



Pacific Sun



# CalcFeeder PRO

## Calcium Reactor

with stepper motor feeding pump

User Manual

ver. 2.0

[www.Pacific-Sun.eu](http://www.Pacific-Sun.eu)

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# 1. Introduction

Dear Customer,

**Thank you for purchasing the Pacific Sun CalcFeeder PRO calcium reactor.**

With the purchase of this unit, you have selected a top quality product. It has been specifically designed for aquaristic purposes and has been tested by experts. With this unit, you are able to adjust the calcium level as well as the carbonate hardness in your seawater tank simply and efficiently in order to achieve optimum levels.

For best results, please read through this instruction manual before installing the reactor on your system.

During or after installation, please do not hesitate to contact our technical support team at [service@pacific-sun.eu](mailto:service@pacific-sun.eu) if you have any questions about your new calcium reactor.

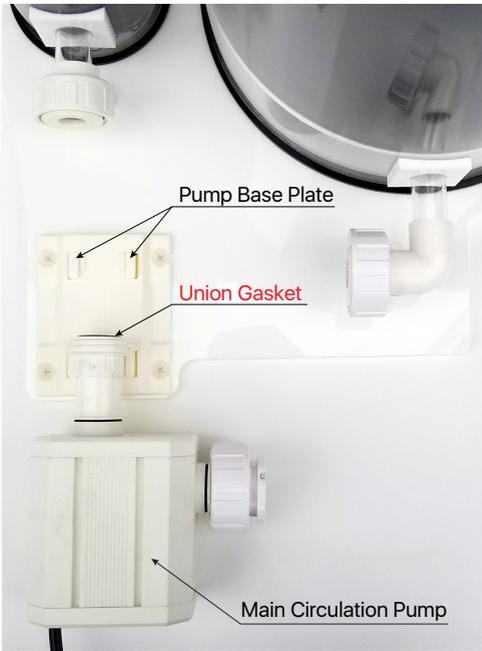
## 2. Technical data

CalcFeeder Model	Media Chamber Diameter	Dimensions (WxDxH)mm (WxDxH)inch	Media Capacity	For Aquariums
<b>AC Mini</b>	Ø130mm Ø5-1/8 inch	<b>231x324x550</b> 9-1/16x12-3/4x21-5/8	6 liters/6 kg	up to 600 liters
<b>AC1 PRO</b>	Ø150 mm Ø5-15/16 inch	<b>295x353x550</b> 11-5/8x13-7/8x21-5/8	7 liters/7 kg	up to 800 liters
<b>AC2 PRO</b>	Ø200 mm Ø7-7/8 inch	<b>347x359x550</b> 13-11/16x14-1/8x21-5/8	12 liters/12 kg	300-1400 liters
<b>AC3 PRO</b>	Ø250 mm Ø9-13/16 inch	<b>373x438x580</b> 14-11/16x17-1/4x22-13/16	20 liters/20 kg	500-2500 liters
<b>AC4 PRO</b>	Ø300 mm Ø11-13/16 inch	<b>427x463x580</b> 16-13/16x18-1/4x22-13/16	29 liters/29 kg	800-4000 liters

### 3. CalcFeeder Main Unit



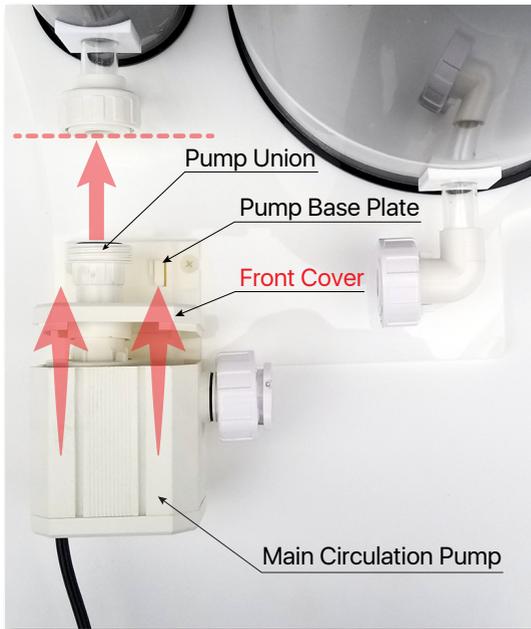
## 4. Main Pump Installation and Setup - AC3/4 Model



