

# rEvodream manual P / P5 Version 05.2018

**rEvodream** is an independent electronic system that informs the diver about oxygen partial pressure in the breathing loop. For easy use, a rEvodream is attached to the oxygen and/or diluent pressure gauge. A rEvodream can display ppO<sub>2</sub> read out from one or two sensors. When two sensors are connected and correctly calibrated, the rEvodream displays ppO<sub>2</sub> from both sensors alternatively, in 3 seconds' intervals.

rEvodream P & rEvodream P5 consist of:

- ppO<sub>2</sub> display with battery and measuring electronics
- a 'head's up display' (HUD)
- cable for oxygen sensors with at the end 2 Molex connectors for 2 sensors.

## THE HEADS-UP-DISPLAY (HUD)

The HUD will display a range of ppO<sub>2</sub> values using a simple 3-LED display that clips to the DSV of the rEvo, always in view of the diver's peripheral vision. The display the HUD will give can be in 3 different modes:

1. Standard mode = rEvo 1.30 ppO<sub>2</sub> green zone
2. 1.0 pulse code 'aka modified Smithers code'): when ppO<sub>2</sub> = 1.0, only the green LED is ON continuously.
3. The SCR mode: when the SCR option is set the 'green-only' zone is between 0.50 and 1.45.

The main difference between the rEvodream P and P5: the P5 has a different battery system and offers a much longer operating time till the battery must be changed.

## Basic operations of the rEvodream P/P5

### SWITCHING rEvodream ON AND OFF

To switch the rEvodream on press once (1P - "one push") the piezo button on ppO<sub>2</sub> display. After start-up, rEvodream HUD informs how many calibrated sensors are attached. This information is provided by LED sequence: **orange** > **green** > **red**. If two correctly calibrated sensors are connected to rEvodream, the sequence is displayed twice. If there's only one sensor - the sequence is displayed once. After that rEvodream starts to display ppO<sub>2</sub>.

The rEvodream can be switched off in 3 following ways:

1. By pressing the piezo button once (1P) within 2 minutes from switching it on.
2. By pressing the piezo button once (1P) if the ppO<sub>2</sub> < 0.5 bar (in this condition time doesn't matter).
3. Automatically, ('auto-off') if the ppO<sub>2</sub> ≤ 0.25 bar for 15 minutes

### CALIBRATION

Before we discuss rEvodream calibration, it should be mentioned, that calibration is a process of "teaching" the electronics, what voltage the sensor generates at known ppO<sub>2</sub>. When the rEvodream is in CCR mode, it assumes that the sensor is surrounded with 100% oxygen during calibration. Unlike Shearwater, rEvodream doesn't have an atmospheric pressure sensor, so during calibration it assumes that ambient pressure is 1.0 bar.

As we know, ppO<sub>2</sub> is the product of oxygen fraction and ambient pressure, so during calibration rEvodream measures voltage of the sensor at 1.00 bar ppO<sub>2</sub>. That makes the basis for calculating higher ppO<sub>2</sub> during the dive.

Example:

During calibration the sensor voltage was 50 mV, so ppO<sub>2</sub> 1.00 bar equals to 50 mV

During the dive this sensor generates voltage of 65 mV, what the rEvodream reads as ppO<sub>2</sub> = 1.30 bar (65/50=1.3)

**Remember:**

rEvodream calibration should be preceded by a full oxygen flush. After flushing the loop with oxygen, you can start calibration by pressing the piezo button 3 times (3P), but only when the rEvodream is OFF.

