak, immediately take the dive computer to an authorized SUUNTO dealer or distributor.

sda

For more information on service & warranty, please refer to FAQs on www.suunto.com.

5.1. BATTERY REPLACEMENT

NOTE

It is advisable to contact an authorized Suunto dealer for battery replacement. It is imperative that the change is made in a proper manner to avoid any leakage of water into the battery compartment or computer.

**CAUTION**

When the battery is changed all nitrogen and oxygen uptake data is lost. Therefore, the no-flying time shown by the computer should have reached zero or you must wait for 48 hours or preferably even 100 hours between dives before you may dive again.

All history and profile data, as well as the altitude, personal and alarm settings, will remain in the dive computer memory after the battery change. However, the clock time and time alarm setting is lost. In the NITROX Mode the Nitrox settings are also reverted back to default settings (21 % O₂, 1.4 bar PO₂).

When working with the battery compartment, cleanliness is extremely important. Even the smallest dirt particles may cause a leakage when you dive.

BATTERY KIT

The battery kit includes a 3.0 V coin type lithium cell battery and a lubricated O-ring. When handling the battery do not make contact with both of the poles at the same time. Do not touch the surfaces of the battery with your bare fingers.

TOOLS REQUIRED

- A flat 1.5 mm screwdriver or a special tool for spring bars (K5857).
- Soft cloth for cleaning.
- Needlenose pliers or large screwdriver for turning securing ring.

BATTERY REPLACEMENT

The battery and the buzzer are located in the back of the instrument in a separate compartment, the parts of which are shown in Fig. 5.1. To change the battery, follow the procedure below:

1. Remove the computer from the console or boot.

Wrist model:

- Disassemble the shorter part of the strap with a flat 1.5 mm screwdriver or a special tool for spring bars. The longer part of the strap may stay on but removing it may ease the work later on.

Console model:

1. Remove the dive computer from the console according the instructions of the console.
2. Thoroughly rinse and dry the computer.
3. Open the securing ring of the battery compartment lid by pushing it down and rotating it clockwise. You may use a pointed nose pliers or a small screwdriver as an aid in the rotating. Put the pliers ends into the holes of the securing ring or the screwdriver onto the side of the right tooth on the ring (Fig. 5.2) and turn the ring clockwise. Care should be taken not to damage any of the parts.
4. Remove the ring.
5. Carefully remove the lid with the beeper attached to it. The lid can be removed by pressing with your finger on the outermost edge of the lid while at the same time pulling with your nail at the opposite side. Do not use sharp metal objects as they might damage the O-ring or the sealing surfaces.

6. Remove the O-ring and the battery retainer.
7. Carefully remove the battery. Do not damage the electrical contacts or the sealing surface. Check for any traces of flooding, particularly between the beeper and the lid, or for any other damage. In case of a leak or any other damage, bring the dive computer to an authorized SUUNTO dealer or distributor for check and repair.
8. Check the condition of the O-ring; a defective O-ring may indicate sealing or other problems. Dispose the old O-ring, even if it seems to be in good condition.
9. Check that the battery compartment, battery holder and lid are clean. Clean with soft cloth if necessary.
10. Gently insert the new battery in the battery compartment. Check the polarity of the battery: the “-” mark should point toward the bottom of the compartment and the “+” mark upwards.
11. Reinstall the battery retainer in its correct position.
12. Check that the new lubricated O-ring is in good condition. Put it in the right position on the battery compartment. Be very careful not to get any dirt on the o-ring or its sealing surfaces.
13. Carefully press the lid onto the battery compartment with your thumb. It is better to press down the lid down one side first, this minimizes entrapped air and it is thus easier to hold down the lid. Make sure that the O-ring is not at any point protruding out on the edge.
14. Put your other thumb through the locking ring. Press this thumb firmly against the lid and release the other one. Make sure that the lid is pressed completely down!
15. Turn the locking ring counterclockwise with your free thumb and fingers until it snaps into its locked position.


16. The dive computer should now active it's timekeeping mode and show time 18:00 [6:00 PM] and date SA 01,01. Activate the instrument. Check that:
 - All display segments work.
 - The low battery warning is off.
 - The buzzer beeps and backlight works.
 - All the settings are correct. Reset if necessary.
17. Install the dive computer back into the console or boot and reassemble the strap. The instrument is now ready for use.

