



Predictive Multi Gas for

Galileo
luna

TABLE OF CONTENTS

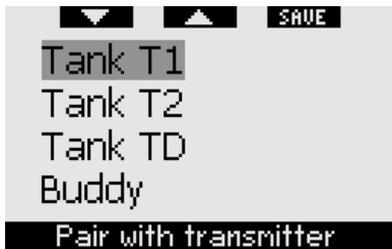
1. Glossary	1
2. Pairing of transmitters and gas summary table	2
3. PMG menu	2
4. RBT=0min in Gas integration menu	2
5. Screen configurations	3
6. Diving with more than one gas mixture	3
6.1 Setting the oxygen concentration when diving with more than one gas mixture	4
6.2 Gas summary table	4
6.3 Deco summary table	5
6.4 Switching gas mixture during the dive	6
6.5 Special situations	6
6.6 RBT when diving with more than one gas mixture	8
6.7 Gauge mode and gas switching	8
6.8 Logbook for dives with more than one gas mixture.....	8
6.9 Planning dives with more than one gas mixture	8
7. Button function overview	9

1. Glossary

Gas switching	The act of changing from one breathing gas to another.
Multi gas	Refers to a dive in which more than one breathing gas is used (air and/or Nitrox).
PMG	Predictive Multi Gas, refers to the algorithm capable of including up to three different Nitrox mixes in its decompression calculations.
Switch depth	The depth at which the diver plans to switch to a higher oxygen concentration mix while using the multi-gas option in the ZH-L8 ADT MB PMG algorithm.
T1, T2, TD	Refers to tank T1, tank T2, tank TD when using the multi-gas option of the ZH-L8 ADT MB PMG algorithm.

2. Pairing of transmitters and gas summary table

Once the PMG upgrade is installed on your Galileo, up to 4 transmitters can be paired to it instead of the original 2. The additional tanks are now labelled **T2** and **TD**. When the pairing operation is initiated as described in the main Galileo manual, all four tank designations are now shown (**T1**, **T2**, **TD** and **BUDDY**).



Similarly, the **GAS SUMMARY TABLE** now shows the settings for your three tanks plus the tank pressure of your buddy (if applicable).

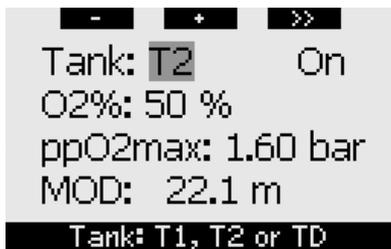
3. PMG menu

After installing the PMG upgrade, you will find a new submenu under the **DIVE SETTINGS** menu. The menu is called **PMG** and allows you to toggle Galileo between being a single gas computer (**OFF**) and a multi-gas computer (**ON**).



When **PMG** is **OFF**, Galileo behaves completely alike the single-gas version. When **PMG** is **ON**, Galileo will change in several aspects:

- a line is added inside the O₂ settings submenu which allows you to choose between one of three tanks;



- upon **pressing** the middle button from the **GAS SUMMARY TABLE** during the dive, the **DECO SUMMARY TABLE** appears, which shows the PMG decompression calculations and the single-gas computation at the active MB level and also at MB L0;

	BOOK	MORE	LIGHT
PMG L5	12 _h	2: 15:	
1G L5	15 _h	1: 30:	
PMG L0	3 _h	2: 6:	
1G L0	3 _h	4: 8:	

- the **GAS INTEGRATION** menu will have a new item called **RBT = 0min**. Refer to the appropriate section in this manual for a complete description.

4. RBT = 0min in Gas integration menu

Once the PMG upgrade is installed on your Galileo, the **GAS INTEGRATION** menu has a new setting called **RBT = 0min**. This allows to turn the RBT =0min alarm into a warning: if more than one gas mixture is set and you reach RBT= 0min, Galileo will warn you for 12 seconds about the situation instead of beeping incessantly. Please refer to section 6.6 for more information about RBT when diving with more than one mixture.



5. Screen configurations

The **LIGHT** screen configuration does not support diving with more than one gas mixture. If you have chosen the **LIGHT** configuration and you set more than one gas mixture, the screen configuration will automatically switch to **CLASSIC** during the dive.

