







Matrix Dive Computer

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• 1 INTRODUCTION

1.1 GLOSSARY

	Symbolizes dive violation (in dive mode).
	Symbolizes uncontrolled ascent violation (in post-dive and logbook displays).
	Symbolizes decompression stop violation (in post-dive and logbook displays).
ASC:	Total ascent time, the time it takes to perform the ascent from your current depth to the surface in a decompression dive, including all decompression stops and assuming an ascent rate of 10m/min or 33ft/min.
AVG:	Average depth, calculated from the beginning of the dive.
CNS:	Central Nervous System. CNS% is used to quantify toxic effects of oxygen.
DESAT:	Desaturation time. The time needed for the body to eliminate the nitrogen taken up during diving.
Gas switching:	The act of changing from one breathing gas to another.
Max depth:	Maximum depth attained during the dive.
MOD:	Maximum Operating Depth. This is the depth at which the partial pressure of oxygen (ppO ₂) reaches the maximum allowed level (ppO ₂ max). Diving deeper than the MOD will expose the diver to unsafe ppO ₂ levels.
Multigas:	Refers to a dive in which more than one breathing gas is used (air and/or Nitrox).
Nitrox:	A breathing mix made of oxygen and nitrogen, with the oxygen concentration being 22% or higher.
NO 	Minimum amount of time the diver should wait before taking a plane.
No deco time:	This is the time that you can stay at the current depth and still make a direct ascent to the surface without having to perform mandatory decompression stops.
O₂:	Oxygen.
O₂%:	Oxygen concentration used by the computer in all calculations.
P Factor:	Personalization factors, which allow the user to select between the standard decompression algorithm (P0) and an increasingly more conservative one (P1, P2).
ppO₂:	Partial pressure of oxygen. This is the pressure of the oxygen in the breathing mix. It is a function of depth and oxygen concentration. A ppO ₂ higher than 1.6bar is considered dangerous.
ppO₂max:	The maximum allowed value for ppO ₂ . Together with the oxygen concentration it defines the MOD.
Switch depth:	The depth at which the diver plans to switch to a higher oxygen concentration mix while using the multigas option.
S.I.:	Surface interval between dives in the logbook.
SURF:	Real time surface interval in post dive mode, the time that has elapsed since the end of the dive.

1.2 OPERATING MODES

The functions of the Matrix computer can be grouped into two categories, each corresponding to a specific mode of operation:

- **watch** : Matrix is dry on the surface. In this mode you can use it as a normal watch. You can also change settings, review your logbook, use the dive planner, see remaining desaturation after a dive, download to PC and much more;
- **dive**: Matrix monitors depth, time, temperature and performs all decompression calculations; dive mode itself can be broken down into 4 sub categories:
 - **pre-dive** (Matrix is on the surface but actively monitoring ambient pressure, so that it can begin to calculate a dive the instant it is submerged below 1.2m/4ft);
 - **dive**
 - **surfacing** (Matrix is on the surface at the end of a dive; dive time calculation is halted but if the diver submerges within three minutes the dive is resumed including the time spent on the surface; this for instance would allow a diver to surface momentarily to set a bearing towards the boat, then submerge again and swim towards the boat);
 - **post-dive** (after the three minutes of surfacing mode, Matrix closes the logbook and reverts to a display showing desaturation time, no-fly time and surface interval; this lasts until the desaturation and the no-fly time both have been reduced to zero).



The rechargeable battery has a life time of approximately 500 charging cycles. Please contact your authorized Mares dealer if you need to replace it.

1.3.1 CHARGING THE BATTERY

The battery takes about 2 hours to charge from completely empty to completely full. To charge the battery, use the special clip and the USB cable, connecting it either directly to a power supply or to the USB port of a PC or Mac. You will see the battery symbol at the bottom of the display, with flashing elements inside, and a number indicative of the charge level (from 0 to 100). When the battery is fully charged, the elements inside the battery stop flashing.



1.3 RECHARGEABLE BATTERY

Matrix uses a lithium-ion polymer rechargeable battery. A full charge allows you to do up to 15 hours of diving, depending on the usage of the backlight and the temperature of the water. When used only as a watch, the battery lasts approximately two weeks. As a rule of thumb, Matrix uses about 5-6% of battery per day as a watch and 4-5% for each hour diving. Diving in cold water, usage of the backlight and of the beeper increases battery consumption.

The display alerts you of the status of the battery. The three possible situations are described as follows:

- Matrix has more than **15%** charge left: no warning on the display, you can use Matrix for diving and as a watch;
- Matrix has between **11** and **15%** charge left: the display shows a partially empty battery symbol next to a warning sign. This is sufficient for one 60-minute dive but it is best to charge the battery now;
- Matrix has **10%** or less charge left: the display shows an empty battery symbol and a "no dive" message at the top. You can use Matrix as a watch but not as a dive computer. If you submerge, Matrix will not activate and will continue to show the time of day.

The exact level of the battery charge can be viewed at the bottom of the display by scrolling through the information using the bottom right button (see section 1.4).

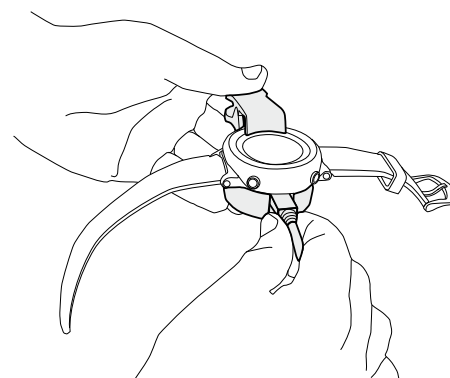
In the event that the charge drops below **10%** during a dive, the message **LOW BATTERY** will appear on the display. When you see this message, you should consider starting the procedure for a safe ascent as there may not be enough charge to continue diving.

⚠ WARNING

- Starting a dive with less than **15%** charge can cause the computer to fail during the dive. Recharge the battery as soon as you notice this message.
- Check the battery charge before each dive and recharge it if necessary.
- Temperature can noticeably affect battery performance. A low battery warning may appear when diving in cold waters even if you think that the battery should have sufficient charge.
- It is advised that you charge the battery if you intend to dive in cold water.

1.3.2 CONNECTING MATRIX TO A PC

To connect Matrix to a PC or Macintosh computer, use the dedicated clip and the USB cable.

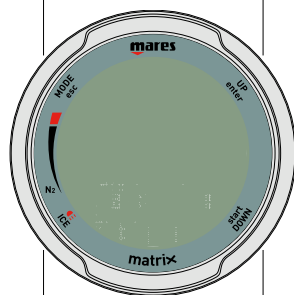


1.4 BUTTON OPERATION

Matrix has four buttons. These buttons allow you to access menus and change settings while in surface mode. During the dive they switch displays, call up the compass, and allow to display further information on the computer screen. Each button performs a different function when it is pressed and when it is pressed and held for one second. The overall operation follows a very clear logic:

	press	press and hold
WATCH	in watch display: switch between digital and analog display inside menus: go back one level (does not save changes)	in watch display: call up compass inside menus: return to digital watch display (does not save changes)
DIVE	go to dive profile	go to compass

	press	press and hold
WATCH	in digital watch display: modify top row inside menus: scroll up or increase by 1	in watch display: go to main menu inside menus: enter a submenu or confirm a setting
DIVE	modify top row	- go to gas switch screen (multigas mode only) - confirm gas switch (multigas mode only)