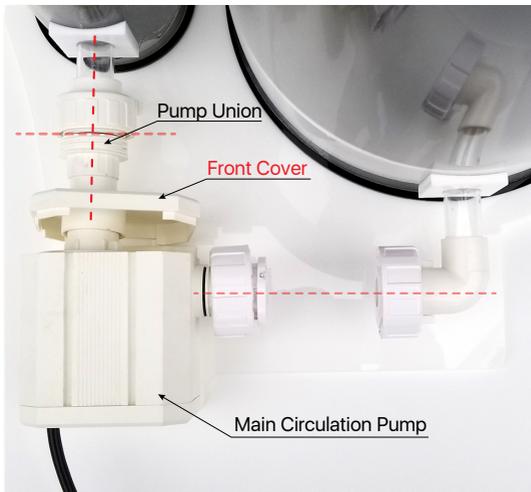
**1. Position** Main Circulation Pump close to the reactor and Pump Base Plate. **Make sure** that the front pump **Union Gasket** is in place and secure.



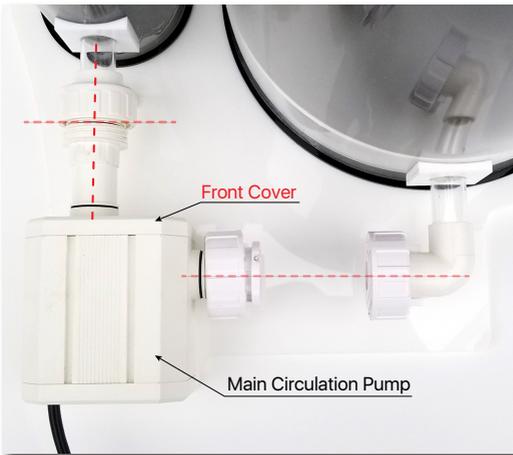
**2. Carefully take out** (slide out) the Front Cover from the Main Circulation Pump. Try do **NOT use** any tools. The **Front Cover** should be able to slide out by using just hands.



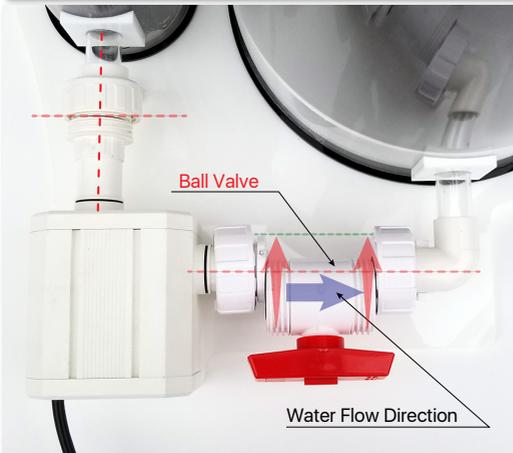
**3. Carefully position and start inserting** the Main Circulation Pump into the Pump Base Plate.



**4. Carefully insert** the Main Circulation Pump into the Pump Base Plate until the front Pump Union will **touch** the other Union side of the CO<sub>2</sub> Mixing Chamber.



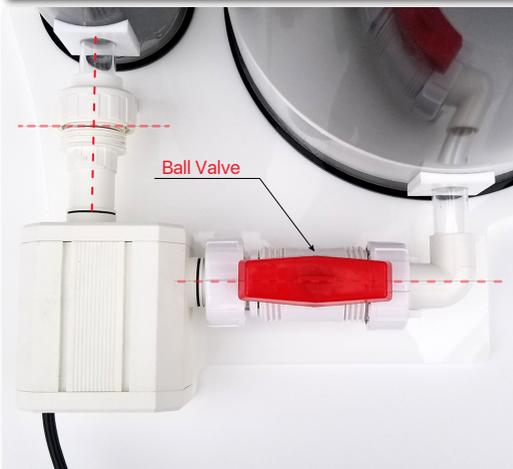
**5. Mount** back the Front Cover on the Main Circulation Pump.