Wrist model:

- Assembling into the boot: First insert the longer strap in its hole in the front of the boot and then the dive computer into its cavity in the boot starting at the back end. Then snap also the long strap end of the instrument into the boot. Stretch the boot as needed.
- Assemble the shorter part of the strap. Use the spring bar tool or small screwdriver to compress the spring bars. Make sure that the spring bars get fully seated so they will not come off their holes.

Console model:

- Refit the dive computer in the console according the instructions of the console.

 **CAUTION** *Check after the first dives for possible moisture under the transparent battery compartment lid, indicating a leak.*

Complete Strap
(V5841)

Short Strap with buckle
(V5836)

Spring Bar (K5588)

Long Strap (K5592)



Securing Ring (V5844)

Battery Compartment Lid
with buzzer (V5843)

O-Ring (K5664)

Battery Retainer (V5842)

Battery (K5597)

Fig. 5.1. Instrument parts. The code after the name stands for spare part order number.



Fig. 5.2. Opening of the securing ring.

6. TECHNICAL DESCRIPTION

6.1. OPERATING PRINCIPLES

NO-DECOMPRESSION LIMITS

The no-decompression limits displayed by the dive computer for the first dive to a single depth (see Table 6.1. and Table 6.2.), are slightly more conservative than those permitted by the U.S. Navy tables.

TABLE 6.1. NO-DECOMPRESSION TIME LIMITS (MIN) FOR VARIOUS DEPTHS (M) FOR THE FIRST DIVE OF A SERIES.

Personal Mode / Altitude Mode									
Depth [m]	P0/A0	P0/A1	P0/A2	P1/A0	P1/A1	P1/A2	P2/A0	P2/A1	P2/A2
			▲			▲			▲
9	--	163	130	163	130	96	130	96	75
12	124	89	67	89	67	54	67	54	45
15	72	57	43	57	43	35	43	35	29
18	52	39	30	39	30	25	30	25	21
21	37	29	23	29	23	20	23	20	15
24	29	24	19	24	19	16	19	16	12
27	23	18	15	18	15	12	15	12	9
30	18	14	12	14	12	9	12	9	7
33	13	11	9	11	9	8	9	8	6
36	11	9	8	9	8	6	8	6	5
39	9	8	6	7	6	5	6	5	4
42	7	6	5	6	5	4	5	4	4
45	6	5	5	5	5	4	5	4	3

TABLE 6.2. NO-DECOMPRESSION TIME LIMITS (MIN) FOR VARIOUS DEPTHS [FT] FOR THE FIRST DIVE OF A SERIES

Personal Mode / Altitude Mode									
Depth [ft]	P0/A0	P0/A1	P0/A2	P1/A0	P1/A1	P1/A2	P2/A0	P2/A1	P2/A2
			▲			▲			▲
30	--	160	127	160	127	93	127	93	73
40	120	86	65	86	65	53	65	53	43
50	69	56	41	56	41	34	41	34	28
60	50	38	29	38	29	25	29	25	20
70	36	29	23	29	23	20	23	20	15
80	28	23	19	23	19	15	19	15	11
90	22	18	15	18	15	11	15	11	9
100	17	14	11	14	11	9	11	9	7
110	13	11	9	11	9	7	9	7	6
120	10	9	8	9	8	6	8	6	5
130	9	7	6	7	6	5	6	5	4
140	7	6	5	6	5	4	5	4	4
150	6	5	4	5	4	4	4	4	3

ALTITUDE DIVING

The atmospheric pressure is lower at high altitudes than at sea level. After traveling to a higher altitude, the diver will have additional nitrogen in his body, compared to the equilibrium situation at the original altitude. This “additional” nitrogen is released gradually in time and equilibrium is reached. It is recommended that you acclimate to the new altitude by waiting at least three hours before making a dive.

Before high altitude diving, the instrument must be set to the Altitude Adjustment mode to adjust the calculations for the new altitude. The maximum partial pressures of nitrogen allowed by the mathematical model of the dive computer are reduced according to the lower ambient pressure.

As a result, the allowed no-decompression stop limits are considerably reduced.