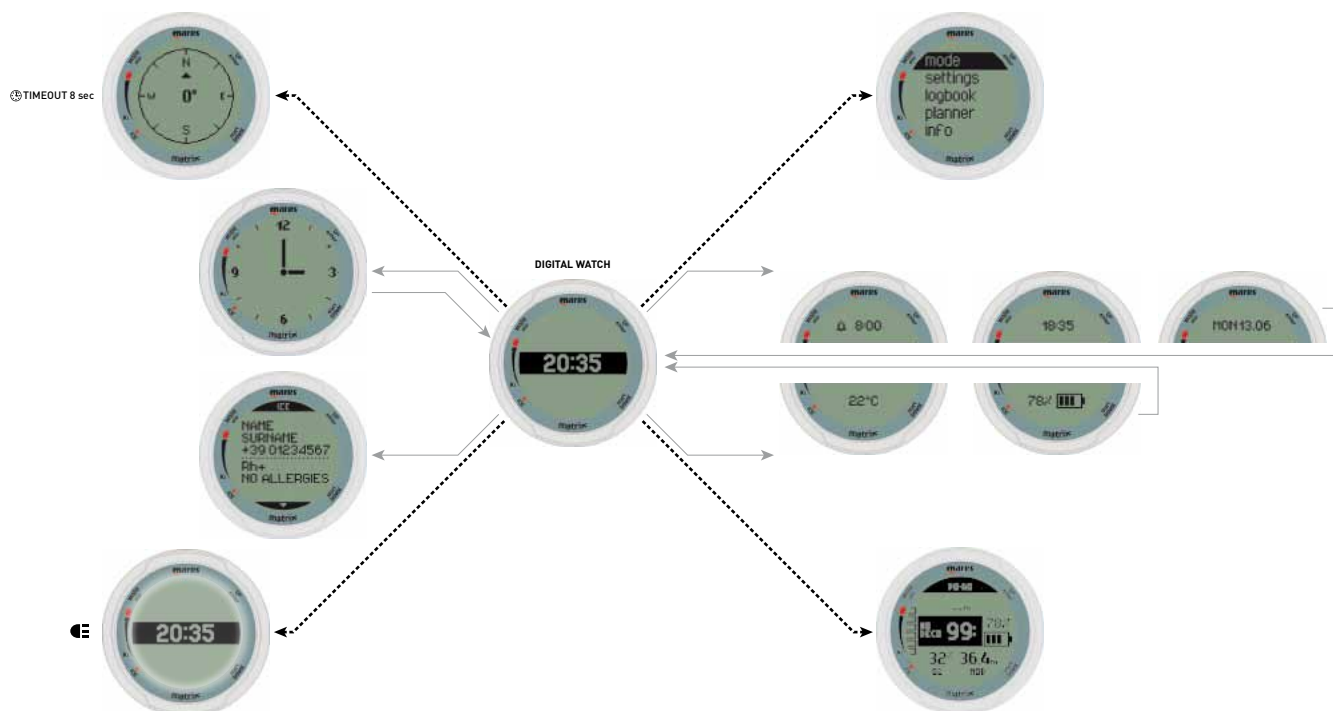
	press	press and hold
WATCH	ICE	backlight
DIVE	go to stop summary table (when applicable)	backlight

	press	press and hold
WATCH	in digital watch display: modify bottom row inside menus: scroll down or decrease by 1	go to pre-dive mode
DIVE	modify bottom right corner	restart stop watch

An overview of the button function both in watch mode and during a dive is presented here below.

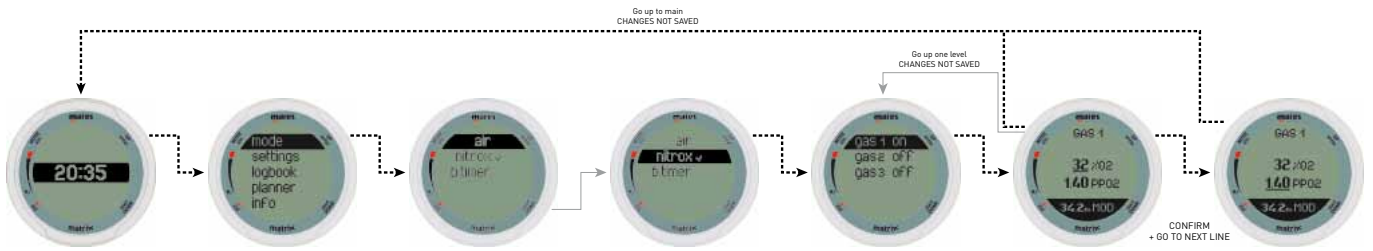
WATCH MODE

- press
- press and hold



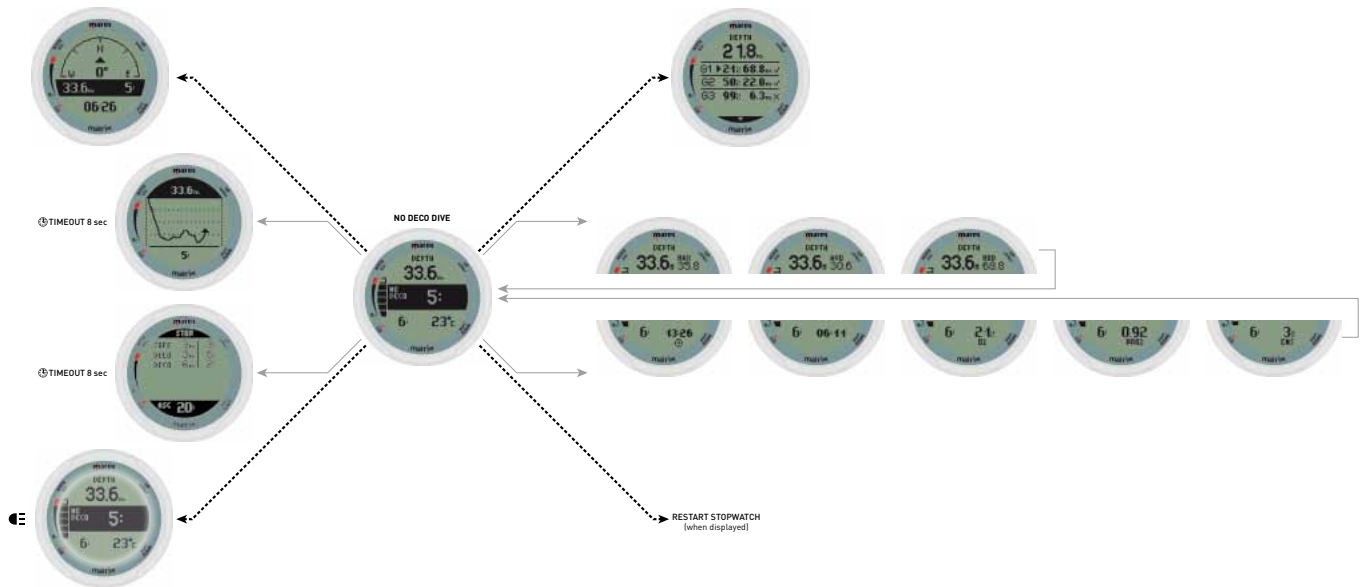
MENU MODE

- press
- press and hold



DIVE MODE

- press
- press and hold



1.4.1 DIGITAL WATCH DISPLAY

The digital watch display is the “home” display of Matrix. In this mode, you have a central ribbon with the current time in hours and minutes, while the top and bottom portions of the display can be customized.



To change what is displayed on the top portion, press the top right button. The choice is between a blank field, the current date, the set alarm time and the second time (useful when travelling to a different time zone).

To change what is displayed on the bottom portion, press the bottom right button. The choice is between a blank field, the temperature and the battery level. Note that the temperature reading will be affected by your body heat while you are wearing the watch.



1.4.2 ANALOG WATCH DISPLAY

From the digital watch display, press the top left button to switch to a simulated analog watch display.



1.4.3 DIGITAL COMPASS

From either watch display, press and hold the top left button to reach the digital compass display. Matrix has a tilt-compensated digital compass which can be used at almost any inclination. The compass can be called up at any moment during the dive and it can also be used on the surface. This menu allows you to use the compass on the surface and also to set a bearing for reference during your next dive. Note that for optimum energy management the compass times out after 8 seconds when on the surface.



The number shown in the middle of the compass rose represents the bearing, between 0 (North) and 359.

1.4.3.1 SETTING A BEARING

Setting a bearing is useful for instance if you are on a boat and there is a landmark on the shore that you can use for alignment to reach a specific spot on that dive site. Press the top right button and a dot will appear to indicate the set bearing. Additional symbols will appear as well: squares at 90 degrees, triangles at 120 degrees and two parallel lines at 180 degrees, as an aid in navigation for square, triangular and reciprocal courses. The number at the bottom represents the deviation of the direction you are pointing at with reference to the set bearing.

