

# HALCYON SYMBIOS



PHOTO JULIAN MÜHLENHAUS



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# – A revolution in rebreather diving





GUE Instructor John Kendall ready for yet another test dive of the Halcyon Symbios in Deep Dive Dubai.

PHOTO JESPER KJØLLER

**Halcyon Manufacturing is set to redefine rebreather diving with the launch of the Symbios, a compact, chestmount closed-circuit rebreather (CCR) designed for maximum flexibility and performance. Debuting at the 2024 DEMA show, the Symbios combines cutting-edge wireless technology, a lightweight design, and unmatched versatility for both recreational and technical divers.**

**GUE diving instructor and Halcyon R&D team member John Kendall provides insights into the Symbios' development and groundbreaking features, showcasing how this innovative unit is poised to transform underwater exploration for divers worldwide.**

**E**ver since Halcyon Manufacturing entered the scene, the company has enabled divers with novel tools to enrich their diving adventures. Halcyon's unique PVR-BASC (passive, variable-ratio, biased addition), also known as "The Fridge," was a semi-closed rebreather first built in 1994 and a vital element of the company's early history. This distinctive semi-closed-circuit rebreather has allowed countless adventurous divers to travel thousands of kilometers into the longest and deepest caves on the planet.

Subsequent iterations—the RB80 and RB-K—refined the pioneering concepts of these early units. Halcyon rebreathers, known for their robust construction and reliable operation, have been and continue to be at the forefront of exploration projects as both primary and bailout/redundant units for divers worldwide.

Historically, Halcyon divers and principals have used both semi-closed and fully closed rebreathers, adapting to the demands of spe-

cific dives. These projects revealed the value of a flexible rebreather configuration. Halcyon began using the RB80 as both a backmount and a staged sidemount rebreather in the early 2000s, a practice that evolved into its use in small caves for sidemount diving. The pursuit of a smaller, more flexible rebreather culminated in the latest addition to the Halcyon family: the Halcyon Symbios Rebreather. Compact, versatile, and high-tech, this rebreather meets the needs of "tecreational" and hardcore technical divers, conforms to a wide range of equipment configurations, and satisfies diverse dive requirements.

### **Why chestmount?**

There are many reasons for using a chestmount rebreather instead of, or alongside, a traditional backmount unit. Initially, the team was drawn to the flexibility of adding the Symbios to sidemount or backmount setups. Over time, the ease of use and tremendous adaptability revealed a broader potential: the Symbios can easily integrate into almost any configuration. ►►



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The chestmount design is ideal for new rebreather divers, allowing them to keep their existing cylinder setup and easily clip the rebreather onto their chest for a smoother learning curve.









Seen from above, a group of Symbios divers appears similar to regular open circuit divers. The only giveaway is the absence of exhaust bubbles.

Industry-leading technology and an exceptionally small form factor (7.5 kg, 37 x 30 x 12 cm/16.5 lb, 15 x 12 x 5 inches without a tank) significantly enhance this flexibility. The compact size makes the Symbios attractive to traveling divers seeking a lightweight package with the capacity of much larger rebreathers. Whether traveling to remote dive sites or navigating dry caves to reach a sump, the Symbios has proven remarkably capable.

A chestmount configuration is also advantageous for divers new to rebreathers, as they can retain their existing cylinder setup and simply clip the rebreather onto their chest. This design provides a friendlier learning curve for novice rebreather divers.

### Development of the Symbios

Chestmount rebreathers were among the first rebreathers ever built, so what makes the Halcyon Symbios unique? Three significant features set it apart.

The first is its completely wireless platform. The Symbios CCR uses redundant wireless

transmitters to relay all forms of data—including the  $pO_2$  of all three sensors and  $O_2$  pressure via an onboard pressure transmitter. Divers familiar with the frustrations of cabling will appreciate the wireless system, which eliminates tangled wires and enhances comfort and utility. The Symbios can send data to a handset and/or HUD without cables, and divers can even receive and read data from their dive buddies and students.

The Symbios integrates seamlessly with the Symbios wireless ecosystem, supporting pressure transmitters, navigation systems, GPS receivers, and operational specs for DPVs, lights, and trim sensors. Its wireless system employs magnetic transmission technology, ensuring higher data rates and reliability, with data sent twice per second.

The next innovation is the integrated BOV/ADV. The bailout valve is positioned on the chest and doubles as an ADV, allowing the diver to easily switch between CCR and open-circuit. The design avoids the drawbacks of traditional mouthpiece-based BOVs, such as weight and jaw fatigue.





PHOTOS JESPER KJØLLER

The Symbios chestmount system integrates well with a standard GUE configuration.

## Oxygen sensing

A proprietary solid-state oxygen sensor developed with Oxygen Scientific is another significant evolution. The Greenflash sensor, powered by a small CR2477 battery, can function as a plug-in replacement for traditional galvanic oxygen sensors or output digital signals. In the Symbios, this system combines analog and digital sensors for enhanced reliability, mitigating risks like water accumulation and ensuring accurate oxygen readings in the breathing loop.

Despite its compact size, the Symbios is a remarkably capable electronic CCR. Its lightweight design (7.5 kg/16.5 lb for travel and under 11 kg/24 lb ready to dive) and 2.7 kg/6 lb scrubber offer long dive durations and easy portability, fitting into a small backpack.

