# sens07vest

## *User Manual*

October 2020


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# 1 About sens07vest

## 1.1 Overview


The sens07vest is an electronic floating device to return free diver and spear fisher back to the surface in the event of an emergency.

sens07vest constantly monitors drowning risk based on user programmed settings and automatically inflates a floating bladder in case of high drowning risk.

The blackout protection feature requires a manual confirmation from the diver after the dive, in order to prevent inflation of the bladder.

The sens07vest is designed to protect free divers and spear fisher up to 50 meters under water when using a 95gr $CO_2$ cylinder. Below this depth the bladder might not be able to inflate sufficient in order to bring the diver back to the surface.





## 1.2 Specifications

### *1.2.1 Sens07vest*

| | |
|---|---|
| Applications | Any kind of water sport like freediving, spearfishing, wave surfing, kiting, windsurfing or even swimming. *Caution: Don't use the sens07vest for scuba diving (no decompression)!* |
| Weight | 1'200gr. incl. $CO_2$ cylinder. |
| Buoyancy | 150N (around 15kg uplift). Unconscious wearers are turned face-up. Head is stabilised to protect airway. |
| Max. depth | 50m when using 95gr. $CO_2$ cylinders; 30m when using 60gr. $CO_2$ cylinders. |
| Fixation | Adjustable chest and crotch strap. |
| Sensors | Contact-free sensors (all integrated into the sens07 inflator). |
| Manual inflation | Pulling the manual handle triggers an inflation bypassing the electronics. |
| Power Switch | sens07vest is always on. Automatic activation can be disabled if legally required (not recommended). |
| Maintenance | No battery maintenance required (battery life time 5 years or more). Physical check for abrasion every 2 years recommended. |
| Guarantee | 2 years. |
| Data recording | Time and depth are logged for months or years into a non-volatile memory allowing data recovery even upon physical damage (optional licence required). |
| Other features | Grab loop, blow tube, whistle and neck pocket with zipper for weights. |

### *1.2.2 sens07 app configuration*

| | |
|---|---|
| Profiles | sens07vest can store 3 configuration profiles for different users, applications or missions, etc. |
| Basic configuration | Inflation for each profile can be programmed by time, depth or both. Different depth zones allow individual timing per zone. |
| Blackout protection | Manual confirmation is required to prevent inflation after returning to surface. |
| Suspension | A suspend button allows to delay upcoming inflation by a specified time. |
| Data transfer | Optical data transfer (flickering smartphone screen). Data transfer can be protected or blocked by a password. |
| Timed inflation | Inflation can be programmed on a specified time/date or with timer up to 4 months in advance (optional licence required). |
| Customization | Colour, logo, brand name and features of the app can be customised. |

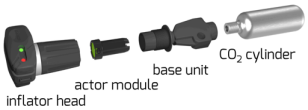




## 1.3 sens07vest components


The core *sens07vest* contains the inflatable bladder and the sens07 inflator which can be configurated using the sens07 app.

The *sens07inflator* consists of 4 components:




The *sens07inflator* consists of 4 components:

1. The inflator head contains the electronics, sensors, red/green light indicators, battery, self-test button and the optical light sensor to configure sens07 by using any smartphone.
2. The actuator module gives the thrust to pierce the $CO_2$ cylinder and opens the gas flow in order to inflate the rescue bladder. The actuator module needs to be replaced after every inflation.
3. The base unit connects the sens07 head, actuator module and $CO_2$ cylinder to the inflatable bladder. The base unit is equipped with the manual emergency handle which allows manual inflation of the bladder at any time.
4. $CO_2$ cylinder (60gr. or 95gr.) with 1/2-inch thread providing the needed gas volume to inflate the bladder up to 50 meter depth. It is important to verify that a fresh and unused $CO_2$ cylinder is inserted before each dive.

## 1.4 Activation on water contact

The *sens07 inflator* immediately starts its auto-supervision when water can be "sensed" by the integrated contact-free water sensors. When taking out of the water, the sens07 inflator automatically goes into a power-saving standby mode.

The sens07 inflator deliberately has no "power" button - it is always switched on, even if it is stored for months or years; activation cannot be forgotten.

However, it is possible to enable manual deactivation of the *sens07 inflator* for security reasons like in aircrafts.
Please note that switching off the sens07 inflator doesn't save energy and is not recommended by ProVitaTec.

