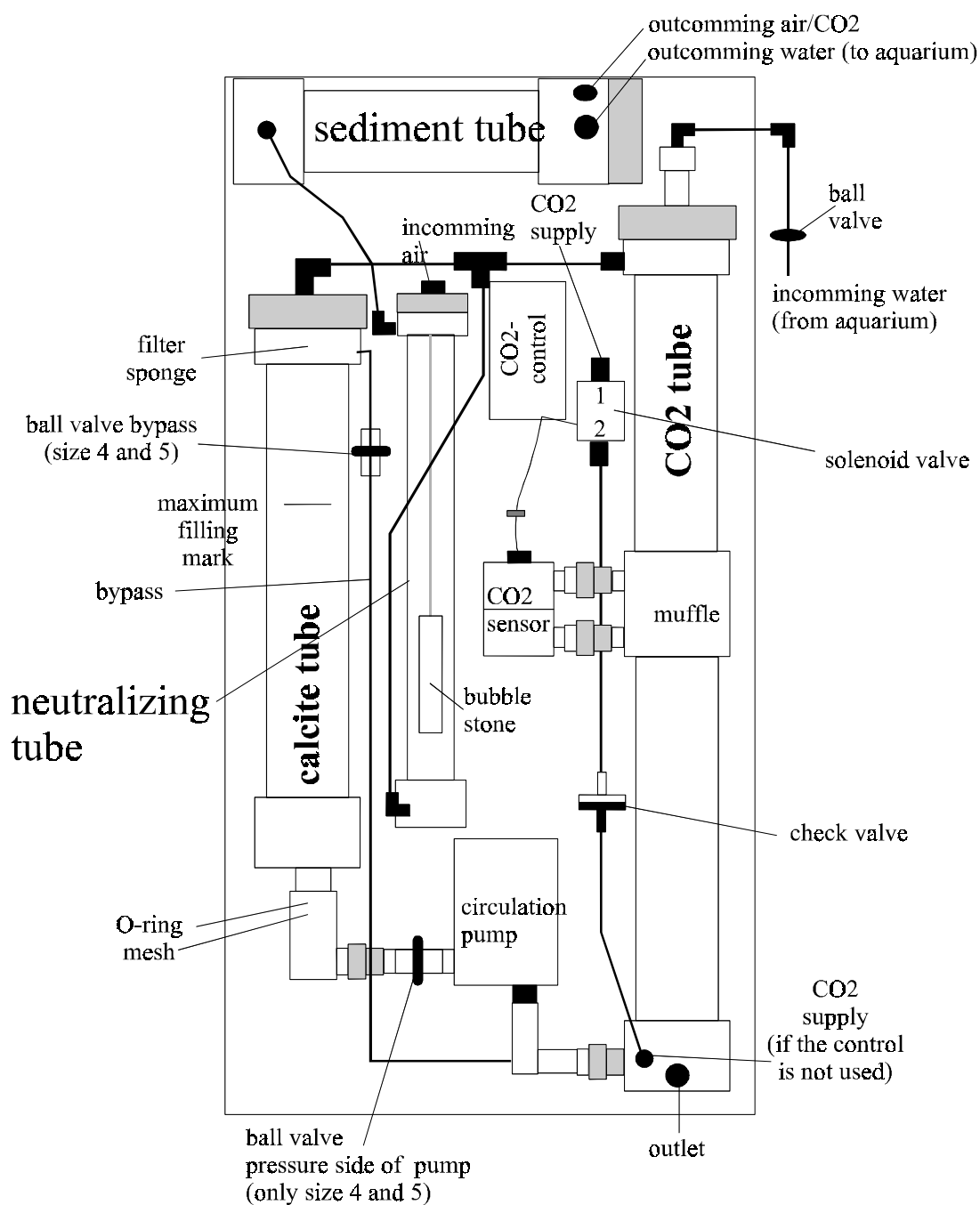


Systems for Aqua Culture,
Aquarists, Laboratories and
for Water Treatment

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Instruction Manual for
Turbo Chalk Reactor Size 1 to 5



1. Principe of the Turbo Chalk Reactors

In the CO₂ tube CO₂ is dosed to lower the pH of the water (about 5,2 to 5,5). The circulation pump pumps the water into the next tube - the calcite tube. In this compartment the calcite material is dissolved with help of the most effective turbulent system - the fluidized bed. The calcite is splitted into calcium and hydrogene carbonate. The enriched water flows to the CO₂ tube - the cycle is closed.