Once underwater, align the dot with the arrow and start swimming in that direction. If you press the top right button again, the new bearing will override the one in memory. If you press and hold the top right button you erase the bearing.



1.5 IN CASE OF EMERGENCY (ICE)

Matrix allows you to enter information about yourself, such as name, contact information, emergency number, insurance policies and allergies. This information is entered via the PC software Dive Organizer. Alternatively, it can also be entered via Diver's Diary (Mac software). To view the information on Matrix press the bottom left button from either watch or from the post-dive display.



• 2 MENUS, SETTINGS AND FUNCTIONS

This chapter describes in detail all menus, setting and functions of the Matrix dive computer.

Press and hold the top right button to reach the main menu. Inside this you will see the following submenus:



- **mode**: allows you to set the computer to air, nitrox or bottom timer mode;
- **settings**: allows you to view and change all settings relative to the dive computer, the watch and the compass;
- **logbook**: allows you to access the detailed history of the dives performed;
- **planner**: allows you to view no deco times as a function of depth based on your current nitrogen load;
- **info**: allows you to view information about software and hardware of your Matrix.

Note that Matrix has a **pre-dive** function. This puts the computer in a ready-to-dive mode and ensures that Matrix starts to monitor the dive as soon as a depth of 1.2m/4ft is reached. If you start the dive without putting Matrix into **pre-dive** mode, it will start to monitor the dive automatically but with a delay of up to 20 seconds from immersion.

To put Matrix in **pre-dive** mode, press and hold the bottom right button. The screen will look as depicted below.



NOTE

- If you remain in pre-dive for longer than 10 minutes without pressing any button, Matrix will return to the time of day display.
- It is recommended to put Matrix into pre-dive before submerging. Not doing so can lead to a delay of up to 20s in Matrix monitoring the dive.

2.1 MODE

The **mode** menu is reached from the time of day display by pressing and holding the top right button. Here you can define the type of gas you will be breathing during the dive (**air** or **nitrox**, including **multigas**). You can also set Matrix to **bottom timer**, in which case Matrix will show only time, depth and temperature: it will not carry out any decompression calculation and it will not show any warnings and alarms.

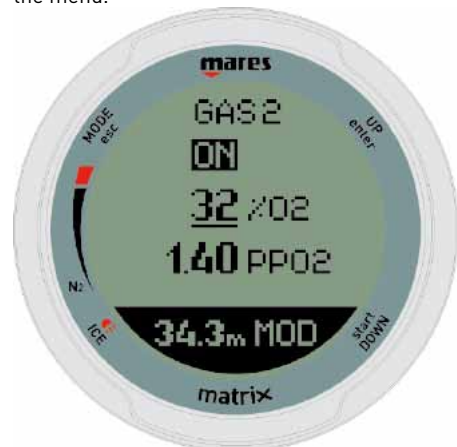


Use the buttons on the right side to highlight your choice, then press and hold the top right button to activate it. **air** is the equivalent of setting **nitrox** to 21% and a ppO_2 max of 1.4bar, but simplifies the display a bit by not showing the CNS (its value however is calculated in the background and if needed the 75% warning and the 100% alarm are triggered).

When selecting **nitrox**, you are taken to a submenu in which you can define the percentage of oxygen in the mixture ($\%O_2$) and the maximum value of oxygen partial pressure (ppO_2 max) for up to three breathing mixes. The maximum possible value for the ppO_2 max is 1.6bar. Most training agencies recommend not to exceed a value of 1.4bar.



Once inside this menu, use the buttons on the right side to change the $O_2\%$, and watch how this affects the maximum operating depth (MOD). Then press and hold the top right button to move on to the ppO_2 max and use the buttons on the right to change the value, again noticing how this affects the MOD. Press and hold the top right button again to save and exit the menu.



⚠ WARNING

- Diving with Nitrox may only be attempted by experienced divers after proper training from an internationally recognized agency.
- Before every dive and after changing the tank, you must make sure that the set oxygen concentration in Matrix corresponds to the oxygen concentration in the tank. Setting the wrong oxygen concentration can lead to serious injury or death.

This is also the menu where you would be setting your decompression gases if you dived with more than one gas. See chapter 3.5 for more information about diving with more than one gas.

2.2 SETTINGS

Matrix's **settings** menu allows you to access functions or to change settings. Once inside this menu, you will see three submenus: **set dive**, where you can set parameters pertaining to the dive, **set watch**, where you can set parameters pertaining to the watch, and **set compass**, where you can set parameters relative to the digital compass.



Press and hold the top right button to enter a menu or submenu, press the right side buttons to scroll up and down between available options or to increase or decrease the value of a setting. Then press and hold the top right button to confirm the change in setting. Press or press and hold the top left button to exit a menu without saving the last change.

MENU	Description
SET DIVE	
backlight	Allows you to set the duration after which the backlight turns off automatically. You can set this between 1 and 10 seconds or you can set it to on . If you set it to on the backlight will remain on until you press and hold the lower left button again to turn it off.
p factor	Allows you to choose between the standard algorithm (P0) and an increasingly more conservative one (P1 , P2).
altitude	Allows you to set the algorithm into altitude mode when diving in mountain lakes.
water	Allows you to choose between salt and fresh water.
units	Allows you to choose between metric (m , °C) and imperial (ft , °F) units
fast ascent	Allows you to turn off the dive violation due to uncontrolled ascent. This is for dive instructors only, who may find themselves in such a situation because of their teaching requirements.
alarms	Allows you to turn on or off all audible alarms of Matrix.
erase desat	Allows you to reset the nitrogen saturation to zero, thereby erasing the effects of a previous dive. This is only for people who plan to lend their computer to another diver who has not performed a dive within the last 24 hours.
factory reset	Sets Matrix back to the original configuration.

MENU	Description
SET WATCH	
time	Allows you to set the time.
format	Allows you to choose between AM/PM and 24-hour formats
date	Allows you to set the date.
second time	Allows you to set a second time, useful when travelling to a different time zone.
alarm	Allows you to set a wake-up alarm

MENU	Description
SET COMPASS	
declination	Allows you to define the degrees of compensation between magnetic north and geographic north in the digital compass.
direction	Allows you to define the direction in which to perform the compensation.
calibrate	Allows you to recalibrate the compass.

2.2.1 SET DIVE

2.2.1.1 BACKLIGHT

Matrix has a backlight which can be activated in case of low ambient light. The backlight is activated by pressing and holding the bottom left button. During a dive, the backlight will stay on for the duration defined in this menu. You can choose between 1 and 10 seconds, or you can set it to **always on**. If you set it to **always on**, the backlight will remain on until you press and hold the lower left button again.

NOTE

- The backlight consumes battery energy: the longer the backlight stays on high intensity, the less your battery charge will last. Whereas with the backlight always off Matrix uses up about 4-5% battery charge per hour of diving, with the backlight always on the battery consumption per hour of diving goes up to 8-9%.
- If the **low battery** warning is activated, the backlight will be disabled.

In surface mode, the backlight has always a duration of 6 seconds in either watch display. If the backlight is on when you enter any menu or function other than the watch display, it will remain on until you return to the watch display. This preserves the battery if you are simply checking the time, yet allows you to browse at length through the logbook or change settings if you wish to do so in low light conditions.

2.2.1.2 P FACTOR

Matrix allows you to set an additional personal safety factor for those circumstances in which

you want to be especially cautious, such as after a long period of inactivity or when planning a strenuous dive. In this menu you can choose between the standard algorithm (**P0**), a more conservative version (**P2**) or an intermediate one (**P1**).

NOTE

The choice of **p factor** will be reflected in the dive planner.

2.2.1.3 ALTITUDE

Atmospheric pressure is a function of altitude and of weather conditions. This is an important aspect to consider for diving, because the atmospheric pressure surrounding you has an influence on uptake and subsequent release of nitrogen. Above a certain altitude, the decompression algorithm has to change in order to account for the effect of the change in atmospheric pressure. When diving in a mountain lake, find out what the altitude is and choose the altitude range in Matrix within the four available options:

- **A0**: from sea level to approximately 700m/3300ft;
- **A1**: from approximately 700m/2300ft to approximately 1500m/4900ft ;
- **A2**: from approximately 1500m/4900ft to approximately 2400m/7900ft;
- **A3**: from approximately 2400m/7900ft to approximately 3700m/12100ft;
- We do not recommend diving at altitudes above 3700m / 12100ft. If you do, set Matrix to **bottom timer** and find appropriate altitude dive tables.

