USER MANUAL

CO2 SCRUBBER

VERSION DS-2019-09

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PREFACE

ABOUT THIS USER MANUAL

This user manual provides instructions for installing and operating the IHC Hytech CO_2 scrubber.

The manual consists of:

Chapter 1 - Introduction
Chapter 2 - Safety precautions
Chapter 3 - Installation
Chapter 4 - Operation
Chapter 5 - Maintenance

INTENDED AUDIENCE

The information in this user manual is intended for operators and maintenance personnel working with diver decompression chambers and hyperbaric treatment chambers.

CORRECTIONS AND/OR CLARIFICATIONS

During the composition of this manual much attention has been given to avoid errors and mistakes. If during the use of this manual errors or incomplete descriptions are found or if the reader considers that improvements are necessary to overcome any inaccuracies, please inform us. We appreciate any comments which will help us to improve our documentation.

For corrections or clarifications please contact:

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INTRODUCTION 1

1.1 GENERAL

The IHC Hytech CO_2 scrubber unit removes CO_2 from the atmosphere in hyperbaric chambers. The scrubber has an induced flow fan that pulls breathing gas through a canister filled with soda lime to adsorb CO_2.

The fan motor is designed by IHC Hytech and has completely potted stator electronics. This protects the motor from environmental impacts such as raised oxygen levels, humidity and pressure.

The canister can hold approx. 7.5 kg (16.5 lbs) of CO_2 adsorbent and is connected to the motor by a bayonet locking mechanism for easy replacement. The canister is provided with internal mesh of 0.3 mm to keep in the smallest grains.

One scrubber is capable of serving eight persons for more than 6 hours in a chamber with adequate gas circulation.

To minimise dust forming and increase the duration of the adsorbent, soda lime with a particle size of 1-2 mm can be used.

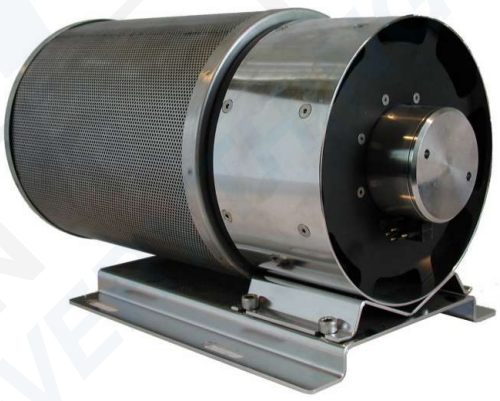
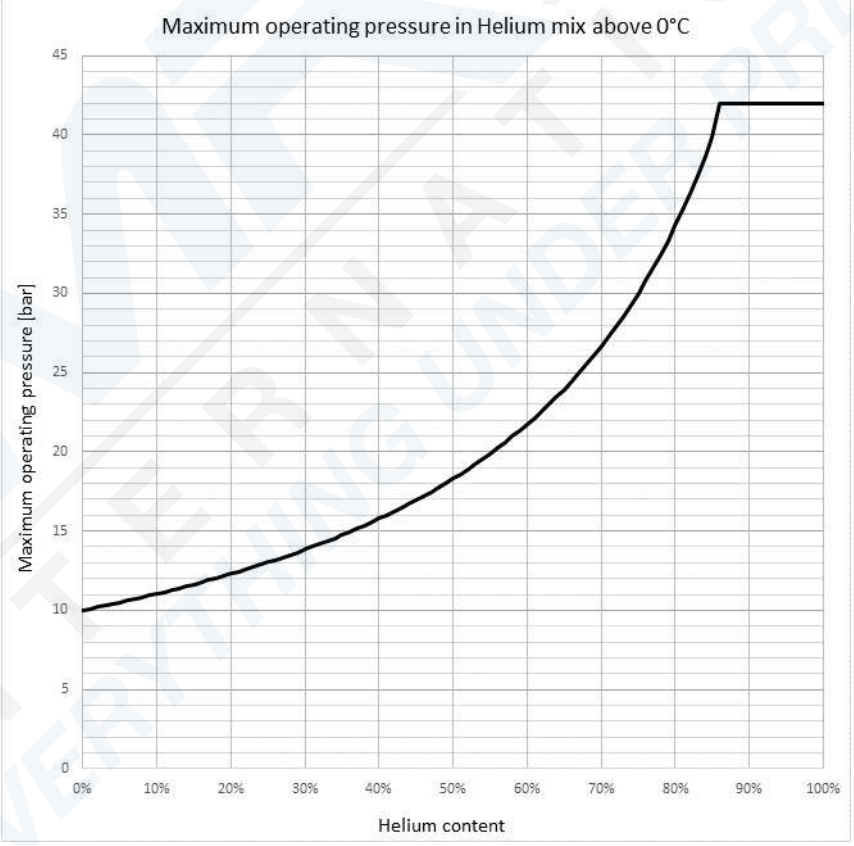


