



VPM-B:

The VPM-B decompression model has been added. An unlock code must be purchased, see www.shearwaterresearch.com. The VPM-B firmware has adjustable conservatism from 0 to +5. Higher numbers create more conservative (longer decompression) profiles.

The VPM-B calculations on the Predator run every 5 to 10 seconds. This means the Predator will best match a desktop planner (like V-Planner) when the minimum stop time is set to 10 seconds.

VPM-B/GFS:

The Gradient Factor Surfacing (GFS) option adds conservatism to the shallow stops on dives with significant decompression requirements (typically > 1 hour deco).

The GFS extension automatically chooses the decompression ceiling from the more conservative of the VPM-B profile and a Buhlmann ZHL-16C profile. For the Buhlmann profile a single gradient factor, adjustable over a range of 70% to 99%, is used. See Appendix A for details.

OTHER CHANGES:

Advanced Configuration:

A new sub-menu has been added to allow changes for values that will not need frequent adjustment.

The Advanced Configuration is accessed after the System Setup menu page.



Figure 1: Advanced Config Screens



At the top level menu, you can either enter the Advanced Configuration or reset the Advanced Configuration values to their defaults.

Advanced Configuration Page 1:



Salinity:

The salinity setting sets the density of water in kilograms per cubic meter [kg/m³]. A cubic meter of pure water weighs 1000kg. Therefore, this value sets the weight of the dissolved salts in the water. For example, a value of 1030 kg/m³ means there are 30kg of salts per 1000kg of water.

Since the depth sensor actually measures pressure, this value affects the displayed depth. Note that decompression profiles are computed using the actual measured pressure (and not the somewhat arbitrary depth).

Common values:

1000 kg/m³ = Fresh water

1020 kg/m³ = EN13319 value, Predator default (between fresh and salt water)

1025kg/m³ to 1035 kg/m³ = Salt water (varies by location).

Title Color:

The title colors can be changed for added contrast or visual appeal. Default is Green.



Figure 2: Cyan and Gray Title Colors (green and blue also available)



OC Show PPO2:

When in OC Only mode, sets whether the GasPO2 value is displayed on the main screen. Default is On.

Note: This setting has no effect on Closed-Circuit enabled models (unless the “OC Only” setting is turned on).

End Dive Delay (and End Dive menu option):

Sets the time in seconds to wait before ending the current dive.

This value can be set from 20 seconds to 600 seconds (10 minutes). Default is 60s.

Since the Predator can stay in dive mode for a longer time, a new “End Dive” menu option has been added. This is the first menu option when the Predator is still in dive mode AND is at the surface.

Solenoid Depth Compensation:

This setting is only available on rEvo rebreather controller models.

Sets whether the solenoid on-time should be compensated for depth.

rEvo Hybrid Models: Use OFF setting. The solenoid is supplied by an 'absolute pressure' or 'fixed pressure' first stage. This means as the depth increases, the solenoid supply pressure does not change with respect to surface pressure, so the gas density of the supply gas stays the same, the solenoid on-time remains the same as it would on the surface. Thus, no depth compensation needed or wanted.

rEvo eCCR Models: Use ON setting. On an eCCR, the solenoid is supplied by a normal, 'depth compensating' first stage, so the supply pressure is always a fixed amount above ambient pressure. However, since gas density now rises as the depth increases, the solenoid on-time must shorten, to create the same rise in PPO2 with each injection, as compared to on the surface. Thus, depth compensation is needed.

The default on rEvo controllers is OFF. The default on all other controllers is ON (and is not adjustable).

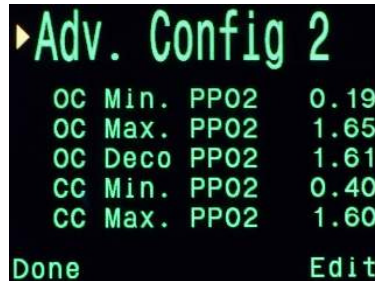


Advanced Configuration Page 2:

Advanced Config Page 2 allows changing of PPO2 limits:

Warning: Do not change these values unless you understand the effect. See descriptions below.

