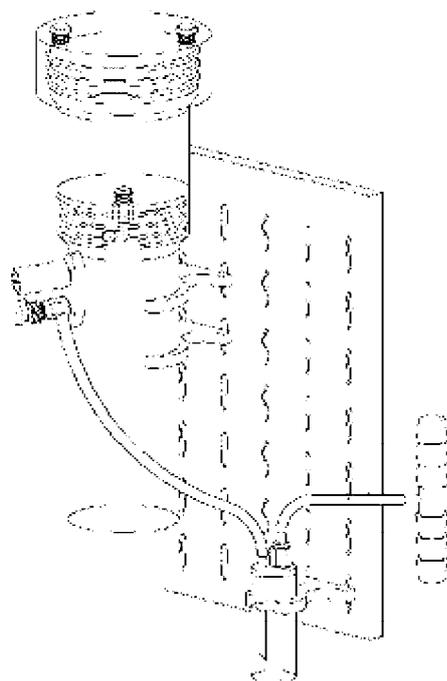


# Operation manual

## for the

### *CEOMAT*



The *Aqua Medic CEOMAT* is a system for the fertilisation of aquaria with CO<sub>2</sub> that works without pressure bottle. The CO<sub>2</sub> is stored in chemical compounds and released as required.

## 1. Product description

The dimensions over all are:

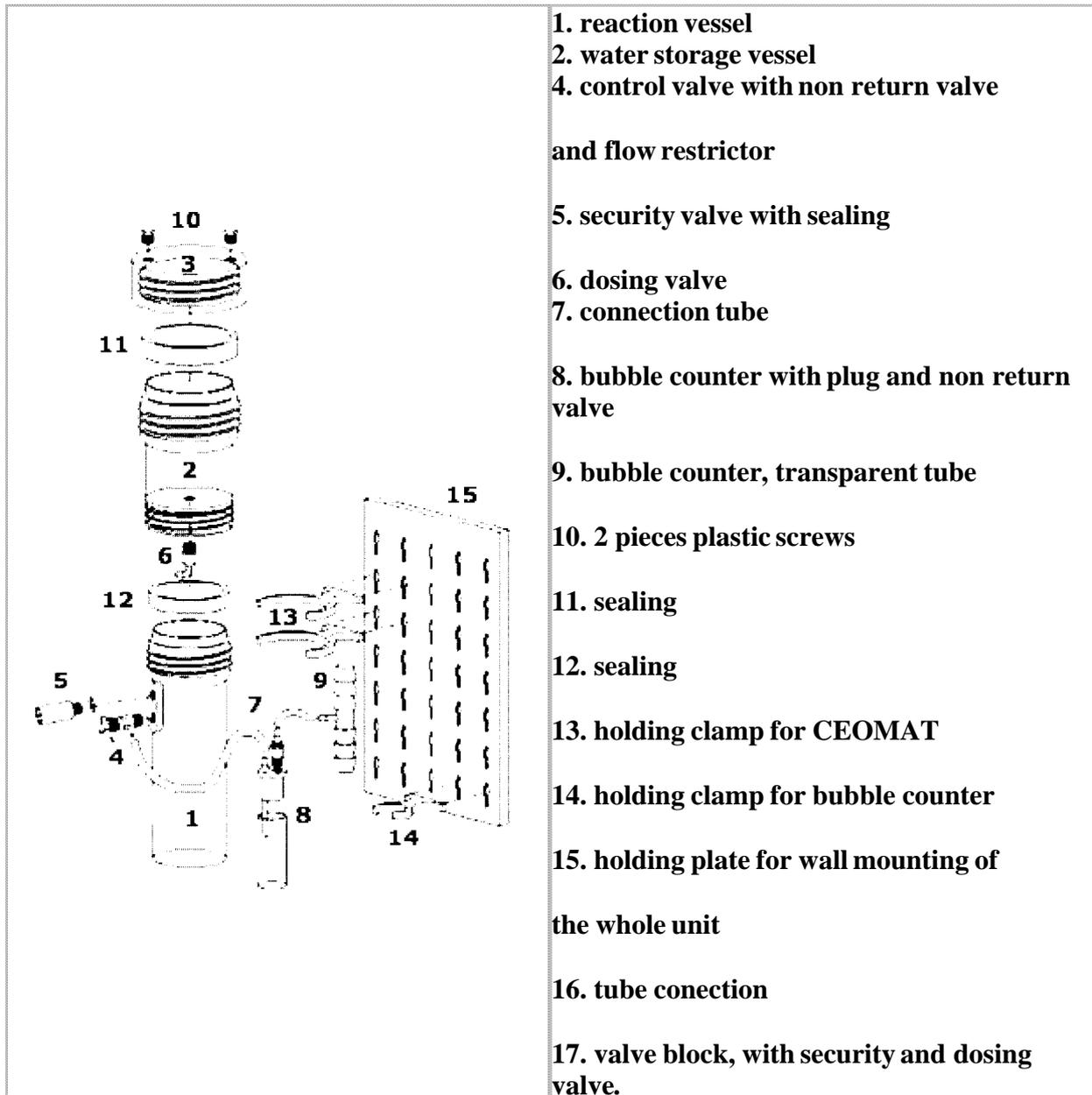
height: 33 cm, width: 18 cm and depth: 13 cm, including holding plate and security valve.