⚠ WARNING

Diving in mountain lakes without first setting Matrix to the proper altitude setting can cause severe injury or death.

2.2.1.4 WATER

You can set the computer for **fresh** water or **salt** water calibration, depending on where you intend to dive. Setting the wrong water type entails an error in depth measurement of approx 3% (i.e. at a depth of 30m/100ft, a computer set to salt water will show 29m/97ft in fresh water whereas a computer set to fresh water will show 31m/103ft in salt water). Note that this does not affect the proper functioning of the computer, since the computer performs all of the calculations based purely on pressure measurements.

2.2.1.5 UNITS

You can choose between metric (depth in meters, temperature in °C) and imperial units. (depth in feet, temperature in °F).

2.2.1.6 FAST ASCENT

A fast (uncontrolled) ascent is defined as one in which a speed of 12 m/min / 40ft/min or higher was maintained over more than two thirds of the way up. This applies to dives deeper than 12m/40ft only. In such an event, due to the potential of harmful bubble formation, Matrix locks the computer for 24 hours in order to discourage you from diving again. In this menu, you have the option to disable the

locking up of the computer in the event of an uncontrolled ascent.

WARNING

- An uncontrolled ascent increases your risk of decompression sickness (DCS)
- This feature is intended for very experienced divers only, such as dive instructors, who take full responsibility for the consequences of turning off this function.

2.2.1.7 ALARMS

In this menu you can disable audible alarms.

WARNING

Disabling audible alarms can lead you into potentially dangerous situation and could result in serious injury or death.

2.2.1.8 ERASE DESAT

Matrix allows you to reset the desaturation in the computer. Any tissue saturation information from a recent dive will be reset to zero and the computer treats the next dive as a non-repetitive dive. This is useful when the computer is loaned to another diver who has not dived in the last 24 hours.

WARNING

Diving after having reset the desaturation is extremely dangerous and is very likely to cause serious injury or death. Do not reset the desaturation unless you have a valid reason to do so.

In order to prevent accidental desaturation reset, you must enter the security code once you decide to proceed with the reset. The security code is 1234.

After entering the security code you will get a confirmation of the successful completion of the operation.

2.2.2 SET WATCH

2.2.2.1 TIME

This menu allows you to set the time.

2.2.2.2 FORMAT

This menu allows you to set the time format (am/pm or 24 hours).

2.2.2.3 DATE

This menu allows you to set the date.

2.2.2.4 SECOND TIME

This menu allows you to set a second time. This is useful when travelling to a different time zone.

When the second time is displayed on the top row of the digital watch display, press and hold the top right button to switch between the main and the second time.

2.2.2.5 ALARM

This menu allows you to set a wake-up alarm.

2.2.3 SET COMPASS

2.2.3.1 DECLINATION

Depending on the exact location on the planet, there can be a deviation between true North and magnetic North. Any compass will always show magnetic North, so via this menu you can set a value for the so-called declination that will make the compass show true North instead.

2.2.3.2 DIRECTION

In this menu you specify the direction of the deviation specified in the section above (east or west).

2.2.3.3 CALIBRATION

The digital compass in Matrix is calibrated from the factory and does not require, under normal circumstances, any further maintenance. In certain instances, however, such as after exposure to extremely intense magnetic fields, it may be necessary to recalibrate the compass to ensure its accuracy. If you notice an obvious deviation in the indication of the compass, access this menu and perform the calibration as described below.

First you must enter the security code, 1234.

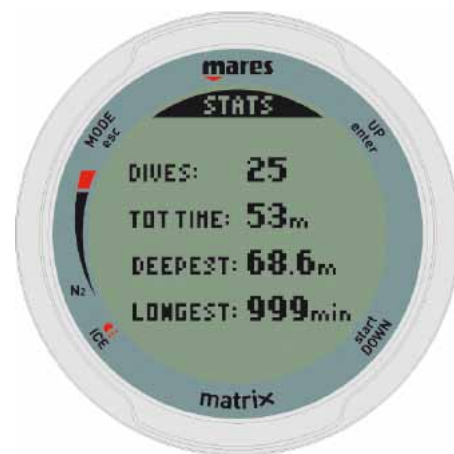
Now hold Matrix horizontal to the surface and perform one slow counter clockwise circle. Once you have finished the circle, the calibration is completed.

2.3 LOGBOOK

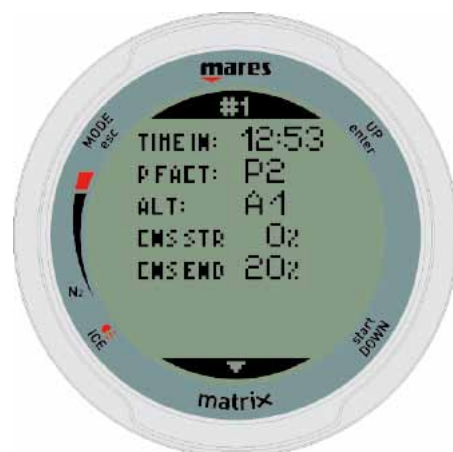
Matrix can record the profiles of approximately 35 hours of diving, at a sampling rate of 5 seconds. The information can be transferred to PC via the Dive Organizer software or to a Mac via the Divers' Diary software. In addition, Matrix can show most of the information directly on the display. On the main page of the logbook you will see a listing of all dives, including date, depth and dive time.

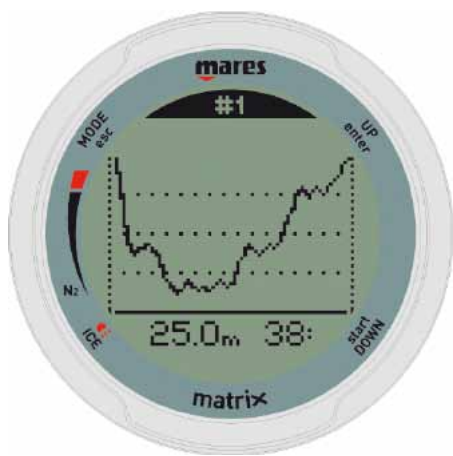


Under **STATS** you will find a summary of all dives carried out with this Matrix: total number of dives, total time spent underwater, longest dive and deepest dive.



From the main logbook page, scroll down to the dive of interest, then press and hold the top right button to access the details about the dive itself. Each dive has two pages of data plus the complete profile. Press the top right button to scroll between the two pages of information, press and hold the top right button to view the profile. Press the top left button to return to the main logbook page.



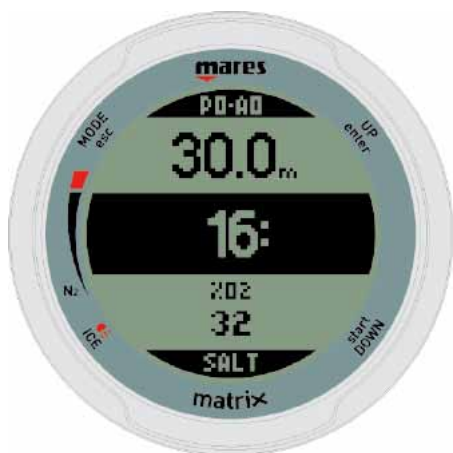


2.4 DIVE PLANNER

This function allows you to scroll through the no decompression limits, automatically taking into account the current residual saturation of the tissue compartments from a preceding dive. The times shown when scrolling the no decompression limits take into account the information entered under the **set dive** submenu: altitude, personal safety factor, Air, or in the case of Nitrox, the values for the oxygen percentage and its maximum partial pressure. For each depth, the display shows the corresponding no deco time expressed in minutes. If Nitrox mode is selected, the maximum depth shown in the planner is limited by the MOD.

NOTE

The dive planner is enabled only if either **air** or **nitrox** mode is set



2.5 INFO

This submenu provides information about the hardware and software of your Matrix.