## 1.5 No battery change or replacement required

Battery change or battery charge is not required during the lifetime of the sens07 inflator due to ultra-low energy consumption. The life-time of a sens07 inflator is at least 5 years, the full life-time depends on user activity.

In the unlikely event that battery power should run low due to very extensive usage, the red LED will light up when pressing the self-test button.





## 1.6 Interactive self-test

Pressing the *sens07* button will initiate a self-test and give a clear and intuitive feedback confirming the proper function of the *sens07 inflator* by showing the green light.

The self-test checks battery status, all sensors and the microcomputer as well as the presence of a fresh and correctly inserted *actuator module*.
Please note that a manual $CO_2$ cylinder check is required.

## 1.7 Suspend upcoming inflation in water

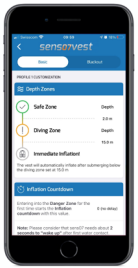
A suspend button allows the user to delay upcoming inflation for a pre-defined time. The suspend feature can be enabled and configured by the sens07 app.

## 1.8 Blackout Mode

Many accidents happen just after surfacing (just after the dive). Therefore, the sens07vest can be set to inflate just some seconds after surfacing. The diver must press the button during a specified time after the dive to confirm consciousness in order to avoid inflation.

If the diver does not press the button in time, then the sens07vest inflates and keeps the airways out of the water.

### 1.9 Customization using the sens07 app




The inflation parameters and features (called profiles) can be customized using the *sens07 app* and are wirelessly transferred to the *sens07 head*.
The *sens07 head* can store up to 3 profiles for different divers or activities.

Holding the *sens07 button* for 2 seconds switches to the next uploaded profile.

The smartphone is not required to operate the sens07vest or to switch between the already uploaded profiles.

### 1.10 Data recording (optional licence required)

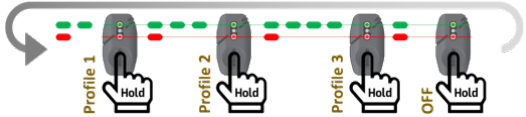

The *sens07 head* is able to constantly log all sensor data for weeks, months or even years, depending on the activity of the user. The recorded data is stored in a *non-volatile memory* which allows data restoration even in case of severe physical damage of the *sens07 head* or embedded electronics.





## 2 sens07 inflator manual

### 2.1 Switching between profiles




Pressing the button while not in water for more than 2 seconds will switch to the next profile which was specified using the sens07 app. A successful change of the profile is confirmed by a short flash of both LEDs (green and red). After that, the profile number is shown by the number of blinks of the green LED (red LED indicated a self-test problem).

- Red & green flash + **0 flash: Manual mode (off)**
- Red & green flash + **1 flash: Profile 1**
- Red & green flash + **2 flashes: Profile 2**
- Red & green flash + **3 flashes: Profile 3**

*Note: Please verify configuration using the sens07 app in case you can't change the profile as expected.*

## 2.2 Suspend upcoming inflation while diving

Pressing the self-test button when the sens07vest is submerged will suspend (freeze) the risk inflation countdown for the specified suspend time. This time can be defined by the *sens07 app.*

The suspend button works under water only. An active suspension will be cleared when reaching the Safe Zone.

The suspend button doesn't influence the blackout countdown.

This feature can be enabled or disabled using the sens07 app. When disabled, pressing the button will have no effect underwater.

## 2.3 Manual inflation handle

Pulling the manual inflation handle will inflate the bladder in any situation (emergency).

The manual inflation handle is an emergency device and works without any electronic, configuration or actuator module.





## 2.4 Replacing actuator module & $CO_2$ cylinder


The actuator module needs to be replaced after each inflation.

Disassembly of the sens07 inflator

1 Remove $CO_2$ cylinder by firmly rotating cylinder counter clockwise.
2 Remove sens07 head by rotating rippled screw nut counter clockwise.
3 Remove actuator module from the sens07 head and discard.

Rearming of the sens07 inflator

1 Check the expire date (month & year) printed on the sens07 head. The date should not exceed today's date.
2 Insert a new unused actuator module into the sens07 head.
3 Install the sens07 head by screwing rippled screw nut clockwise until it meets the housing shoulder.
4 Install an unused $CO_2$ cylinder by rotating clockwise into base unit until $CO_2$ cylinder is secured firmly.