6. Diving with more than one gas mixture

NOTE:

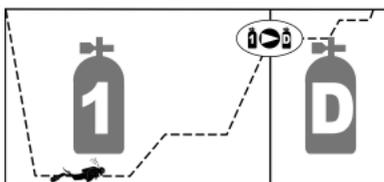
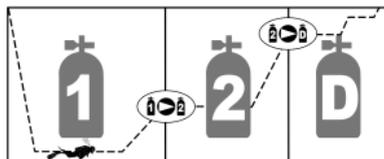
*You must set **PMG** to **ON** for Galileo to allow diving with more than one gas mixture.*

Galileo is equipped with the ZH-L8 ADT MB PMG algorithm. PMG stands for Predictive Multi Gas, meaning that when you program more than one gas mixture, Galileo will predict the switch to the higher oxygen concentration gas(es) at the depth(s) that you specified and provide you at all times with a decompression schedule comprehensive of all gas mixtures that you programmed. In other words, you get full credit at any point during the dive for all the extra gas that you are carrying with you. At the same time Galileo can also show you what the decompression schedule would be if you were to finish the dive using only the gas mixture that you are currently breathing from, so that you can be prepared in the event that something did not work as planned.

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.

Galileo enables you to use up to three gas mixtures during the dive (air and Nitrox only). The three mixtures are labeled T1, T2 and TD and must be in ascending order of oxygen content, i.e. T1 has the lowest oxygen concentration, T2 an intermediate value, and TD has the highest oxygen concentration of the three. Two or more tanks can also be set to the same oxygen concentration. If you are diving with only two mixtures, you will be utilizing tanks T1 and TD.

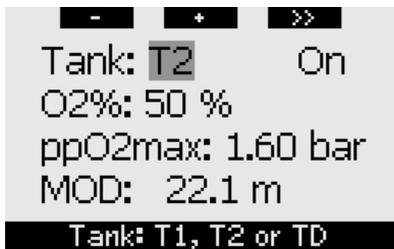


Galileo can show the tank pressure of each tank if the corresponding first stage regulator is equipped with an UWATEC Smart transmitter, paired as described in chapter 2. Note that Galileo can be

programmed and used for diving with more than one gas mixture whether you use transmitters or not.

6.1 Setting the oxygen concentration when diving with more than one gas mixture

To set the oxygen concentration for tanks T1, T2 and TD you need to access the **O₂ setting** menu.



While **TANK** is highlighted, use the - and + buttons to choose the tank for which you want to set the oxygen concentration. **Press >>** to highlight **ON** or **OFF**, and use the - and + buttons to toggle between the two. **Press >>** again to move down one line to the oxygen concentration. After setting the oxygen concentration, **pressing >>** moves you down one line to the ppO₂max. Note that the MOD for tanks T2 and TD is actually the switch depth that Galileo will use for its calculations, warnings and suggested gas switch point. **Press SAVE** to save your settings.

NOTE:

- Galileo considers in its algorithm only gas mixtures whose tanks are set to **ON** in the O₂ settings menu.
- The oxygen concentration of T2 can only be set after having set the oxygen concentration of TD.
- Setting the ppO₂max value to **OFF** applies to tank T1 only. Tanks T2 and TD are always limited to a maximum value of ppO₂max of **1.6bar**.
- For oxygen concentrations of 80% and higher, the ppO₂max is fixed at **1.6bar** and cannot be changed.
- The oxygen concentration of T1 cannot be set to **OFF**.

- The oxygen concentration of T2 can only be set to a value between that of T1 (equal or higher) and TD (equal or lower).
- Galileo adds the label **T1, T2 or TD** next to the O₂ label and between the tank pressure and RBT labels to identify the currently active tank.
- The **ON/OFF** option for each tank allows you to easily go from 3 to 2 or even to 1 gas mixture without changing the actual oxygen settings.
- If you set tank TD to **OFF**, T2 will automatically be set to **OFF** also.
- The MOD for tanks T2 and TD is the switch depth for the corresponding gas. This is what Galileo uses for its calculation, alarms and suggested switch points.
- Galileo does not allow MODs of different gases to be less than 3m/10ft apart.
- Setting a tank to **OFF** does not affect the pairing of the corresponding transmitter.
- When diving with more than one gas mixture, the Nitrox reset time function has the following effect:
 - o T1 is set to 21%
 - o T2 and TD are set to **OFF**.