The *Aqua Medic CEOMAT* consists of :

- the reaction vessel with O-ring (height 20 cm, volume approx. 500 ml),
- the valve block, with security and dosing valve.
- the water storage vessel, approx. 400 ml volume, with control valve and flow restrictor for water
- Top with O-ring and 2 pieces 1/8" plastic screws
- Bubble counter with non return valve

- Holding system for wall mounting, including 4 screws and plugs
- CO<sub>2</sub> tube
  
- CEOPACK material for 2 fillings

**Fig: CEOMAT**



## 2. Theory/Function

The fertilisation of fresh water aquaria with CO<sub>2</sub> has been widely established in the last years. It is now regarded to be the basic technology for good plant growth. For sea water aquaria, CO<sub>2</sub> is necessary for the calcium reactor.

Up to now, for an effective CO<sub>2</sub> fertilisation pressure bottles had to be used. The refilling of the bottles is difficult and has to be done by professionals. This is not consumer friendly because of the difficulties of refilling and bottle changing.

The *Aqua Medic CEOMAT* is a completely new technology of CO<sub>2</sub> fertilisation. A mixture of chemicals, containing carbon dioxide, reacts with water. During this reaction, a definite amount of CO<sub>2</sub> is set free and can be used - like the CO<sub>2</sub> from a pressure bottle. The chemical compounds are food approved and nontoxic. The remaining liquid or salty material can be discarded.

The **CEOMAT** consists of 2 vessels, one above the other. The upper vessel contains water, the lower one (the reaction vessel) the CO<sub>2</sub> powder. The connection between both vessels consists of the control valve with the flow restrictor. Water is dripping through this system from the upper into the lower vessel. This water starts the chemical reaction and CO<sub>2</sub> is released. This CO<sub>2</sub> production causes a rise of pressure in the reaction vessel. Due to this overpressure, the control valve closes and thus prevents that more water drips down. Via the dosing valve, CO<sub>2</sub> can now be directed into the aquarium. Due to the CO<sub>2</sub> consumption, the pressure in the reaction vessel drops. If the whole CO<sub>2</sub> is used, the control valve opens and allows more water to drip into the reaction vessel. The reaction starts again.

If, in the beginning, the dosing valve is opened wide and too long, too much water drips into the reaction vessel and a high pressure is produced. New water enters the reaction vessel only if the whole CO<sub>2</sub> is used and the overpressure is gone. It is better, to allow only little water to enter the reaction vessel. The smaller the pressure differences is in the reaction vessel, the better the bubbles can be adjusted at the dosing valve.

If, caused by misoperation or clogging of the control valve, the pressure in the reaction vessel rises too high, it is automatically released by the security valve.

### 3. Mounting

Firstly, the mounting plate has to be mounted at a suitable place at the wall or in the cabinet of the aquarium. The holding clamps of the **CEOMAT** and the bubble counter can be hanged into the mounting plate.

As shown in the figures, the **CEOMAT** and the bubble counter can be pressed into the clamps. Take care not to break the bubble counter. The bubble counter is filled with water for 2 cm, so that the small inner tube is submerged and the bubbles can be counted.

