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Thank you for choosing the GEO calcium carbonate reactor. This latest model reflects many changes made over the years to provide a better product. Heavy duty cast construction and quality fittings used throughout ensure years of trouble free service.

Setting Up and Installing Your New GEO Calcium Carbonate Reactor

Things you will need to install, operate and tune in your reactor

- The complete reactor as provided by the manufacturer
- Large Grain reactor media or equivalent
- One Maxi-Jet 1200 or Aqua Lifter feed pump
- CO_2 system including the tank, regulator, needle valve, and solenoid*
- pH meter, calcium and alkalinity test kits (recommend Salifert)

* I also recommend adding brass check valve between the check valve supplied with the reactor and the CO_2 needle valve to protect against any water damage to the CO_2 equipment.

Set up and installation instructions

Remove the union found at the lid to allow the reactor's plumbing to be out of the way. Loosen the eight thumb screws nuts to remove the lid. Remove the black media screen. You will now want to give the reactor a thorough rinse to remove any residual glue, dust or fabrication debris. Replace the black media screen. Before installing the media you will also want to give it a rinse to help remove any dust. After the media is in place install the lid and tighten the thumb screws in a staggered bolt pattern like you would do while installing lug nuts on a wheel. The clear lid will allow you to see the o-ring compress evenly. Do not over tighten the thumb screws. With the lid secure, replace the reactors plumbing before tightening the union found at the lid. It is a good idea to give the reactor a bench test at this point to insure there are no leaks. This is best done at the kitchen sink. It is much easier to remove and re-tape a leaking fitting now than after the reactor is installed and under your aquarium cabinet. DO NOT OVER TIGHTEN THE FITTINGS ON THE EHEIM PUMP. This could damage the pumps body or volute.

Once confident the reactor is leak free, install the unit to its final location. Attach the reactors feed pump with the proper fitting provided with the reactor. DO NOT ALTER THE REACTOR TO ACCEPT A LARGER DIAMETER FEED LINE, THIS WILL ALLOW TOO MUCH FEED TO THE REACTOR AND CAN RESULT IN DAMAGE TO THE UNIT. INSTALLING A LARGER DIAMETER FEED LINE WILL VOID THE WARRANTEE. Place the return line into the sump above the water level. Be sure the micro ball valve is in the "open" position and plug in the feed pump. Having the micro ball valve open while filling will allow the reactor to purge air. Once the reactor is filled and water is being returned to your sump, plug in the reactor's Eheim circulating pump. Allow the reactor to run like this for a period of time as air is released from the media.

Once the reactor is in place and running, connect the CO_2 line supplied with the reactor to the proper connection on your CO_2 system (CO_2 needle valve) and open the valve on top of the tank. Adjust the pressure dial on the regulator to 10 pounds maximum, or to manufactures recommendations. Close the CO_2 needle valve and then plug in the solenoid. You are now ready to dial in the reactor.

Setting Up and Installing Your New GEO Calcium Carbonate Reactor

Dialing in Your GEO Calcium Carbonate Reactor

Before attempting to dial in the reactor you must first understand how the reactor operates. Water in the reaction chamber is being circulated through the media many times per hour. Water is fed through the reactor rather slow, being just ml per minute. CO_2 is slowly added to the reaction chamber and this allows the pH of the water to drop to an acidic level. This in turn allows the media in the chamber to break down and add elements to the water in the circulation loop. As water from your aquarium is fed into the loop, water from the reactor rich in calcium and carbonates is allowed to drip back into the sump. Two adjustments will effect the reactor effluent, CO_2 bubbles per minute.(BPM) and the effluent drip rate. Increasing the BPM will raise the effluent alkalinity and lower the effluent pH. Increasing the effluent drip rate will raise the effluent pH and lower the effluent alkalinity.