• 3 DIVING WITH MATRIX

3.1 A FEW WORDS ABOUT NITROX

Nitrox is the term used to describe breathing gases made of oxygen-nitrogen mixes with an oxygen percentage higher than 21% [air]. Because Nitrox contains less nitrogen than air, there is less nitrogen loading on the

diver's body at the same depth as compared to breathing air.

However, the increase in oxygen concentration in Nitrox implies an increase in oxygen partial pressure in the breathing mix at the same depth. At higher than atmospheric partial pressures, oxygen can have toxic effects on the human body. These can be lumped into two categories:

- Sudden effects due to oxygen partial pressure over 1.4bar. These are not related to the length of the exposure to high partial pressure oxygen, and can vary in terms of the exact level of partial pressure they happen at. It is commonly accepted that partial pressures up to 1.4bar are tolerable, and several training agencies advocate maximum oxygen partial pressures up to 1.6bar.
- Long exposure effects to oxygen partial pressures over 0.5bar due to repeated and/or long dives. These can affect the central nervous system, cause damage to lungs or to other vital organs.

Matrix keeps you safe with respect to these two effects in the following ways (as long as it is set to either **air** or **nitrox**):

- Against sudden effects: Matrix has an MOD alarm set for a user-defined ppO_2,max . As you enter the oxygen concentration for the dive, Matrix shows you the corresponding MOD for the defined ppO_2,max . The default value of ppO_2,max from the factory is 1.4bar. This can be adjusted to your preference between 1.2 and 1.6bar. Please refer to section 2.2.1.1 for more information on how to change this setting. If Matrix is set to **air**, the ppO_2,max is set to 1.4bar by default.
- Against long exposure effects: Matrix "tracks" the exposure by means of the CNS % (Central Nervous System). At levels of 100% and higher there is risk of long exposure effects, and consequently Matrix will activate an alarm when this level of CNS% is reached. Matrix also warns you when the CNS level reaches 75%. Note that the CNS% is independent of the value of ppO_2,max set by the user.

3.2 ALARMS

Matrix can alert you of potentially dangerous situations. There are five different alarms:

- Ascent rate alarm;
- Exceeding a safe ppO_2/MOD ;
- CNS =100%;
- Missed decompression stop;
- Low battery during the dive

⚠ WARNING

When in bottom timer mode, all warnings and all alarms are OFF aside for the low battery alarm.

NOTE

- Alarms are both visual and audible, as described in detail below.
- If you are in **compass** mode when an alarm is triggered, Matrix will revert to the default computer display in order to properly display the message related to the alarm.
- Ascent rate alarm has priority over other alarms if they are triggered simultaneously.

3.2.1 ASCENT RATE

As soon as depth decreases Matrix activates the ascent rate control algorithm and displays the calculated value. This is shown in lieu of the dive time in the bottom left corner for the duration of the ascent.

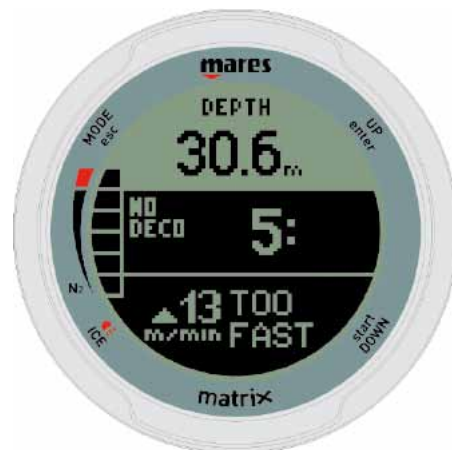
⚠ WARNING

A rapid ascent increases the risk of decompression sickness.

If Matrix determines an ascent rate of 10m/min / 30ft/min or higher, the fast ascent alarm is triggered: an audible alarm goes off and the message **SLOW DOWN** is displayed at the bottom of the screen. This persists until the ascent rate is reduced to 10m/min / 30ft/min or less.



If the ascent rate exceeds 12m/min / 40ft/min at a depth below 12m / 40ft, the message on the screen changes to **TOO FAST**. If a speed in excess of 12m/min / 40ft/min is maintained for two thirds or more of the depth at which the alarm was first triggered, Matrix considers it a dive violation and the display will show ⚠.



In this case, if the diver attempts a repetitive dive after surfacing, Matrix will only function as a depth gauge and timer (bottom timer mode), and will display the message **LOCKED** in the middle of the screen.

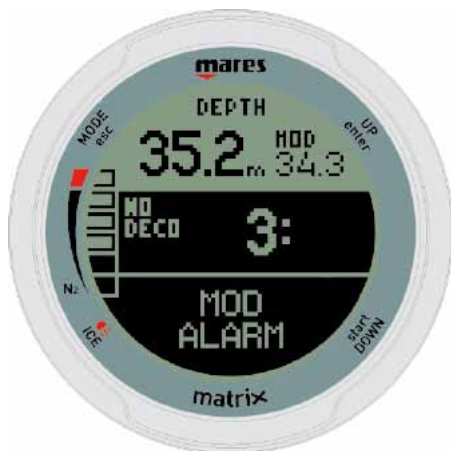


3.2.2 MOD/ppO₂

⚠ WARNING

- The MOD should not be exceeded. Disregarding the alarm can lead to serious injury or death.
- Exceeding a ppO₂ of 1.6bar can lead to sudden convulsions resulting in serious injury or death.

When the diver reaches a depth at which the ppO₂ of the inspired gas exceeds the maximum limit entered in the corresponding setting (from 1.2 to 1.6bar), an audible alarm goes off, the current depth starts to blink and the message **MOD ALARM** is shown at the bottom of the display. In addition, the value of the MOD is shown to the right of the current depth.



The alarm persists until the diver has ascended enough for the ppO₂ to return within the set limit. While the alarm is active, the compass can only be called up for 8 seconds, after which the default display with the alarm message is shown again.

⚠ WARNING

When the MOD alarm is triggered, ascend immediately until the alarm stops. Failure to do so could result in serious injury or death.

3.2.3 CNS = 100%

⚠ WARNING

When the CNS reaches 100% there is danger of oxygen toxicity. Start procedure to terminate the dive.

Oxygen toxicity exposure is tracked on Matrix by means of the CNS % based on currently accepted recommendations for exposure limits. This toxicity is expressed as a percentage value which ranges from 0% to 100%. When the value reaches 75%, an alarm goes off and the message **CNS > 75%** appears for 10 seconds. Additionally, once the text message has expired, the CNS becomes the default item in the lower right corner: if you call up other information such as the temperature or the time of day, after 8 seconds the CNS appears again. Ascend to shallower depth to decrease oxygen loading and consider terminating the dive.



When the oxygen toxicity level approaches 100%, the alarm message **CNS > 100%** appears. The alarm message and the audible signal are repeated for 5 seconds in one-minute intervals after the first occurrence and for as long as the value of CNS stays at or above 100%. Consider terminating the dive immediately!

⚠ WARNING

Diving with oxygen toxicity at levels of 75% or greater may put you into a potentially hazardous situation, which could result in serious injury or death.

3.2.4 MISSED DECOMPRESSION STOP

⚠ WARNING

Violating a mandatory decompression obligation may result in serious injury or death.

If you ascend above the decompression stop depth by more than 0.3m (1ft), a downward pointing triangle appears, an audible alarm goes off and the message **STOP AT 3m!** or **STOP AT 10ft!** is displayed at the bottom of the screen (or whatever the depth of the stop is). This alarm remains active until you return to the correct depth. Note that while the alarm is active, the compass can be viewed only for 8 seconds before the screen returns to the default display.

⚠ WARNING

- When the missed deco stop alarm is triggered, desaturation of the simulated tissue compartments is halted and resumes only when the diver returns to the correct stop depth.
- Never ascend above the displayed decompression stop depth.



3.2.4.1 MISSED DECO STOP MODE

If the stop depth is exceeded by more than 1m (3ft) for more than three minutes, Matrix considers it a dive violation and the display will show ⚠.



In this case, if the diver attempts a repetitive dive after surfacing, Matrix will function only as a depth gauge and timer (bottom timer mode), and it will display the message **LOCKED** in the middle of the screen.



