



OFFICINE  
MECCANICHE  
GENERALI

TECHNICAL  
MANUAL  
MT A026

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**Castoro**

**C96  
PRO**

FULLY CLOSED CIRCUIT OXYGEN REBREATHING CYCLIC TYPE

OPERATIONS AND MAINTENANCE MANUAL

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## Warranty Information

O.M.G. snc warrants every rebreather Castoro C96PRO to be free from defects in workmanship for a period of one (1) year from date of purchase. This warranty don't cover rubber parts.

Should any part become defective, contact your nearest authorized O.M.G. dealer. If there is no dealer in your area contacts O.M.G. directly at +039 187632128 or FAX +039 187632192. You must have a return authorization from O.M.G. . Upon approval from O.M.G., return the defective part, freight prepaid to O.M.G. plant. The part will be repaired or replaced at no charge as deemed necessary by O.M.G.

This warranty becomes null and void if:

- The product has not been properly serviced and maintained according to the appropriate O.M.G. Manual
- Unauthorized modifications have be made to the product
- The product has been abused or subjected to conditions which are unusual or exceed the product's intended sevice.

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## *Definitions of Signal Word*

### *Used in this Manual*

***Danger:*** This words indicates an imminently hazardous situation, which if not avoided, will result in death or serious injury.

***Warning:*** This words indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.

***Caution:*** This words indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Due to the constant improvements of it's product, O.M.G. snc reserves the right to modify them, saving the essential characteristics here to described and illustrated.

## **1. INTRODUCTION**

Castoro C96PRO is a new fully closed circuit oxygen rebreather designed by O.M.G. firm in La Spezia, Italy, for recreational and technical use.

Castoro C96PRO is one of the most compact and lightest weight fully closed circuit oxygen rebreather on the market.

CASTORO C96CPRO has an innovative soft shield composed of kevlar-cordura wich keeps and protects the polyurethane rubber breathing bag from possible cutting and abrasion under special operating conditions.

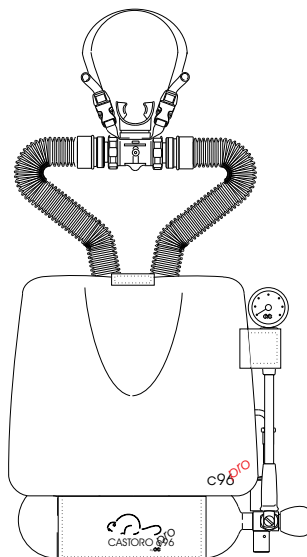
An optional jacket, w/out buoyancy compensator, allows to wear the C96 PRO, fast and comfortably. Moreover, the jacket is equipped of several fast-releasing weight pockets, both on the back and sides, so as to correctly balance the diver.



*Figure 1- Fully Closed Circuit Oxygen Rebreather CASTORO C96PRO*

## 2. TECHNICAL DATA

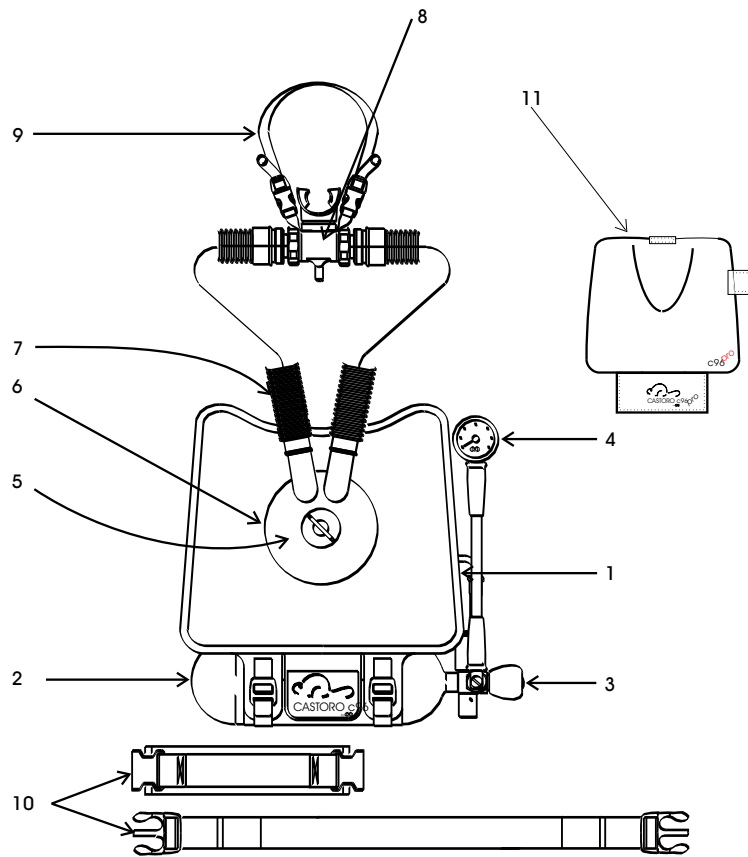
Manufacturer:	O.M.G. snc, Via Vincinella Loc. Ponzano S. Stefano Magra, La Spezia
Order No	402-001.00
Working Principle:	cyclic
Breathing Gas:	pure oxygen
Cylinder (two type available):	
volume	1,5 litres 2 litres
pressure:	200 bar 200 bar
material:	aluminium alloy steel
Breathing Bag Volume:	9,5 litres
Carbon Dioxide Scrubber :	soda lime, abt 2 kg
Duration:	according to the activity up to 3 hours
Maximum Depth:	6 metres, (ppO <sub>2</sub> 1,6 ATA)
Weight:	6 kg, ashore
Dimensions:	L 400 mm x W 400 mm x H 110 mm