Figure 1.1 CO_2 scrubber

1.2 SPECIFICATIONS

Specifications	
Dimensions	L 422 mm (16.6 inch) x W 226 mm (8.9 inch) x H 245 mm (9.7 inch)
Weight complete unit (empty)	8.3 kg (18.3 lbs)
Weight complete unit (full)	16 kg (35.3 lbs)
Weight canister (empty)	2.3 kg (5.1 lbs)
Weight canister (full)	10 kg (22)
Power supply	24-28VDC, 2A
Rotating speed	1400-3300 rpm
Operating pressure*	Max. 42 bar (420 msw)

* = The maximum operating pressure depends on the gas mixture of the atmosphere. For compressed air, the maximum operating pressure is 10 bar. Adding helium to the mix allows increase of the maximum operating pressure according to the graph below.



1.3 OPTIONAL EQUIPMENT

1.3.1 CONTAMINATION CANISTER

The scrubber fan unit can be installed with a contamination canister (2.80.3963). The IHC Hytech contamination canister removes contamination from breathing gas in enclosed environments. The special fill of the canister removes all kind of contamination in enclosed environments such as vomit, urine, feces and sweat.

The following chemical components are eliminated:

- Urea $(NH_2)_2CO$ from urine
- Carbon monoxide (CO) from endogenous production
- Acetone (GH_3 $COCH_3$) metabolic and from organic waste
- Hydrogen chloride (HCL) from vomit
- Hydrogen sulphite (H_2S) from feces/intestinal gas
- Carbonyl sulphite (OCS) from intestinal gas
- Hydrogen (H) from intestinal gas
- Methane (CH_4) from intestinal gas
- Carbondisulphite (CS_2) from intestinal gas
- Butyric acid (C_3H_1COOH) from intestinal gas

The contamination scrubber canister contains a special blend of carbon molecular sieves and a catalyst and is stored in an air tight container. Once the container is opened and the canister is exposed to the environment it starts to work. The canister lasts for at least 450 hours/person.

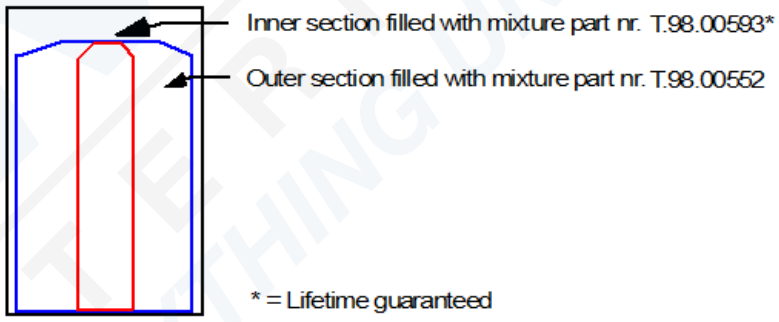


Figure 1.2 Canister refill

NOTE

The duration of a canister is calculated as follows:
450 divided by the number of occupants = hours of duration.

Example: A hyperbaric life boat is occupied by 18 persons. The duration of one canister is 450 divided by 18 occupants = 25 hours.

SAFETY PRECAUTIONS 2

2.1 GENERAL

The manufacturer does not accept any responsibility for damage or injuries caused by misuse of the scrubber.

2.2 WARNING SIGNS

In this manual three types of warning signs can be found on the left of the page.
These warnings indicate possible dangers. The warning signs are:

NOTE

This indicates a situation that requires extra attention.

