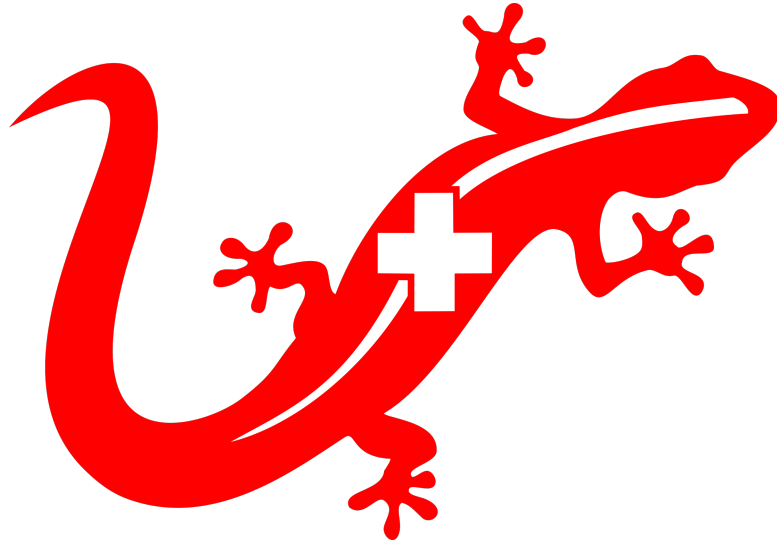




Salamander mCCR Rebreather

User Manual

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1 SAFETY MEASURES AND WARNINGS



Scuba diving with a rebreather can cause serious bodily injury or even death to the user. It is therefore essential to follow all safety and maintenance measures described in this User Manual.

The risks associated with using a rebreather can be reduced, but never completely eliminated.

Never use the Salamander mCCR Rebreather, either in or out of the water, without first undergoing a **complete and detailed training** by a **qualified instructor** possessing the knowledge and certification necessary to convey the specific instructions for its use.

Consult a qualified physician to verify that you have **no medical contraindications** to using a rebreather or to scuba dive.

These instructions for use are **only a guide to the assembly, the use, the maintenance, and the basic servicing of the Salamander mCCR Rebreather**. They may be updated from time to time to take into account the evolutions of the equipment. Reading them **does not replace** a complete training recognized by Air Research Sarl with a qualified instructor.

Your training, your knowledge and your preparation are the best means to avoid accidents.

All components of the rebreather must be in working order, carefully and properly assembled, maintained and tested to reduce the risk of failure.

The **maximum depth of use** of the Salamander mCCR Rebreather is **-6 meters (-20 feet)** with pure oxygen.

Before each dive:

- always make sure that your rebreather is properly maintained and that its components are in working order;
- assemble your rebreather correctly and completely in accordance with the User Manual;
- make sure that your tank is in working order and contains the correct gas or gas mixture;
- perform the necessary tests to ensure that your rebreather is working properly;
- perform the final checks recommended by Air Research Sarl before entering the water.

As a diver, **YOU are ultimately responsible** for your actions and safety when using the Salamander mCCR Rebreather or any other rebreather.

2 TECHNICAL SPECIFICATIONS

2.1 General Description

The Salamander mCCR Rebreather is a closed-circuit ventral rebreather designed to be used with pure oxygen. It consists of the following components (**Figure 1.**, see Section 4.4 for a detailed list):

1. A Cordura bag with four bindings that can be adapted and attached to a harness, two straps with four attachment points to attach a tank with an oxygen regulator, a back pocket and a weight pocket located under the bag, and a tightening cord,
2. Two breathing hoses and a dive surface valve (DSV) incorporating a lever to enter or exit the closed circuit, a mouthpiece and a head strap,
3. One canister (scrubber) connected to the head of the rebreather, with two grids, a spring to compress the soda lime and a strainer covering the canister,
4. An auto-diluent valve (ADV) for the injection of oxygen, with automatic and manual injection,
5. A silicone counterlung with a strap and an absorbent cloth,
6. An oxygen tank with a regulator (first stage) and a pressure gauge.

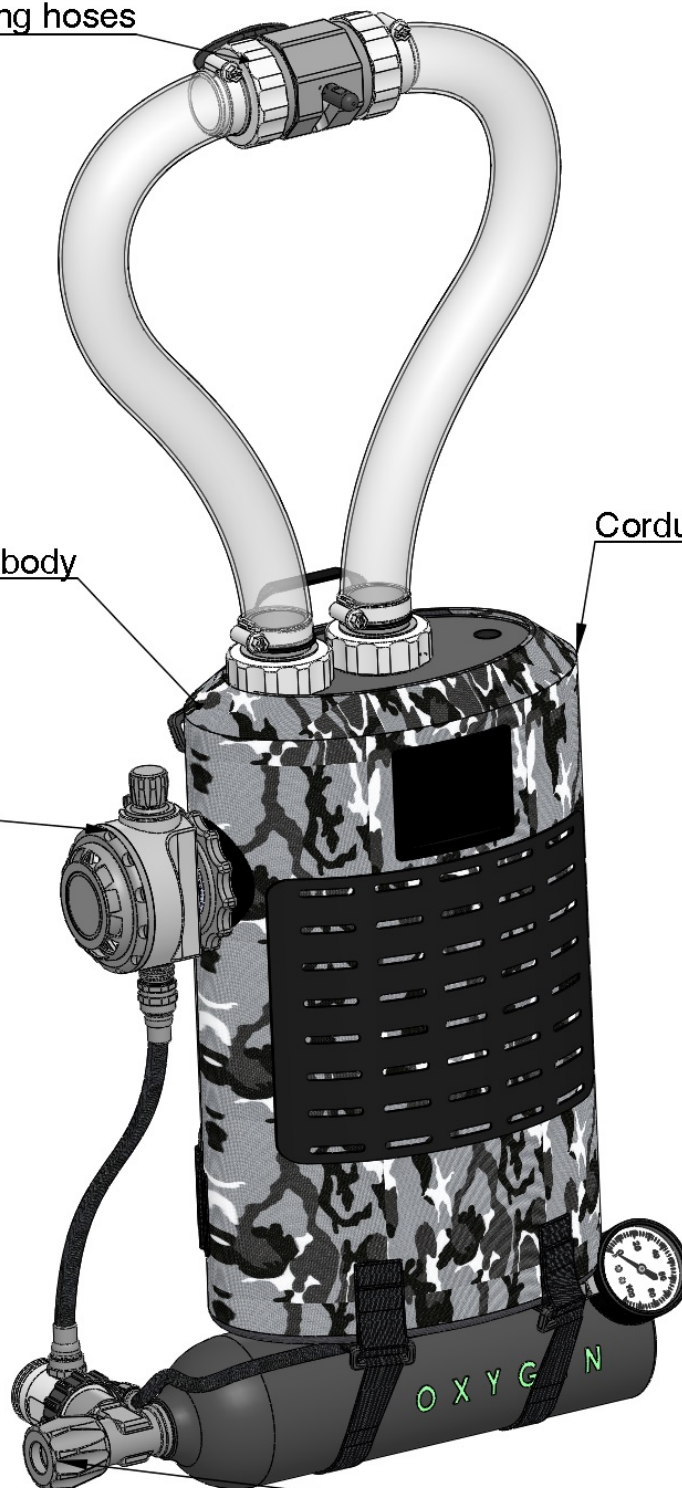
The Salamander mCCR Rebreather is also delivered with a transport and protection box, as well as maintenance equipment (Section 4.4).

DSV mouthpiece
and breathing hoses

Rebreather body

Cordura bag

ADV



Oxygen tank and regulator

1. Salamander mCCR Rebreather

2.2 Technical Data

- Dimensions
 - Thickness: 15 cm / 5.9 inches
 - Height: 45 cm / 17.7 inches
 - Width: 30 cm / 11.8 inches
- Ready to dive weight with 0.8 liter (27 oz) tank and 1200 grams (2.6 lb) of soda lime: 5.8 kg (12.8 lb)
- Counterlung volume: 6.4 liters (216 oz)
- Maximum depth of use with pure oxygen: -6 meters (-20 feet).
- Duration of soda lime scrubber: the performance and limits of the Salamander mCCR scrubber depend on the configuration in which it is used, as well as the type of soda lime used.

Test parameters:

- Intersorb 812 type soda lime, depth -6m (-20 ft), water temperature 4°C (39°F).
- WOB: respiratory work
- RVM: respiratory volume per minute

CO ₂ (liters/min)	RVM (liters/min)	Duration (min, until 0,5% CO ₂)
1.6	40	54
0.9	22.5	126

RVM (liters/min)	WOB (joules/liters, position 90°)
15	0.61
22.5	0.73
40	1.12
62.5	1.70
75	2.19

- Operating temperature: from +4°C (39°F) to +32°C (90°F)
- Standard storage temperature: from +5°C (40°F) to +25°C (80°F)

2.3 Characteristics of the Components

2.3.1 Bag

The Salamander mCCR Rebreather bag is an abrasion-resistant Cordura outer shell measuring 36 x 22 x 15 cm (14 x 9 x 6 inches). It features a tank attachment system consisting of two velcro straps with four attachment points for optimal fixation, as well as a tightening cord to maintain the rebreather's head. The zip fastener on the left side of the rebreather allows an easy insertion of the counterlung in the cordura bag and eases the verification of the sealing. The handle at the top of the bag makes it easy to handle and carry the rebreather. The Molle system on the front of the bag allows for the attachment of lightweight accessories (**Figure 2a.**).



2a. Cordura bag – front view

The bag also has a back pocket and a weight pocket on the bottom, as well as four attachments on the back that allow it to be easily attached to a harness, which ensures that the rebreather is ideally positioned against the user's chest (**Figure 2b.**).

During transport, it is advised to store the hoses, mouthpiece, ADV, first stage regulator and pressure gauge in the bag for maximum protection.



2b. Cordura bag – back view

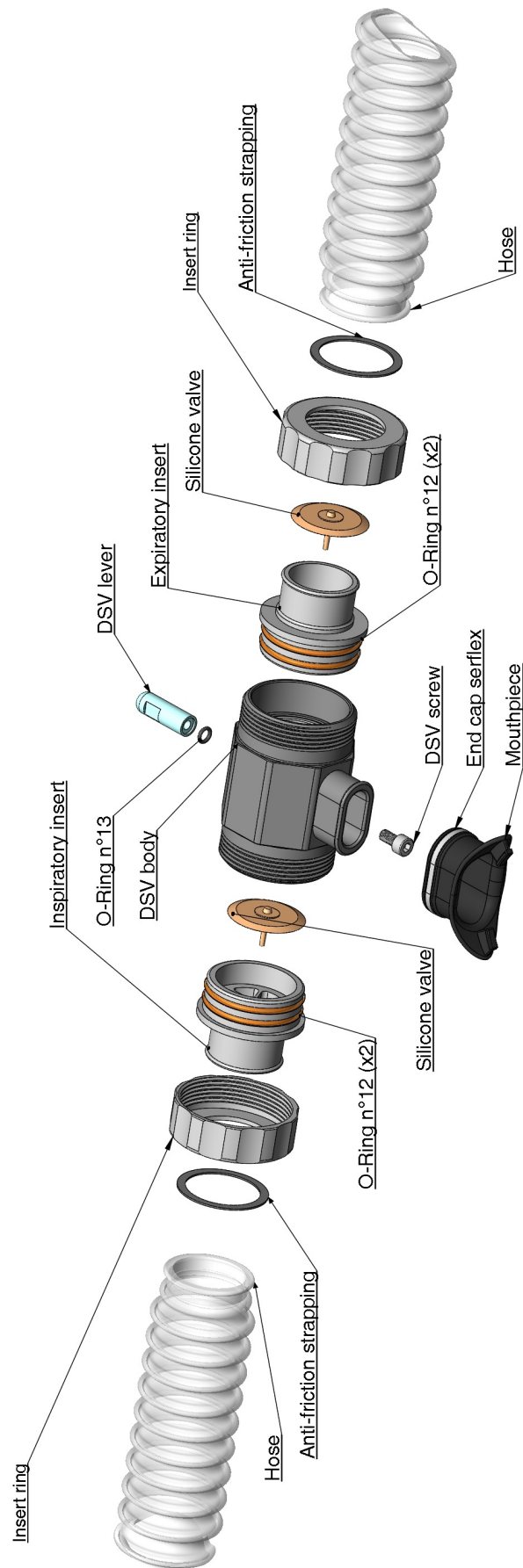
2.3.2 Breathing Hoses and Mouthpiece with One-Way Valves

The breathing hoses are 32 cm (12.6 inches) long ethylene propylene diene monomer rubber or “EPDM”. The hoses have threaded inserts at the ends to connect to the counterlung on one side and the breathing hose on the other (**Figure 3a.**). The clamps used are specially selected so as to not damage the breathing hoses. Each insert is equipped with a double O-Ring to ensure a tight seal (**Figure 3b.**).