Perform the self-test as described in chapter 1.6 after replacing the actuator module.

# 3 LED signals

The inflator head has 2 front LEDs for important information and 3 back LEDs for system information.

## 3.1 Main LEDs on the front side

The green and red front LED give the following information:

### *3.1.1 Water zone indicator*

| | sens07 inflator is functional | sens07 inflator has a fault |
|---|---|---|
| Safe zone | • • • • | • • • • |
| Diving zone | •• •• •• •• | •• •• •• •• |
| Warning zone | ••• ••• ••• ••• | ••• ••• ••• ••• |

A short blink every second indicates water detection. The number of blinks corresponds to the dive zone.

The red LED is used instead of the green LED in case of a negative self-test. However, the sens07 inflator will still try to operate as expected, but there is a high chance of failure.

The water zone indicator can be disabled for defence applications.

### *3.1.2 Suspend Mode*

| | |
|---|---|
| Suspend mode | • • • • • • • • |

An alternating green & red LED blink means that the button was pressed under water suspending inflation for a certain time.





### *3.1.3 Blackout warning*

| | |
|---|---|
| Blackout warning | • • • • • • • • • |

After emersion in Blackout-mode, sens07 blinks fast with both LEDs indicating the need for immediate user action (press the button to confirm consciousness).

### *3.1.4 Inflation occurred*

| | |
|---|---|
| Inflation occurred | • • • • |

A simultaneous blink of the green & red LED together every second means that inflation was triggered and sens07 is waiting for total emersion. Replacement of the actuator module and $CO_2$ cylinder is needed.

### *3.1.5 Timed Inflation: Active*

| | |
|---|---|
| Timed inflation active | • • • • • |

A green light every 10 seconds indicates a running *Timed Inflation* counter. Inflation will be triggered as soon as timed inflation runs out.

Note: Timed inflation can be stopped by holding the button.

### *3.1.6 Timed Inflation: Standby*

| | |
|---|---|
| Timed inflation standby | •• •• •• •• |

A green double light every 10 seconds indicates that the sens07 inflator is in standby waiting for water contact which will start the *Timed Inflation* count-down.

Note: This standby mode can be stopped by holding the self-test button.

## 3.2 System LEDs on the back side

There are 2 LEDs (red & green) on the backside of the sens07 inflator, visible through the transparent housing. They offer more detailed system information when pressing the self-test button. They are not needed for normal operation.

### *3.2.1 Green LED: Cause of last inflation*

| Reason for inflation | Blink code |
|---|---|
| Exceeded time in zone 1 (safe zone) | • |
| Exceeded time in zone 2 (diving zone) | •• |
| Exceeded time in zone 3 (warning zone) | ••• |
| Entering into the immediate inflation zone | •••• |
| Blackout protection time exceeded | ••••• |
| Activation by Timed inflation | •••••• |

The amount of flashes of the green LED indicates the reason of the previous automatic inflation. The reason of the last is permanently stored and can be read out each time when pressing the self-test button. The information is cleared when inserting a fresh actuator.

### *3.2.2 Red LED: Battery low*

The red LED indicates the battery status.

| | |
|---|---|
| Battery OK | • |
| Battery LOW | •• |

In the unlikely event of low battery, the sens07 head will be replaced free of charge during the first 5 year after purchasing.





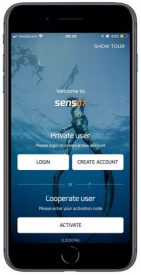
# 4 sens07-app

## 4.1 Introduction


The *sens07-app* allows to manage up to 3 profiles defining the way how sens07vest is operating. The profiles are transferred wireless using flickering light flashes from the smartphone screen which are received by the sens07inflator light sensor.

After profile transfer the sens07vest works completely autonomously. The sens07 app is not needed for operation.

## 4.2 Installation and registration




Available on the App Store

Get it on Google play

The sens07 app is free of charge, available for IOS and for Android devices and can be downloaded and installed from the App store and Google Play store.

A registration code for private or cooperate users is required before using the sens07app.

- Private user:
  Create an account by entering your name and Email. You will then receive an email with a password. Then log in.
- Corporate user:
  Enter the activation code you received. The activation code will customize the sens07app and consider the corporate identity (CI) definition.