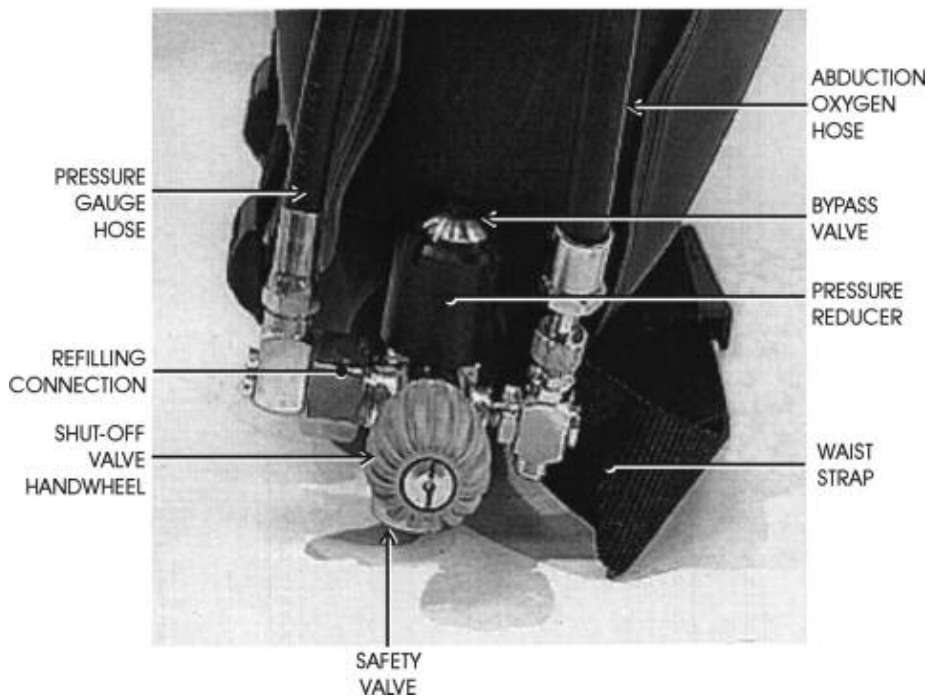
### 3. DESCRIPTION

Castoro C96PRO consists of the following main components (see figure 2):

- Breathing bag. Made with poliurethane rubber sheets high frequency electronically welded. The breathing bag has been placed in manner to give a small hydrostatic pressure difference as possible, i.e. low inhalation and exhalation resistance.
- Cylinder. Two cylinder type are available on request:
  - 1,5 litres/200 bar realized in aluminium alloy for decrease the magnetic level
  - 2 litres/200 bar realized in steel alloy
- Shut-off valve assy. Open or close the gas flow from the cylinder, includes the manual actuating type bypass, the pressure reducer and the safety valve
- Pressure gauge. Test the internal cylinder pressure.
- Canister. Contains the soda lime wich absorbs the carbon dioxide due to respiration acts. The canister is made in such way that it becomes completely surrounded by a gas flow wich prevents the soda lime from beeing cooled down by surrounding water.
- Hose connector. Carries the inhalation and exhalation hose gases in proper manner to and from soda lime canister .
- Inhalation and exhalation hose. Both hoses are provided with non return valves wich control in proper manner the flow direction.
- Mouthpiece. The mouthpiece contains a rotary valve wich isolates the circuit from the atmosphere when it is in closed position. In the open position, the rotary valve supplies the oxygen to the diver.
- Mouthpiece retainer. Help to retain the mouthpiece in the diver's mouth
- Harness. The harness (neck strap and waist strap) are easy to adjust to desidered lenghts.
- Soft shield made with high resistance kevlar cordura. Contains the breathing bag equipped with the hose connector and hoses, protecting the breathing bag against tearing and abrasions.