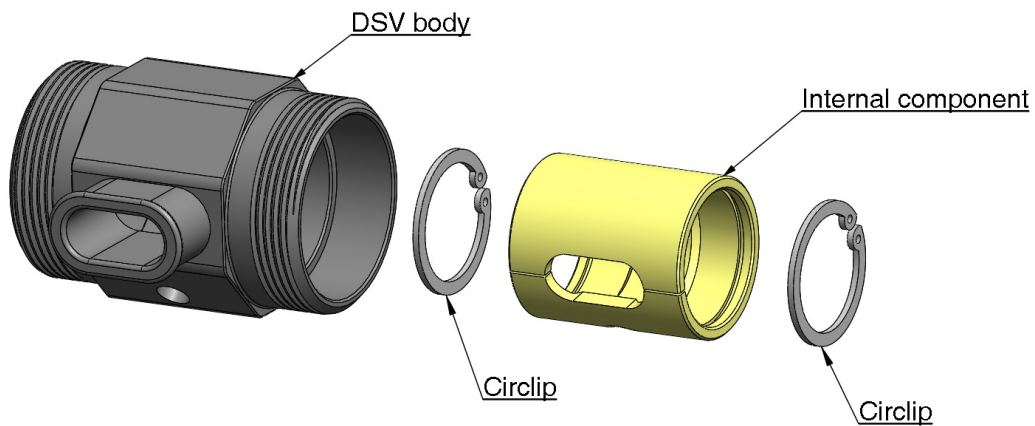
3a. Breathing hoses and DSV mouthpiece

The DSV mouthpiece consists of a main body with a lever and a mouthpiece, to which inspiratory and expiratory inserts are attached with rings and anti-friction strappings. Two silicone valves allow the unidirectional flow of air, and the O-rings (n° 12) attached to the inserts ensure the airtightness of the breathing loop (**Figure 3b.**).



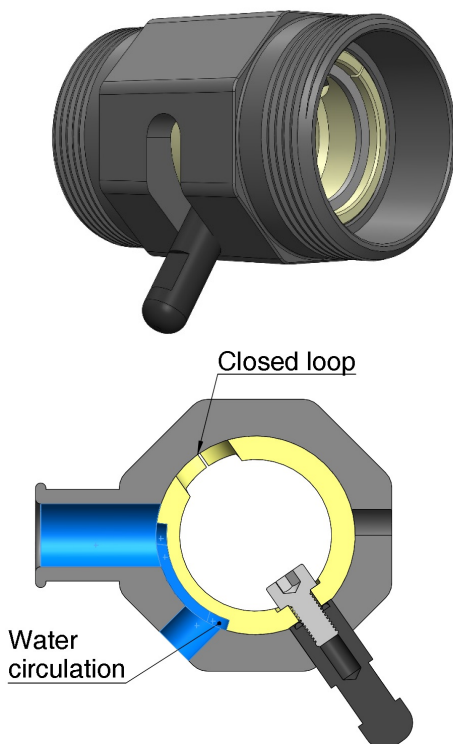
3b. DSV mouthpiece body and inserts

The body of the DSV mouthpiece consists of a main element into which an internal component is inserted and secured with two circlips (**Figure 3c.**) It includes a lever to open the internal component for diving and close it on the surface to prevent water from entering the circuit (**Figure 3d.**). The DSV mouthpiece includes a friction seal between the outer surface and the inner space, allowing to avoid the use of O-rings, which would have to be replaced with time due to wear.

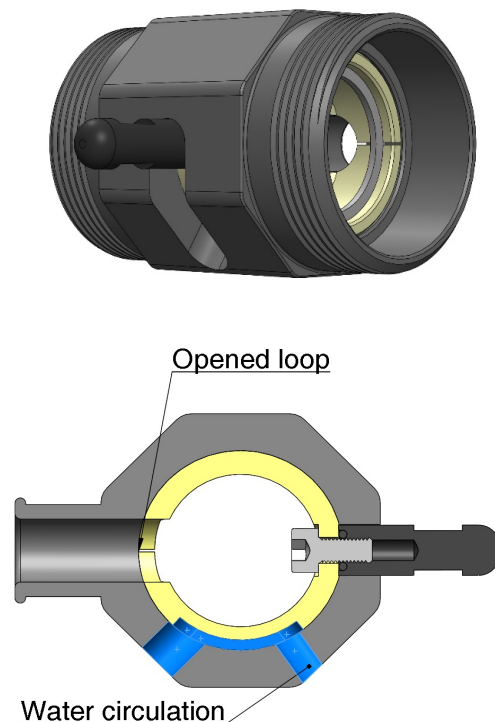


3c. DSV mouthpiece body

Closed DSV mouthpiece:



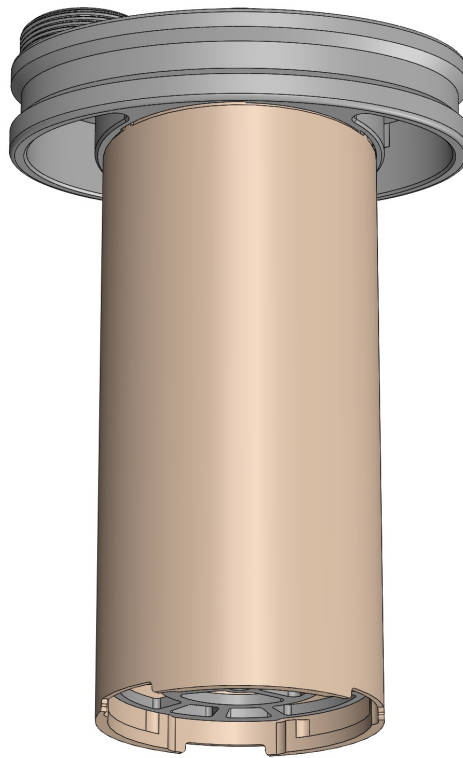
Opened DSV mouthpiece:



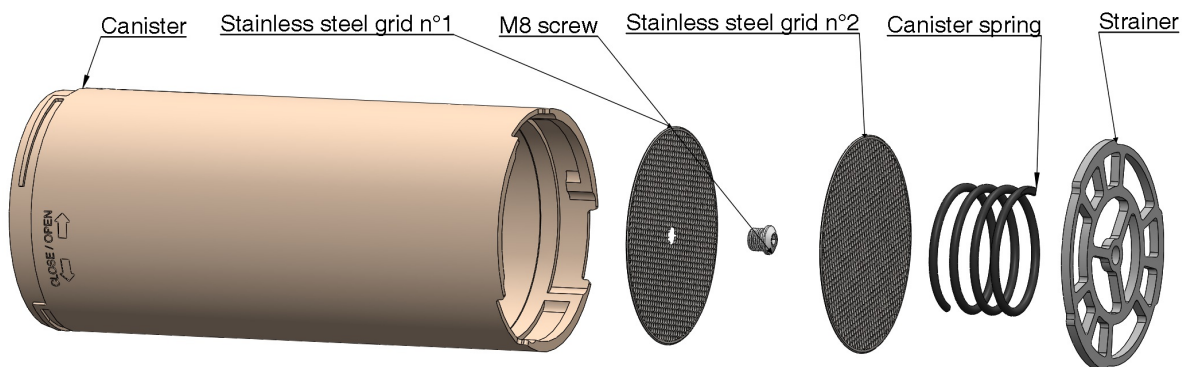
3d. DSV mouthpiece operation

2.3.3 Scrubber and Rebreather Head

The Salamander mCCR Rebreather has one central scrubber, attached to the head (**Figure 4a.**). The scrubber consists of a base canister, two grids, a spring to compress the soda lime and a strainer covering the canister (**Figure 4b.**).

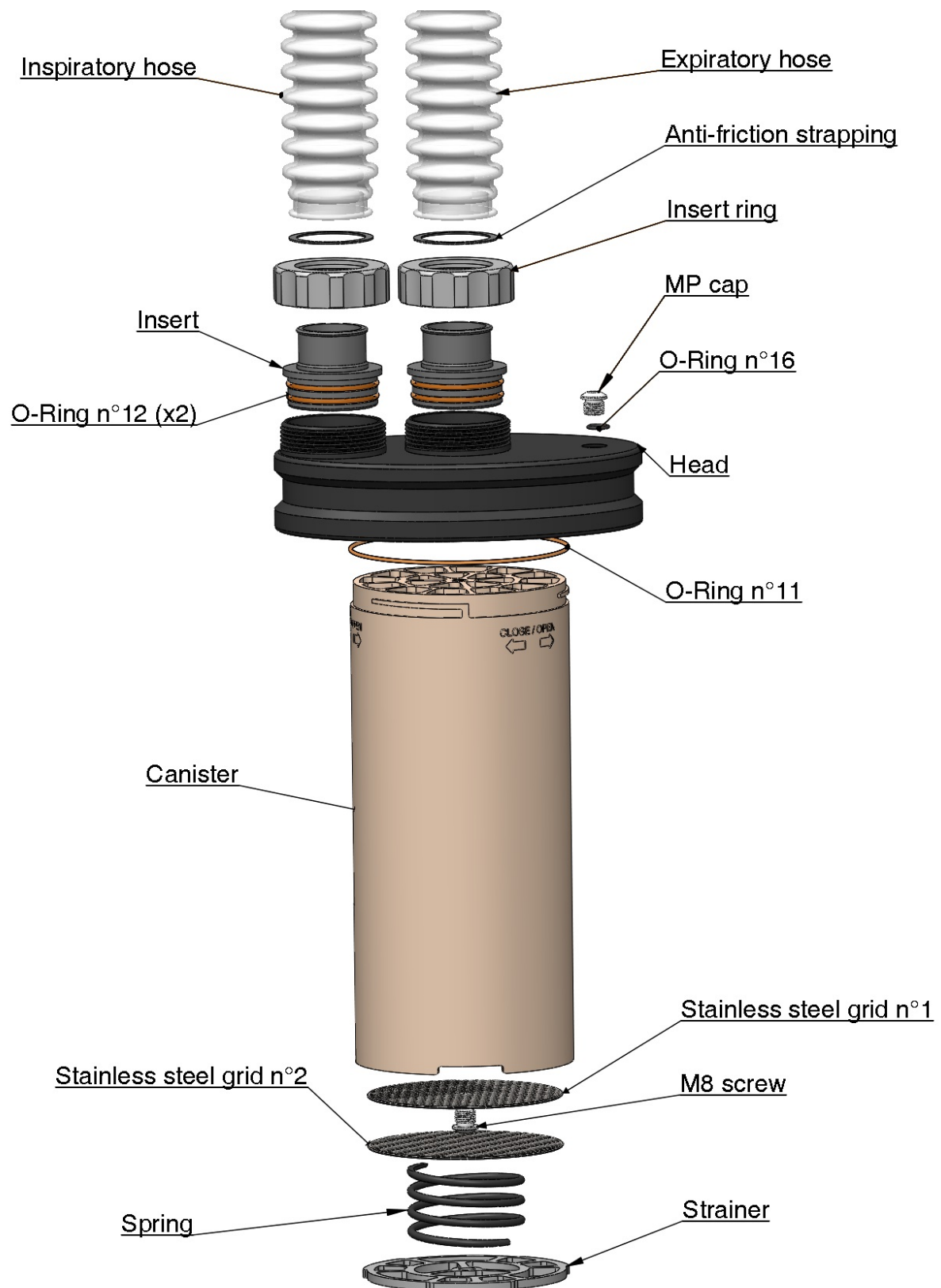


4a. Head mounted canister



4b. Components of the scrubber

The ends of the breathing hoses attach to the head with the inserts and the rings, once the canister is connected to the head (**Figure 4c.**).