From the bubble counter, the CO<sub>2</sub> is directed to the Calcium reactor, the CO<sub>2</sub> -reactor or into the filter. The delivered T-reduction piece can be used to connect the CO<sub>2</sub> tube to the suction side of a canister filter.

### 4. Starting

First the **CEOMAT** is dismantled. The dosing valve is closed completely. Now the water storage

vessel is removed from the reaction vessel. The following points have to be controlled:

- if the control valve and the flow restrictor are clean and correctly mounted. Residues from CO<sub>2</sub> powder or the solution have to be removed. **After flushing, let it drip with pure water for 30 seconds.**
- if the washer is clean and mounted correctly

### **Mixing of the CO<sub>2</sub> powder**

Both components of the CO<sub>2</sub> powder have to be mixed carefully. The complete content of bag „A" and the complete content of bag „B" are mixed in a plastic can. Fill the mixture carefully into the reaction vessel of the **CEOMAT**. A very dust free method is to mix both components in a plastic bag.

Take care that no water contacts the powder, as the reaction starts immediately and CO<sub>2</sub> is released. Dry the reaction vessel precisely.

### **Start**

Now water can be filled into the water storage vessel and the top is closed. The **CEOMAT** is now pressed into the holding clamps and the tubes are connected. If the dosing valve is opened, water drips into the reaction vessel and the reaction starts.

During the start, the control valve may be blocked by an air cushion. Remove it with a slight suction at the CO<sub>2</sub> tube. Once started, the reaction runs automatically.

The **CEOMAT** is filled with air, over the powder. This air is directed into the aquarium with the first 100 ml CO<sub>2</sub>. If you suck the gas into a cannister filter (see below), this air is of course not dissolved in the water and fine bubbles leave the filter together with the cleaned water. During normal operation, if pure CO<sub>2</sub> leaves the **CEOMAT**, the bubbles have to dissolve completely on the cannister filter.

### **Adjustion**

The bubbles can be adjusted with the dosing valve and controlled at the bubble counter. The number of the bubbles is depending on the pressure in the **CEOMAT** (see Theory). The number of bubbles is changing with changing pressures in the **CEOMAT**. At the first day, you should re-adjust the bubbles from time to time. Afterthat, the number should remain more or less constant.

## **5. Introduction of the CO<sub>2</sub> into the aquarium**

The introduction of the produced CO<sub>2</sub> from the **CEOMAT** into the aquarium differs in some important points from the pressure bottle:

Caused by the regular pressure changes in the **CEOMAT**, sometimes phases with very low pressure arise - shortly before the control valve opens and new water drips in. The CO<sub>2</sub> introduction into the aquarium has to be adapted to this. Some CO<sub>2</sub> systems on the market need a high prepressure - almost all reactors. This means, that the CO<sub>2</sub> introduction stops, before the control valve in the **CEOMAT** opens and new water drips in. For this reason, it is ideal to suck the CO<sub>2</sub> actively out of the **CEOMAT**. We recommend the following systems:

- In **freshwater aquaria**, the CO<sub>2</sub> can be directed to the suction line of a cannister filter - close to the suction port. Here we have the highest under-pressure to suck the CO<sub>2</sub> out of the **CEOMAT**. In the filter, the CO<sub>2</sub> dissolves completely and enters the aquarium together with the treated water. The needed reduction T-fitting is delivered with the **CEOMAT**. The CO<sub>2</sub> enriched water should not be introduced into the aquarium at the surface, with splashing, etc. With this, a great part of the CO<sub>2</sub> would be removed and blown into the air. The water should be introduced below the water level.

### **What is the effect of the CO<sub>2</sub> introduction into the filter?**

For the biology in the filter, the introduction of CO<sub>2</sub> is very positive. The nitrifying bacteria that oxidise ammonia to nitrate, need CO<sub>2</sub> for growth, like green plants. In filters that are heavily loaded with ammonium, a shortage of CO<sub>2</sub> may arise. This can be avoided by the introduction of CO<sub>2</sub> into the filter. Overdosage is not possible - if you use the **CEOMAT** correctly.