CASTORO C96PRO - Figure 2, Main Components





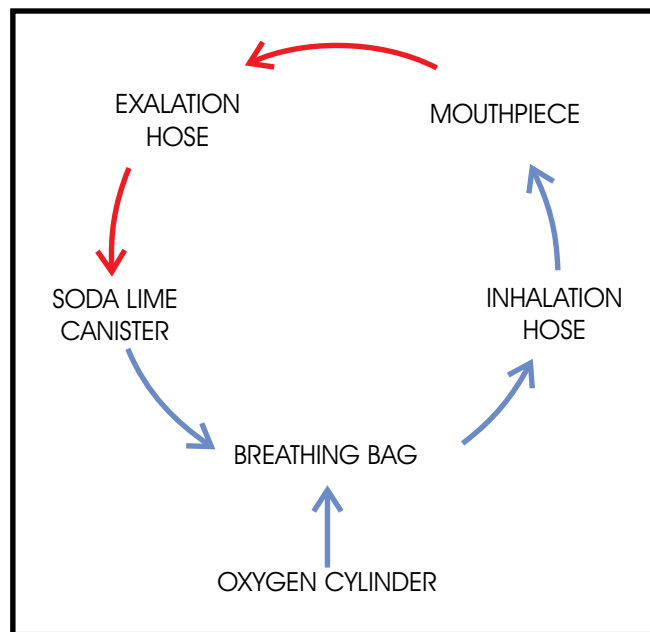
#### 4. FUNCTIONAL DESCRIPTION

Rebreather is a simply device that capture and recirculate the exhaled breath, scrub out the carbon dioxide produced by the respiratory functions and add oxygen to replenish what consumed.

Castoro C96PRO is a cyclic type fully closed circuit oxygen rebreather.

Instead of a one-way gas circulation, to and from breathing bag as pendular type, the gas circulates in two separate directions.

During the respiratory cycle the gas circuit is as in figure 4.



*CASTORO C96PRO - Figure 4, Breathing Loop*

High pressure gas (see figure 5) passes from the oxygen cylinder through the bypass valve into the breathing bag, expanding same and assuming the environmental pressure.

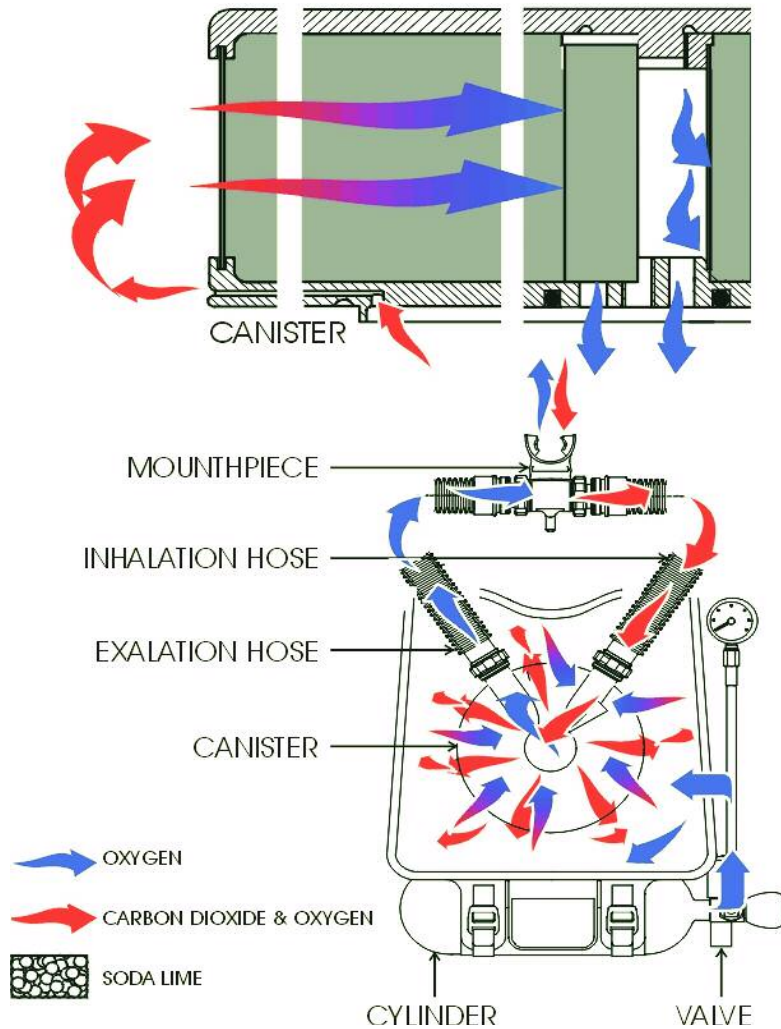
The diver inhales the oxygen from the breathing bag through the inhalation hose and mouthpiece and exhales the respiration gases through the exhalation hose into soda lime canister (the non-return valve contained in each hose, controls in proper manner the flow direction).