CAUTION

This indicates a situation that can cause severe damage to the installation and/or can result in injuries.

WARNING

This indicates a situation that can cause severe injuries or death.

2.3 GENERAL SAFETY MEASURES

2.3.1 MAINTENANCE AND REPAIR

Maintenance and repair jobs must only be performed by qualified personnel.

It is strictly forbidden to modify the scrubber in any way without written permission from the manufacturer.

INSTALLATION 3

3.1 MECHANICAL

The scrubber can be mounted in any position, but vertical position is preferred. If the scrubber is mounted in vertical position, keep the motor on the bottom side for easy changing of the canister.

NOTE

A free space of at least 75 mm (3”) must be provided on each side of the unit to ensure proper gas flow. Also keep free space on the side of the canister for removal of the canister.

3.2 ELECTRICAL

The scrubber can be used with a pre-set speed or external speed control function. Use the specified pins on the connector and place the jumper inside the scrubber to configure the desired function. See table and pictures for pre-set speed and external speed configuration.

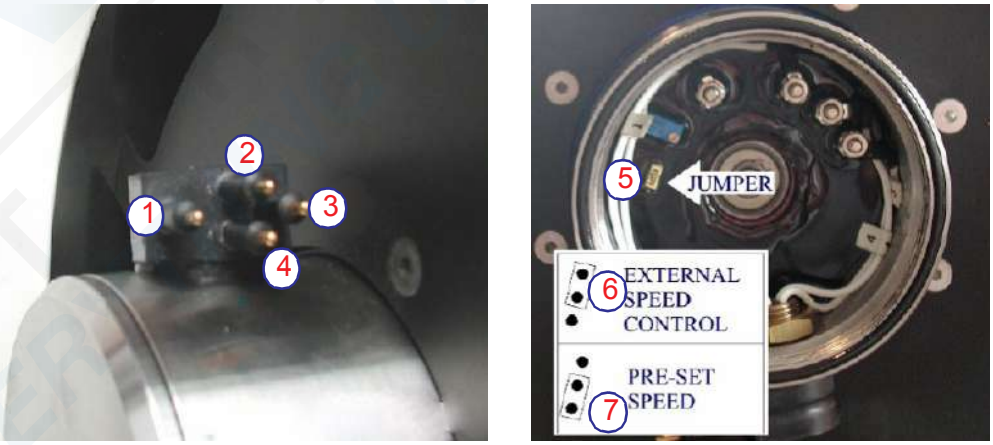


Figure 3.1 Electrical connections

ID	Description	ID	Description
1	Black wire (24 VDC)	5	Jumper
2	White wire (0 VDC)	6	Jumper in position for external speed control
3	Red wire (0 - 10 VDC speed control signal referenced to pin 2, optional)	7	Jumper in position for pre-set speed
4	Green wire (rpm signal referenced to pin 2, optional)		

OPERATION 4

4.1 GENERAL

The scrubber is switched on or off by the power supply outside of the chamber.

WARNING

Do not install the switches inside the chamber to avoid the risk of fire.

4.2 PERFORMANCE

The CO_2 scrubber is designed to run continuously during diving operations. The performance of the scrubber is influenced by a number of environmental factors such as:

- The type of adsorbent
- Chamber pressure
- CO_2 production (number of persons in the chamber)
- Humidity
- Temperature
- Motor speed