SURFACE INTERVALS

The dive computer requires a minimum surface interval of 5 minutes between dives. If a surface interval is shorter than 5 minutes, the next dive is treated as a continuation of the previous dive.

6.2. SUUNTO REDUCED GRADIENT BUBBLE MODEL (RGBM)

The Suunto Reduced Gradient Bubble Model (RGBM) is a modern algorithm for predicting both dissolved and free gas in the tissues and blood of divers. It was developed in a co-operation between Suunto and Bruce R. Wienke BSc, MSc. PhD. It is based on both laboratory experiments and diving data, including data from DAN.

It is a significant advance on the classical Haldane models, which do not predict free gas (microbubbles). The advantage of Suunto RGBM is additional safety through its ability to adapt to a wide variety of situations. Suunto RGBM addresses a number of diving circumstances outside the range of just dissolved gas models by:

- Monitoring continuous multiday diving
- Computing closely spaced repetitive diving
- Reacting to a dive deeper than the previous dive
- Adapting for rapid ascents which produce high micro-bubble (silent-bubble) build-up
- Incorporating consistency with real physical laws for gas kinetics.

Suunto RGBM Adaptive decompression

The SUUNTO RGBM algorithm adapts its predictions of both the effects of micro-bubble build-up and adverse dive profiles in the current dive series. It will also change these calculations according to the personal adjustment you select.

The pattern and speed of decompression at the surface is adjusted according to micro-bubble influence.

Also on repetitive dives adjustment may be applied to the maximum allowable nitrogen overpressure in each theoretical tissue group.

Depending on circumstances Suunto RGBM will adapt the decompression obligations by doing any or all of the following:

- Reducing no-decompression stop dive times
- Adding Mandatory Safety Stops
- Increasing decompression stop times
- Advising an extended surface interval (Diver Attention symbol).

Some patterns of diving cumulatively add a higher risk of DCI, e.g. dives with short surface intervals, repetitive dives deeper than earlier ones, multiple ascents, substantial multiday diving. When this is detected in addition to adapting the decompression algorithm the Suunto RGBM model will in some circumstances also advise, with the Diver Attention Symbol (review chapter 3.6) that the diver extend the surface interval.

6.3. OXYGEN EXPOSURE

The oxygen exposure calculations are based on currently accepted exposure time limit tables and principles. In addition to this the dive computer uses several methods to conservatively estimate the oxygen exposure. These include for example:

- the displayed oxygen exposure calculations are upped to the next higher percentage value
- for recreational scuba diving, the recommended upper limit of 1.4 bar PO_2 is used as a default
- the CNS% limits up to 1.4 bar are based on 1991 NOAA Diving Manual limits, but the limits above 1.4bar are significantly shortened
- the OTU monitoring is based on the long-term daily tolerance level and the recovery rate is reduced

Oxygen related information displayed by the dive computer is also designed to ensure all warnings and displays in the appropriate phases of a dive. E.g. the following information will be shown before and during a dive, when the computer is set in Nitrox mode:

- the selected O₂%
- the color-coded OLF% bar graph for either CNS% or OTU%
- audible alarms are given and the OLF bar graph starts to blink when the 80% and 100% limits are exceeded
- the blinking of the bar graph stops, when the PO₂ is below 0.5 bar
- audible alarms are given and the actual PO₂ value blinks when it exceeds the preset limit
- in dive planning the maximum depth according to the O₂% and maximum PO₂ selected.

6.4. TECHNICAL SPECIFICATION

Dimensions and weight:

- Diameter: 61 mm [2.4in].
- Thickness: 28 mm [1.1in].
- Weight: 68g [2.4 oz].

Depth Gauge:

- Temperature compensated pressure sensor.
- Calibrated complying with EN 13319, in fresh water the readings are about 3% smaller.
- Maximum depth of operation: 80 m [262 ft] (complying with EN 13319).

- Accuracy: $\pm 1\%$ of full scale or better from 0 to 80 m [262 ft] at 20°C [68°F] (complying with EN 13319).
- Depth display range: 0 ... 99.9 m [328 ft].
- Resolution: 0.1 m from 0 to 99.9 m [1 ft from 0 to 328 ft].