Before dialing in the reactor you will want the target values for the aquarium in place. Manually adjust these values with the appropriate buffers. You will also want to record the values of each test to track the effect of your adjustments during dial in. There is no set rule for BPM to gallons of water as aquarium is very different in demands and each reactor would be tuned in to meet those needs. I recommend a starting point of 50 ml per minute (NOT DROPS) and a BMP of 30. It is better to ramp up the values than to start too high and attempt to dial down. Let the reactor run for twelve to twenty four hours between each adjustment and test to see the results. After the initial adjustment you should see an increase in the effluent alkalinity and a drop in pH. If the aquarium values have dropped, increase the BMP. If the aquarium values have remained consistent or increased, allow the reactor to run as is and retest after the given time period. I suggest an increase of BPM no more than 10 at a time. As you are testing and adjusting the BMP, you will also want to keep track of the effluent pH, do not allow this to drop below 6.0 (depending on media used) for a long period of time. Below 6.0 pH, the media will quickly dissolve and turn to a mushy state. Once this has happened, the flow through the reactor is hampered and performance will greatly suffer. If you do see the effluent pH below 6.0, make adjustment to the effluent drip rate, increasing as needed. As a general rule, the effluent alkalinity will be between 2 and 3 times that of your aquarium alkalinity.

If you are using a pH controller to regulate effluent pH, see page 3 of reactor instructions.

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Using a pH controller with your GEO calcium reactor.

A pH controller can be used in conjunction with your GEO calcium reactor to regulate the flow of CO_2 gas into the reaction chamber keeping the effluent pH at your pre-set level.

Things you will need to install a pH controller.

- pH controller with probe
- Electronic solenoid valve (normally built into the CO^2 regulator)
- pH probe adapter (included with reactor)
- Teflon tape

Installing the pH controller

1. With flow of water to reactor OFF remove the threaded plug located on the lid of the reactor.
2. Install the pH probe adapter in place of the threaded plug. You will need to apply a few wraps of Teflon tape to the thread of the adapter before installing. Thread the adapter in hand tight plus one half turn. **DO NOT OVER TIGHTEN.**
3. Loosen the compression nut on the adapter and insert he calibrated* pH probe. Tighten the compression nut hand tight. **DO NOT OVER TIGHTEN.**
4. Plug the electronic solenoid into the pH controller. Set controller per manufacturers instructions.
5. Start your reactor.

You will now use the controller to regulate the flow of CO_2 gas into the reaction chamber. When the pH in the chamber rises above your pre set level the controller will trigger your solenoid to open, allowing the flow of gas. Once your target pH value is reaches the controller will close the electronic solenoid shutting off the flow of gas. You will need to set the CO_2 needle valve to allow gas to bubble through the counter with the solenoid is open. Bubbling gas too slow and your target pH will not be reached, the solenoid will never close. Bubbling gas too fast (needle valve wide open) will allow excessive gas to enter the reaction chamber, overpowering the effluent drip rate and stopping flow. There is a wide range in-between too fast and too slow. Try setting the BPM around 90 as a starting point.

***Calibrate your probe per manufacturer's instructions before installing into reactor.**

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TROUBLE SHOOTING

Leaks

- **Leaking at the lid** - Leaking found at the lid would be caused by either overfeeding the supply to the reactor or the thumbnuts not being tight.
- **Leaking at a fitting** - Leaks at a fitting must be repaired by removing the fitting and applying Teflon tread seal tape to the threads.

Effluent drip slowing or coming to a stop

- **Air build up in the chamber and drip stops** - This is normally caused by one of two things. Air is being drawn into the reactor from the feed pump. Be sure the feed pump is located in an area of the sump free of micro bubbles and is submerged enough not to draw air from the surface of the water. This can also occur from running a BPM much higher than that of the effluent drip rate.
- **No air in the chamber, but the drip stops** - This is typically caused from the effluent drip rate being run too slow, increase the drip rate. This can also happen if the pump feeding the reactor has stopped or the line has become clogged with debris. Check pump for proper operation and clean lines as needed.

Pump is making noise

- **Pump makes a "sizzle" sound periodically** - This is normal. The sound is being made as the CO_2 is drawn into the pump impeller.
- **Pump in making a chattering noise** - This would indicate foreign matter has made it into the pump. The pump must be disassembled for cleaning.