The Symbios is currently undergoing CE certification, with the first units expected to launch in non-CE countries by the end of the year. Major training agencies, including GUE will offer Symbios training, and pricing is expected to be competitive, considering the remarkable benefits of this groundbreaking technology. ■



**John Kendall**

John Kendall is a GUE technical, cave, and CCR instructor who has turned his lifelong fascination with the underwater world into a global teaching career. He builds local GUE communities and pioneers underwater 3D photogrammetry for nautical archaeology, creating digital models of shipwrecks and caves. John authored the GUE

Photogrammetry class and serves on the GUE Training Council. A Fellow of the Explorers Club, he also joined Halcyon Manufacturing's R&D team, focusing on their new CCR. His work combines exploration, education, and innovation, helping researchers navigate underwater sites with unparalleled ease from their computers.





# FACT FILE // SYMBIOS SPECS

## CONTROLLER

|   |  |
|---|--|
| <i>Primary controller</i>                   | Onboard physical button with wireless monitoring                       |
| <i>Redundant controller</i>                 | Optional corded controller/HUD/Buddy Light                             |
| <i>Secondary electronics/pO<sub>2</sub></i> | Redundant "Sentinel" with independent transmitter array                |
| <i>Tertiary electronics</i>                 | Readable by an infinite number of compatible handsets and/or HUD units |

## SCRUBBER

|  |   |
|--|---|
| <i>Scrubber type</i>                     | Axial                                     |
| <i>Scrubber volume</i>                   | 2.7kg                                     |
| <i>Temp. stick (scrubber monitoring)</i> | No  |
| <i>Scrubber duration</i>                 | CE: CO <sub>2</sub> 1.6l/m 5mb bypass TBC |

## LOOP

|                                      |   |
|--------------------------------------|---|
| <i>Work of breathing (WOB)</i>       | CE 100m test, trimix, horizontal TBC  |
| <i>Work of breathing (WOB)</i>       | CE 40m test, air, vertical 1.6 joules/liter   |
| <i>Active loop volume (liter)</i>    | CE Test   |
| <i>Counterlungs</i>                  | Front-mounted   |
| <i>Detachable counterlungs</i>       | Yes   |
| <i>Oxygen injection</i>              | Before scrubber   |
| <i>Loop direction</i>                | Right to left   |
| <i>Automatic diluent valve (ADV)</i> | Yes   |
| <i>Diluent shut-off valve</i>        | No  |
| <i>Bailout valve (BOV)</i>           | Yes (Built into the ADV system)   |
| <i>Mouthpiece retaining strap</i>    | Yes   |
| <i>Flood resistance</i>              | Exhalation lung has purgeable water trap.<br>All electronics sealed from water ingress. |

## HEAD & SENSORS

|  |  |
|--|--|
| <i>User upgradeable firmware?</i>                  | Yes  |
| <i>Number of solenoids</i>                         | 1  |
| <i>Means of O<sub>2</sub> addition</i>             | Solenoid + MAV   |
| <i>Solid state O<sub>2</sub> sensor</i>            | Yes, Greenflash  |
| <i>Independent secondary O<sub>2</sub> reading</i> | Yes  |
| <i>Helium sensors</i>                              | No   |
| <i>CO<sub>2</sub> sensors</i>                      | No   |
| <i>Dual computers</i>                              | Yes  |
| <i>Independent electronics</i>                     | Two monitoring systems in head with independent transmitters |
| <i>Bailout mode</i>                                | No   |
| <i>Battery type</i>                                | Rechargeable   |





## DISPLAYS & WARNINGS

|                                     |                                     |
|-------------------------------------|-------------------------------------|
| <i>Head-up display (HUD)</i>        | Fully featured dive computer HUD    |
| <i>Buddy display</i>                | Optional wired HUD with buddy light |
| <i>Other active warning devices</i> | Vibrating alert in rebreather head  |
| <i>Near eye computer (HUD)</i>      | Yes                                 |

## HANDSET

|   |                              |
|---|------------------------------|
| <i>Number of handsets</i>                 | Infinite number of receivers |
| <i>Pressure reading (air Integration)</i> | Yes                          |
| <i>Bluetooth on handset</i>               | Yes                          |
| <i>Wi-Fi on handset</i>                   | No                           |
| <i>Digital compass</i>                    | Yes                          |
| <i>Multi-language interface</i>           | Yes                          |

## CYLINDERS

|  |   |
|--|---|
| <i>Cylinder options</i>                  | Multiple options for onboard O <sub>2</sub> |
| <i>Onboard multi diluent tank option</i> | N/A   |
| <i>Offboard gas feed</i>                 | Yes   |

## FORM FACTOR

|                             |  |
|-----------------------------|--|
| <i>Travel/mini version</i>  | Inherent in design                               |
| <i>Stand</i>                | No   |
| <i>Sidemount conversion</i> | Compatible with sidemount bailout configurations |

## SERVICE & SUPPORT

|                                     |                          |
|-------------------------------------|--------------------------|
| <i>Supplied ready to dive</i>       | Yes                      |
| <i>Warranty (months)</i>            | TBD                      |
| <i>Worldwide service/support</i>    | Yes                      |
| <i>Recommended service interval</i> | Yearly                   |
| <i>Cost of service</i>              | Service center dependent |

## SHIPPING & ORDERING

|                             |  |
|-----------------------------|--|
| <i>Weight ready to dive</i> | ~11 KG depending on O <sub>2</sub> tank used         |
| <i>Manufacturer website</i> | <a href="http://www.halcyon.net">www.halcyon.net</a> |