Temperature display:

- Resolution: 1°C [1.5°F].
- Display range: -9 ... +50°C [-9 ... +122°F].
- Accuracy: $\pm 2^\circ\text{C}$ [$\pm 3.6^\circ\text{F}$] within 20 minutes of temperature change.

Calendar Clock:

- Accuracy: ± 25 s/month (at 20°C [68°F]).
- 12/24 h display.

Other displays:

- Dive time: 0 to 999 min, counting starts and stops at 1.2 m [4 ft] depth.
- Surface time: 0 to 99 h 59 min.
- Dive counter: 0 to 99 for repetitive dives.
- No-decompression time: 0 to 199 min (- - after 199).
- Ascent time: 0 to 99 min (- - after 99).
- Ceiling depths: 3.0 to 100 m [10 to 328 ft].

Displays only in Nitrox mode:

- Oxygen%: 21 - 50.
- Oxygen partial pressure display: 1.2 - 1.6 bar depending on the limit setting.
- Oxygen Limit Fraction: 1 - 110% with 10% resolution (bar graph).

Logbook/Dive Profile Memory:

- Recording interval: 30 seconds
- Depth accuracy: 0.3 m [1 ft].

Operating Conditions

- Normal altitude range: 0 to 3000 m [10000 ft] above sea level.
- Operating temperature: 0°C to 40°C [32°F to 104°F].
- Storage temperature: -20°C to +50°C [-4°F to +122°F].

It is recommended that the instrument be stored in a dry place at room temperature.



NOTE

Do not leave the dive computer in direct sunlight!

Tissue Calculation Model

- Suunto RGBM algorithm (developed by SUUNTO and Bruce R. Wienke, BS, MS and PhD).
- 9 tissue compartments.
- Tissue compartment halftimes: 2.5, 5, 10, 20, 40, 80, 120, 240 and 480 minutes (on gassing). The off gassing halftimes are slowed down.
- Reduced gradient (variable) “M” values based on diving habit and dive violations. The “M” values are tracked up to 100 hours after a dive.
- The EAN and oxygen exposure calculations are based on recommendations by R.W. Hamilton, PhD and currently accepted exposure time limit tables and principles.

Battery

- One 3 V lithium battery: CR 2450 (K5597) and O-ring 1.78 mm x 31.47 mm 70 ShA (K5664).
- Battery storage time (shelf life): Up to three years.
- Replacement: Every two years or more often depending on dive activity.
- Life expectancy at 20°C [68°F]:
 - 0 dives/y → 2 years
 - 100 dives/y → 1.5 years
 - 300 dives/y → 1 year

The following conditions have an affect on the expected battery lifetime:

- The length of the dives.
- The condition in which the unit is operated and stored (e.g. temperature/cold conditions). Below 10°C [50°F] the expected battery lifetime is about 50-75% of that at 20°C [68°F].
- The use of the audible alarms.
- The quality of the battery (some lithium batteries may exhaust unexpectedly, which cannot be tested in advance).
- The time the dive computer has been stored until it gets to the customer. The battery is installed into the unit at the factory.



NOTE

Low temperature or an internal oxidation of the battery may cause the battery warning even though the battery has enough capacity. In this case, the warning usually disappears when the Dive Mode is activated again.

7. SUUNTO LIMITED WARRANTY FOR SUUNTO DIVING COMPUTERS AND SUUNTO DIVING COMPUTER ACCESSORIES

Suunto warrants that during the Warranty Period Suunto or a Suunto Authorized Service Center (hereinafter Service Center) will, at its sole discretion, remedy defects in materials or workmanship free of charge either by a) repairing, or b) replacing, or c) refunding, subject to the terms and conditions of this Limited Warranty. This Limited Warranty is only valid and enforceable in the country of purchase, unless local law stipulates otherwise.

Warranty Period

The Limited Warranty Period starts at the date of original retail purchase. The Warranty Period is two (2) years for display devices. The Warranty Period is one (1) year for accessories and consumable parts, including but not limited to chargeable batteries, chargers, docking stations, straps, cables and hoses.

Exclusions and Limitations

This Limited Warranty does not cover:

1. a) normal wear and tear, b) defects caused by rough handling, or c) defects or damage caused by misuse contrary to intended or recommended use;
2. user manuals or any third-party items;
3. defects or alleged defects caused by the use with any product, accessory, software and/or service not manufactured or supplied by Suunto;
4. replaceable batteries.