**The calibration process proceeds as follows:**

1. First, the sensors' voltage is displayed and according to these values sensors will be calibrated or not:
  - if the voltage of the first sensor is in correct range (36 - 64 mV), this sensor will be calibrated.
  - The rEvodream shows a ppO<sub>2</sub> of 1.00 on the display and HUD's **green** LED flashes few times, confirming successful calibration and calibration of the second sensor starts.
  - if the voltage of the first sensor is lower than 36 mV, the rEvodream assumes that sensor is failed and switches it off. HUD's **orange** LED flashes few times, confirming failed calibration due to low output voltage, and calibration of the second sensor starts.
  - if the voltage of the first sensor is higher than 64 mV, the rEvodream assumes that sensor is failed and switches it off. HUD's **red** LED flashes few times, confirming failed calibration due to high output voltage, and calibration of the second sensor starts.
2. If at least one sensor is successfully calibrated, the rEvodream asks about altitude calibration (see next section), by flashing all 3 LEDs twice. To confirm altitude calibration mode, you should press the piezo button once (1P). The rEvodream confirms entering altitude calibration mode by HUD LED sequence **orange > green > red**. Now you can correct ppO<sub>2</sub> of the calibration. You can read more about altitude calibration in the next section of this article.
3. If none of the sensors can be calibrated, rEvodream shows that with rapid alternate flashing of **red** and **orange** HUD LEDs and then switches off. From this moment the rEvodream won't operate and every try of switching it on will end with information about failed calibration (rapid alternate flashing of **red** and **orange** LEDs) and switching it off, until at least one oxygen sensor of the rEvodream will be correctly calibrated. After solving the problem with the sensors, you should repeat calibration.

**Remember:**

Calibration with air can be only done when the rEvodream is in SCR Mode.

If possible, you should always calibrate with 100 % Oxygen in rEvo 1.3 Mode.

**Remember :**

- Pt = Pulse Train: a series of brief Pulses
- **Pt O**: Pulse Train of the Orange LED, means that the millivolt value of the sensor is too low, the calibration is not carried out. (the sensor is switched off and will not be displayed)
- **Pt R**: Pulse Train of the Red LED, the millivolt value of the sensor is too high, the calibration is not carried out. (the sensor is switched off and will not be displayed)
- **Pt G**: Pulse Train of the Green LED, the millivolt value is correct, its value is registered in the memory.

## Advanced settings of the rEvodream P/P5

### ALTITUDE CALIBRATION

As mentioned before, during calibration in CCR mode, rEvodream assumes that ambient pressure is 1.00 bar and 100% oxygen in the breathing loop. These criteria are fulfilled rather rarely in practice. Ambient pressure can be lower or higher than 1.00 bar and oxygen content in the loop is not always 100%. The example of such situation can be altitude diving with atmospheric pressure below 900 mbar (0.9 bar) or using oxygen of purity lesser than 100% (95% - 96%). Let's say - for example - that the atmospheric pressure is 970 mbar (0.97 bar) and oxygen percentage in oxygen tank is 98%. In that case, real oxygen partial pressure after flushing the loop is  $0.97 \cdot 0.98 = 0.95$  bar. And that value will be shown after calibration by Shearwater.

If you don't change the rEvodream calibration, it will show ppO2 = 1.00 bar, so there'll be 0.05 bar difference between the Shearwater and the rEvodream.

To avoid such situation, you can use "altitude calibration" mode. After successful calibration, the rEvodream asks about altitude calibration, by flashing all 3 LEDs twice. If you want to enter altitude calibration mode to change the displayed ppO2, press the piezo button once (1P). rEvodream confirms entering altitude calibration mode by HUD LED sequence **orange > green > red**. Now you can correct the ppO2 using the piezo button - by pressing the piezo multiple times, you reduce the ppO2 value displayed. When you reach the correct value just wait - after 2 seconds the rEvodream saves the corrected ppO2 and starts the altitude calibration for the second sensor with the sequence **orange > green > red**, or goes to standard working mode, if only one sensor was correctly calibrated. Saving of any change is always confirmed by **green** LED rapid flashing.

### rEvodream MODES

1. Standard mode = rEvo 1.30 ppO2 green zone
2. 1.0 pulse code 'aka modified Smithers code'): when ppO2 = 1.0, only the green LED is ON continuously.
3. The SCR mode: when the SCR option is set the 'green-only' zone is between 0.50 and 1.45.

Although in most cases you will use the rEvodream in standard mode, you should know about its additional features.