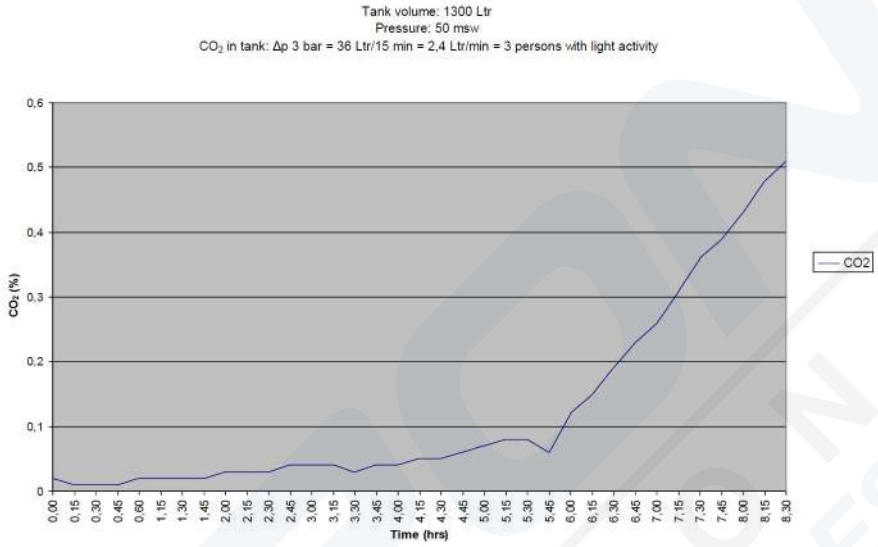
The service life of a canister filling depends on the above mentioned factors.

NOTE

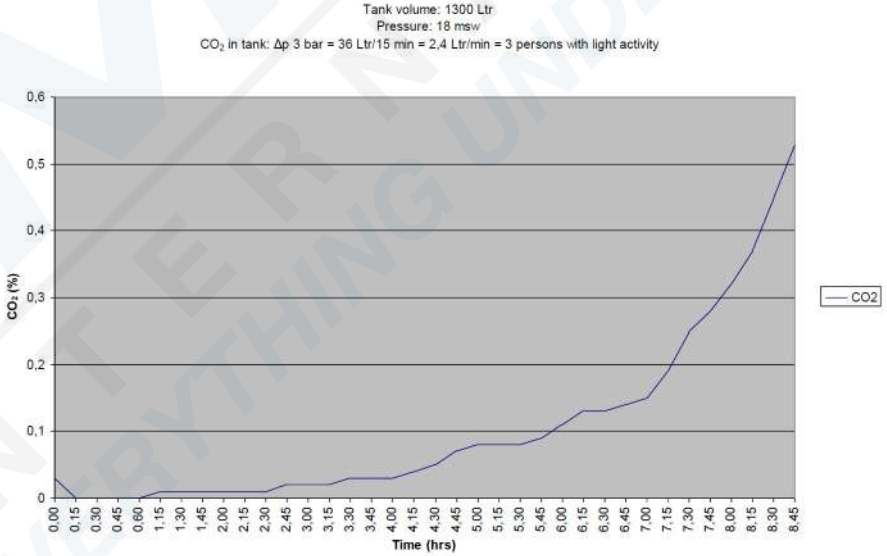
The O_2 and CO_2 levels inside the chamber must be continuously monitored. The scrubber must always be used in combination with an oxygen make-up system. If the CO_2 level starts rising, the canister should be refilled or replaced. If the oxygen level inside the chamber drops, oxygen must be added to the chamber atmosphere.