6.2 Gas summary table

When more than one gas mixture is set, Galileo lists the tank pressure, oxygen concentration, ppO₂max and MOD for each tank on the **GAS SUMMARY TABLE**. If a tank designation has not been paired, **NO P** appears instead of the pressure. If the tank designation has been paired but Galileo is not receiving a signal, “---” appears instead of the pressure.

	BOOK	NORE	LIGHT	
	BAR	O2	PPO2	MOD
T1	153	21%	1.60	68.8M
T2	146	48%	1.60	24.0M
TD	59	91%	1.60	7.9M

The gas summary table is visible both on the surface and during the dive. On the surface it allows you to review your settings and, if the transmitters for all tanks are in range and have not turned themselves off to preserve battery life, it allows you to verify the pressure in each tank. To bring up the table, **press and hold** the middle button (marked **LOG**) from the time of day display. **Pressing** the middle button once the table is displayed brings you into the picture-viewing function.

During the dive, the gas summary table is useful to remind you at what depth you planned to perform the gas switch(es) and also to verify again the pressure in each tank (provided that the transmitters are in range and are active). To bring up the table, **press and hold** the middle button (marked **MORE**). The gas summary table stays on the display for a maximum of 12 seconds, after which Galileo reverts to the regular computer display. **Pressing** the middle button while the gas summary table is displayed brings up the **DECO SUMMARY TABLE**, explained in the next section.

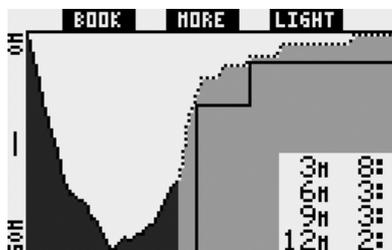
6.3 Deco summary table

Galileo shows you the predictive multi-gas decompression calculation on the main computer screen. However, in the background it is also calculating what the decompression would be if you were to finish the dive with just the gas mixture that you are currently breathing from. If you are diving with an MB level higher than L0, Galileo also computes both the predictive multi-gas decompression calculation and the current gas only calculation for L0. All these calculations are shown at once in the **DECO SUMMARY TABLE**.

	BOOK	MORE	LIGHT
PMG L5	12 _h	2: 15:	
1G L5	15 _h	1: 30:	
PMG L0	3 _h	2: 6:	
1G L0	3 _h	4: 8:	

During the dive, from the gas summary table, **press** the middle button to access the deco summary table. On the top row, with label **PMG L5** (or whichever MB level is active) you see the predictive multi-gas decompression calculation at the active MB level. This is the same as on the main computer screen. Underneath it, with label **1G L5** (or whichever MB level is active) you see the decompression calculation for the active MB level if you were to finish the dive with the gas mixture you are currently breathing. Next is the row with label **PMG L0**, showing the predictive multi-gas decompression calculation for L0 (this is what you see in the **MORE** sequence also), followed by row **1G L0**, showing the single gas decompression calculation at L0 for the gas you are currently breathing from. The first two rows described here do not appear if Galileo is set to L0.

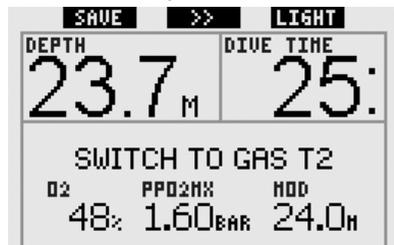
The deco summary table stays on the display for a maximum of 12 seconds, after which Galileo reverts to the regular computer display. **Pressing** the middle button while the deco summary table is displayed brings up the dive profile. In the case of dives with more than one mixture, Galileo adds a solid line indicating the MOD for the various gas mixtures. The vertical line then represents the predicted time and depth of the switch.



6.4 Switching gas mixture during the dive

During the ascent phase, when you reach a depth corresponding to the MOD of T2 or TD, Galileo will suggest that you perform the switch. An audible sequence goes off, and the message **SWITCH TO GAS T2 (or TD)** appears on the display. Simultaneously, the labels of the left and middle buttons change to **SAVE** and **>>**, respectively. You have 30 seconds to respond to this message, else Galileo will consider that tank T2 (or TD) never existed and adapts the decompression schedule accordingly. You can:

- **Press** or **press and hold SAVE** to confirm the gas switch.
- **Press** or **press and hold >>** to choose the next gas in sequence, after which you would still have to **press** or **press and hold SAVE** to confirm the switch.
- **Press and hold** the right button to terminate the gas switch procedure without carrying out any switch.