All values are in absolute atmospheres [ATM] of pressure (1 ATM = 1.013 Bar)



OC Min. PPO2: PPO2 displays in flashing red when less than this value. (Default 0.19)

OC Max. PPO2: PPO2 displays in flashing red when greater than this value. (Default 1.65)

OC Deco. PPO2: The decompression predictions (TTS and NDL) will assume that the gas in use at a given depth is the gas with the highest PPO2 that is less than or equal to this value. Also, the suggested gas switches (when the current gas is displayed in yellow) are determined by this value. If you change this value, please understand its effect. For example, if lowered to 1.50, then oxygen (99/00) will not assumed at 20ft/6m. (Default 1.61)

Note: Semi-closed (SC) PPO2 alarms and gas switch depths use the OC values.

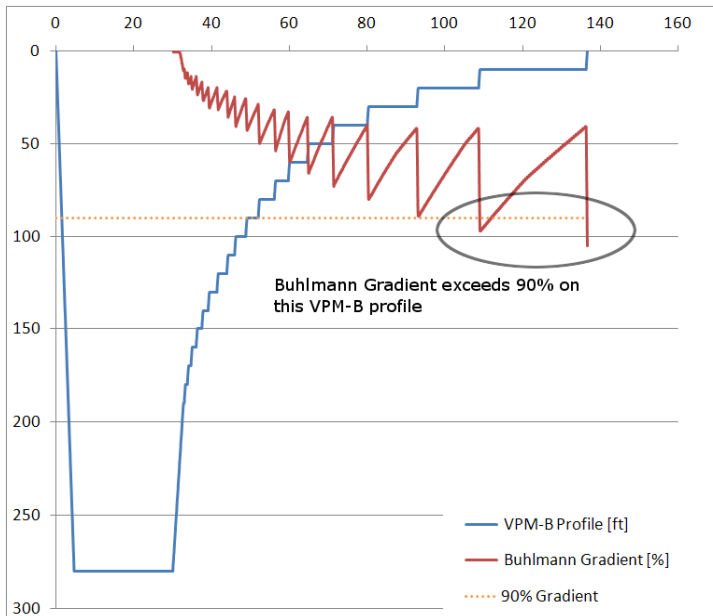
CC Min. PPO2: PPO2 displays in flashing red when less than this value. (Default 0.40)

CC Max. PPO2: PPO2 displays in flashing red when greater than this value. (Default 1.60)

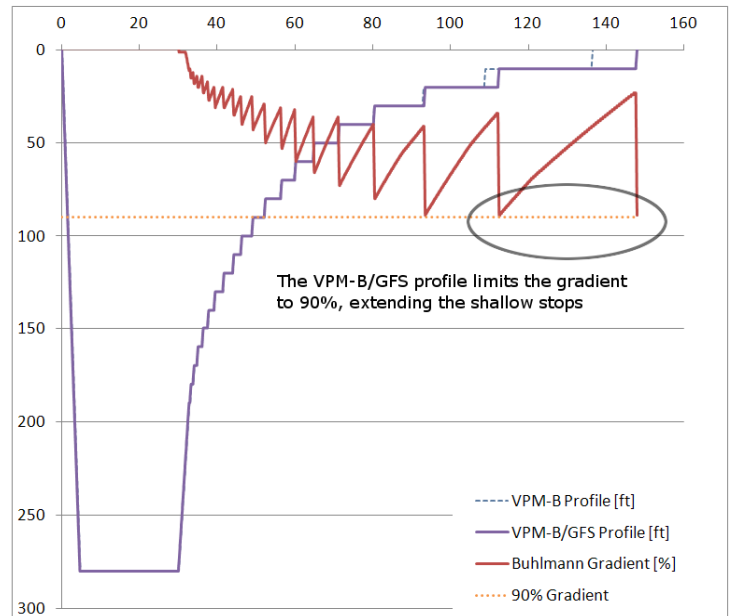
Note: In both OC and CC mode, a “Low PPO2” or “High PPO2” alert is displayed when the above limits are violated for more than 30 seconds.



APPENDIX A: VPM-B/GFS EXPLANATION



a) VPM-B Profile



b) VPM-B/GFS Profile

- Gradient Factor Surfacing (GFS) adds conservatism to the shallow stops of a VPM-B profile.
- In the pure VPM-B profile the Buhlmann (ZHL-16C) Gradient exceeds 90%.
- On the VPM-B/GFS profile, the shallow stops have been lengthened because the gradient is limited to 90%.
- GFS adds more time to dives that require more decompression. Dives with deco times under 45 minutes are typically not affected.
- The GFS gradient factor can be adjusted from 70% to 99%. The default is 90%.