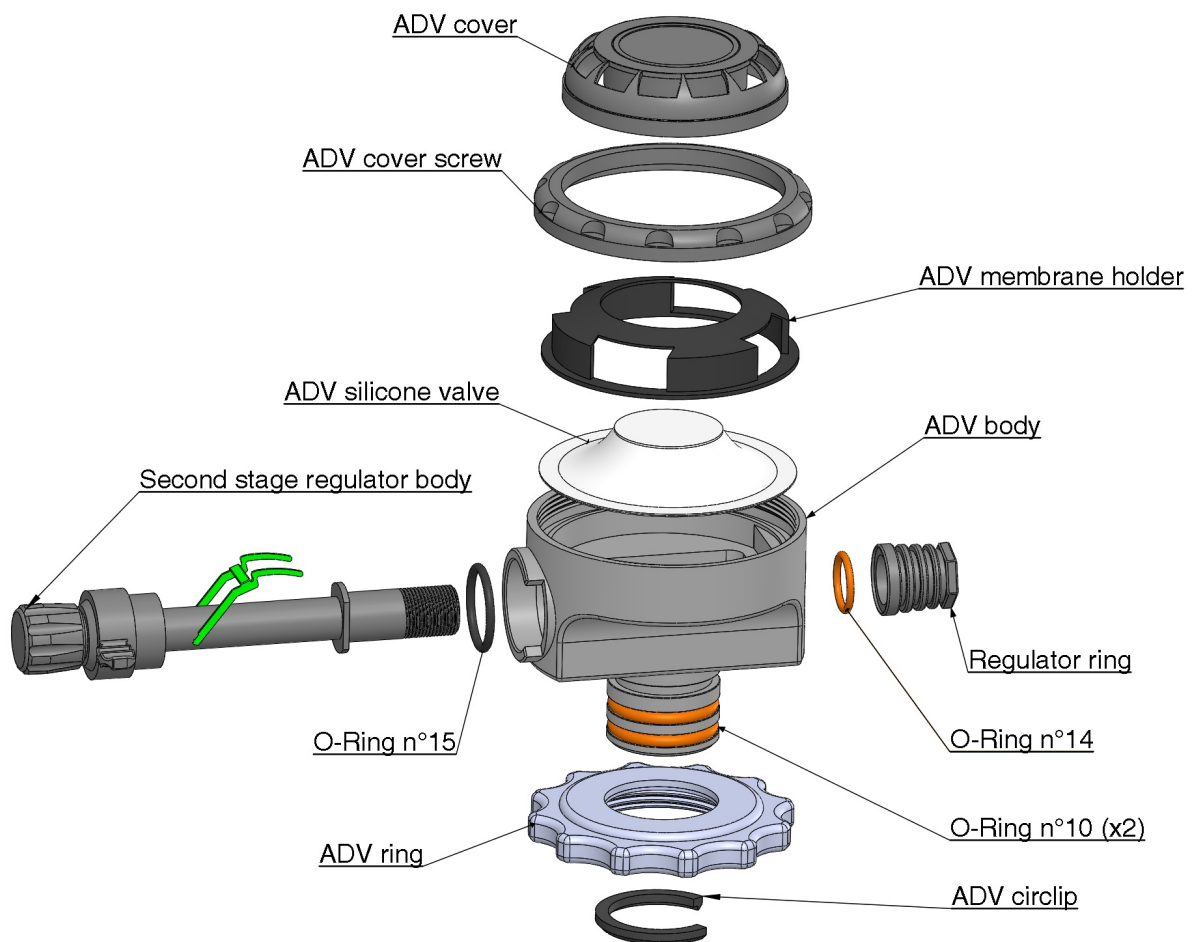


4c. Overview of the head, scrubber and breathing hoses

The canister must be filled with soda lime before using the unit. Soda lime such as Intersorb 812 or Sofnolime 797 is recommended. The total amount of soda lime required will vary slightly depending on the size of the granules and the filling method. For instructions on filling the canister, see Section 3.1.1.

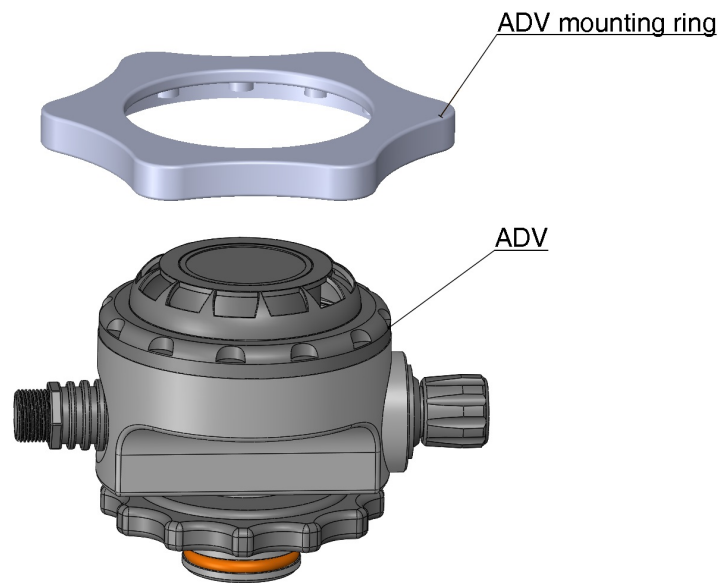
2.3.4 ADV

The ADV consists of a main body into which an automatic valve protected by a membrane holder and a cover are inserted. It also contains the second stage regulator body, fixed by a ring. O-rings (N^{os} 10, 14 and 15) ensure its tightness. The ADV is attached to the counterlung by a ring held in place with a circlip (**Figure 5a.**):



5a. ADV

The cover is screwed on using a specially designed mounting ring supplied with the rebreather (**Figure 5b.**):



5b. ADV cover

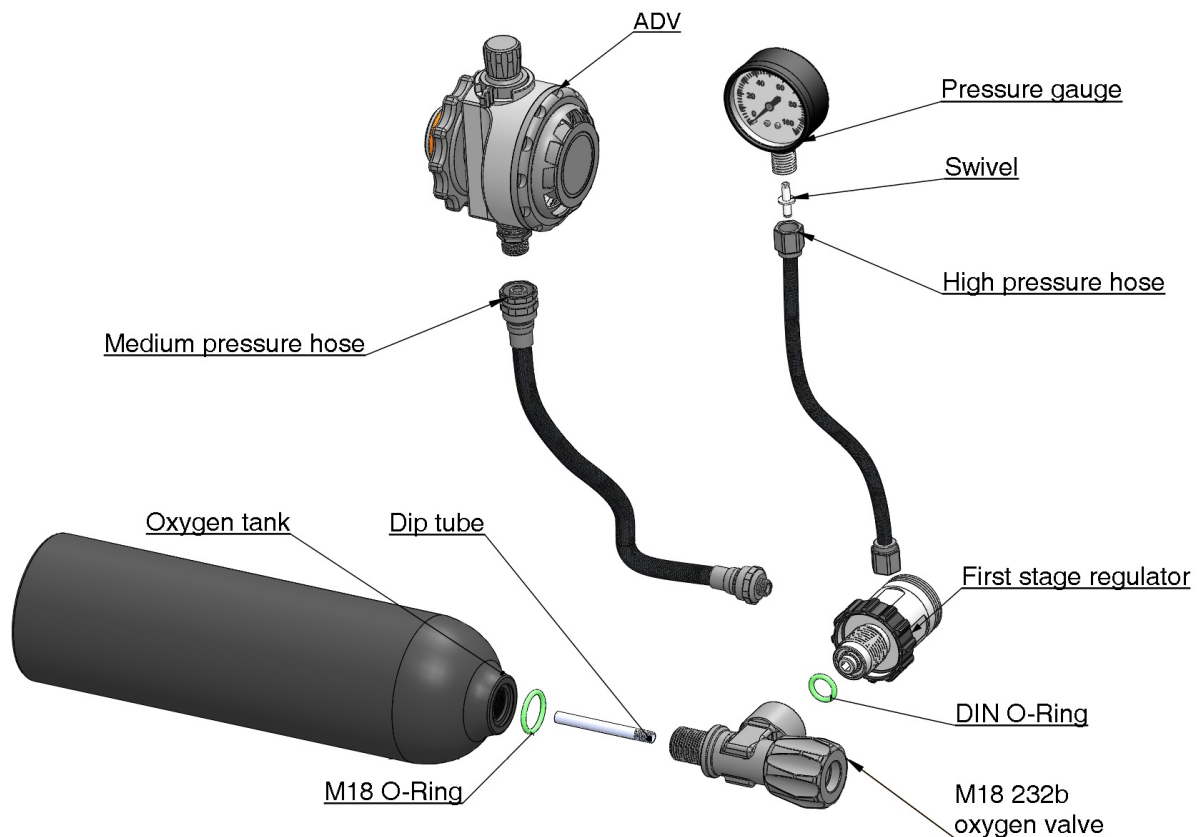
Once the rebreather is assembled, the ADV, which is attached to the side of the rebreather in an insert screwed to the inside of the counterlung (**Figures 8a. and 8b.**), is activated either automatically by a negative pressure system or manually by pressing directly on the cover. The sensitivity of the automatic activation of the valve can be adjusted with an adjustment knob.

2.3.5 Counterlung

The counterlung is made of food-grade silicone. It is specially adapted to be attached to the rebreather head, with the ADV on the side (**Figure 7.**). An absorbent cloth to be placed in the counterlung is also supplied with the rebreather, in order to capture the humidity generated during use by condensation inside the counterlung and by the fixation of CO₂ by soda lime. The position of the counterlung on the rebreather must be as close as possible to the user's lungs, in order to optimize the respiratory work.

2.3.6 Oxygen Tank, First Stage and Pressure Gauge

The tank supplied with the Salamander mCCR Rebreather is a 0.8 liter (27.1 oz) aluminum tank, including an M18 valve with a dip tube, a first stage regulator, a pressure gauge with swivel and two hoses (medium and high pressure). Sealing is provided by O-rings (M18 O-Ring and DIN O-Ring) (**Figure 6.**).



6. Oxygen tank, first stage and pressure gauge

The tank must be used with pure oxygen only and according to the applicable standards. A pressure test must be performed at least every two years.

The first stage regulator is an intermediate pressure regulator. Maintenance of the first stage regulator must be performed according to the manufacturer's recommendations.

3 OPERATING INSTRUCTIONS

3.1 Assembling the Salamander mCCR Rebreather

CAUTION: Most of the rebreather's components, that have a thread that can be screwed in during assembly, must be screwed in carefully; and, above all, without forcing or overtightening, so as not to damage the threads. These components are made of Delrin/POM and are bulk machined. The threads only serve to hold the elements together and not to create a seal, which is achieved by the silicone O-rings on the device.