The soda lime absorbs and fixes the carbon dioxide contained in the respiration gases and purifies fully the non metabolized oxygen.

Therefore the oxygen passes in the breathing bag and the cycle starts again.

Actuating the by-pass lever is possible to restore the oxygen metabolized or to inflate quickly the breathing bag.

An high pressure gauge screwed on valve assy shows the pressure rate of the cylinder.



CASTORO C96PRO - Figure 5, Functional Diagram

## 5. PRE-DIVE PREPARATION

Before every dive with the rebreather *CASTORO C96PRO* it is necessary to check the following points:

### *Checks and Refills Oxygen Cylinder.*

Open the shut-off valve and verify the pressure value on the gauge; If the pressure value is less than 190 bar refill the cylinder with pure oxygen as follows:

**Warning:** open slowly the shut-off valve; the high pressure oxygen flow may burn or explode

- close the shut-off valve
- push down the bypass button to assure with the pressure discharge (make sure that high pressure gauge indicates zero).
- unscrew the gauge hose nut with the spanner wrench size no 28, PN 400-900, and remove the gauge complete from the rebreather
- connect the high pressure refilling hose to refilling connection
- open the shut-off valve
- follows the relevant instructions to refilling the cylinder.

**Warning:** verify the cylinder test date; discharge and replace if necessary

### *Checks and Fill Soda Lime Canister*

- unscrew the lock screw of the hose connector
- remove the hoses connector complete with corrugated hoses and mouthpiece from the breathing bag.
- remove the soda lime canister from the breather bag (to remove canister, take it firmly with the filler plug in vertical position and rotating slowly the canister draw it.

**Warning:** make sure don't damage the breathing bag torus gasket

- unscrew the canister plug and fill, using a funnel, with the appropriate soda lime (fill the canister a bit at a time and tap the sides of the canister to ensure that it is packed with no gaps).

**Caution:** soda lime dust is caustic and can cause chemical burns

**Warning:** if the soda lime isn't packed tightly in the canister this can lead to "channelling", where the exhaust gas passes through the scrubber without coming into full contact with the carbon dioxide absorbent.



Figure 6 a, Refilling Soda Lime



Figure 6 b, Tapping the Sides of Canister

- screw the plug, verify the canister O ring (discharge and replace if necessary) and put the canister into the rebreathing bag.
- verify the seating of canister, put down with care the canister and insert the torus gasket in the seating
- install the hoses connector complete and turning gently the same assuring that the gasket goes into filter seating.
- lock with the screw

### *Final Check*

Once you have completely assembled the rebreather, test it to ensure there are no leaks

- make sure that the four way valve is turned in closed position (lever down ward)
- slowly open the shut-off valve
- push down the bypass button and inflate moderately the breathing bag
- submerge the rebreather in a tub of water and looking for leaks
- if a leak is detected, it is necessary locate and repair it before the dive

Leaks can occur any number of places; check the breathing bag and hoses for punctures; check all the fitting and hoses connector to make sure they are properly closed.

## 6. DIVE

### *Donning the Rebreather*

- insert the neck strap on the neck
- insert the waist strap
- adjust and put the breathing bag at the same height of diver's counterlungs

### *On Surface*

- open shut-off valve
- put the four way valve lever in up ward
- inflate a little bit the breathing bag actuating the bypass button
- put mouthpiece and rotate the four way lever in down ward
- inhale with mouth and exhale with nose within the breathing bag is empty
- rotate the four way valve lever in up ward and leave mouthpiece.

This operation clean the bag from the other gases inside

**DANGER:** It's very important to make properly this operation to make sure wick no nitrogen gas is Still in the breathing bag..