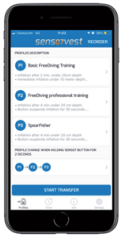
Entering password or activation code is only needed after installation or app-reset (see settings).

Note: The app doesn't require internet connection. Even a possible necessary re-login can be done offline.





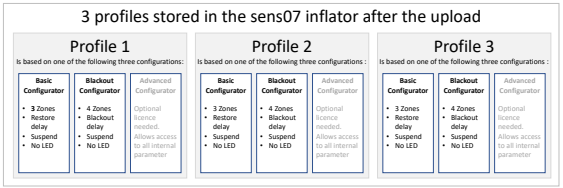
## 4.3 Tab 1: "Profiles"




The sens07 app can manage up to 3 different profiles defining the way the sen07vest should operate. This screen shows the 3 profiles including profile number (1 to 3), title and short description.

- The button "Reorder" on the top-right corner adds a "handler" to each profile, allowing to move the profile up or down.
- Clicking on the profile name goes to the profile configurator.
- The last segment shows the *profile switch mode* defining in what manner the profiles will change when holding the self-test button of the sens07 inflator.
- The button "start transfer" launches the process to transfer the needed profiles to the sens07 inflator (see chapter 4.3.5).

Profiles can be very different. Therefore, the sens07 app offers 2 configurators (or 3 with additional licence) to generate a profile.



### *4.3.1 Basic profile configurator*

This *Basic profile configurator* offers 3 depth zones:
**Safe zone**, **Diving zone** and **Inflation zone**.

A simple inflation countdown starts at the specified value when descending into the **Diving Zone**. Inflation is triggered when inflation countdown reaches zero.

This inflation countdown freezes when returning into the **Safe Zone**. Staying in the **Safe Zone** for the specified time resets the countdown to the initial start value.

Descending into the **Inflation zone** will immediately inflate.

Pressing the **Suspend Button** under water will freeze the countdown for the specified time (Inflation Delay). This feature can be activated by the slider "**Enable Suspend Button**".

Combat divers or Spearfisher can disable the **LED Signal** under water for this specific profile for better camouflage.

The last segment **Profile Info** offers to name the profile.

Save changes before returning to the main menu.

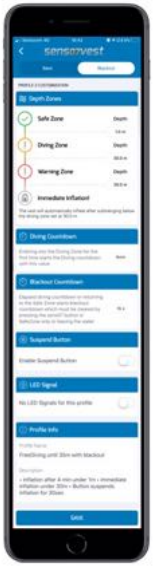




### *4.3.2 Blackout profile configurator*

The *Blackout profile configurator* is based on the requirement of manual confirmation of consciousness after the dive within a specified time.

The drowning algorithm is based on 4 depth zones:
**Safe zone**, **Diving zone**, **Warning zone** and **Inflation zone**:



The diving countdown starts at the specified value when descending into the **Diving Zone**. Inflation is triggered when the diving countdown reaches zero.

In a later system revision, the **Warning Zone** will offer additional features, but for the time being there is no difference between the Diving Zone and Warning Zone.

Blackout Countdown starts to count down when returning to **Safe Zone** after being at least 10 seconds in the Diving Zone. Upcoming inflation can only be stopped by pressing the button.

Pressing the **Suspend Button** under water will freeze the inflation countdown for the specified time (Inflation Delay). This feature can be activated by the slider "**Enable Suspend Button**".

Combat diver or Spearfisher can disable the **LED Signal** under water for this specific profile for better camouflage.

The last segment **Profile Info** offers to name the profile.

Save changes before returning to the main menu.

### *4.3.3 Advanced profile configurator*

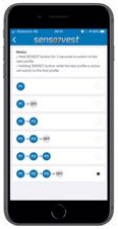
Depending on your sens07 app licence, a third tab “Advanced” is shown offering more detailed profile configuration.

The description of the advanced profile configurator is available in a separate manual.





### *4.3.4 Profile switcher*

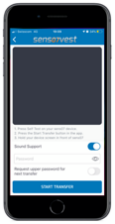


Clicking on this segment offers the choice of different profile switching plans which will be applied when holding the sens07inflator button for 2 seconds.

Some of them include the manual mode (off) to deactivate automatic inflation. The manual handle will always inflate the sen07vest.

Note: Manual mode is only needed for special legal requirements. We strongly recommend to stay always in automatic mode (don’t even include the OFF feature into the profile switching plan). Power consumption is not reduced in manual mode.