**6. Carefully** slide in the **Ball Valve** between two unions (Main Pump output and Reaction/Media Chamber input).

**Make sure** the small arrow on the **Ball Valve** is showing correct water flow direction like on the picture.

Also, **make sure** that both **Ball Valve Gaskets** are in place and secure.



**7. Adjust** the **Ball Valve** to fit exactly in the center between two unions (**Main Pump output** union end and **Reaction/Media Chamber water input** union end).



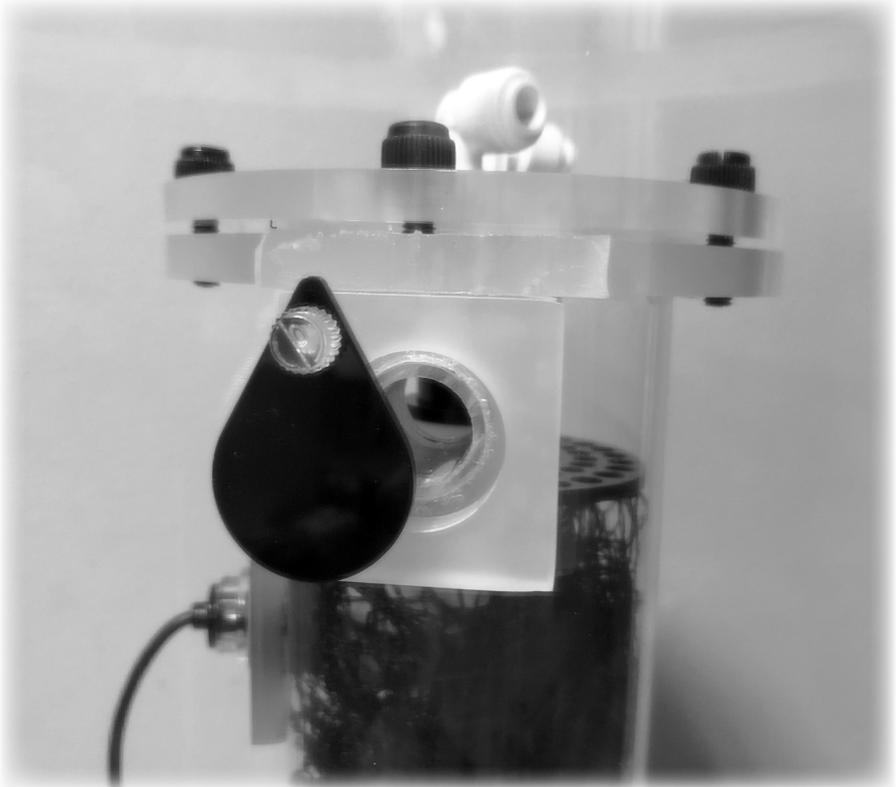
**8. Slowly and carefully screw in all three Union Cups. Make sure that the connections are tight.** Tighten the Unions Cups if necessary, but do not use excessive force as this can create too much force on the PVC connections and cause leak later on.