Correct and complete assembly of the Salamander mCCR Rebreather is the first operation to be performed before using the unit. It is carried out according to the following steps:

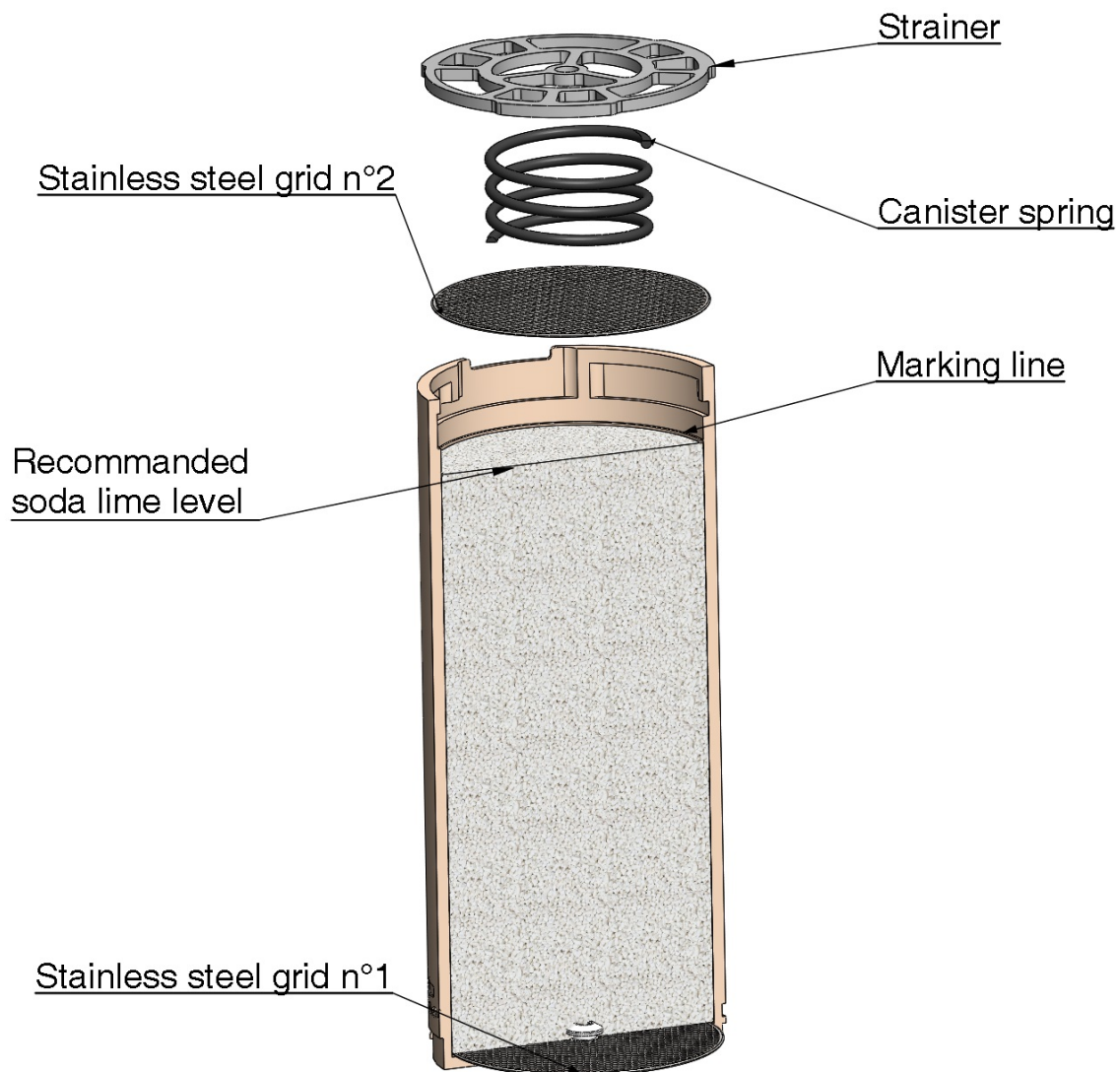
1. Filling and closing of the scrubber, connecting to the head,
2. Insertion of the counterlung with the absorbent cloth in the Cordura bag, and connection of the ADV,
3. Insertion of the head and the scrubber in the counterlung, and fastening of the counterlung to the head with the clamping strap,
4. Verification of the breathing loop with the DSV mouthpiece and connection to the head,
5. Attachment of the oxygen tank to the Cordura bag, verification and connection to the ADV,
6. Pre-dive checks and positive and negative pressure tests.

The pre-dive verifications (pre-dive tests) are summarized in a complete list provided in Section 6.1 of this manual (**Section 6.1 - Pre-dive Checklist**).

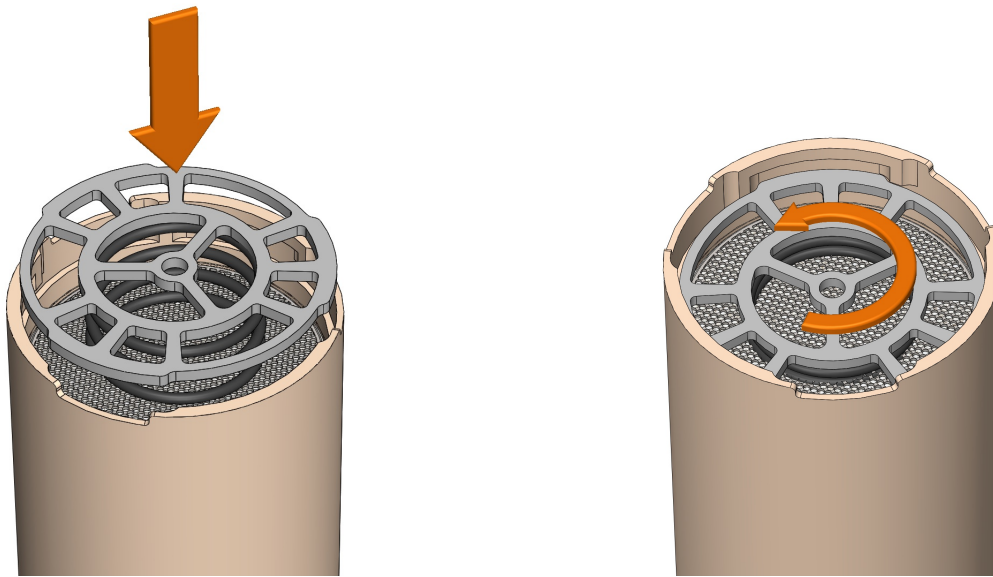
3.1.1 Filling, Closing and Fixing the Scrubber

It is recommended to use Sofnolime 797 type soda lime, granule size 1.0 to 2.5 mm (approximately 0.04 to 0.1 inches) or Intersorb 812. The scrubber must be filled in a dry, well-ventilated area. The following steps must be taken (**Figures 7a. and 7b.**):

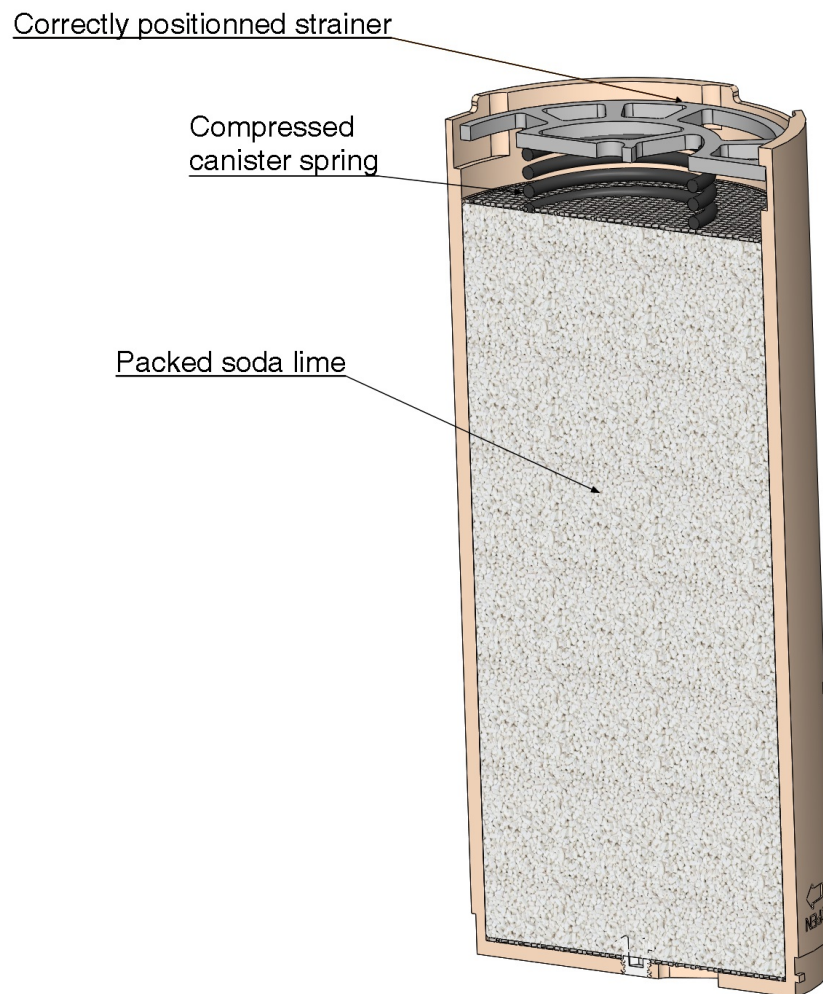
1. Detach the canister from the head;
2. Verify that the protective grid is correctly placed at the base of the canister;
3. Fill the canister with soda lime to its maximum;
4. Lightly tap the canister all around to pack the soda lime;
5. Add soda lime to the canister again and repeat step 4;
6. Repeat steps 4 and 5 until the soda lime level reaches the internal marking line of the canister (**Figure 7a.**);
7. Place the second grid on top of the canister, on the soda lime, and the spring above it, then attach the strainer on top, in two steps (**Figures 7b. and 7c.**);
8. Screw the canister to the head, anti-clockwise (**Figure 7d.**). Caution: Do not overtighten.



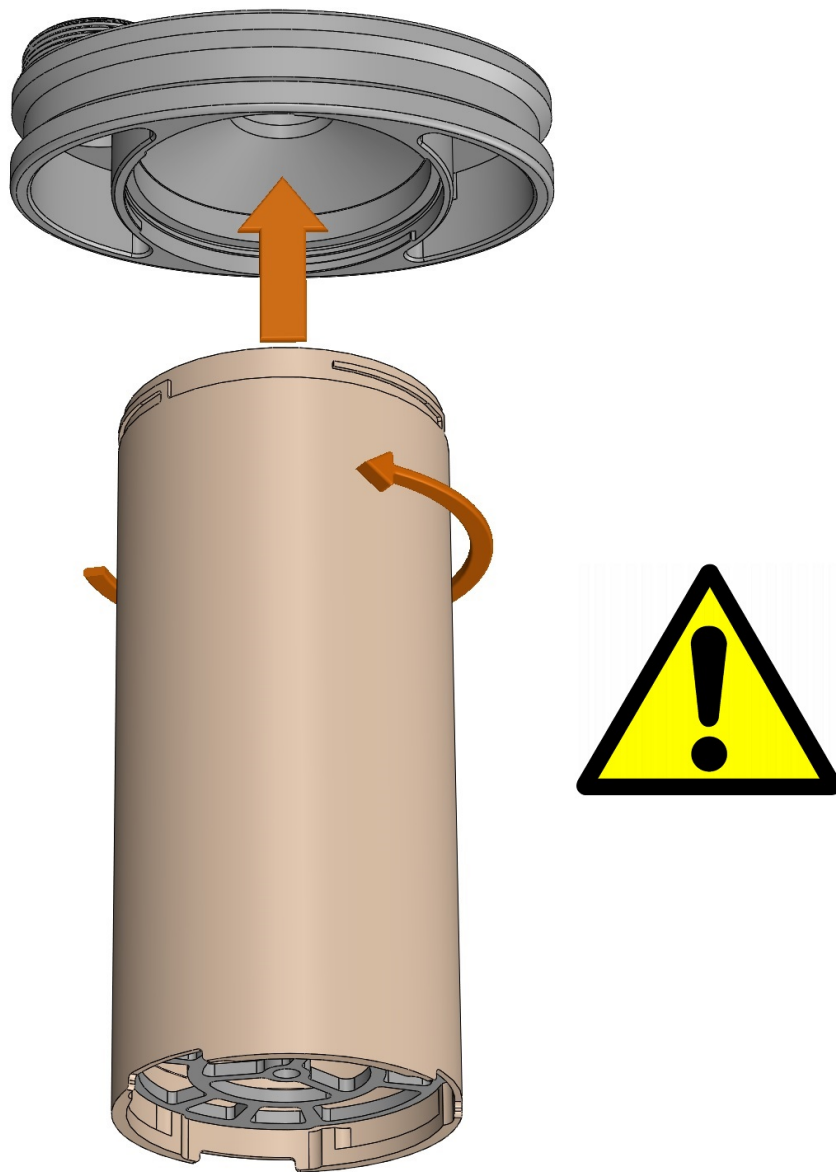
7a. Preparation and filling of the scrubber