### *Dive with Rebreather*

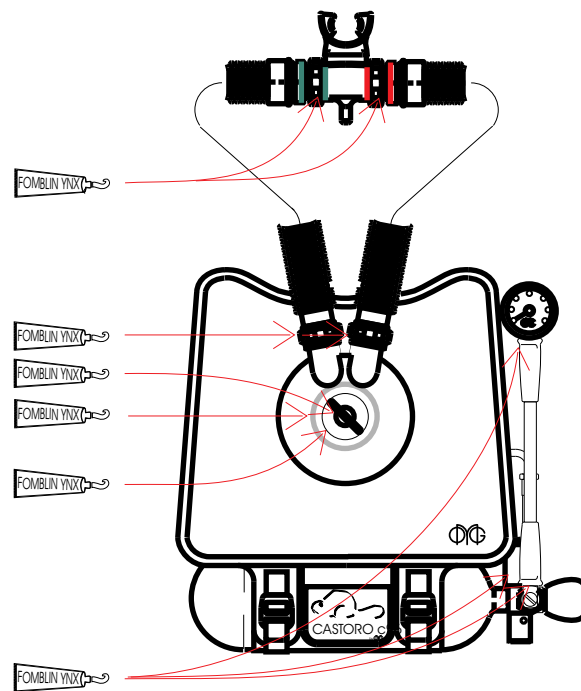
- put mouthpiece with the four way valve lever in up ward
- exhale all the air from the counterlungs through the four way valve
- rotate the four way valve lever in down ward
- inflate a little bit the breathing bag actuating the bypass button
- start the dive and during the first breath exhale from nose (in this manner the nitrogen gas into the counterlungs is completely blow away)
- inflate when necessary, to compensate the oxygen usage, actuating the bypass button

**DANGER:** It's very important to make properly this operation to make sure wick no nitrogen gas is Still in the breathing bag..

## 7. MAINTENANCE

### Post Dive

- rinse with fresh water the rebreather with the four way valve lever in up ward
- draw out the canister from the breathing bag
- empty the canister from soda lime
- rinse the canister with fresh water and blow out residual soda lime granules from canister
- rinse with fresh water hoses connector complete of hoses and four way valve
- disinfect this assy with a bactericide solution and rinse again
- rinse into the breathing bag, disinfect with a bactericide solution and rinse again
- allow to dry all the components at a shady place before assembly
- lubricate *ONLY* with YNX grease, PN 300- 500, as illustrated in figure 7.



CASTORO C96PRO - Figure 7, Lubrication Chart

**CAUTION:** all the components must be greased only with YNX grease, PN 300-500. Any other kind of oils and greases may burn or explode in contact with a pure oxygen flow.

### **Biennial Maintenance**

Test the cylinder

Overhaul the shut-off valve (manufacturer workshop)

### **Overhaul (Every Four Years)**

Major overhaul of complete rebreather (manufacturer workshop)

### **Breathing Bag Repair**

Material and tools required:

- emery cloth grain size 100\*
- Aquasure adhesive\*
- brush\*
- cleaning gasoline
- poliurethane rubber patch\*
- punches and scissor

*\*material contained in maintenance and repair kit, PN 401-015*

- inflate the rebreathing bag, localize and mark the damaged area
- roughen with emery cloth
- clean with gasoline and let dry up for about fifteen minutes
- roughen and clean the patch
- coat with Aquasure adhesive the surfaces of patch and breathing bag

**CAUTION:** Aquasure adhesive contains toluene. Use only in well airy area. Avoid prolonged breathing of vapors do not use closed to heat or flames. Do not ingest. If swallowed do not induce vomiting. Seek medical aid immediately. Avoid contact with skin or eyes. Keep out of reach of children.

- place patch in position and press on it firmly
- complete hardening takes place after one day.



- test repair before using

### ***Hoses Repair***

Material and tools required:

- Aquasure adhesive\*
- emery cloth grain size 100\*
- brush\*
- cleaning gasoline

*\*material contained in maintenace and repair kit, PN 401-015*

- localize the puncture on the damaged hose
- roughen with emery cloth
- clean with gasoline and let dry up for about fifteen minutes
- coat with Aquasure adhesive the surface roughened with a thickness of about 1,5 mm
- complete hardening takes place after one day.
- test repair before using

**CAUTION:** Aquasure adhesive contains toluene. Use only in well airy area. Avoid prolonged breathing of vapors do not use closed to heat or flames. Do not ingest. If swallowed do not induce vomiting. Seek medical aid immediately. Avoid contact with skin or eyes. Keep out of reach of children.