CO_2 Delivery System

- **Fluctuating BPM** - This is caused from a leak in your CO_2 system. Use soapy water around all of the threaded connections and look for any bubbles being produced. This will indicate a leak. Repair leaks as needed.
- **CO_2 tank has gone empty rater quick** - This also would be caused by a leak in your CO_2 system. Fix leaks,

Aquarium pH has dropped after installing the reactor

- Some will experience a dip in pH after the reactor is in operation. The best way to help prevent such a dip is to situate the effluent to drip near the protein skimmer's pump intake. Water from the reactor would be drawn into the skimmer and excess CO_2 will be removed.

Air build up in the chamber

- Air build up in the chamber is caused by either CO_2 build up or air being drawn into the circulation loop. A good way to test the problem is to shut off the CO_2 delivery to the reactor. Purge the air build up from the chamber and let the reactor continue to operate without CO_2 If the air continues to accumulate in the chamber, the problem is not the CO_2, but air from an outside source being introduced into the circulation loop. The most common being the feed pump drawing air from the surface of the water or being too close to a turbulent area, such as the skimmer output or aquarium drain plumbing. If the air build up does not occur with the CO_2 off, then you would have CO_2 build up in the reactor.

The calcium and alkalinity levels are not increasing simultaneously

- This is caused by the ionic balance between the calcium and alkalinity being skewed. Raise the lower level manually with the appropriate buffer. As the lower level increases the higher level will decrease. Once the levels are in check the reactor will then maintain them as needed.

The media seems to be depleting

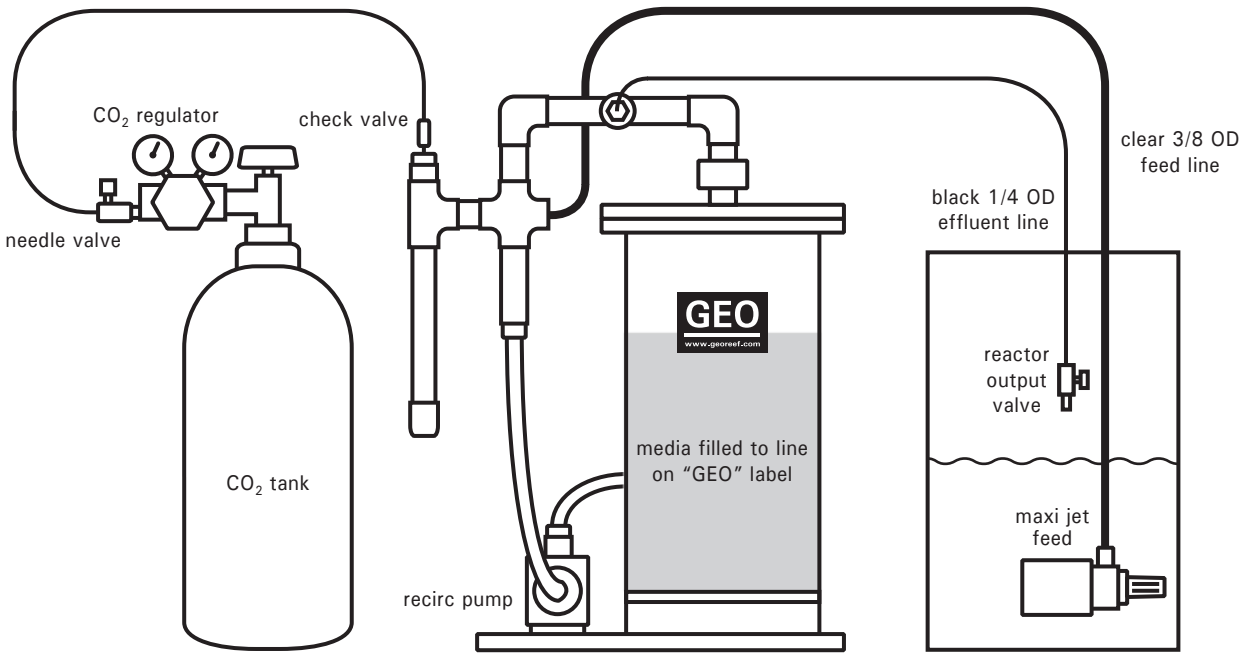
- Congratulations! Your reactor is working. As the media dissolves, the level in the reactor will decrease. The media should be replaced when about half gone, or every six months or so. Do not top off media as it dissolves, the older media will become very fine or mud like and hamper flow through the reactor and overall performance will suffer. When changing media, it is a good idea to pull the reactor and service it with a clean up as done with the initial set up. A five pound CO_2 tank will last between six and eight months, and once depleted it is a good time to go ahead and perform reactor maintenance.