This Limited Warranty is not enforceable if item:

1. has been opened beyond intended use;
 2. has been repaired using unauthorized spare parts; modified or repaired by unauthorized Service Center;
 3. serial number has been removed, altered or made illegible in any way, as determined at the sole discretion of Suunto;
 4. has been exposed to chemicals including but not limited to mosquito repellents.
- Suunto does not warrant that the operation of the Product will be uninterrupted or error free, or that the Product will work with any hardware or software provided by a third party.

Access to Suunto warranty service

You must have proof of purchase to access Suunto warranty service. For instructions how to obtain warranty service, visit www.suunto.com/warranty, contact your local authorized Suunto retailer, or call Suunto Help Desk +358 2 2841160 (national or premium rates may apply).

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To the maximum extent permitted by applicable mandatory laws, this Limited Warranty is your sole and exclusive remedy and is in lieu of all other warranties, expressed or implied. Suunto shall not be liable for special, incidental, punitive or consequential damages, including but not limited to loss of anticipated benefits, loss of data, loss of use, cost of capital, cost of any substitute equipment or facilities, claims of third parties, damage to property resulting from the purchase or use of the item or arising from breach of the warranty, breach of contract, negligence, strict tort, or any legal or equitable theory, even if Suunto knew of the likelihood of such damages. Suunto shall not be liable for delay in rendering warranty service.

8. SUUNTO DIVE MANAGER (SDM)

Suunto Dive Manager (SDM) is optional PC software that greatly enhances the functionality of your Suunto Zoop.

With the SDM software, you can download dive data from your dive computer to your PC. You can then view and organize all the data recorded with your Suunto Zoop. You can also print copies of your dive profiles.

You can always download the latest version of Suunto Dive Manager from www.suunto.com.

Please check for updates regularly as new features are constantly being developed.

The following data is transferred to your PC:

- depth profile of the dive
- dive time
- preceding surface interval time
- dive number
- dive start time (year, month, day and time)
- dive computer settings
- tissue calculation data
- water temperature

- additional dive information (e.g. SLOW and Mandatory Safety Stop violations, Diver Attention Symbol, Bookmark, Surfaced Mark, Decompression Stop Mark, Ceiling Error Mark)
- dive computer serial number
- personal information (30 characters)

Using SDM, you are able to enter setup options such as:

- input a personal, 30-character field into the Suunto Zoop

It is also possible to manually add comments, multimedia and other personal information to the PC-based dive data files.

9. GLOSSARY

Altitude dive	A dive made at an elevation greater than 300 m [1000 ft] above sea level.
Ascent rate	The speed at which the diver ascends toward the surface.
ASC RATE	Abbreviation for ascent rate.
Ascent time	The minimum amount of time needed to reach the surface on a decompression stop di
ASC TIME	Abbreviation for ascent time.
Ceiling	On a decompression stop dive the shallowest depth to which a diver may ascend based on computer nitrogen load.
Ceiling Zone	On a decompression stop dive the zone between the ceiling and the ceiling plus 1.8 m [6 ft]. This depth range is displayed with the two arrows pointing toward each other (the "hour glass" icon).
CNS	Abbreviation for Central Nervous System toxicity.

Central Nervous System Toxicity	Toxicity caused by oxygen. Can cause a variety of neurological symptoms. The most important of which is an epileptic-like convulsion which can cause a diver to drown.
CNS%	Central Nervous System toxicity limit fraction. Also note Oxygen Limit Fraction.
Compartment	See “Tissue group”.
DAN	Divers Alert Network.
DCI	Abbreviation for decompression illness.
Decompression	Time spent at a decompression stop or range before surfacing, to allow absorbed nitrogen to escape naturally from tissues.
Decompression range	On a decompression stop dive the depth range, between the floor and ceiling, within which a diver must stop for some time during ascent.
Decompression illness	Any of a variety of maladies resulting either directly or indirectly from the formation of nitrogen bubbles in tissues or body fluids, as a result of inadequately controlled decompression. Commonly called “bends” or “DCI”.