### *4.3.5 Start transfer*



Tapping on the *Start Transfer* button offers the following options:

- **Sound support** indicates the start and end of a transfer process with an acoustic signal.
- The transferred profile can be protected by using a **password**.
  Enable password protection:
  Enable the password switch and enter a password. This setting will be transferred to the sens07 inflator.
  The next transfers will also require the same password.
  A wrong or missing password on the next transfers will ignore the transfer and indicate the rejected transfer by a red blinking LED.
  Disabling password protection:
  Deactivating password protection is done by sending the valid password but disabling the password switch.





Transferring the profiles to the sens07 inflator

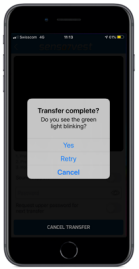
1. Press the sens07 button on the inflator and click on “Start transfer” on the app. Hold the phone screen against the front of the sens07 inflator (the phone must touch the inflator).
2. Wait 10 sec. (or listen to the sound support if activated).
3. A successful transfer is indicated by the blinking green LED.

| Transfer successful | ● ● ● ● ● ● ● ● ● ● (10 x) |
|---|---|

4. Confirm seeing the green LEDs by clicking “Yes” on the app. Click on “Retry” in case of no blinking LED signal which will re-launches optical data transfer. Don’t forget to press the self-test button on the sens07 inflator again.

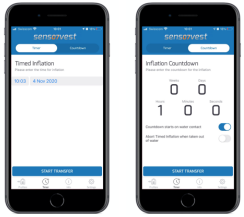
Ensuring identical profile data in the app and sens07 inflator

The sens07 app can’t read out data from the inflator head. Therefore, it is important that you confirm a successful parameter transfer on the sens07 app. This ensures that the parameters stored on the app and stored on the sens07 inflator are identical.




Any parameter change on the sens07 app will mark the profile with the warning text “Profile changed since last transfer”, informing you that the profile parameters on the app and on the sens07 inflator may not identical anymore. This warning text will be cleared on the next successful data transfer.

## 4.4 Tab 2: "Timer" (optional licence required)



The second tab offers timed inflation or inflation countdown, independent of the sens07 sensors.

**Timed inflation** can be programmed up to 4 months in advance by selecting date and time..

**Inflation Countdown** allows to specify the number of weeks, days, hours, minutes and seconds until inflation. There are 2 sliders for additional options:

- The countdown starts just after the optical data transfer or is delayed until the first water contact.
- Countdown aborts when sens07 is taken out of the water.

Note: Timed inflation can be stopped by holding the button for 3 seconds.

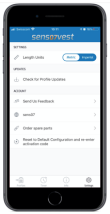




## 4.5 Tab 3: "Info"

This tab shows basically this manual.

## 4.6 Tab 4: "Settings"

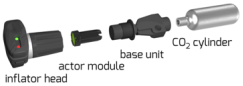


Offers the following features:

- Change depth units between metrics and imperial.
- Check for profile updates. You can download customized profiles based on your login. Contact ProVitaTec for more information.
- Send any kind of feedback to ProVitaTec.
- Go to the web page for more information.
- Go to the web page to order spare parts.
- Resets the sens07 profiles and returns to the login-screen. A new login is required.

# 5 Unpacking & recommended first steps

We recommend to read the manual (available on the WEB, on the sens07 app and on paper) and test the features on land. It is not required to put the sens07vest on and test the features while diving.




Just unscrew the inflator head and emerge it without actuator module into a big bucket of water or bath. 20 to 30cm water depth is enough to understand and test the most important features.

## 5.1 First step: Register the app and test data transfer

Download the sens07 app and follow the registration process. After having a first glimpse to the manual, we recommend to test the optical data transfer. Don't worry about the actual configuration. The transfer test doesn't require meaningful configuration data.

Read section 4 (sens07-app) and follow the 5 steps below:

1. Click on *Start Transfer* on the sens07 app (profile menu).
2. Press the button on the inflator head.
3. Put the inflator head in front of the smartphone so that the front of the inflator head touches the display.
4. Wait until the display stops flickering which is also indicated by a beep (if enabled).
5. Check for the blinking green LED indicating successful transfer.