7b. Attachment of the strainer



7c. Vertical section of the filled scrubber



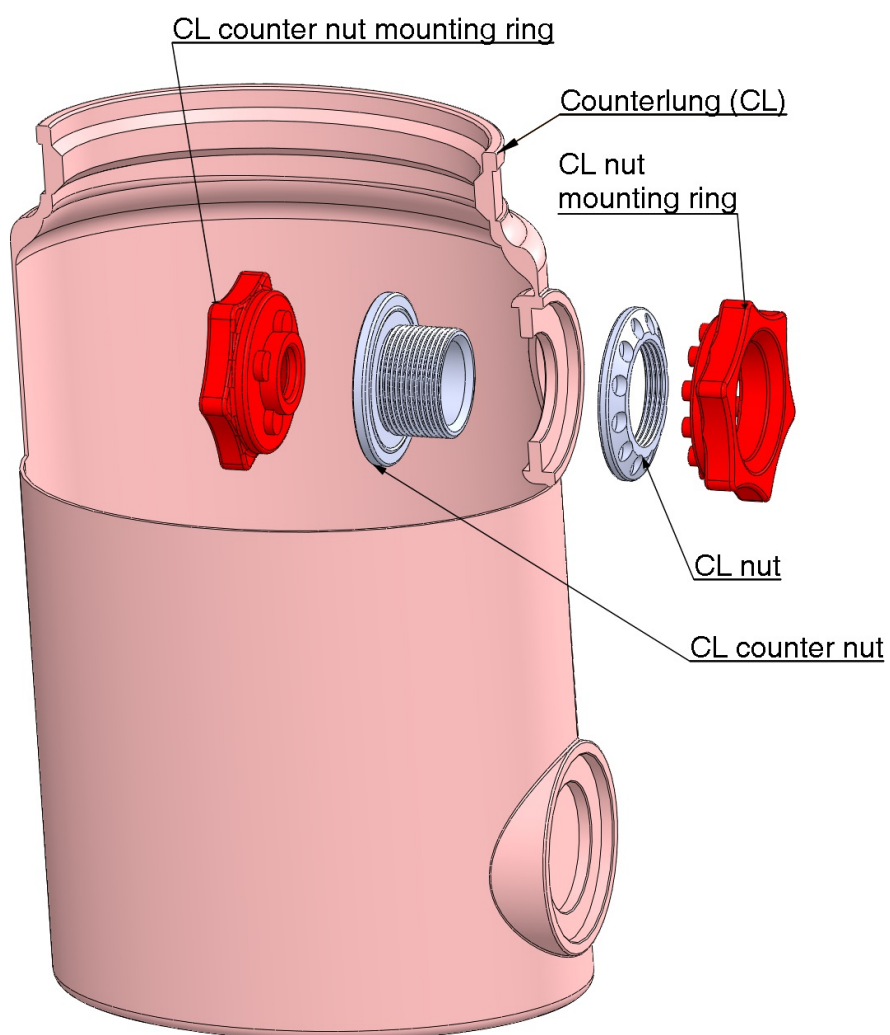
7d. Attachment of the canister onto the head

CAUTION: When fitting the canister to the head, screw the canister anti-clockwise onto the head without overtightening. Before each dive, check that the canister is securely screwed onto the head.

CAUTION: The use and handling of soda lime may present certain hazards. Instructions and precautions recommended by the soda lime manufacturer must be followed at all times.

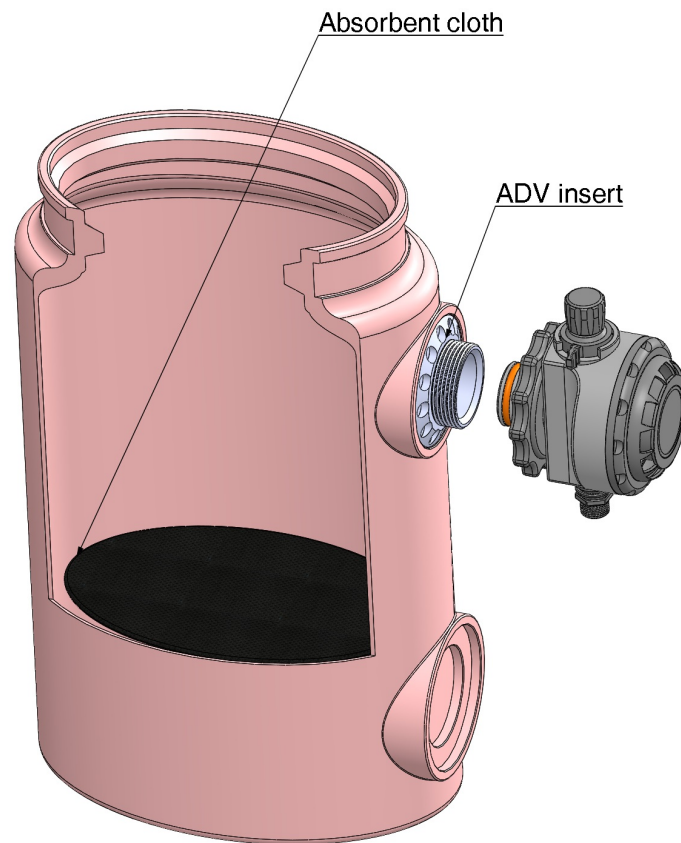
3.1.2 Insertion of the Counterlung and Connection to the ADV

Start by attaching the nut and counter nut of the counterlung, which will allow the ADV to be inserted (**Figure 8a.**):



8a. Installation of the nuts

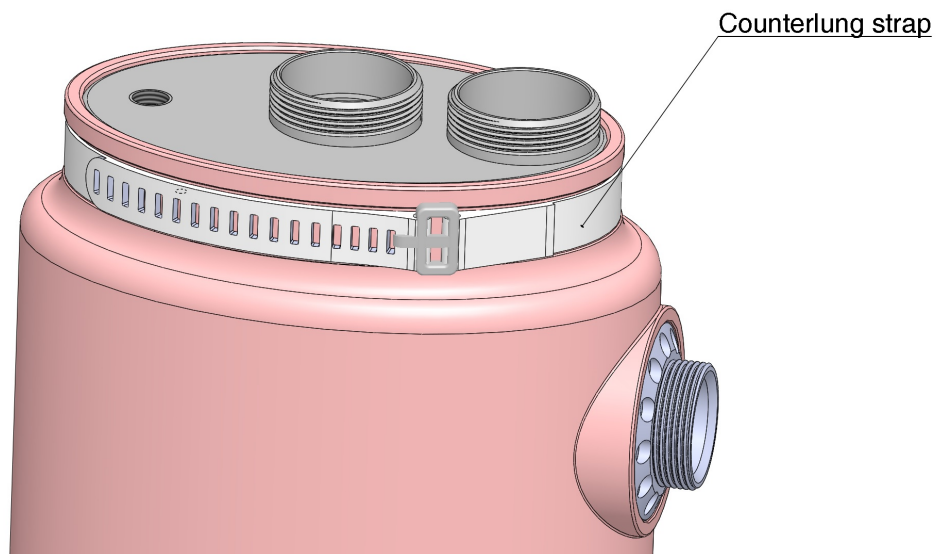
Place the absorbent cloth on the bottom of the counterlung and place the counterlung in the Cordura bag, aligning the openings of the counterlung and of the bag for the ADV. Insert the base of the ADV into the space provided and screw it down to secure it (**Figure 8b.**):



8b. ADV connection

3.1.3 Insertion of the Head and Fixation of the Counterlung

Insert the head and scrubber into the counterlung. Be sure to place the top of the counterlung precisely in the space provided around the head. Then place the strap around the top of the counterlung over the attachment point of the head. Tighten the strap using the holes provided (**Figure 9**). For optimum tightening, it is recommended to use the 8th or 9th hole.

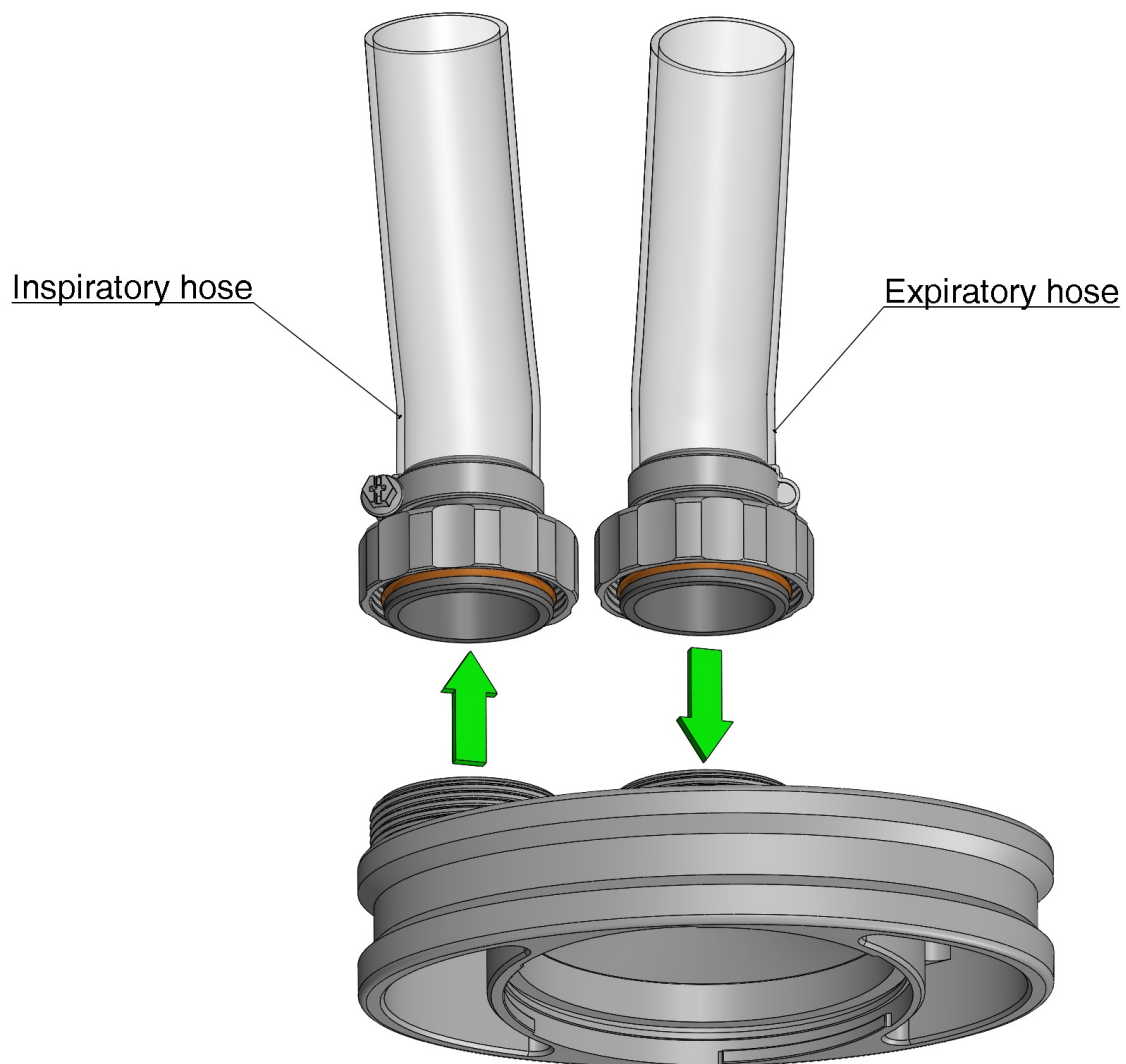


9. Fixation of the counterlung

CAUTION: Be sure to loosen and remove the strap when the unit is not in use, to avoid deformation or wear (see Section 4.1 for post-dive procedure).

3.1.4 Verification and Connection of the Breathing Loop

Start by attaching the breathing hoses to the DSV mouthpiece. It is recommended to attach the ends of the breathing hoses that include the one-way valves to the DSV mouthpiece and not to the head of the device. It is also recommended to attach the expiratory hose to the center of the unit, in the direction of the soda lime filter, and the inspiratory hose to the side. This allows an optimal breathing performance.



10. Attachment of the hoses to the head

Next, verify that the breathing hoses and the DSV mouthpiece are correctly functioning before they are connected to the rest of the device. This is done according to the 3 steps described hereinafter.