Feel free to email George at **sales@geosreef.com** with any questions concerning the set up, dial in or maintenance of your new reactor. I hope this unit brings you many years of stress free calcium and alkalinity addition to your aquarium.

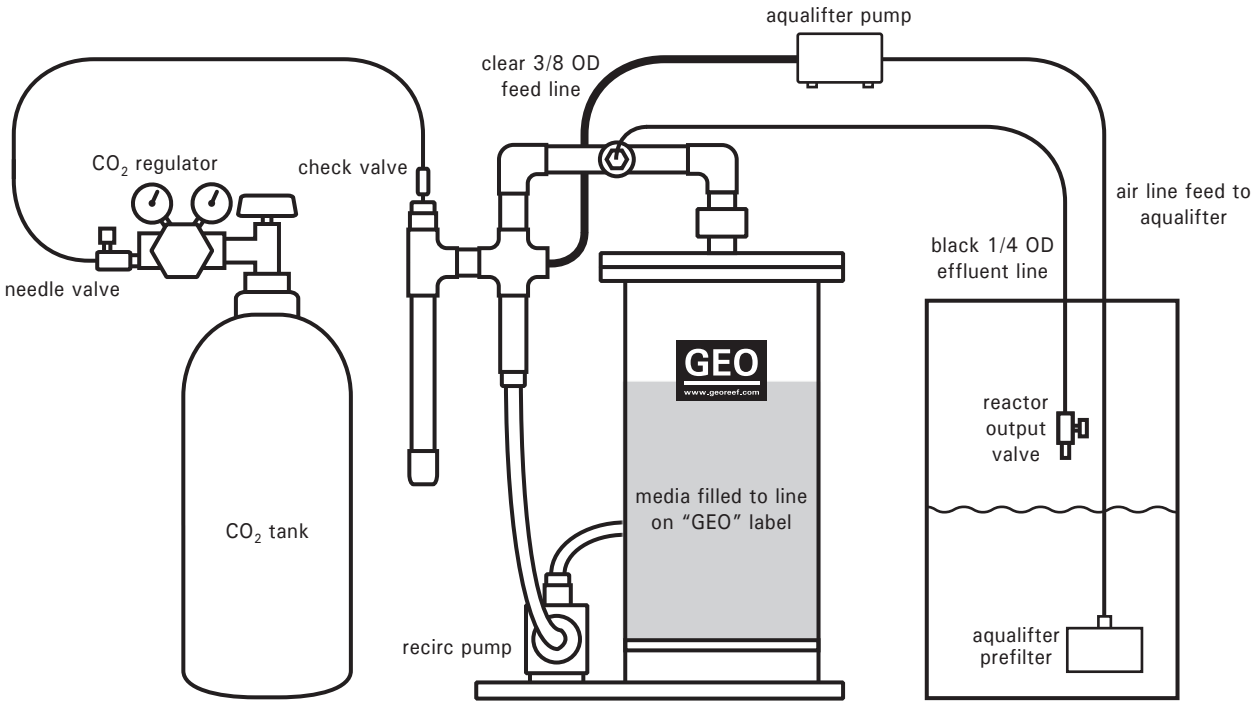
Enjoy!

George Weber

Calcium Reactor Maxi Jet Feed Diagram A



Calcium Reactor Aqualifter Feed Diagram B



Using Your GEO Reactor With Controller Diagram C