Please check the following points in case transfer failure:

- The inflator head must touch the black screen during the full data transfer sequence (flickering screen).
- Remove any display protection (scratch protection).
- Protect the inflator head and smartphone from direct sun light.
- Keep away from any conventional neon light or LED light.
- The inflator head waits about 20 seconds for the data transfer after pressing the button. Any data after that will be ignored.

## 5.2 Seconds step: Profile switching

The sens07 app is transferring 3 profiles (depending on your configuration). It is important to understand which profile is active and how to switch between them. Read the corresponding chapter and switch between the 3 profiles (including manual mode OFF).
Note: you must enable profile switch on the sens07 app in order to switch profiles on the inflator head.

## 5.3 Third step: Test depth sensor

Edit the first profile and set the diving zone to 20cm and the inflation zone to 30cm. Take care that you set the time to 5 minutes or more, because we don't want to be interfered by an inflation trigger. Transfer and select this profile on the inflator head.

The inflator head starts to blink when emerged under water. The red LED means that the sens07 head can't detect a functional actuator module. However, the inflator head will continue to work as normal, but using the red instead of the green LED.

The LED will blink double as soon as you emerge the sens07 head below 20cm, indication the diving zone (zone 2). The inflator head will trigger inflation when reaching 30cm depth, indicated by a blinking red & green light. After that the inflator head is waiting (indicated by short red light every 10 sec) until it gets out of water.

# 6 Checks - before and after the dive

The following points must be checked before each dive:

## 6.1 Verify the $CO_2$ cylinder

Unscrew the $CO_2$ cylinder and verify that there is no visible piercing hole (see upper $CO_2$ cylinder in the picture).
After checking make sure that the O-Ring in the base unit is still on its position.
Screw the $CO_2$ cylinder firmly onto the base unit. The sens07vest uses a standard $CO_2$ cylinder with a 1/2-inch thread.

## 6.2 Check sens07vest components

The sens07vest consists of different mechanical components which needs to be checked before starting a dive:

- *Bladder*: Verify the bladder for any hole or other kind of damage. It is recommended to inflate the bladder every 2 years to check it for holes.
- *Straps*: Verify if the straps are well sewed and the buckles are not damaged.
- *Rubber parts*: Check if the rubber parts are not broken or brittle.

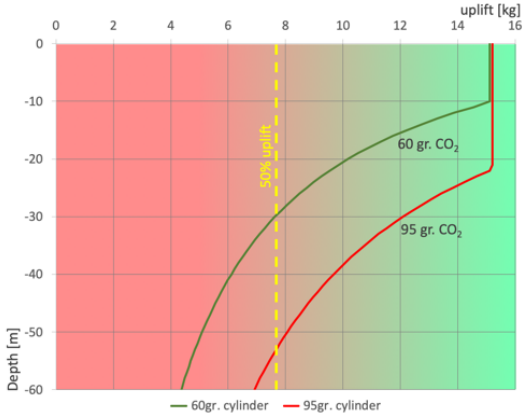




## 6.3 Choosing the right $CO_2$ cylinder & max. depth

The uplift of the sens07vest decreases with depth (see graphic) and the negative buoyancy of the diver increases due to the wetsuit compression and excessive weights.

Therefore, there is a point where sens07vest can't bring the diver back to the surface anymore.




We recommend a maximal depth of 30m when using a 60gr. $CO_2$ cylinder or a maximal depth of 50m when using a 95 gr. $CO_2$ cylinder in order to get at least 8 kg uplift performance (50%).

## 6.4 Perform Self-Test

Pressing the button while not in water will launch the self-test.

- The green LED confirms a fully operational electronic.
- The red LED indicates an internal problem such as actuator module not inserted or already used, battery low, sensor error or other internal errors, see chapter 3.2.
  In most cases, the problem is based on an already used or wrongly-placed actuator module that needs to be replaced.

Note: The $CO_2$ cylinder is excluded from the self-test!

The number of green blinks indicate the activated profile:

- 0 flash: Manual mode (off)
- 1 flash: Profile 1
- 2 flashes: Profile 2
- 3 flashes: Profile 3
- 4 flashes: Timed inflation (optional licence required)

Note: In case of a negative self-test (red LED), the sens07 inflator will still do it's best to function as usual. The operation and principle of operation of the device does not change in case of a negative self-test. However, there is a high chance of failure and you must not use sens07vest.