NOTE:

- Start breathing from the tank with the new gas mixture before confirming a switch.
- If you choose a different tank than the one suggested by Galileo, the MOD alarm may go off and the decompression schedule may change.

⚠ WARNING

Always make sure you are switching to the intended gas. Failure to do so may result in serious injury or death.

If you confirm the switch, the message **SWITCH TO GAS T2 (or TD) SUCCESSFUL** appears on the display for 4 seconds. If you exit without confirming the switch, the message **EXCLUDING GAS T2 (or TD)** appears for 4 seconds.



6.5 Special situations

6.5.1 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 TD during the decompression. At this point you can manually initiate the gas switch by **pressing and holding** the left button. Galileo will display the message **SWITCH TO GAS T1** (or whichever is next in the sequence) and its MOD. The left and middle button labels change to **SAVE** and **>>**, respectively. Use **>>** to choose the tank you want to use, then **press** or **press and hold SAVE** to confirm the switch. Galileo will display the message **SWITCH TO GAS T1 (or T2) SUCCESSFUL** and adapt the decompression schedule accordingly. If you want to interrupt the gas switch procedure, **press and hold** the right button.

6.5.2 Gas switch not carried out at the planned depth

If you fail to confirm the change of gas mixture within the 30 seconds of when Galileo suggested it, the gas mixture in question is excluded from the decompression calculation and the decompression schedule is adapted accordingly.

- If you had programmed 3 gases, you were on T1 and you did not switch

- to T2 when Galileo suggested it, T2 is excluded from the calculations, the decompression schedule is adapted and Galileo continues with T1 and TD only.
- If you had programmed 3 gases, you were on T2 and you did not switch to TD when Galileo suggested it, TD is excluded from the calculations, the decompression schedule is adapted and Galileo continues with T2 only.
 - If you had programmed 2 gases, and you did not switch to TD when Galileo suggested it, the decompression schedule is adapted to reflect the use of T1 only.

Galileo alerts you of the change in the decompression calculation by displaying the message **EXCLUDING GAS T2** (or **TD**) for 4 seconds.



☞ NOTE:

*If after Galileo has changed the decompression schedule to reflect the missed gas switch, you descend again below the MOD for the gas mixture you did not switch to, Galileo reintroduces that gas into its calculations and the decompression schedule changes accordingly. This is accompanied by the display message **INCLUDING T2** (or **TD**) **AGAIN** for 4 seconds.*



6.5.3 Belated gas switch

You can catch up on a planned gas mixture switch at any time by selecting the gas manually. **Press and hold** the left button to start the gas switch procedure. Galileo will show the message **SWITCH TO GAS T2** (or **TD**), and its MOD. This helps you verify that you are performing a switch to a safe gas. The button labels change to **SAVE** (left) and **>>** (middle). Use **>>** to choose the next tank you want to use, then **press** or **press and hold SAVE** to confirm the switch. Galileo will display the message **SWITCH TO GAS T2** (or **TD**) **SUCCESSFUL** and adapt the decompression schedule accordingly. If you want to interrupt the gas switch procedure, **press and hold** the right button.

6.5.4 Manual gas switch at a depth deeper than its MOD

There may be situations in which you have no other choice but to switch to a different gas mixture although you are below the MOD for that mixture. Galileo does not prevent you from doing this, but the MOD alarm will immediately go off.

☞ NOTE:

It is not dangerous to switch the computer to a gas mixture below its MOD, but rather it is dangerous to breathe a gas mixture below its MOD. Galileo alerts you of the imminent danger when you do so.

6.5.5 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.

6.6 RBT when diving with more than one gas mixture

Galileo determines the RBT based on your breathing pattern. The tanks with the various gas mixtures you have with you may be of different sizes, therefore the RBT calculation cannot be extended to all tanks at once since your breathing pattern will be different for each tank. Since Galileo performs several decompression calculations simultaneously for all possible combinations of gas mixtures, the RBT calculation references the decompression calculation that considers only the gas you are currently breathing from.