Dive series	A group of repetitive dives between which the dive computer indicates some nitrogen loading is present. When nitrogen loading reaches zero the dive computer deactivates.
Dive time	Elapsed time between leaving the surface to descend, and returning to the surface at the end of a dive.
EAD	Abbreviation for equivalent air depth.
EAN	Abbreviation for enriched air nitrox.
Enriched Air Nitrox	Also called Nitrox or Enriched Air = EANx. Air that has some oxygen added. Standard mixes are EAN32 (NOAA Nitrox I = NN I) and EAN36 (NOAA Nitrox II = NN II).
Equivalent Air Depth	Nitrogen partial pressure equivalent table.
Floor	The deepest depth during a decompression stop dive at which decompression takes place.
Half-time	After a change in ambient pressure, the amount of time required for the partial pressure of nitrogen in a theoretical compartment to go half-way from its previous value to saturation at the new ambient pressure.

Multi-level dive	A single or repetitive dive that includes time spent at various depths and whose no-decompression limits are therefore not determined solely by the maximum depth attained.
NITROX	In sports diving refers to any mix with a higher fraction of oxygen than standard air.
NOAA	United States National Oceanic and Atmospheric Administration.
No-decompression time	The maximum amount of time a diver may remain at a particular depth without having to make decompression stops during the subsequent ascent.
No-decompression dive	Any dive which permits a direct, uninterrupted ascent to the surface at any time.
NO DEC TIME	Abbreviation for no-decompression time limit.
OEA = EAN = EANx	Abbreviation for Oxygen Enriched Air Nitrox.
OLF	Abbreviation for Oxygen Limit Fraction.
OTU	Abbreviation for Oxygen Tolerance Unit.
Oxygen Tolerance Unit	Is used to measure the Whole-Body-Toxicity.

Oxygen Limit Fraction	A term used by SUUNTO for the values displayed in the Oxygen Toxicity bargraph. The value is either the CNS% or the OTU%.
O₂%	Oxygen percentage or oxygen fraction in the breathing gas. Standard air has 21% oxygen.
Oxygen partial pressure	Limits the maximum depth to which the used Nitrox mixture can safely be used. The maximum partial pressure limit for enriched air diving is 1.4 bar. The contingency partial pressure limit is 1.6 bar. Dives beyond this limit have the risk for immediate oxygen toxicity.
PO₂	Abbreviation for oxygen partial pressure.
RGBM	Abbreviation for Reduced Gradient Bubble Model.
Reduced Gradient Bubble Model	Modern algorithm for tracking both dissolved and free gas in divers.
Repetitive dive	Any dive whose decompression time limits are affected by residual nitrogen absorbed during previous dives.
Residual nitrogen	The amount of excess nitrogen remaining in a diver after one or more dives.

SURF TIME

Abbreviation for surface interval time.

Surface interval time

Elapsed time between surfacing from a dive and beginning a descent for the subsequent repetitive dive.

Tissue group

Theoretical concept used to model bodily tissues for the construction of decompression tables or calculations.

Whole-Body Toxicity

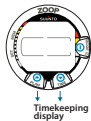
Another form of oxygen toxicity, which is caused by prolonged exposure to high oxygen partial pressures. The most common symptoms are irritation in the lungs, a burning sensation in the chest, coughing and reduction of the vital capacity. Also called Pulmonary Oxygen Toxicity. See also OTU.

DISPOSAL OF THE DEVICE

Please dispose of the device in an appropriate way, treating it as electronic waste. Do not throw it in the garbage. If you wish, you may return the device to your nearest Suunto dealer.



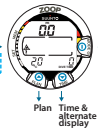
TIME & STAND-BY MODE



3 sec.



SURFACE MODE

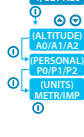


2 MODE OPTIONS

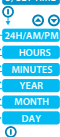


4 SET OPTIONS 3 MEMORY OPTIONS

4) SET ADJ.



3) SET TIME



2) SET ALARMS



1) SET MODEL



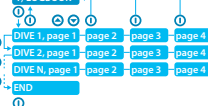
3) PC SET



2) HISTORY



1) LOGBOOK



SUUNTO

 **SUUNTO HELP DESK**

Global	+358 2 284 1160
USA (toll free)	+1-800-543-9124
Canada (toll free)	+1-800-267-7506

www.suunto.com


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