### Standard CCR MODE (default): 1.3 ppO2 green zone

In standard CCR mode the rEvodream assumes that sensors were calibrated with 100% oxygen at 1 bar ambient pressure. Default ppO2 display mode is rEvo 1.30, PPO2. In this mode, the desired ppO2 is 1.30 bar so when in the range from 1.25 to 1.40, only a green HUD LED is on, constantly (everything is OK).

The variations of PPO2 are symbolized as follows:

PO2 < 0,3 **orange** LED flashes rapidly

> 0,3 < 0,5 **orange** LED flashes twice for every 3 seconds

> 0,5 < 0,7 1 long pulse of **orange** LED for every 3 seconds + **green** LED constantly

> 0,7 < 1,0 1 short pulse of **orange** LED + **green** LED constantly

> 1,0 < 1,25 1 very short pulse of **orange** LED + **green** LED constantly

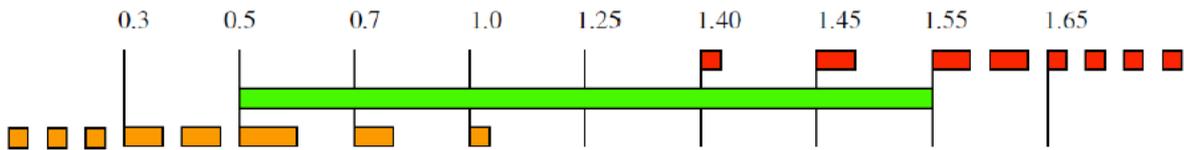
> 1,25 < 1,40 **green** LED constantly

> 1,40 < 1,45 1 very short pulse of **red** LED for every 3 seconds + **green** LED constantly

> 1,45 < 1,55 1 pulse of **red** LED for every 3 seconds + **green** LED constantly

> 1,55 < 1,65 2 pulses of **red** LED for every 3 seconds

> 1,65 **red** LED flashes rapidly.



**Alternative CCR MODE: 1.0 ppO2 green zone with 'modified Smithers code'**

The alternative HUD ppO2 display mode is "rEvo 1.0 pulse code". When the PPO2 = 1,0 only the green LED is constantly on.

For every 0.1 bar above 1.0, the red LED will pulse once. (up to 1.5 bar). For every 0.1 bar below 1.0, the orange LED will pulse once.

Below 0.5 bar, the green LED will be off, and the orange LED will pulse continuously. Above 1.55 the green LED will be off, and the red LED will pulse continuously.

## SCR MODE

In SCR mode the rEvodream assumes that sensors were calibrated with air at 1 bar ambient pressure. HUD ppO2 display changes - the 'green-only' zone is between 0.50 and 1.45.

The variations of PPO2 are symbolized as follows:

- PO2 < 0,25 **orange** LED flashes rapidly
- > 0,25 < 0,5 1 pulse of **orange** LED + **green** LED constantly
- > 0,5 < 1,45 **green** LED constantly
- > 1,45 < 1,55 1 pulse of **red** + **green** LED constantly
- > 1,55 **red** LED flashes rapidly



### Remember:

Only in SCR mode you have the possibility to calibrate the rEvodream with air. This should be only done if the unit is used in the SCR mode.

## How to change the MODES?

All mode changes are made by a specific number of pushes on the piezo button while the rEvodream is OFF. After the desired number of pushes on the piezo button, the rEvodream turns on and the green HUD LED flashes as many times as you have pressed the piezo button. Next, if mode change demands confirmation, you'll be asked for it (all 3 HUD LEDs flashes twice). Press the piezo button once to confirm changes. The rEvodream confirms saving the new mode with rapid flashing of the green LED and then turns off.

- 4 presses (4P) - rEvodream is set to factory setting: HUD shows PPO2 according to the rEvo 1.3 green zone pulsing, CCR mode. No confirmation is needed.
- 5 presses (5P) - rEvodream HUD will display the PPO2 using the rEvo 1.0 pulse code CCR mode. Confirmation is required.
- 6 presses (6P) - rEvodream HUD will display the PPO2 according to the SCR display mode. Confirmation is required.