3.2.5 LOW BATTERY

⚠ WARNING

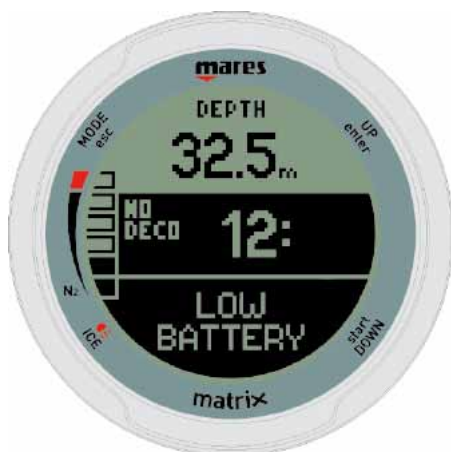
Do not start a dive if the low battery warning is displayed on the screen on the surface. The computer may fail to function during the dive and this could lead to serious injury or death.

If Matrix detects that the battery power level is getting below 10%, it will show the message **LOW BATTERY** on the display. In a **LOW BATTERY** situation, the backlight is disabled, as well as audible signals.

⚠ WARNING

When this warning appears, you should stop the dive, safely, without delay.

If the battery is completely drained during or right after a dive, Matrix will lose the nitrogen loading information in the tissues, and hence it will calculate the next dive wrongly. Do not dive for 24 hours following a dive in which the battery was completely drained.



3.3 DISPLAY INFORMATION

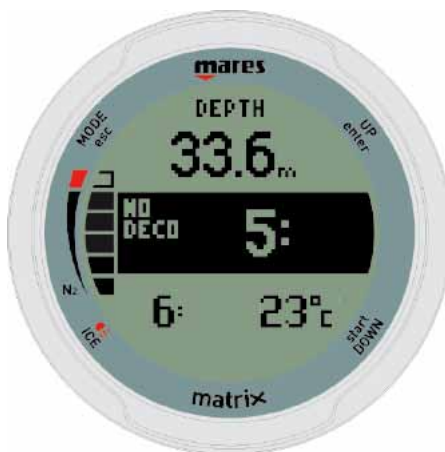
Upon immersion, if Matrix was set to pre-dive, it will immediately start monitoring the dive. Otherwise, it will turn on automatically within 20 seconds of having reached a depth of 1.2m/4ft.

The default display presents dive information in a prevalently numerical format. More specifically, the following information is shown:

- current depth
- no deco time (or depth and duration of deepest stop and total ascent time in case of decompression dives)
- dive time
- temperature
- nitrogen saturation bar graph

By pressing the upper right button, you can modify the upper row of information. At each button press, the row cycles through the following combinations:

- current depth
- current depth and max depth
- current depth and average depth
- current depth and MOD (nitrox dives only).



By pressing the lower right button, you can choose which information to show in the bottom right corner of the display between the following:

- temperature
- time of day
- stopwatch (activated by a long press of the bottom right button)
- oxygen concentration of the breathing mix (nitrox dives only)
- ppO₂ (nitrox dives only)
- CNS% (nitrox dives only; for air dives CNS% is not shown for simplification of the interface, but it is tracked in the background and the alarms are triggered if applicable).



In case of an ascent, the **speed** in m/min or ft/min is displayed in lieu of the dive time for the duration of the ascent.

The **depth** is given in 10cm resolution until 99.9meters, after which it is given in 1m resolution. When the depth is displayed in feet, the resolution is always 1 foot. At a depth shallower than 1.2m/4ft, the display shows ---. Maximum possible depth is 150m/492ft.

The **dive time** is displayed in minutes. If during the dive you ascend to the surface, the time spent on the surface will only be counted if you descend again below 1.2m/4ft within 3 minutes. This allows for brief periods of orientation. While on the surface, the time will not show as progressing but it is running in the background. As soon as you submerge, the time will resume, including the time spent on the surface.

The **no deco time** is calculated in real time and updated continuously. Maximum displayed no deco time is 99 minutes. If you remain at depth beyond a no deco time of zero minutes, you will enter into decompression: you can no longer make a direct ascent to the surface and Matrix displays a **MANDATORY** decompression stop. Instead of a no deco time, it shows you the depth and duration of the deepest stop and the total ascent time (**ASC**), which includes each decompression stop and the time required to travel the vertical distance to the surface at a rate of 10m/min / 33ft/min. **ASC** includes the duration of deep stops as well. To emphasize the presence of mandatory decompression stops, the display inverts its colors, now showing the top row in white on a black background, the middle row in black on a white background, and the bottom row in white on a black background.

DEEP, DECO and SAFETY stops:

- A **SAFETY** stop is generated as soon as the depth of the dive exceeds 10m / 33ft. It has a duration of 3 minutes and it is carried out between depths of 6m / 20ft and 3m / 10ft at the end of a dive prior to surfacing. Such stop is **NOT** mandatory but **HIGHLY RECOMMENDED**.
- **DECO** stops are generated progressively as you stay down beyond the no deco time. **DECO** stops are **MANDATORY**.



- **DEEP** stops are generated as you approach the no deco limit. You can either have one 2-minute stop or two 1-minute stops. **DEEP** stops are **NOT** mandatory.



During a decompression stop, the following symbols may appear:

- ▲: optimal range for the decompression stop;
- ▲: above decompression stop depth, descend immediately!

The **nitrogen bar graph** is on the left side of the display. It represents nitrogen saturation in the leading tissue compartment. The bar graph is made of six segments, which gradually fill during the dive. The more black segments you see, the closer to the no deco limits you are. As you enter a situation of mandatory decompression stop, all segments will be black.

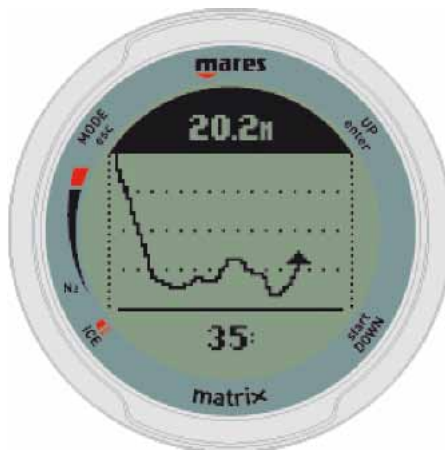
During a surface interval, the segments will gradually turn from black to clear as Matrix tracks the offgassing of your tissues.

Ascent/descent rate: in presence of a depth change in excess of 80cm / 3ft, Matrix calculates the corresponding ascent or descent speed and displays it at the bottom left of the display, in lieu of the dive time, for the duration of the ascent or descent.

3.3.1 ALTERNATE DISPLAYS

3.3.1.1 PROFILE VIEW

By pressing the top left button from the default display, the screen changes to a graphic representation of the dive, which includes the current depth at the top and the dive time at the bottom. The profile view has a time-out of 8 seconds. After this time the screen reverts automatically to the default display. You can exit the profile view before the 8 seconds are passed by pressing the top left button.



3.3.1.2 COMPASS

Pressing and holding the top left button from the default display brings up the compass, which in addition to the compass rose shows also the current depth, the no deco time (ascent time in case of decompression dive) and a stopwatch. Matrix utilizes a full-tilt compass, which means that you do not need to hold the compass leveled for it to be accurate. The compass retains its precision up to an almost vertical inclination.



By pressing the top right button you can set a reference bearing. A dot will appear to indicate the set bearing. Additional symbols will appear as well: squares at 90 degrees, triangles at 120 degrees and two parallel lines at 180 degrees, as an aid in navigation for square, triangular and reciprocal courses. The number in the middle of the rose, which in absence of a set bearing represents the bearing straight ahead, now represents the deviation between the set bearing and the direction straight ahead. If you press the top right button again, the new bearing will override the one in memory. If you press and hold the top right button you erase the bearing.



By pressing and holding the bottom right button you activate the stop watch. This can be helpful when timing yourself on the leg of a navigation course. Every time you press and hold the bottom right button, the stop watch restarts from 00:00. If you exit the compass the stop watch keeps running in the background.

The compass mode has no time-out. It stays on the screen until you push the top left button. This leads you back to the default computer display.

NOTE

If an alarm is triggered while in compass mode, Matrix automatically reverts to the default display for better visualization of the alarm message itself.