NOTE:

For VPM-B, higher conservatism values are more conservative. The most aggressive settings is 0, and the most conservative is +5. The default is +3.

For the GFS value, higher values are less conservative. The most aggressive setting is 99%, and the most conservative is 70%. The default is 90%.



APPENDIX B: Release Notes

Version 42:

- Added VPM-B decompression model.
- Also, VPM-B is available as a hybrid model with Gradient Factor Surfacing (VPM-B/GFS).
- Added Advanced Configuration menus.
 - Salinity
 - Title Colors
 - OC Only PPO2 display
 - End Dive Delay time
 - rEvo Solenoid Depth compensation
 - PPO2 limits
- Changed external PPO2 sampling rate. Previous versions sampled once per second and displayed the average of the last 4 samples. Now 4 samples are done in 1 second, with the average displayed.
- Top-level menus (Turn Off, Switch Setpoint, Dive Setup, etc) timeout after 10 seconds (down from 60 seconds). Once a menu is entered, timeout is still 60 seconds.
- Time can now be displayed in AM/PM as well as 24 Hour format.
- Changed the date format from (mm/dd/yy) to (dd-mon-yy). For example, what was 08/27/11, is now 27-Aug-11.
- Added “End Dive” menu option. Only available when Predator is still in dive mode and is at the surface. Dive will also end when the computer has been on the surface for the “end dive delay” time.

Version 40:

- Update only for rebreather controllers with automatic calibration. Corrects problem where PPO2 calibration is accepted prematurely if a low external battery warning occurs during automatic calibration.

Version 37:

- Corrects a bug that affected the PROCT-SA and Kiss GEM models when turning off the “OC Only” mode.



Version 36:

- Nicer Fonts.
- Option to turn gases on/off.
- 20ft (6m) last stop option.
- When only 0.5ft (0.2m) below stop depth, do not flash red warning.
- Dive planner now uses maximum PPO2 of 1.4 to pick bottom gas in OC mode (was using the deco gas value of 1.6).
- When gas is off or cleared to 00/00, display dimmer to indicate off state.
- Use yellow font to indicate when more appropriate deco gas is setup but not currently selected (previously flashed red).
- Added seconds bar graph above dive time.
- Moved ascent rate graph to beside depth. Changed ascent rate graph to up arrows.
- New “OC Only” option on some models. Simplifies operation when diving OC only.
- Display “OC” in yellow, on models when CC or SC is available (if diving only OC, use the new “OC Only” option).
- In SC mode, new option to display both PPO2 and FiO2 on the main screen.
- Improved TTS deco calculations for SC mode when using multiple gases.
- The conservatism settings (GF Low and GF High) can now be edited in the Dive Setup menu. While diving, the GF High value can now be edited. This allows changing the surfacing conservatism during a dive. For example, if you worked much harder on the bottom segment than expected, you may wish to add conservatism by reducing the GF High setting.
- Increase ADC sampling time. Improves reading stability by a few tenths of a millivolt, especially for O2 sensor 3.
- Added permanent warning to center line of main screen for conditions that persist. For example, Low PPO2, High PPO2 and Solenoid problem. These warning clear automatically when condition goes away.
- When all sensors voted out, alternate centre line between PPO2 values and “VOTING FAILED” in yellow.
- For PROCTE, when in external PPO2 mode, remove high and low setpoint settings from menu.



- Use yellow for system menu arrows and underlining into increase visibility.
- In System Menu, show error conditions in yellow.
- Gas definition fails if duplicate gas.
- Gas sorting prefers gases with less helium if O2 is equal (that is, lower helium gas to be used at shallower depth).
- Fixed bug where clearing dive log would lead to blank spots in displayed dive logs when viewed in Desktop application.
- Changed the label “Cal PPO2” to “Cal FO2”. Since the Predator compensates for altitude or weather changes in atmospheric pressure automatically, the FO2 label is correct.
- After upgrade, show alternating “FAIL FAIL FAIL” and “NEEDS CAL.” on centre line.
- Fixed transition point between showing percentage and ‘on gas’ for GF99.
- Don’t show GF99 in place of NDL when on surface. Was too confusing, just show NDL.