The same volume of incoming water flows out of the system - you can see in inflow in the small transparent tube above the CO₂ tube. The volume is controlled with the small ball valve. The outflow reaches the neutralizing tube. In this compartment air strips out the CO₂ (about 80%). The neutralized water flows to the sediment tube. Most of the very fine sediment, caused by friction in the calcite tube, sinks down on the bottom of the sediment tube. In this tube phosphate adsorbs (chemo sorption) at the sediment.

2. Mounting the unit

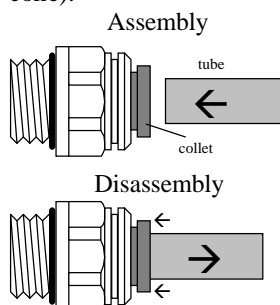
The *Turbo Chalk Reactor* should be mounted in the near of the aquarium or the filter chamber. Please mount the unit in an upright position. The outlet of the water must fall down free (without ascend)!

Please take a small pump (or a bypass of a big aquarium circulation pump) to bring the water into the inlet of the reactor. Connect the air supply (look to technical data for the right volume) and the CO₂ supply to the system. Only use a CO₂ pressure tank with pressure release and needle valve. The CO₂ working pressure should be between 0,5 and 2 bar (max. 6 bar). Please use a good check valve to prevent destruction of the CO₂ tank. If you have the full version with electronic control a check valve is build in.

All inlets an outlets are made with the AquaCare push fit fittings. If you don't use the PE pressure tube, please use the connectors for other tubes.

The water outlet should be made with 10 mm tubes. Please attend that the tube must be mounted without ascend!

For mounting the tube cut them with a sharp knife. For the push fit fittings only use the black AquaCare PE tube. Otherwise use the connectors to other tubes (PVC or silicone).



The pressure tube is pushed into the push fit fitting until it cannot be pushed further. The tube should be gently pulled to ensure that the connection is sound. The connection can be released by pushing back the collet and pulling the tube out. Please attend that the air supply must be safe. If powers fails the water shouldn't be go

back to the air pump. Use a check valve or a big loop over the water level.

3. Putting into operation

Please read this part carefully to prevent work and failures. Incorrect use of the reactor may destroy the circulation pump.

1. Be sure that all inlets and outlets are connected (incoming water, outcoming water, air and CO₂)
2. Only size 4 or 5: Close the bypass ball valve and open the ball valve at the pressure side of the circulation pump.
3. Open water inlet ball valve and put the incoming water pump (or bypass) into operation. Fill the reactor half with water.
4. Put the Turbo Chalk Reactor circulation pump into operation for a short time to bring out the air out of the pump. **This step is important to minimize the work.** Only if all air is out of the pump it can produce the pressure for the fluidized calcite bed. Please attend, that the circulation pump sucks no air out of the CO₂ tube. Maybe you have to wait for half a minute and start the pump again.
5. Stop the inflow pump and open the calcite tube. Unscrew the cap of the calcite tube and take out the filter sponge.
6. Fill up the calcite tube to the maximum filling mark. Do not use more or another material. Otherwise the fluidized filter system does not work correctly.
7. Close the calcite tube - don't forget the filter sponge! Start the incoming pump (or bypass).
8. If water reaches the sediment tube put the circulation pump in operation.
9. Reduce the incoming water (ball valve) to the optimum. For the right volume, see technical data.
10. Now start the air supply. For the right volume, see technical data.
11. Start the CO₂ supply carefully. You see the incoming bubbles at the bottom of the CO₂ tube. The optimum CO₂ volume depends on the incoming water and the pH of the intern reactor water. **Attention!** At the beginning you need more bubbles. If you have mounted the CO₂ control reduce the incoming CO₂ to 2-5 bubbles per second (size 4 and 5 up to 20 bubbles per seconds!). The control stops the CO₂ inlet if the CO₂ level reaches the gray PVC muffle. The control works with 30-40 seconds delay. So raise the CO₂ supply carefully. **After starting the reactor the CO₂ level should reach the muffle within 15 to 30 minutes.** If you need more time take more CO₂ - otherwise the reactor does not work in its optimum. If the filling time is less than 15 minutes lower the CO₂ inlet - otherwise the circulation pump sucks CO₂ and does not work properly and will stop.
12. If water reaches the sediment tube put the circulation pump in operation.
Size 4 and 5: reduce the ball valve at the pressure side of the circulation pump. If the calcite material of the fluidized filter bed is **very slowly** in motion you have the right