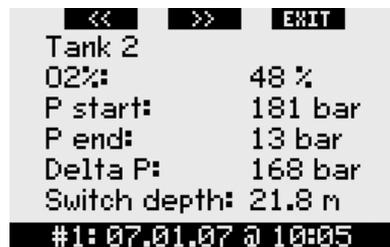
- If you have programmed 2 or 3 gases and are currently breathing from T1, the RBT will be for the decompression schedule that considers T1 only.
- If you have programmed 3 gases and are currently breathing from T2, the RBT will be for the decompression schedule that considers T2 only.
- If you are breathing from TD, the RBT is for the decompression calculation that is actually displayed on the computer screen.

6.7 Gauge mode and gas switching

By **pressing and holding** the left button, you manually start the gas switch process. The only result of switching gas mixtures in gauge mode is that the pressure of the newly chosen tank is displayed instead of the current one. There are no restrictions on when a gas switch can take place in gauge mode. The message **SWITCH TO GAS T2** (or **TD** or **T1**, whichever is next in sequence) appears on the display, and the button labels change to **SAVE** (left) and **>>** (middle). **Press** or **press and hold** the left button (**SAVE**) to confirm the switch. **Press** or **press and hold** the middle button (**>>**) to move to the next tank in the sequence. **Press and hold** the right button to interrupt the gas switch procedure without carrying out any switch. If the switch is completed, the message **SWITCH TO GAS T2** (or **TD**) **SUCCESSFUL** appears on the display for 4 seconds.

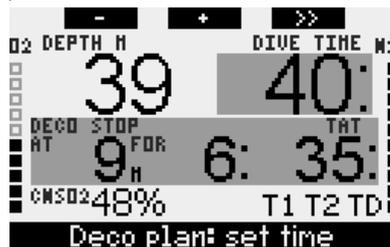
6.8 Logbook for dives with more than one gas mixture

For dives carried out with more than one gas mixture, Galileo adds a page in the logbook for each gas mixture. These appear just before the page listing warnings and alarms. Each page shows oxygen concentration, starting pressure, end pressure, consumed pressure and, for T2 and TD only, depth at which the switch took place.



6.9 Planning dives with more than one gas mixture

The dive planner considers all programmed gas mixtures when computing no-stop times or decompression schedules. When more than one gas is set, the symbols T1, T2 (if applicable) and TD appear on the dive planner screen.



7. Button function overview

	LEFT BUTTON		MIDDLE BUTTON		RIGHT BUTTON	
	Press	Press and hold	Press	Press and hold	Press	Press and hold
CLASSIC	Set bookmark and reset stopwatch	(Start gas switch, PMG only)	Access alternate field. In sequence: - (Max depth) - O ₂ % - Stopwatch - (Buddy tank pressure, if paired) - (Active MB level if other than LO) - (Information @ MB LO) - Time of day - CNS O ₂ - Average depth - ppO ₂	Access alternate display. In sequence (press): - (Gas summary table, PMG only) - (Deco summary table, PMG only) - Dive profile (with ascent, dotted) - Individual compartment saturation - Picture 1 - Picture 2 - ...	Activate backlight	Access compass display
LIGHT	Set bookmark	-	Access alternate field. In sequence: - (Max depth) - O ₂ % - Temperature - (Buddy tank pressure, if paired) - (Active MB level if other than LO) - (Information @ MB LO) - Time of day - CNS O ₂	Access alternate display. In sequence (press): - Dive profile (with ascent, dotted) - Individual compartment saturation - Picture 1 - Picture 2 - ...	Activate backlight	Access compass display
FULL	Set bookmark and reset stopwatch	(Start gas switch, PMG only)	- O ₂ % - (Buddy tank pressure, if paired) - (Information @ MB LO) - ppO ₂	Access alternate display. In sequence (press): - (Gas summary table, PMG only) - (Deco summary table, PMG only) - Dive profile (with ascent, dotted) - Individual compartment saturation - Picture 1 - Picture 2 - ...	Activate backlight	Access compass display
COMPASS	Set bookmark and reset stopwatch	(Start gas switch, PMG only)	Set bearing	Erase set bearing	Activate backlight	Manual return to regular display
GAUGE	Set bookmark and reset stopwatch	Start gas switch	Set bookmark and reset average depth	Access alternate display. In sequence: - Gas summary table - Dive profile - Picture 1 - Picture 2 - ...	Activate backlight	Access compass display
GAS SWITCH (PMG only)	Confirm gas switch		Go to next gas in sequence		Activate backlight	Exit without carrying out any gas switch