- In **sea water aquaria** a connection to the *Aqua Medic Calcium reactor* with integrated needle wheel pump, the CO<sub>2</sub> can be connected to the suction port of the pump. This causes an underpressure in the **CEOMAT**, the CO<sub>2</sub> is sucked out.

In all cases, you have to take care, that after all of the **CEOMAT** powder is exhausted, the rest of the water from the storage vessel drops down into the reaction vessel and, after that, air is sucked in. At the bubble counter, you can still see bubbles, this is not CO<sub>2</sub>, but air. A good indication that all the **CEOMAT** powder is exhausted, is, if the complete content of the storage vessel is dripped into the reaction vessel.

## **5.Operation**

**Dosing:** The quantity of CO<sub>2</sub> depends on the demand of the aquarium. A medium size tank needs between 20 and 60 bubbles/min. This depends also on the hardness and the pH value of the aquarium water. In any case, you have to monitor the pH of the aquarium water, if you work with CO<sub>2</sub>. In a fresh water aquarium, the pH should be in the range between pH 6.5 and 7, in a sea water aquarium between 7.9 and 8.25.

**Capacity:** One filling of the **CEOMAT** develops, if used correctly, approx. 125 g of carbonic acid. This quantity lasts approx. 3-4 weeks in a medium sized tank.

One refill pack **CEOPACK** lasts for 2 **CEOMAT**-fillings, this is for 250 g carbonic acid.

## 6. Refilling, cleaning

For refilling the **CEOMAT** has to be demounted and cleaned. The  $\text{CO}_2$  - powder has reacted with water to a viscid liquid. A part of the substance may cristalise and it seems that a part of the material hasnot yet reacted. Indeed, the reaction always runs completely. The material that has been wetted, reacts. One filling of the water storage vessel is enough for one run.

The reaction vessel has to be cleaned and dried carefully before refilling. Residues of water would start the reaction immediately, if they come in contact with the powder.

The control valve and the flow restrictor also have to be cleaned. First, they are flushed with water. Now, the storage vessel is filled and you allow a free dripping for approx. 30 seconds. This cleans the valve. Now the tank is emptied again.

All threads have to be cleaned from residues of the chemicals. If not, the vessels stick together and cannot easy be demounted. The refilling with chemicals and the new start is the same as mentioned above (chapter „start“).

## 7. Failures

If used and cleaned carefully, the **CEOMAT** works trouble free for long time.

### **Trouble finding:**

#### **The CEOMAT-filling is exhausted too early:**

- **CEOMAT** and all connections have to be tested for leakage and eventually tightened.
- the bubble quantity is too high - reduce it. (Attention! Too much  $\text{CO}_2$  is dangerous for the aquarium!)
- $\text{CO}_2$  escapes through the control valve into the upper water storage vessel (see below). The control valve does not close tight. Unscrew the valve, clean it with water and remount it. If it is still not tight, replace it against a new one (one replacement is delivered with the **CEOMAT**).

#### **Gas bubbles escape into the water storage vessel:**

- The control valve is not tight. The reason may be some clogging or it is damaged. Clean the valve with pure water and let it drip freely for 5 min. If it is still not tight, replace it.

#### **The CEOMAT stops, no water drips down:**

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- Open the dosing valve, if no effect:
- the pump capacity of the cannister filter is too small, the under pressure is too low. Reason: the filter is clogged ----> clean the filter material.
- CO<sub>2</sub> reactor needs too much pressure. Remove the CO<sub>2</sub> tube from the bubble counter and suck slightly. If water starts dripping, the operation can go on. Use a CO<sub>2</sub> reactor with a separate circulation pump to guarantee the necessary under pressure in the **CEOMAT**.
- Control valve is clogged. Remove the water storage vessel and let the valve drop freely for some minutes. If this does not work, replace the valve. You can open the valve and clean it. But take care. Inside you find a small glass pebble, that you may loose. The plastic umbrella in the control valve may not be dirty or porous. It has to be changed then.

### **From the cannister filter air bubbles come into the aquarium:**

- The **CEOMAT**-filling is exhausted and the water storage vessel is empty. Because of the underpressure air is sucked through the **CEOMAT** ----> refill the **CEOMAT**.