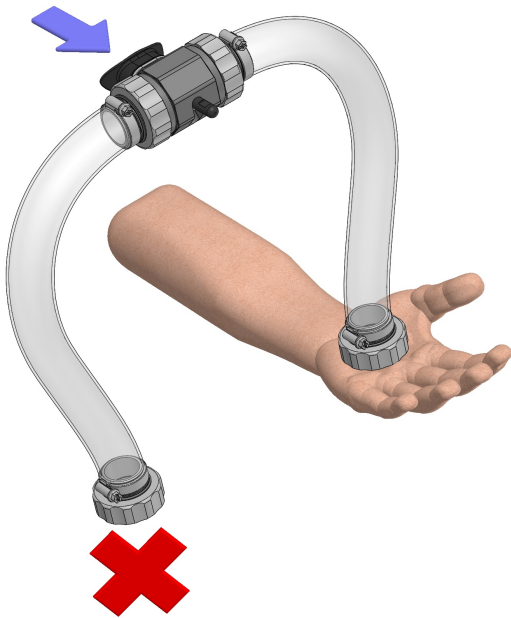
1. Pressure Tests:

The first step consists of the performance of a positive pressure test and a negative pressure test.

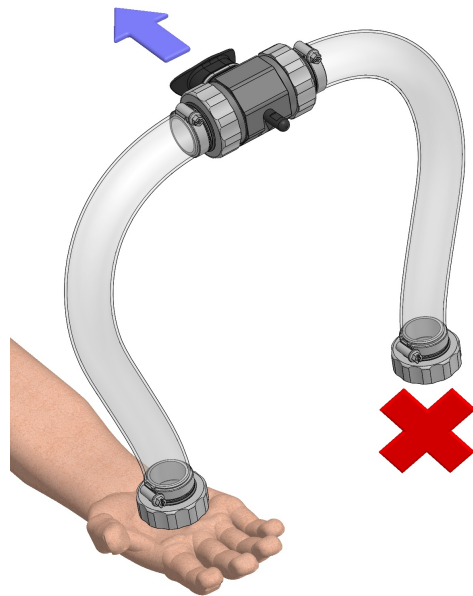
To perform a positive pressure test, block the outlet of the breathing loop with your hand and blow through the DSV mouthpiece (**Figure 10a.**). Air should not be able to pass.

To perform a negative pressure test, block the inlet of the breathing loop, then inhale through the DSV mouthpiece (**Figure 10b.**). Air should not be able to pass.

For both tests, it is also advisable to listen to the other end of the hose each time to confirm that no leakage is occurring.



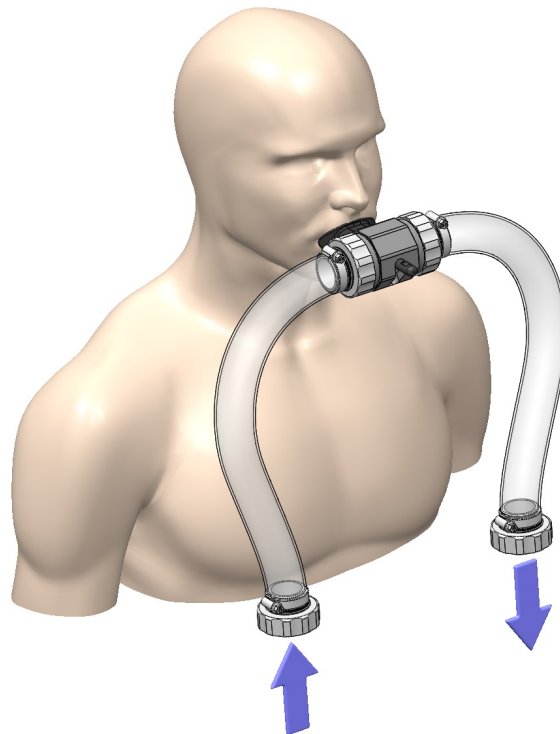
10a. Positive pressure test



10b. Negative pressure test

2. *Airflow Test:*

Leave the inlet and the outlet of the breathing loop free, then inhale and exhale through the DSV mouthpiece (**Figure 11.**). Air should flow freely and without constraint.



11. Airflow test

3. *Mouthpiece Verification:*

Check the mouthpiece and make sure it is properly attached to the DSV body. Make sure you can use it comfortably and safely.

3.1.5 Connection of the Breathing Hoses

Once the above 3 steps have been successfully completed, attach the breathing hoses to the top of the head using the threaded connectors at their ends (inserts and rings). Close the Cordura bag zip fastener and the tightening cord.

3.1.6 Oxygen Tank Connection and Verification

Verify the oxygen tank pressure and ensure that it contains pure oxygen by using a properly functioning oxygen analyzer. Do this before each dive.

Screw the first stage regulator to the tank and attach the tank to the Cordura bag using the two straps provided.

Then connect the tank's medium pressure hose to the ADV and the high-pressure hose to the pressure gauge.

3.2 Basic Operation and Use

Before each use, verify that all parts of the Salamander mCCR Rebreather are in good working order and that no part is damaged, especially the most exposed or fragile parts. It is imperative to use only oxyclean type grease to lubricate the rebreather's O-rings.

It is imperative to perform pre-dive tests on the Salamander mCCR Rebreather before each use. These tests must be carried out just before going into the water, considering that external elements such as transport or poor handling can damage the unit. The pre-dive tests are used, in particular, to detect potential leaks in the breathing circuit. This is important considering that the rebreather cannot function properly if there are leaks.

Two tests must be performed before each dive, in the following order:

1. Positive pressure test to verify that all O-rings are properly placed and that all connections are properly made.
2. Negative pressure test to detect any leak in the breathing loop.

3.2.1 Pressure Tests

3.2.1.1 Positive Pressure Test

The principle of this test consists of filling the rebreather with air in order to check if any losses are noticed.

To perform a positive pressure test, the rebreather must be fully assembled.

Start by placing the DSV mouthpiece in your mouth. Open the DSV mouthpiece with the lever and inhale through your nose and exhale through your mouth repeatedly until the counterlung is filled to full capacity. On the last exhale, close the DSV mouthpiece.

Once this is done, check the counterlung and breathing hoses for any movement or noise that may be due to air loss. If there are no leaks in the system, the volume of the counterlung should remain the same.

After waiting at least one minute, open the DSV mouthpiece. At this point, you should hear a characteristic sound generated by air escaping from the breathing circuit.

3.2.1.2 Negative Pressure Test

The principle of this test is to generate a vacuum in the rebreather in order to check if air is seeping in anywhere.

To perform a negative pressure test, the rebreather must be fully assembled and the oxygen tank closed.

Start by placing the DSV mouthpiece in your mouth. Open it with the lever and breathe in through your mouth and out through your nose repeatedly until the counterlung is completely emptied. This step may require a sustained chest effort to empty the counterlung as much as possible. On the last inhale, close the DSV mouthpiece.

Once this is done, check the counterlung and breathing hoses for any movement or noise that may be due to air leakage. If there is no air leakage, the counterlung should remain empty.

After waiting at least one minute, open the DSV mouthpiece. At this point, you should hear a characteristic sound generated by air entering the breathing circuit.

3.2.1.3 Non-conclusive Tests

If the positive pressure test, negative pressure test, or any other indication suggests a leak, an air infiltration, or any other problem in the breathing circuit, it is imperative that its cause be determined and corrected before diving.

Leaks may be due to poor assembly of the device, one or more defective O-rings, the presence of one or more parasitic elements preventing a proper seal (lime pellets, sand, small stones, insects, problems with the sealing of the counterlung, etc.), or one or more defective components.

Leaks can sometimes be located by a careful visual inspection of the device or by listening closely to the circuit to try to hear where the leak is coming from. It is advisable to have a container of water available and to immerse the rebreather in it, in order to detect bubbles that may indicate the origin of a leak.

3.2.2 ADV Setting

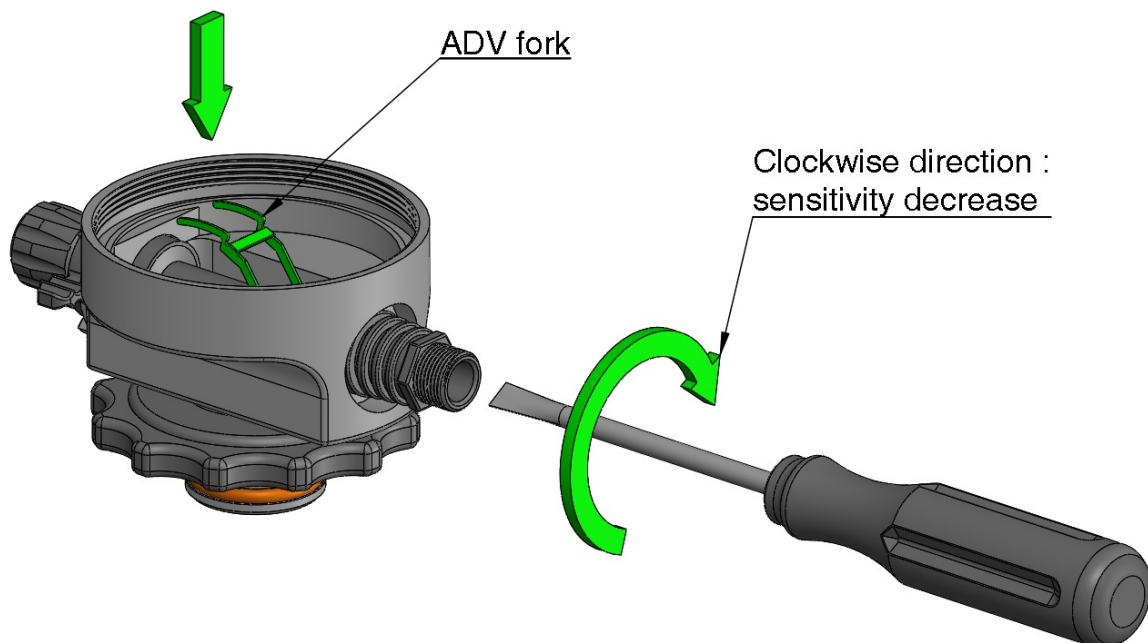
The ADV allows pure oxygen to be added directly to the rebreather's counterlung. The ADV setting allows the rebreather user to calibrate the ADV according to his or her preferences, for optimum use.

It is recommended to mount the ADV on the side of the inspiratory hose, to allow the shortest possible inspiration, in case of necessity, and to reduce the impact in case of water leaking in the counterlung. The ADV sensitivity can be adjusted in two steps:

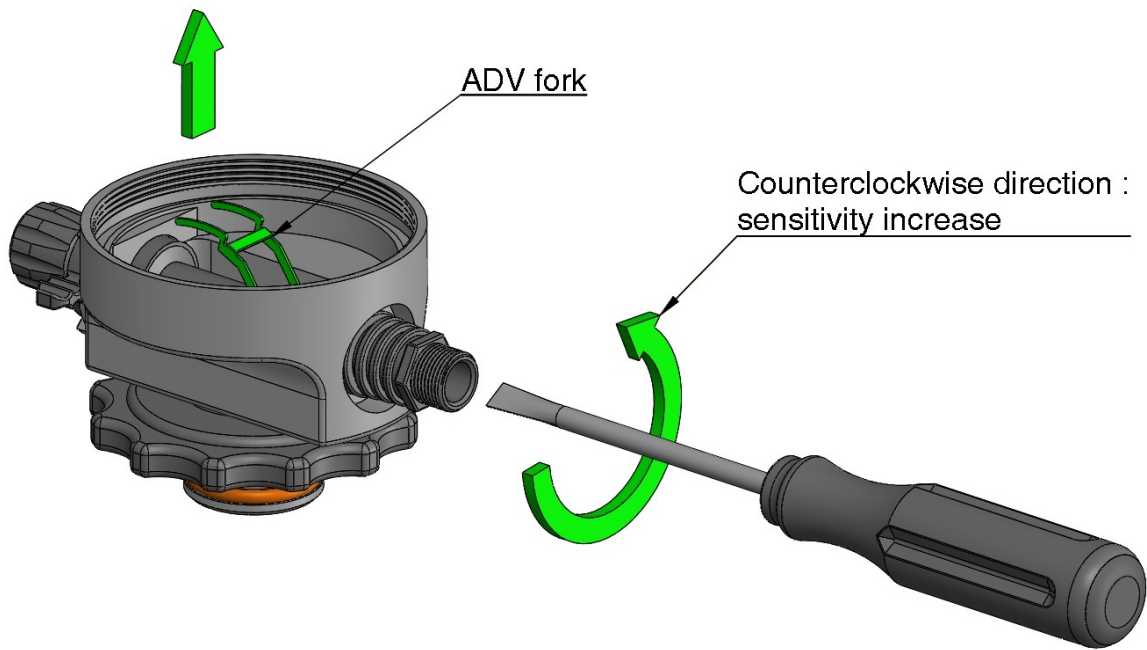
- First, adjust the ADV's vacuum release. To do this, use a flathead screwdriver to turn the internal knob clockwise or anti-clockwise, in eighths of a turn. This will adjust the height of the ADV fork (**Figures 11a. and 11b.**).

