



IMPORTANT

The System Menu has been restructured slightly.

A “Mode” option now controls whether the Predator is configured for OC only, OC/CC, or OC/SC. This replaces the old settings “OC Only” and “Closed/Semi”.

After upgrading, the mode may be different than your previous setting. Please go to “System Setup->Dive Setup” and set the “Mode” to the proper value for your diving.



For example, if previously you had “OC Only” set to “On”, then set “Mode” to “OC”. If diving a closed circuit rebreather, set “Mode” to “OC/CC” (i.e. Closed circuit with open-circuit bailout). For semi-closed rebreather divers, use “OC/SC”. Mode cannot be changed on all models. For example, rebreather controller models are always set to OC/CC.

New Feature: Tissues Bar Graph

The tissues bar graph is available in the info screens (accessed by pressing the right button).

It provides a graphical representation of the Buhlmann ZHL-16C inert gas tissue loading.

Note that VPM-B uses the same method of tracking tissues, so this display is also available when VPM-B is used.



16 tissue compartments are represented. Fastest compartment on top, slowest on bottom.

Values represented are tissue tension pressures. Pressure increases to the right. Each bar is the sum of Nitrogen and Helium tissue tensions.

The vertical blue line is the inspired inert gas pressure. Given enough time, if the gas and depth do not change, all tissues will converge (saturate) at this level.

The vertical yellow line is ambient pressure. Only if a tissue tension is above ambient is there the possibility of bubble growth. For efficient decompression, we allow the tissue tensions to rise above ambient, but control how high we allow them to get to reduce risk.

The vertical red line is the original Buhlmann M-value pressure (unmodified by gradient factors).

For more information search for the “Petrel Tissues Demo” video on YouTube (although this video demonstrates the Petrel, the concepts are the same).



New Feature: Surface Interval on Main Screen

The main screen now shows the surface interval since the end of the last dive in the place of the deco STOP TIME display.

This time is cleared when the tissues are cleared (e.g. after a battery change).



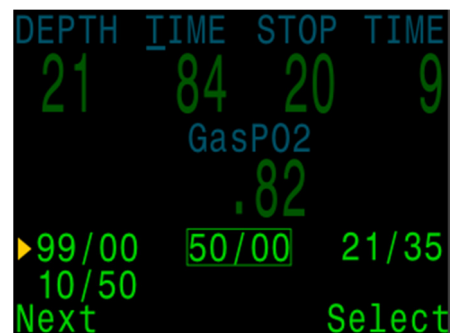
New Feature: Optional New Style Gas Select

A new style of gas select menu is now an option.

Choose this style in the “Adv. Config 1” menu.

Allows all programmed gases to be seen at once. However, the font size is smaller.

The active gas is drawn with an outline. A gas that is turned off is drawn in a dimmer font.

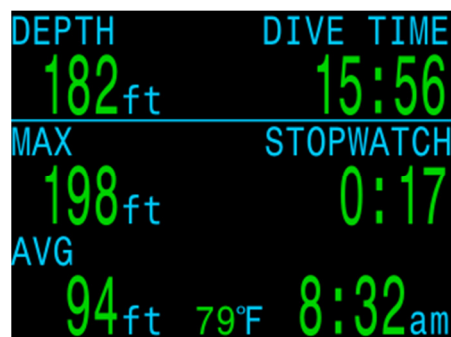


New Feature: Gauge Mode

A gauge mode is now available in the “System Menu->Dive Setup->Mode” menu.

When switching to or from gauge mode, the deco tissues are reset (since gauge mode does not tracking which gas is being used).

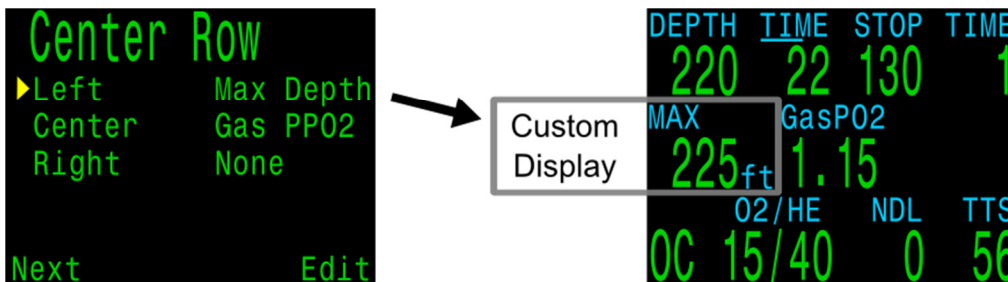
Gauge mode features a stopwatch and has a resettable average depth function.





New Feature: Configurable Center Row

The center row can be configured if space is available. Unfortunately, when PPO2 from 3 external O2 sensors is being displayed, there is no space for configurable displays.



Configure the Center Row in the "System Setup->Center Row" menu.

Option	Description
None	Blank (default value).
Max Depth	The maximum depth of the current (or previous dive when on surface).
Avg Depth	The average depth of the current (or previous dive when on surface).
@+5	The TTS if remaining at current depth for 5 more minutes.
Ceil	The current decompression ceiling (not rounded to the stop interval).
GF99	The Bühlmann ZHL-16C super-saturation percent gradient.
CNS	Central Nervous System (CNS) oxygen toxicity clock as a percentage.
Clock	The time-of-day in 24hr or am/pm format (same as system setting). Does not show "am" or "pm".
DET	Dive End Time. The time-of-day when the dive will end (i.e. Clock plus TTS). In 24hr or am/pm format (same as system setting). Does not show "am" or "pm".
Temp.	Temperature.
Dil PPO2	The diluent PPO2 at the current depth (Only available when CC is available).
FiO2	The fraction of inspired O2 as a percentage (Only available when CC or SC is available).