## 6.5 Location of the manual handle

Make sure that the manual cord is accessible from outside and that the cord runs directly without any diversion to the sens07 base.

The cord of the red handle can be fixed with a Velcro tag near to the zipper so that the handle is always in the same position.

It is very important that you can feel & find the handle immediately because you don't have time to search for it in case of emergency!

## 6.6 Check for leakage

The housing is very robust and tested for leakage during production at 80 meters under water. Nevertheless, the housing may leak due to strong shocks. To detect a leak, the sens07 inflator is equipped with 2 chemical water indicators. These 2 indicators are placed in the gaps of the lower side and turn red at very low humidity.

The sens07 inflator must be replaced immediately if such a red discoloration is visible.

### 6.7 Put on the sens07vest correctly

Take care that the 2 metal buckles on the side are adjusted correctly. Don't pull them too tight so that you can breathe freely.

*Never forget to attach the crotch strap! The uplift of the bladder in case of inflation is about 15 kg.*
*Without the crotch strap the sens07vest may lift over your head, which may be very dangerous!*

### 6.8 Rinse sens07vest after diving

The sens07vest needs similar maintenance like most scuba dive equipment. Please rinse the sens07vest in freshwater. Make sure that the water gets into the vest by opening the lower right part of the zipper. It is important that the sens07 inflator and $CO_2$ cylinders are cleaned from saltwater to avoid corrosion.

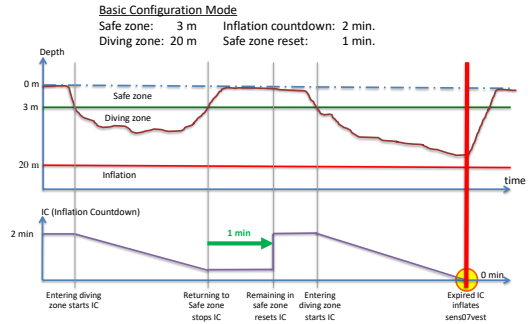




## 7 Configuration examples

The following examples illustrate the configuration options.

### 7.1 Inflation due to exceeded diving time

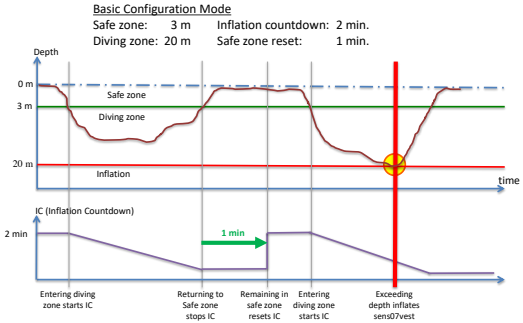



Descending into the *diving zone* (3m) launches the inflation countdown starting from 2 minutes. The diver returns to the water surface within the 2 minutes and stays in the safe zone for 1 minute, which resets the inflator countdown, ready for the next dive.

The second dive exceeds the maximal time of 2 minutes which triggers inflation and brings the diver back to the water surface.

Note: Staying less than 1 minute in the safe zone will not reset the inflation countdown and just continue counting down when returning to the diving zone.

## 7.2 Inflation due to exceeded diving depth



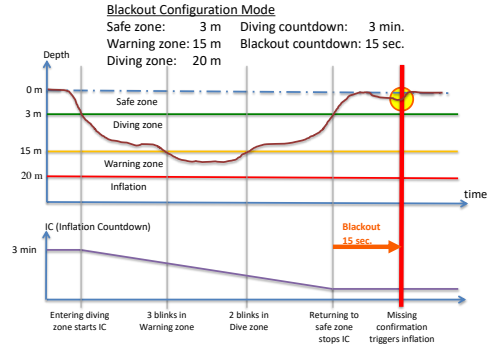

Descending into the diving zone launches the inflation countdown starting from 2 minutes. The diver returns to the water surface within the 2 minutes and stays in the safe zone for 1 minute, which resets the inflator countdown, ready for the next dive.

During the second the maximum depth is exceeded which triggers inflation and brings the diver back to the water surface.





## 7.3 Blackout protection




Descending into the diving zone launches the inflation countdown (3 minutes).

The diving and warning zone do not yet offer any functional differences, except that they can be recognized by different flashing sequences on the sens07 head.

The Blackout countdown is launched as soon as the diver is back in the safe zone and triggers inflation in case the self-test button is not pressed in time (15 seconds).