Each time the setting is modified, perform a test by connecting the ADV to the medium-pressure hose and opening the oxygen tank to pressurize the ADV. For optimum adjustment, the ADV should only inject oxygen when under vacuum.

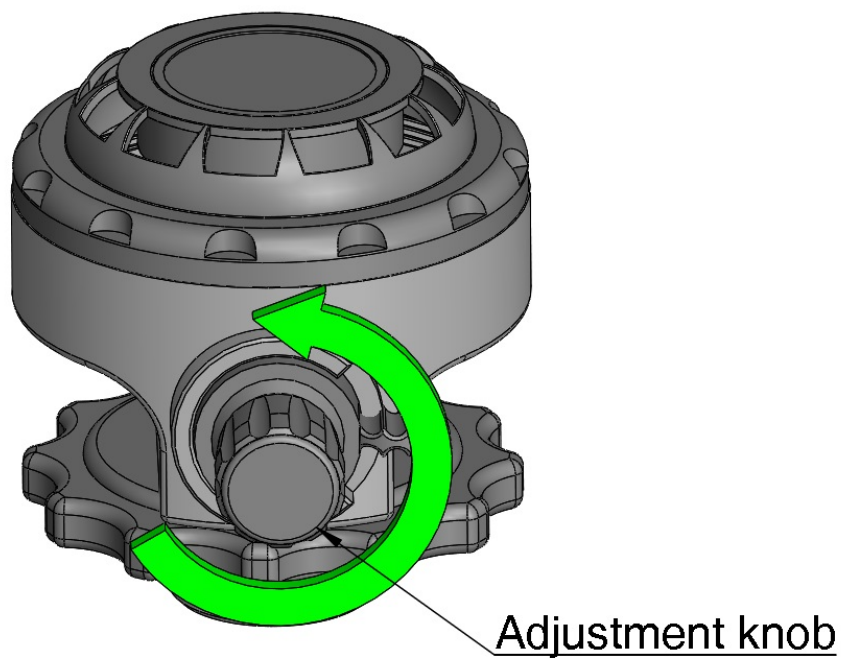
- In a second step, the effort required to trigger the ADV can be fine-tuned using the adjustment knob (**Figure 11c.**).



11a. Decrease of the sensitivity



11b. Increase of the sensitivity



11c. Adjustment of the resistance

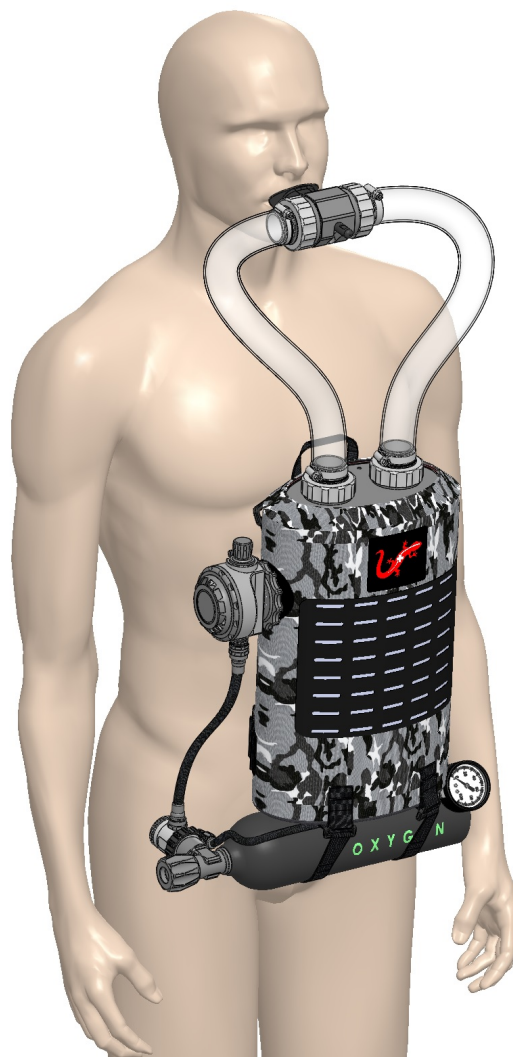
3.2.3 Diving

Once the device has been completely assembled and the tests successfully carried out, the rebreather is ready for use. When diving, it is essential to respect the depths and dive times specific to the device and to take all the usual and recommended precautionary measures.

CAUTION: The Salamander mCCR Rebreather can be used to a maximum depth of -6 meters (-20 feet) with pure oxygen.

3.2.4 Attaching the Rebreather to the Harness

In order to maximize the performance and breathing work of the rebreather, the harness must be adjusted to match the user's morphology, the aim being to attach the device as close as possible to the user's chest (**Figure 12.**).



12. Position of the rebreather

4 MAINTENANCE INSTRUCTIONS

4.1 Post-dive Procedure and Cleaning

After each dive, open the Salamander mCCR Rebreather, dry it and empty any water it may contain.

The tightening strap that provides a seal between the counterlung and the head must be removed when the unit is not in use. The strap must not be stored under tension, as it could become deformed, wear out and lose its effectiveness.

The breathing hoses and the counterlung act as a filter for saliva. This exposes them to germs and bacteria. The rebreather breathing circuit is a warm and humid environment, which is conducive to the growth of microorganisms.

Rinse the breathing hoses and the counterlung with fresh water to remove condensation and saliva residue. It is also advisable to disinfect the rebreather regularly, especially the breathing hoses and the counterlung. The disinfectant must be harmless to the users, as well as to the rebreather's components. The following products are recommended (non-exhaustive list):

- Virkon S,
- Steramine 1G,
- Chemgene HLD4L.

When using disinfectants, always follow the manufacturer's instructions and recommendations.

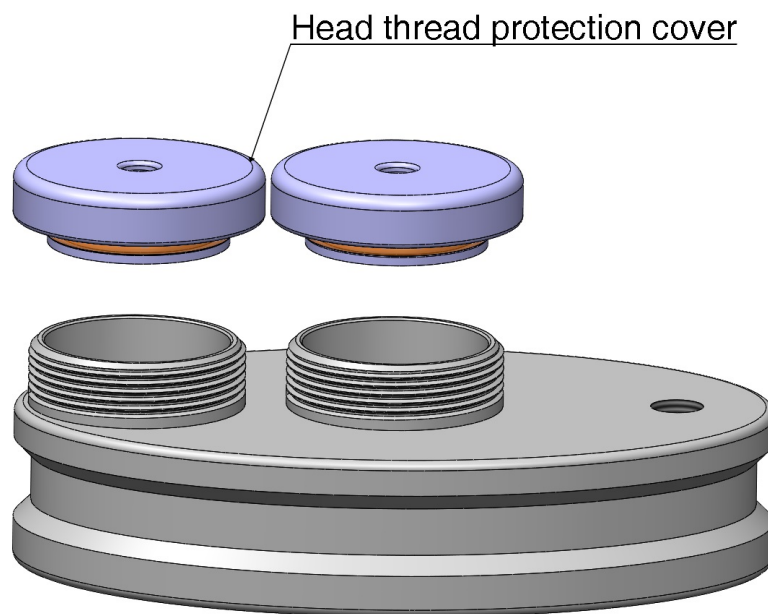
It is important to thoroughly dry the rebreather after each use. In addition, check the condition of the O-rings, the counterlung and other parts of the device.

4.2 Storage

Between uses, store the Salamander mCCR Rebreather in a dry place with a constant temperature and away from light. It is advisable to store the device at a temperature between 5°C (40°F) minimum and 25°C (80°F) maximum. It is also recommended to protect it from harmful elements, such as dust, which can damage the O-rings and cause leaks. Attach the protective covers to the rebreather head to protect the threads on the head (**Figure 13.**).

It is recommended to store the rebreather unassembled (disassembled), in order for the counterlung tightening strap and the O-rings to be free, especially if the period between uses is long.

The soda lime must not be reused. The cans containing new soda lime must be stored in a dry place, at a constant temperature, following the manufacturer's instructions and recommendations.



13. Fixation of the protecting covers

4.3 Maintenance and Services

Proper maintenance is necessary for the correct functioning of the rebreather. Regular checking and maintenance of all components and O-rings are essential.

The O-rings can be greased with oxyclean (oxygen compatible) grease when necessary (see Section 4.4 for a complete list of the rebreather O-rings).

The other components of the Salamander mCCR Rebreather must be maintained in good condition and/or replaced when necessary (see Section 4.5 for maintenance recommendations).

4.4 List of components

Name of the component	Quantity	Location
1. Cordura bag	1	Rebreather bag
2. Tank attachment straps	2	Rebreather bag
3. Neck carrying strap	1	Rebreather bag
4. Waist carrying strap	1	Rebreather bag
5. DSV internal component	1	DSV mouthpiece and circuit
6. DSV stainless steel screw	1	DSV mouthpiece and circuit
7. Mushroom silicone valves	2	DSV mouthpiece and circuit
8. 32cm (12.6") hoses	2	DSV mouthpiece and circuit
9. DSV stem	1	DSV mouthpiece and circuit
10. 7.5mm (0.28") serflex	4	DSV mouthpiece and circuit
11. 4mm (0.16") serflex	1	DSV mouthpiece and circuit
12. O-Rings n° 12 (inserts)	8	DSV mouthpiece and circuit
13. O-Ring n° 13 (DSV screw)	1	DSV mouthpiece and circuit
14. Hoses inserts	2	DSV mouthpiece and circuit
15. Inspiratory insert	1	DSV mouthpiece and circuit
16. Expiratory insert	1	DSV mouthpiece and circuit
17. Mouthpiece	1	DSV mouthpiece and circuit
18. Mouthpiece strap	1	DSV mouthpiece and circuit
19. DSV body	1	DSV mouthpiece and circuit
20. DSV circlips	2	DSV mouthpiece and circuit
21. Anti-friction strappings 32mm (1.26")	4	DSV mouthpiece and circuit
22. 32mm (1.26") insert rings	4	DSV mouthpiece and circuit
23. Rebreather head	1	Rebreather head
24. O-Ring n° 16 (MP cap, optional)	1	Rebreather head
25. Tightening strap	1	Rebreather head
26. O-Ring n° 11	1	Rebreather head
27. Canister	1	Scrubber
28. Bottom stainless steel grid	1	Scrubber
29. Removable stainless steel grid	1	Scrubber
30. Canister spring	1	Scrubber
31. Strainer	1	Scrubber
32. Filter M8 screw	1	Scrubber

33. ADV body	1	ADV
34. ADV silicone valve	1	ADV
35. Membrane holder	1	ADV
36. ADV cover	1	ADV
37. ADV cover screw	1	ADV
38. Second stage regulator body	1	ADV
39. ADV ring	1	ADV
40. ADV circlip	1	ADV
41. O-Rings n° 10 (ADV body)	2	ADV
42. O-Ring n° 14 (regulator ring)	1	ADV
43. O-Ring n° 15 (regulator body)	1	ADV
44. Silicone counterlung	1	Counterlung
45. Nut ring	1	Counterlung
46. Counternut ring	1	Counterlung
47. Absorbent cloth	1	Counterlung
48. 0.8L (27 oz) tank	1	Oxygen line
49. M18 straight valve	1	Oxygen line
50. Dip tube	1	Oxygen line
51. M18 O-Ring	1	Oxygen line
52. First stage regulator	1	Oxygen line
53. DIN O-Ring	1	Oxygen line
54. Medium pressure hose	1	Oxygen line
55. High pressure hose	1	Oxygen line
56. High pressure gauge	1	Oxygen line
57. High pressure oxygen swivel	1	Oxygen line
58. 1535 Air NF pelicase	1	Accessories
59. Head protection covers	2	Accessories
60. CL counter nut mounting ring	1	Accessories
61. CL nut mounting ring	1	Accessories
62. ADV mounting ring	1	Accessories
63. User Manual	1	Accessories