WARNING

During all dives, perform a safety stop between 3 and 6 meters/10 and 20 feet for 3 minutes, even if no decompression stop is required.

Upon reaching the optimum range for carrying out a deep stop (+/- 1m /3ft of the displayed depth) or safety stop (between 6m/20ft and 3m/10ft), a countdown timer appears to indicate the progress of the stop. For **DECO** stops, since the duration is a function of the exact depth, only the minutes are shown.

3.3.1.3 STOP SUMMARY TABLE

The stop summary table lists each individual stop in depth and duration, including safety, deco and deep stops. This table does not appear as long as you are in a no deco dive without deep stop requirement.

This table is especially useful during decompression dives since it breaks down the entire ascent into each individual stop.

To call up the stop summary table, press the bottom left button.



If you submerge again before the 3-minute countdown is over, the dive time will resume from where it left off, including the time spent on the surface. If you do not submerge before the end of the countdown, Matrix considers the dive finished, records the data to the logbook and reverts to the so-called post-dive mode.

The post-dive screen shows the following information:



The stop summary table has an 8-second time-out, after which the screen automatically reverts to the default computer display. You can exit the stop summary table before the 8 seconds are passed by pressing the top left button.

NOTE

In the event of an alarm, Matrix automatically switches back to the default computer display.

3.4 AFTER THE DIVE

Upon returning to the surface, Matrix first goes into the so-called surfacing mode. This mode allows you to resume your dive after a brief period of orientation. The screen shows a 3-minute countdown, a profile of the dive, your maximum depth and the dive time. During surfacing mode you can call up the compass by pressing and holding the top left button.

- The surface interval (**SURF**): this is displayed from the moment the dive is closed (3 minutes after surfacing) for as long as there is remaining desaturation or no-fly time on the computer.
- In case of a dive violation, the corresponding symbol (⚠, ⚡) is shown next to the surface interval.

In addition, the left bar graph shows the calculated nitrogen load in the leading tissue. You can use this to gauge your progress in getting rid of nitrogen as the surface interval grows. Matrix continues to perform decompression-related calculations (nitrogen release), for as long as there is desaturation time left.

During post-dive mode you can revert to the regular watch display by pressing the top left button. You can return to the post-dive screen again by pressing the top left button.

From the post-dive screen you can also jump directly to the log of the last dive by pressing and holding the top right button.

3.5 DIVING WITH MORE THAN ONE GAS MIXTURE

⚠ WARNING

- Diving with more than one gas mixture represents a much higher risk than diving with a single gas mixture, and mistakes by the diver may lead to serious injury or death.
- During dives with more than one gas mixture, always make sure you are breathing from the tank that you intend to breathe from. Breathing from a high oxygen concentration mix at the wrong depth can kill you instantly.
- Mark all your regulators and tanks so that you cannot confuse them under any circumstance.
- Before each dive and after changing a tank, ensure that each gas mixture is set to the correct value for the corresponding tank.

Matrix enables you to use up to three gas mixtures during the dive (air and Nitrox only). The three mixtures are labeled G1, G2 and G3 and must be in ascending order of oxygen content, i.e. G1 has the lowest oxygen concentration, G2 an intermediate value, and G3 has the highest oxygen concentration of the three. If you are diving with only two mixtures, you will be utilizing tanks G1 and G2.

⚠ WARNING

It is not possible to switch to a gas at a depth at which the oxygen partial pressure for that gas is greater than the set maximum value.



- The remaining desaturation time (**DESAT**): this is calculated by the decompression model in the computer. Any dive started while there is remaining desaturation on your computer is considered a repetitive dive, meaning that Matrix accounts for the pre-existing nitrogen load in your body.
- The no-fly time (**NO ←**): this is the time during which an exposure to the reduced pressure inside the cabin of an airplane could cause decompression sickness. Matrix employs, as recommended by NOAA, DAN and other agencies, a standard 12-hour (no-deco non-repetitive dives) or 24-hour (deco and/or repetitive dives) countdown. Hence you may find a situation in which the desaturation time is shorter than the no-fly time. This is simply the consequence of the desaturation time being calculated by the algorithm based on the actual dive profile, while the no-fly time is an accepted standard in the diving industry. Since the real effect of flying after diving has never been fully investigated, this approach fits with our philosophy.

⚠ WARNING

Flying while Matrix displays NO ← can result in serious injury or death.

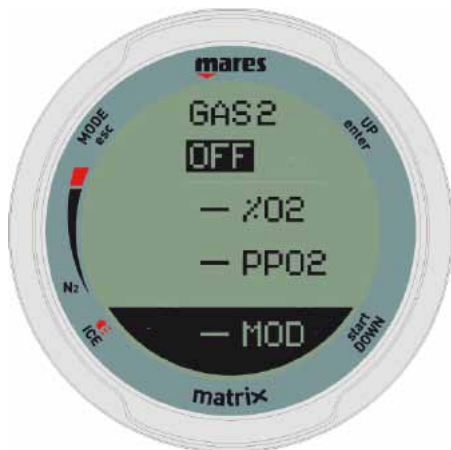
NOTE

- If you dive using just one gas, select G1 and deselect the other two.
- For dives with two gases, select G1 and G2 and deselect the third.
- When enabling G2 and G3, you must first define G2 and then G3.
- You cannot activate G3 without first having activated G2.
- G2 cannot have an oxygen percentage higher than G3.
- If you set G2 to OFF, G3 will automatically be set to OFF also.
- The MOD for G2 and G3 is the switch depth for the corresponding gas. This is what Matrix uses for its calculation, alarms and suggested switch points.

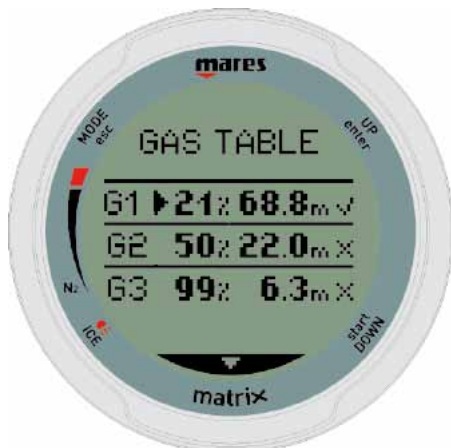
3.5.1 SETTING MORE THAN ONE GAS

The characteristics of the gases must be entered in the computer before the dive. It will then be your responsibility to tell Matrix which gas is currently being used during the various phases of the dive.

To use multiple gases, you will need to enable the gases and set the oxygen percentage and the ppO_2 max for each one. This is done in the same way as for G1, with the difference that for G2 and G3 you can turn a gas ON or OFF. Keep in mind that the MOD for G2 and G3 is the depth at which Matrix will prompt you to perform the gas switch (see section 3.5.2 below).

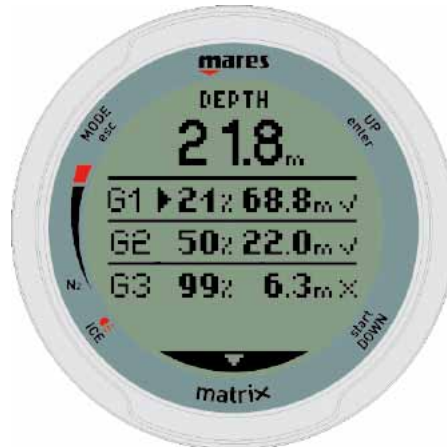


You can verify all set gases from the pre-dive screen by pressing and holding the top right button.



3.5.2 SWITCHING GAS

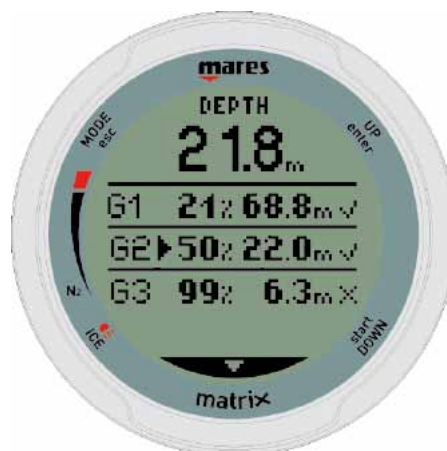
During Nitrox dives with the gas switching function enabled, press and hold the top right button to call up the gas switch screen. This screen lists all set gases, their $O_2\%$ and MOD.