There is no other option to stop upcoming inflation except getting out of the water in time. Please note that the water sensor needs some seconds to detect missing water.

After pressing the button (confirming no blackout) the sens07vest is ready for the next dive.

# 8 Additional explanations &trouble shooting

## 8.1 Unsuccessful optical data transfer

A successful optical data transfer is indicated by a blinking green light after the transfer. The red light or no light at all indicates an unsuccessful optical data transfer, which may have the following causes:

- Display is too far away from the inflator head.
  **We recommend to touch the sensor head with the phone display to protect the light receiver of the sensor head as good as possible from inferences.**
- The optical data transfer is robust against ambient light (for example bright sunlight). However, neon tubes and LED lighting can emit pulsating light that is invisible to the human eye but can interfere with optical data transmission.
- Additional display protection or waterproof sleeves for your mobile phone may interfere with the optical data transfer. In case of problems, please try to transfer the data without the protective cover.
- The sens07 app will set the display brightness to 100% before data transfer. Please check that, as the sens07 app cannot control the brightness on all Android phones.
- Check if password is disabled.

## 8.2 No blinking when pressing the self-test button

This may happen under the following two conditions:

1. The sens07vest is switched off, see 4.3.4 Profile switcher.
2. The housing is leaking and the electronics are damaged, see chapter 8.2 on page 37.
3. The batteries are totally exhausted due to another malfunction.





## 8.3 Unsuccessful self-test

An unsuccessful self-test will not stop the sens07 inflator to perform its normal operation as far as technically possible. All features (like LED signals, drowning risk calculation, optical data transfer, blackout protection and even firing the activator module for inflation) are still enabled and performed as far as possible.

An unsuccessful self-test has the following 2 effects:

1. The *water zone indicator* (see 3.1.1) and self-test are using the red LED instead of the green LED
2. A malfunction at any stage must be expected.

## 8.4 Testing the sens07 inflator without the vest

The configuration of the *inflator head* can be tested without the vest, $CO_2$ cylinder, base unit or even actuator module. Just immerse the *inflator head* into water and observe the LED for "*water zone indicator"* and "*inflation occurred*" signal in order to better understand the effect of your personal configuration.

## 8.5 Accuracy of the pressure sensor (depth)

The installed pressure sensor is very accurate. However, you may notice a difference when you compare the depth with your dive computer. This difference may have the following causes:

1. The dive computer may be up to 1 meter away from the sens07 inflator head (sensor) in case you stretch your arms.
2. The electronics need about 2 seconds to charge the ignition energy. Therefore, the trigger depth may already be exceeded.
3. The depth calculation is based on fresh water. Saltwater is about 3% heavier, which can lead to slight deviations.

# 9 Air traveling with $CO_2$ cylinders

Since January 1st 2019 you can take your inflatable lifejacket systems (sens07vest) on board the aircraft. Each passenger may carry one sens07vest and no more than two spare $CO_2$ cartridges in their luggage. The size limits for $CO_2$ cartridges in life jackets that apply until the end of 2018 have been lifted, so even the big 95gr $CO_2$ cartridges should be accepted. These changes were made in the "Dangerous Goods Panel" of ICAO, a sub-organization of the UNO, and incorporated into the ICAO T.I. 2019-2020 released regulations so they are valid worldwide. They were also included in the dangerous goods regulations of the IATA (DGR).

**Approval required**
According to ICAO T.I. and IATA-DGR the regulations require the approval of the airline to carry lifejackets (sens07vests).

In order to avoid as many stumbling points as possible in advance, you should contact the airline when booking the flight and point out the request to carry life jacket so this permission can be noted directly on the ticket so usually all discussions are dealt with before arriving at the airport. A reference to the entry on the ticket is sufficient.

Our advice is that you always declare your inflatable lifejacket and $CO_2$ cartridges, hand in your luggage and not carry them as carry-on baggage to avoid additional questions and delays. Place the additional replacement cartridges directly alongside the lifejacket so that they can be seen together if the bag is checked.

**No obligation to transport**
The airlines can refuse to take them, because there is no obligation to transport. Ultimately, it is up to each airline and finally to each captain to decide whether he/she allows the passenger, as is their right. This is very unlikely for airlines, but may happen when flying very small aircrafts (island hoppers).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