## DIFFERENT MODELS

### THE REVODREAM CONSOLE

The LCD console is normally attached to either the diluent or oxygen pressure gauge, as during the dive all necessary information will be displayed on the HUD. You only look at the LCD console to compare the measured values with a second independent monitoring system or during the calibration process. In the case of using a second rEvodream console, it is attached to the other pressure gauge and the two HUDs will be placed next to each other on top of the mouth piece.

Previous versions of the rEvodream utilized "tapping technology" and was named "rEvodream", and later on "rEvodream NG" (next generation).

However in 2012 the rEvodream P was launched. The new rEvodream P has all

the functionalities of the rEvodream NG, but comes with a vastly improved and simplified user interface. 'P' stands for the Piezo Push function that is inside the new rEvodream window. The rEvodream P is operated by using a piezo switch located on the face of the unit, and is available in 2 versions:

#### **1. rEvodream P**

When the indication 'low battery' appears on the screen of the rEvodream (battery-sign in the left upper corner of the LCD), both batteries must be replaced: (type: CR2450)

Unscrew the 8 bolts of the display, lift the transparent window with the engraved plate, take away the neoprene cushion. Be careful not to damage the wires that connect to the piezo in the window. Unscrew the battery clip.

Put 2 new batteries in place (+ up) and fix the clip again. The rEvodream goes into 'sleep-mode'.

If the polarity of the batteries is wrong, the rEvodream will not be damaged, but it will not function either. Put the neoprene cushion back, take care that the wires are not going over the LCD, but around, put the engraved plate and the transparent cover in place, and take care that the window has contact with the whole O-ring.

There should be no dirt, hair or any dust visible on the O-ring! Fix the 8 bolts again, but do not overtighten them!! (If so, the thread will be damaged!)

Now the unit can be used normally again. After changing the batteries, all the setting- and calibration data still remaining.

## 2. rEvodream P5

For checking the battery life of the rEvodream P5, only the indication at room temperature should be regarded.

Indications of low battery that appear only at temperatures below 15°C ( 59°F) can be disregarded: this is due to the temperature behavior of the LCD when using a lower voltage battery, and not due to a real 'low battery'.

When at room temperature, the first time a 'low battery' warning appears, the rEvodream P5 will work correctly for at least another month.

It is recommended to send the rEvodream P5 to a rEvo Service Center, for replacement of the battery, as the battery is soldered onto the printed circuit board. Users who are familiar with soldering on small electronics, can buy the specific battery from a rEvo service center.

After changing the battery, all the setting- and calibration data still remaining.

### Technical data

Partial pressure of oxygen gauge for max 2 sensor's type R22D. Display of the PPO2 on the LCD screen and with 3 LED's (orange, green, red) on the HUD.

- PPO2 between 0.00 and 2.50
- max depth: 150m (pressure resistant)  
Use is limited to divers certification.
- Temperature range: -5° + 40°

### rEvodream P:

Batteries: 2 x CR2450 lithium 3V

Service life: +/- 200 diving hours

### rEvodream P5:

Battery: SAFT LS14500 with solder tag

Service life: > 5 year in normal use, > 800 diving hour

### Definitions:

.. Sleep = when the rEvodream is in sleep-mode, or OFF (battery – life > 10 years)

.. 1P = 1 push on the window of the rEvodream, on top of the piezo (yellow disk in the window)

.. 2FL = 2 flashes: a flash is a pulse of the three LEDs together

**Attention: 2FL is always a request for confirmation of the operation that has been just carried out, or of the operation that is going to start. If you agree, you confirm by 1P (one push).**

.. Wake-up Signal = O->OG->OGR (the Orange LED lights up, then the Green one, then the Red)

**Attention: if 2 sensors are connected and correctly calibrated, the sequence OGR runs twice, if only 1 sensor is connected and calibrated, then the sequence only runs once.**

.. Display of the ppO2: when 2 sensors are connected and correctly calibrated, the gauge/HUD will show the ppO2 readings of both, alternating every 3 seconds

.. Standard factory settings are: rEvo 1.30 ppO2 green zone, CCR mode