position. - Open the ball valve of the bypass carefully. If the water runs down the CO₂ tube (if you see CO₂ in the tube) in a not turbulent way you have the right ball valve position. There should be any foam in the CO₂ tube - otherwise open the bypass ball valve.

3.1. The right volumes for incoming water, air and CO₂

Incoming water:

The power of the Turbo Chalk Reactor should be controlled by the daily operation time. Do not reduce the incoming water! Otherwise the circulation pump will be damaged. The pump for the incoming water should be in operation 24 hours per day. (If you stop the circulation pump the reactor would be de-aerated.)

The optimum incoming water of the AquaCare *Turbo Chalk Reactors* in liters per hour:

Size 1	Size 2	Size 3	Size 4	Size 5
4-5 l/h	8-10 l/h	20-25 l/h	40-50 l/h	80-100 l/h

Please take this optimum volumes. If the water in the reactor becomes **yellow** and very turbid, the incoming water must be raised. Otherwise the circulation pump breaks down. For raising the incoming water please open the ball valve in the inlet. If the ball valve is totally open, please take a larger incoming pump. Optional you can use volume meters (size 2-5).

The air supply for the neutralizing tube:

The more air comes into the neutralizing tube the higher the pH of the outcoming water (maximum pH 7,3). The air supply should be in action minimum 15 minutes after stopping the circulation pump. The proper function of the air pump should be controlled in the sediment tube. At the left side you must see a foam. If the foam does not appear please control the air pump and the bubble stone in the neutralizing tube. (Wood bubble stone will not work!)

The right CO₂ volume:

The optimum CO₂ volume should be controlled so that the CO₂ level in the CO₂ tube would reach the muffle within 15-30 minutes after starting the circulation pump. If the level does not reach the muffle after 30 minutes take more CO₂. If the level reaches the muffle in less than 5 minutes lower the CO₂ incoming volume. If the circulation pump of the reactor stops, the CO₂ supply must stop, too. The electronic device controls the CO₂ inlet automatically.

The power of the *Turbo Chalk Reactors*:

Important!!! The power of the *Turbo Chalk Reactors* should be controlled with the operation time. Do not lower or raise the water inlet! Maxmum power is reached with two hours operation - 15 minutes pause - two hours operation.... For a normal reef aquarium you need 2 - 6 hours operation time per day. If the aquarium contains very many living stony corals the operation time can raise up to 20 hours. For the first two months control the carbonate hardness (KH) every week. The optimum is between 8 and 12°dH (German hardness). The reactor can produce a light turbidity in the aquarium. It is pure calcium carbonate and it is not dangerous. To prevent the turbidity, take some very fine filter material at the outlet of the water.

To control the daily operation time please use a simple timer. **With this timer control the circulation pump and the CO₂ supply. Air supply and incoming water can operate 24 hours a day. Please start with a low operation time (2 hours per day). The power of the AquaCare *Turbo Chalk Reactor* is very high compared to other systems!**

Carbonate hardness should not be under 5°dH, the calcium concentration not below 400 mg/l (ppm). KH above 15°dH and calcium above 500 mg/l can cause negative effects in the reef aquarium. If only one parameter is to low, raise it with other compounds, e.g. AquaCare Care System „KH-plus“, „Calcium-plus“ or calcium hydroxide solution „Kalkwasser“.