The center position can only display PPO2. In OC only mode, the PPO2 display can optionally be turned off.



APPENDIX B: Detailed Release Notes

Version 56:

All Models:

- **NEW FEATURE:** Added tissues bar graph to info screens.
- **NEW FEATURE:** Surface Interval now displays on main screen (in place of deco STOP TIME) when not diving.
- **NEW FEATURE:** Added optional new style gas select (like in Petrel).
- **NEW FEATURE:** Added Clear Log menu option (cannot be undone). Doesn't actually delete data, but flags records so does not display on Predator or desktop software. However, logs can still be recovered from .swlogdata file. Reason for the ability to recover is in the case of a diving accident, where logs have been accidentally or maliciously deleted.
- **IMPROVEMENT:** Changed VPM-B convergence criteria to handle corner cases better.
- **CHANGE:** When within 1m of surface, do not update average depth. Prevents surface intervals from being included in average depth.
- **FIX:** Improvements to GF and VPM-B NDL calculations for more accurate NDL times, especially during ascents.
- **FIX:** In VPM-B, if a better gas was available, but user remained on a different gas, then when approaching a stop, the deco calculations would switch back and forth between using the better gas and using the current gas depending on slight changes to depth. Proper behavior is to assume user will select the better gas, and always use that for deco calculations.
- **FIX:** For Deco Planner in Buhlmann GF, fixed problem where on some units the first run of the Deco Planner would result in slightly different results from all subsequent (and correct) runs.

Standalone and Fischer Models:

- **NEW FEATURE:** Added gauge mode. With stopwatch and resettable average depth.
- **NEW FEATURE:** Added configurable centre row displays. Unused space on main screen centre row can be user configured (not available when 3 external O2 sensors are used, as there is no unused space).
- **CHANGE:** Slight menu reorganization. Added a Mode setting (OC, OC/CC, OC/SC, Gauge) like on the Petrel. This replaces two older menu items, 'OC Only' and 'Closed\Semi'.

Analog Rebreather Controller Models:

- **IMPROVEMENT:** Added solenoid current measurements when solenoid is expected to be off. Used to detect if solenoid MOSFET switch has failed as a short circuit. Issues a Solenoid Alert warning.
- **IMPROVEMENT:** O2 injection is more aggressive when using 0.19 setpoint (since overshoot is not a problem, but allowing PPO2 to fall below 0.19 is a problem).



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- **FIX:** For Hollis liability screen, flip buttons when screen is flipped.
- **CHANGE:** When bailing out to OC, automatically switch to low setpoint (to make buoyancy control easier).
- **CHANGE:** If setpoint is 0.19, and wet contacts detect water, then promote setpoint to low setpoint.
- **Reminder that the 0.19 setpoint is not intended for use when breathing on the loop. The 0.19 setpoint is a convenience feature for use when setting up and storing the rebreather only.**

DiveCAN Rebreather Controller Models:

- **FIX:** Fixed problem with very high CAN bus loads (> 40%) which can cause watchdog reset. Never reported in the field, as typically bus loads are under 0.5%.

Version 46:

- Changed Bluetooth Class of Device from 0 to 0x80704 (Wearable Wrist Watch with Capturing Service). This change to allow Bluetooth connections to older Android phones which have a bug in their Bluetooth stack.
- Fixed problem where Missed Deco Stop error would be generated if last deco stop cleared while diver slightly shallower than last stop.

Version 45: (note: V45 was not a general release)

- Added optional "Start-Up Text". Custom text that displays on splash screen during start-up. Set text using Shearwater Desktop program.
- Changed default GF conservatism from 30/85 to 30/70.
- Fixed problem where first run of Dive Planner sometimes different than subsequent runs.
- Fixed problem with CNS tracking when unit turned off between dives.
- Changed behavior when switching from CC to OC during dive, and no gas is available with PPO2 of less than 1.6. Previously was choosing the first gas (highest PPO2), now chooses the lowest PPO2 gas.



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- Removed Adv Config option “O2 Show PPO2” for models that do not support it. Previously this option appeared in the menu but did nothing for those models.
- Improved stability of final few stops when using VPM-B on dives with little deco.
- Improved accuracy of VPM-B NDL calculations.
- Fixed bug where Bluetooth uploads and downloads would fail when performed at high altitude.
- Fixed JJ external low battery warning level.
- Removed Clear Dive Log option from menus.
- In Dive Planner, bailout out ascent legs now display the gas as the gas that was in use at the start of the ascent, not the end of it.
- DiveCAN/rMS: controllers now use wet contacts for auto turn-on.
- DiveCAN/rMS: Now displays a ? or X for each scrubber to indicate connection status. First ? or X is exhale scrubber, next is inhale.
- DiveCAN/rMS: If scrubber not fully ready when dive ends, still show results in Scrubber Times page.
- DiveCAN/rMS: New warm-up conditions.
- DiveCAN/rMS: Added biometric parameters for adjusting scrubber times to metabolism.
- DiveCAN/rMS: New scrubber reset conditions.
- DiveCAN/rMS: Don’t allow scrubber reset while diving.
- DiveCAN/rMS: Bus Devices screen now shows firmware versions.
- DiveCAN/rMS: Added depth compensation option for solenoid control.
- DiveCAN/rMS: Enabled VPM-B for rMS systems.

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



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- 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.



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- 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.



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- 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.



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- 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.



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- 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.