Matrix always begins the dive with G1, which has the lowest percentage of oxygen. When during the ascent you reach the depth corresponding to the MOD of G2, Matrix sounds an audible signal and displays the message GAS 1 -> GAS 2 at the bottom of the screen.

NOTE

- Matrix will allow the change only if the depth is shallower than the MOD corresponding to the set ppO_2 max.
- Matrix will not allow the gas switch if you are deeper.
- The message at the bottom of the screen remains only for 20 seconds. You can however call up the gas switch screen at any time, and switch to another gas as long as your depth allows the gas to be activated.
- The same process is repeated when you approach the MOD for G3 with the message GAS 2 -> GAS 3.
- If you have set G1, G2 and G3 and have not switched from G1 to G2, once you reach the MOD for G3 the display will prompt the message GAS 1 -> GAS 3



NOTE

You can reach the gas switch screen at any time during the dive, for instance to check the planned switch point of G2 and G3.

Once inside this display, use the buttons on the right side to move up or down between gases, then press and hold the top right button to activate the gas. This brings you back to the default computer display. The decompression calculation will reflect the switch in breathing gas. In addition, the display will now show the oxygen concentration of the new gas.

NOTE

- You can exit this mode without changing the gas by pressing the top left button.
- If there is only one gas set, the computer will not enter this display.

3.5.3 SPECIAL SITUATIONS

3.5.3.1 SWITCHING BACK TO A GAS MIXTURE WITH LOWER OXYGEN CONCENTRATION

There may be situations in which you have to switch back to a gas with lower oxygen concentration than what you are currently breathing. This can happen for instance if you want to descend deeper than the MOD for the current gas, or if for instance you have run out of gas in G3 during the decompression. To do so, simply press the top left button to call up the gas switch screen. Use the right buttons to choose another gas, then press and hold the top right button to activate it.

3.5.3.2 SUBMERGING BELOW THE MOD AFTER A GAS SWITCH

If after having switched to a gas mixture with a higher oxygen concentration you inadvertently drop again below the MOD for that mixture, the MOD alarm will immediately go off. Either switch back to a gas mixture suited for that depth, or ascend above the MOD for the gas mixture you are breathing from.

3.6 BOTTOM TIMER MODE

When Matrix is set to **bottom timer** mode, it will only monitor depth, time and temperature, and will not carry out any decompression calculation. Maximum displayed dive time in gauge mode is 999 minutes. You can only switch to bottom timer mode if the computer is completely desaturated. All audible and visual alarms, other than the low battery alarm, are turned off.

WARNING

Dives in bottom timer mode are performed at your own risk. After a dive in bottom timer mode you must wait at least 24 hours before diving using a decompression computer.

During a dive in bottom timer mode, the following information is displayed:



- current depth
- stopwatch
- dive time
- temperature
- in case of an ascent: ascent speed (in m/min or ft/min).

Pressing and holding the bottom right button resets and restart the stopwatch.

By pressing the upper right button, you can modify the upper row of information to include also the maximum depth or the average depth. By pressing and holding the top right button while the average depth is on the display, you can reset the average depth itself.

By pressing the lower right button, you can toggle between temperature and time of day in the lower right corner of the display.

Similarly to the air and nitrox modes, you can call up the dive profile view and the compass by pressing the top left button. These screens show the dive time in lieu of the no deco (or ascent) time shown in air and nitrox mode.

3.6.1 DIVE VIOLATION INDUCED BOTTOM TIMER MODE

The following violations can occur during an Air or Nitrox dive:

- Uncontrolled ascent.
- Missed deco stop.

In case of a violation, Matrix will restrict the use of Air and Nitrox mode for 24 hours, and will only allow operation in Bottom Timer mode, continuously displaying the message **LOCKED**.



• 4 TAKING CARE OF MATRIX

4.1 TECHNICAL INFORMATION

Operating altitude:

- with decompression – sea level to approximately 3700m/12100ft
- without decompression (gauge mode) – at any altitude

Decompression model: RGBM Mares-Wienke (10 tissues)

Depth measurement:

- Max displayed depth: 150m/492ft
- Resolution: 0.1m until 99.9m and 1m at depth deeper than 100m. Resolution in ft is always 1ft
- Temperature compensation of the measurement between -10 °C to +50 °C / 14 °F to 122 °F
- Accuracy from 0 to 80m/262ft: 1% ±0.2m/1ft

Temperature measurement:

- Measurement range: -10 °C to +50 °C / 14 °F to 122 °F
- Resolution: 1 °C / 1 °F
- Accuracy: ± 2 °C / ± 4 °F

Clock: quartz clock, time, date, dive time display up to 99 minutes (999 minutes in bottom timer mode)

Oxygen concentration: adjustable between 21% and 99%, ppO₂max range between 1.2 and 1.6bar

Logbook memory: 35 hours of dive profile at 5-second sampling rate

Operating temperature: -10 °C to +50 °C / 14 °F to 122 °F

Storage temperature: -20 to 70 °C / -4 to 158 °F

Display:

- Diagonal: 28.5mm / 1 1/8"
- Dot matrix
- Resolution: 80*80
- Mineral glass

Power supply:

- lithium-ion polymer rechargeable battery, with battery charge indicator
- operating temperature
- discharging: from -10 to +50 °C / 14 to 122 °F
- charging: from 0 to 45 °C / 32 to 113 °F
- battery duration from one charge: approx 10 hours of diving. Actual battery duration depends on the usage of the backlight and the water temperature
- battery duration from one charge using Matrix only as a watch: approx 2 weeks. Actual battery duration depends on the usage of the backlight, the compass and the wake-up alarm (buzzer)
- lifetime of the battery: approx 500 charging cycles.

4.2 MAINTENANCE

The depth accuracy should be verified by an authorized Mares dealer every two years. Aside from that, Matrix is virtually maintenance free. All you need to do is rinse it carefully with fresh water after each dive (avoid any chemical products) and charge the battery when needed. To avoid possible problems with your Matrix, the following recommendations will help assure years of trouble free service:

- avoid dropping or jarring your Matrix;
- do not expose Matrix to intense, direct sunlight;
- do not store Matrix in a sealed container, always ensure free ventilation.

NOTE

If you notice signs of moisture on the inner wall of the mineral glass, take your Matrix immediately to an authorized Mares service center.

WARNING

The mineral glass is not exempt from scratches resulting from improper use.

WARNING

Do not blow compressed air onto Matrix, because it could damage the pressure sensor area.

4.2.1 REPLACING THE BATTERY IN MATRIX

Matrix uses a rechargeable battery, and it may be necessary to replace it after approximately 500 charging cycles. The battery should only be replaced in a center authorized by Mares. Mares declines all responsibility for any damage caused by replacing the battery.

NOTE

Dispose of the old battery properly. Mares adopts a policy of respect for the environment, and urges use of the appropriate separated waste collection services.

4.3 WARRANTY

Mares products are guaranteed for a period of two years subject to the following limitations and conditions:

The warranty is non-transferable and applies strictly to the original purchaser.

Mares products are warranted free from defects in materials and workmanship: components that, upon technical inspection, are found to be defective, will be replaced free of charge.

Mares S.p.A. declines all responsibility for accidents of any kind that result from tampering or incorrect use of its products.

Any products returned for overhaul or repairs under warranty, or for any other reason, must be forwarded exclusively via the vendor and accompanied with a proof of purchase slip. Products travel at the risk of the sender.

4.4 WARRANTY EXCLUSIONS

Damage caused by water seepage resulting from improper use (e.g. dirty seal, battery compartment closed incorrectly, etc.).

Rupture or scratching of the case, glass or strap as a result of violent impact or blows.

Damage resulting from excessive exposure to elevated or low temperatures.

Damage caused by the use of compressed air to clean the dive computer.

4.5 HOW TO FIND THE PRODUCT SERIAL NUMBER

To see the product serial number, enter the INFO submenu.

• 5 DISPOSAL OF THE DEVICE



Dispose of this device as electronic waste. Do not throw it away with regular rubbish.

If you prefer, you can return the device to your local Mares dealer.



Algorithm



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