The maximum carbonate hardness and calcium concentration depends on the pH of the aquarium water. Normally you can reach 10°dH and 400 mg/l calcium. The pH of the aquarium would raise a little bit after some days operation of the reactor. If the pH of the aquarium is too high reduce the air volume of the neutralizing tube.

4. Maintenance

To have an optimum system you must do some maintenance work. Otherwise the power is not high or some parts would damage.

Daily control of CO₂ (measure the incoming water or use a volume meter)

Daily de-aeration of the reactor: for de-aerating the reactor you have to stop the circulation pump once a day (or use a simple timer) - without stopping the incoming water. After 2-15 minutes all gases are out of the reactor.

Weekly to monthly: fill up the calcite tube with Turbo Granules. Stop the circulation pump and the CO₂ supply. Open the calcite tube, take off the blue filter sponge, wash it out and fill up the calcite tube. The material dissolves totally with the time - you only fill new material to the old.

If the sediment tube is full: stop the system, disassemble the tubes from the sediment tube, take the tube from the mounting plate, open the tube at the cap and clean it. Assemble the system after cleaning.

Every year: clean the neutralizing tube and the CO₂ sensor.

4.1. Some tips

Take some **vaseline** for the **screws** of the tube. It is more easier to open them.

Take some **vaseline** for all **O-rings** to have gas tight connections.

Reduce the power of the reactor if carbonate hardness is more than 15°dH or calcium more than 500 mg/l. You can save electrical power, CO₂ and spare parts.

The reactor should **start** minimum **once a day**. Otherwise the calcite material can block or the mesh in the bottom of the calcite tube can block (size 4 and 5).

Turbidity in the aquarium water can stop after using a fine filter material in the outlet of the reactor

You can **save CO₂** if you stop the CO₂ supply ½ to 1 hour before stopping the circulation pump (you need a second timer).

If the air supply would be not in order the outcoming water of the reactor is too low (5.2-5.5). To prevent damage in the aquarium use a pH control. If the pH in aquarium is below e.g. 7,9 the AquaCare reactor should stop totally.

5. Warranty

You have 12 months warranty on all AquaCare units excepts spare parts like air stones, pump parts and granules. You have no warranty if parts are broken by violent (for example totally closed water inlet). If you send a warranty unit to AquaCare please send the dated receipt, too.

Technical Data					
	Size 1	Size 2	Size 3	Size 4	Size 5
Max. aquarium volume in litres	500	1000	2500	7000	10000
Sizes (W×H×D) in cm	30 × 59 × 13	30 × 74 × 13	40 × 74 × 17	49 × 110 × 21	50 × 140 × 21
volume granules in ccm	250	450	1000	3000	5000
maximum / average power 3h/d operation time per day in litres * hardness	2.000 / 250	4.000 / 500	10.000 / 1.250	20.000 / 2.500	40.000 / 5.000
typical daily operation time	1-6 hours (best operation time at the evening)				
pH value outlet	about 7,0	about 7,3			
build in pump	Eheim 1046	Eheim 1048	Eheim 1250	Eheim 1060	
electrical power of pump in watts	20	25	43	65	
connection inlet / outlet	6 mm / 10 mm AquaCare push fit fittings				
water inlet volume in l/h	4 - 5 at 1 m	8 - 10 at 1 m	20 - 25 at 1,5 m	40 - 50 at 1,5 m	80 - 100 at 2 m
volume meter (optional)	-	3-24 l/h	5-50 l/h	15-150 l/h	15-150 l/h
air volume in l/h at 100 mbar, size 3-5 at 200 mbar	200	300	400	400	500
CO2 supply	CO2 pressure tank with releasing unit and needle valve				
CO₂-control for <i>Turbo Chalk Reactor</i> (optional)	order number: 4001-001 transformer: 15 watts; 24 volts AC; solenoid valve (15 watts, 24 volts) incl. fittings (6 mm push fit); check valve; CO ₂ -sensor 3/4" connection, electronic control unit; mounting material				

other sizes on request

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