4.5 Consumable Parts

Certain components of the Salamander mCCR Rebreather are considered consumable parts and must be renewed from time to time to ensure the rebreather's proper functioning. It is recommended that you renew the following components according to the indications below:

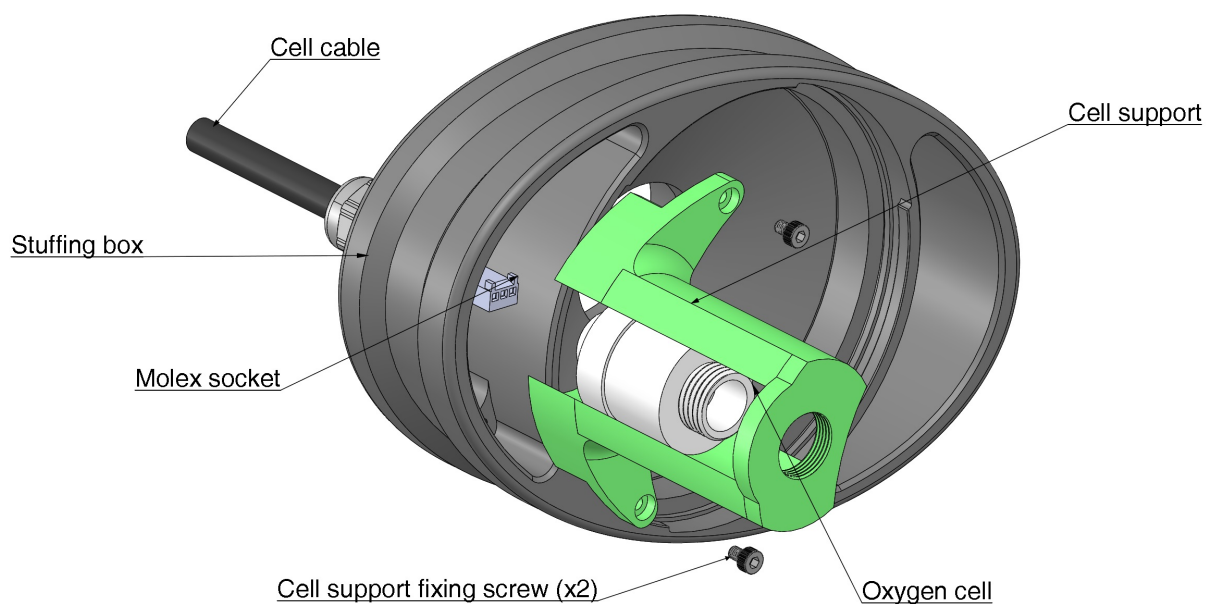
- counterlung strap: 2 years,
- O-Rings: 2 years,
- breathing hoses: 5 years,
- silicone mouthpiece: 5 years,
- counterlung: 10 years,
- high and medium pressure oxygen hoses: 5 years.

5 OPTIONAL ACCESSORIES

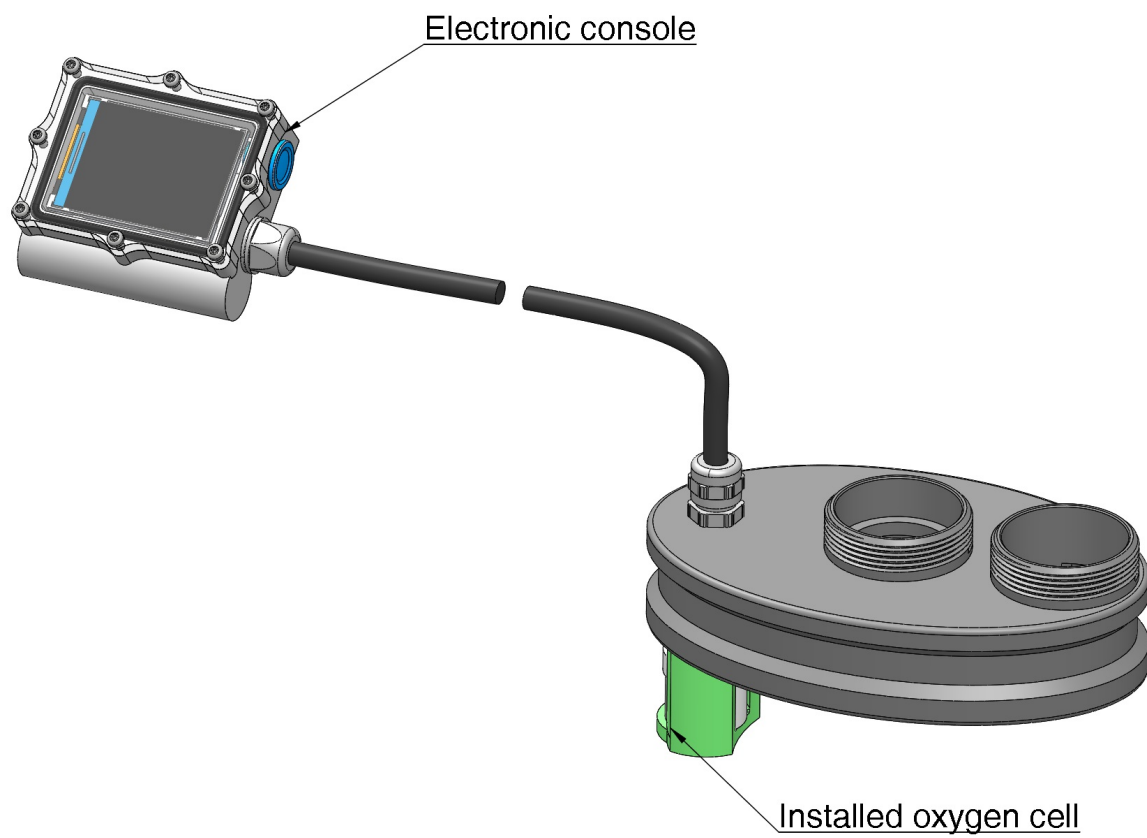
5.1 Electronic Circuit for Oxygen Partial Pressure Control (PaO₂)

The Salamander mCCR Rebreather can be supplied with an electronic circuit for calculating the partial pressure of oxygen (PaO₂). The circuit consists of a cable gland installed on the rebreather head to which an oxygen cell is connected, via a cell support (**Figure 14a.**).

The cell is then connected to an electronic console for controlling the partial pressure of oxygen (PaO₂), via a cell cable and a Molex socket (**Figure 14b.**).



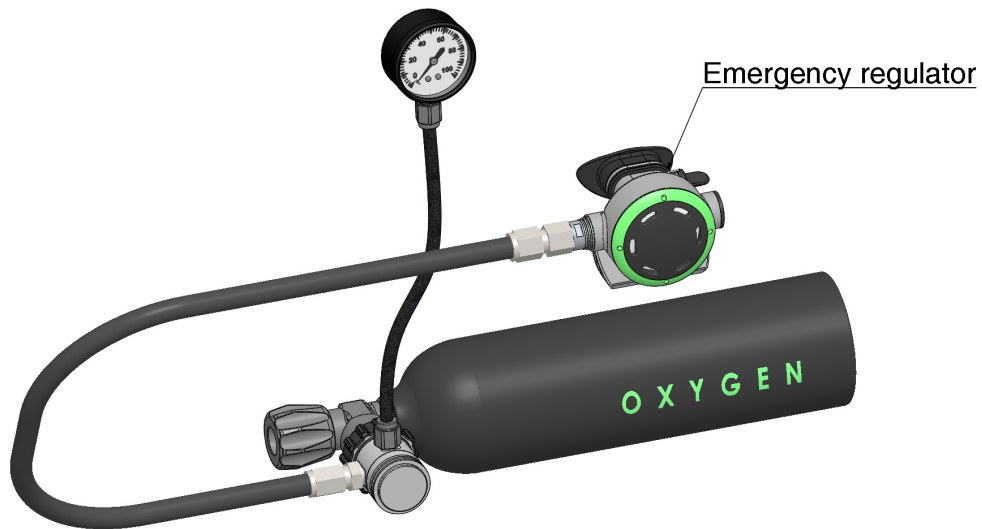
14a. Installation of the oxygen cell



14b. PpO₂ electronic circuit

5.2 Second stage Bailout Regulator

The Salamander mCCR Rebreather can be supplied with a second stage emergency regulator offering a temporary alternative in the event of a problem with the breathing circuit. The emergency regulator is connected directly to the first stage regulator (**Figure 15.**).



15. Second stage bailout regulator

6 CHECKLISTS

NOTE: The checklists presented below are intended to serve as checklists for operations to be performed before and after each dive. They do not replace a complete training course recognized by Air Research Ltd. with a qualified instructor. It is recommended that these checklists be printed separately and completed/checked before and after each dive.

6.1 Assembly Checklist (Pre-dive)

- ☐ 1. During assembly, carefully inspect all parts for dust, damage and verify their correct lubrication.
- ☐ 2. Check that the oxygen tank is full and refill it, if necessary.
- ☐ 3. Attach the oxygen valve and install the first stage regulator, if necessary.
- ☐ 4. Analyze oxygen: _____ %.
- ☐ 5. Fill the rebreather scrubber, if new soda lime is needed. Assemble it and close it properly. Check that the soda lime is well compacted.
- ☐ 6. Attach the scrubber to the head.
- ☐ 7. Prepare the counterlung (absorbent cloth and nuts) and place it in the Cordura bag. Check that the ADV nut and counter nut in the counterlung are properly tightened.
- ☐ 8. Prepare the ADV and attach it to the counterlung. Attach the counterlung to the head. Firmly tighten the clamping strap using the 8th or 9th hole in the strap. Check that the strap is correctly positioned under tension.
- ☐ 9. Perform a mouthpiece check, followed by positive and negative pressure and airflow tests of the DSV mouthpiece and breathing hoses. Confirm the unidirectional airflow and the absence of leaks.
- ☐ 10. Install the breathing loop on the rebreather head. Close the bag tightening cord and the lateral zip fastener.
- ☐ 11. Connect the medium pressure hose to the ADV and the high pressure hose to the pressure gauge. Check that all hoses are properly connected.

- ☐ 12. Perform a positive pressure test.
- ☐ 13. Perform a negative pressure test (60 second test).
- ☐ 14. Slowly open the oxygen tank, once it is connected.
- ☐ 15. Check the pressure gauge for potential variations.
- ☐ 16. Record the oxygen pressure in the tank. O₂: _____ .
- ☐ 17. Close the oxygen tank. Wait 2 minutes, then measure the oxygen pressure. O₂ pressure: _____ . The pressure should be similar to the pressure noted under step 16.
- ☐ 18. If any of the above steps are unsatisfactory or show a problem that could affect the rebreather, do not dive with it.

6.2 Disassembly Checklist (Post-dive)

- ☐ 1. Rinse the rebreather with fresh water.
- ☐ 2. Close the oxygen tank.
- ☐ 3. Purge gases from the system and disconnect all low and high pressure hoses.
- ☐ 4. Disconnect the DSV mouthpiece and breathing hoses from the counterlung. Disinfect and rinse them.
- ☐ 5. Untighten and remove the counterlung strap, remove the counterlung and disinfect it. Hang it upside down to dry.
- ☐ 6. Remove the scrubber and empty it.
- ☐ 7. Remove the oxygen tank and refill it. Verify its content again.

The Salamander mCCR Rebreather is manufactured in Switzerland by:

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Version	Date	Description
1.0	20.01.2022	Salamander Rebreather – User Manual
2.0	09.01.2022	Breathing hoses modification
3.0	15.06.2024	Single scrubber version