4.2.1 PERFORMANCE DIAGRAMS

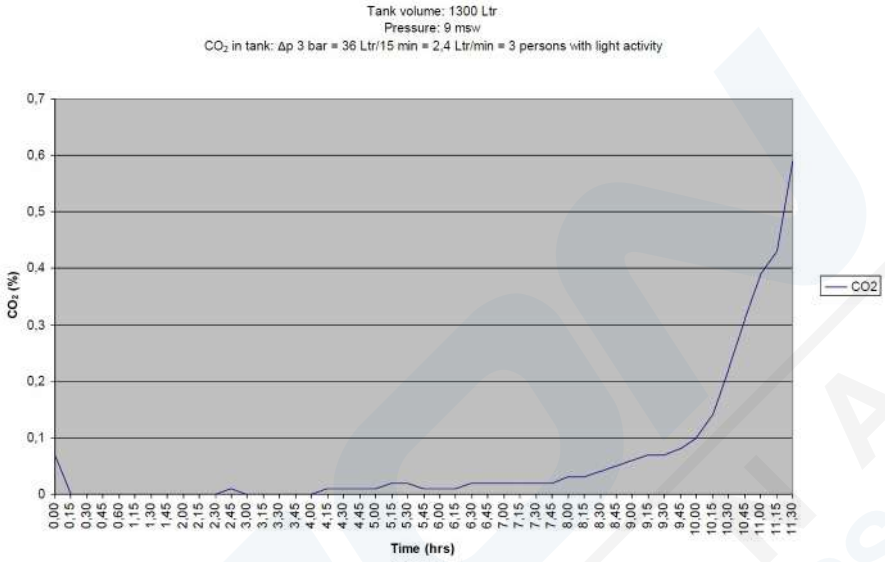
4.2.1.1 PERFORMANCE AT 50 MSW



4.2.1.2 PERFORMANCE AT 18 MSW



4.2.1.3 PERFORMANCE AT 9 MSW



4.3 REPLACING OR REFILLING THE CANISTER

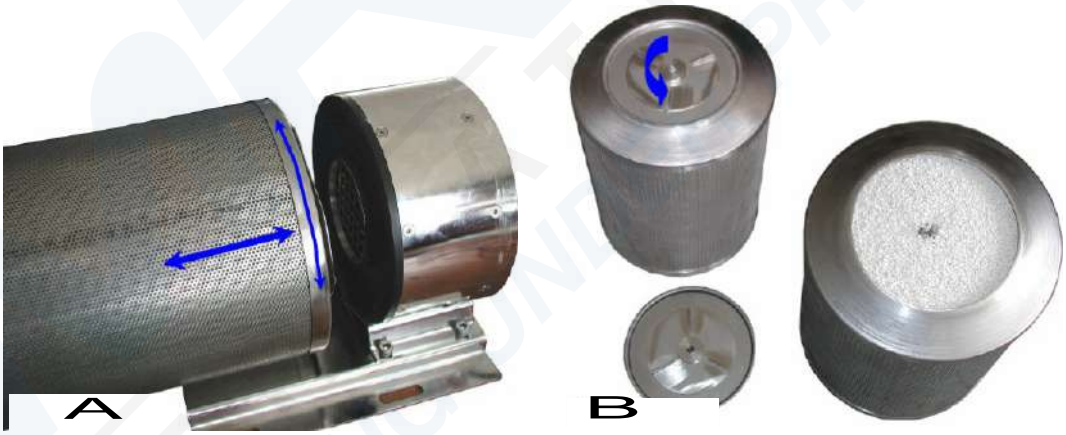


Figure 4.1 Canister

Before replacing or refilling the canister, switch off the scrubber motor.

1. Remove the canister from the scrubber motor by turning the canister counter-clockwise (A).
2. Place the canister on the bayonet with the cover plate facing upwards (B).
3. Remove the cover plate by turning it counter-clockwise (B).
4. Replace the adsorbent.
5. Mount the cover plate.
6. Mount the canister on the scrubber motor.
7. The scrubber motor is now ready for use.

MAINTENANCE 5

5.1 GENERAL

The CO_2 scrubber does not require any maintenance other than refilling the canister if the adsorbent becomes ineffective. If the motor fails, the whole unit should be replaced. Replacing the motor unit can be done in a matter of seconds. After removing the canister, the motor unit can be removed from the mounting bracket by loosening the locking screw.

5.2 SPARE PARTS AND ACCESSORIES

Description	Part number
Scrubber complete, pre-set speed	3.80.1018-1V
Scrubber complete, external speed control	3.80.1018-1E
Scrubber complete, Aisi pre-set speed	3.80.2938-1V
Scrubber complete, Aisi external speed control	3.80.2938-1E
Scrubber motor, pre-set speed	3.80.1018-2V
Scrubber motor, external speed control	3.80.1018-2E
Canister assembly (including canister O-ring)	3.80.973
Canister O-ring 105.00 x 6.00	H.70.00310
Canister Cover plate	3.80.2343
Sofnolime (Sodalime) CO2 absorbent	T.99.02896
Contamination canister	2.80.3963
Refill Contamination canister	T.98.00552
Motor Housing O-ring 75.00 x 6.00	H.70.00292
Motor Housing O-ring 72.00 x 2.50	H.70.00293
Motor Cover plate O-ring 14.00 x 2.50	H.70.00291
Motor lid\ \Scrubber/Heater Motor\AISI316L/1.4404	3.50.5932
Contra connector (motor)	H.10.00133

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