Version 32:

- Added Dive Planner.
- Modifications to Buhlmann GF code to better match Erik Baker’s original implementation (when his program set to short Minimum_Deco_Stop_Time. i.e. to mimic “real-time” calculations). Biggest change is to profiles with minimal decompression obligations. Also, in some cases the deep stop may be shallower by a few stops versus previous Shearwater products, although total deco time roughly the same.
- Added @+5 display (based on Dan Wible’s CCR2000). This shows the TTS if diver was to remain at current depth for 5 minutes more. Can be set to replace NDL on main screen once deco is required.
- Added info screen to show all deco displays (GF99, CEIL, @+5/TTS).
- In Semi-closed mode, the external sensors can optionally display FiO2 instead of PPO2.
- Increased menu timeout when in Dive Planner and on surface to 3 minutes.
- Models heat transfer between water and battery compartment to account for insulation provided by case. Purpose is to reduce false low battery internal warnings caused by changes in water temperature.



- Adjusted levels of low battery internal warnings.
- Added averaging of internal battery reading.
- Fixed bug where menu time-out during gas editing resulted in improperly sorted gases.
- When writing error to info log, update error flags before writing log (or else error flags do not appear properly in log).
- Added “Searching...” animation while looking for next dive log to display.
- Info screens now time-out after 10 seconds (was 6 seconds). Also, can jump from any info screen back to main screen by pressing left button.
- Fixed bug where pressing confirm button during the very short time window between error being set and being displayed caused the wrong error to be acknowledged.
- When on surface, do not correct AvgPO2 or GasPO2 with CE_WATER_CORRECTION (Since there is no water to correct).

Version 30:

- Added Brightness setting with fixed values of Low, Med and High and an Auto-adjusting setting. All previous versions of the Predator firmware used the Auto setting.
- Added Altitude setting. When set to ‘Auto’, pressure changes due to altitude will be used for depth and decompression calculations. When set to ‘SeaLvl’, the surface pressure will always be assumed to be 1013mBar (1 atmosphere). **Important:** The default value is SeaLvl. If you will be diving at altitude, please ensure this value is set to Auto.
- Added button labels to make navigating menus and changing settings easier.
- Changed system menu to make changing settings easier.
- OC/CC Gases setup added to system menu. All gases can now be edited on one screen.
- Added dive plots to Dive Log viewer. Also added average depth to dive log.
- Added option to clear dive log.
- Added option to manually set dive number (useful when dive log cleared or to sync dive number with another computer).
- Added average depth to info screens.
- Added average depth in atmospheres to info screens.



- Added fraction inspired O₂ (FiO₂) to info screens.
- Reorganized info screens to show information most relevant to current diving situation.
- Added reset to defaults option.
- Changed internal battery level measurement to compensate for temperature. Was giving false low-battery warnings when in cold water.
- PROT model (OC only model) now shows the gas PPO₂ on the center line of the display.
- In OC mode, changed warning level for high PPO₂ (was warning at 1.6, now warns at 1.65).

NOTE: Before upgrading, please download all existing dive logs.

The dive log format has changed so there is a possibility of corrupting the existing dive logs on the Predator. If after upgrading to V30 you have troubling viewing the dive log, use the new 'Clear Log' function.

Version 29:

- Fixed external battery display for ISC users.

Version 28:

- Flash red PPO₂ value when outside range 0.4 to 1.6.
- A voted-out PPO₂ sensor will display as yellow (unless outside 0.4 to 1.6, then it will flash red).
- During calibration, display of O₂ Cell millivolts turns yellow when millivolts are outside of acceptable range (range varies with O₂% and altitude, but at 1 ATM and 98% O₂, the acceptable range is 30mV to 70mV).
- Fixed saving of Auto Setpoint Switch settings.
- Changed so external (solenoid) battery is only updated when the solenoid is firing. This is done because the battery voltage can be erroneously high when solenoid is not on. If you see Ext. V = 0.0 after turning Predator on, this may be because the solenoid has not yet fired.
- Separated ascent rate graph into distinct bars for easier reading.