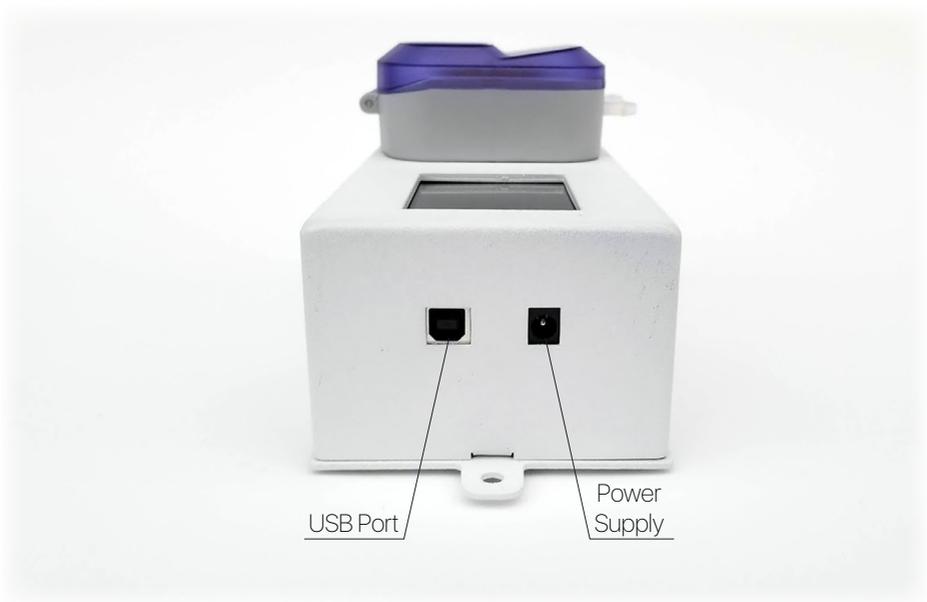
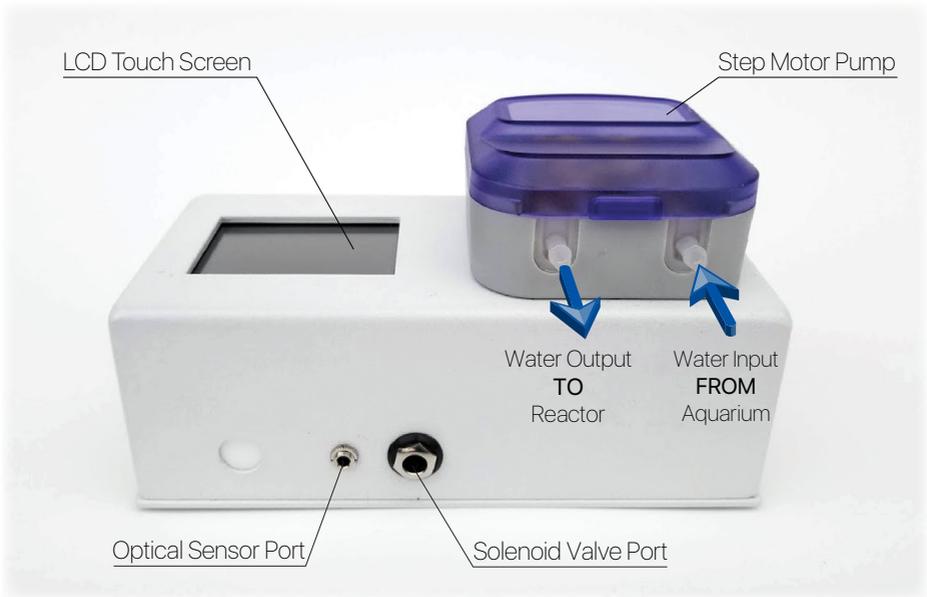
**9. The Main Circulation Pump Installation and Setup has been completed.**

**Note:**

For CalcFeeder models **Mini/AC1** and **AC2**, the **Main Pump Installation and Setup** process are very similar. However, the steps regarding the Ball Valve may be omitted. Instead of the **Ball Valve** component, those models are equipped with the inner black valve inside the **Reaction/Media Column**. See the below picture.



## 5. CalcFeeder PRO Controller

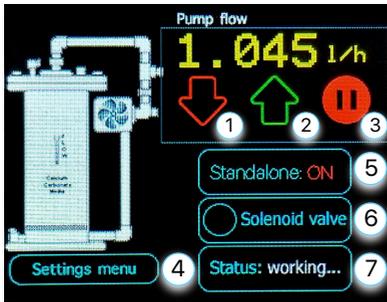


Controller unit was designed to work with CalcFeeder PRO calcium reactor but can be used also as a very precise feeding pump for any other Calcium Reactor brand (require turning the "**Standalone**" mode to **ON**).

The CalcFeeder PRO controller is equipped with ultra-precise Stepper Motor pump with four rollers. Built-in LCD touch-screen allows for very easy flow adjustments and controller operations. The Controller firmware updates can be performed by the internal USB port.

## 5.1. Controller Touch-Screen Operations

### Main screen



- ① Decreasing flow effluent button.
- ② Increasing flow effluent button.
- ③ Dosing pump "Pause" button.
- ④ "Settings menu" button.
- ⑤ Optical sensor status indicator.
- ⑥ Solenoid valve status indicator.
- ⑦ Current controller status working mode indicator.

### Settings menu

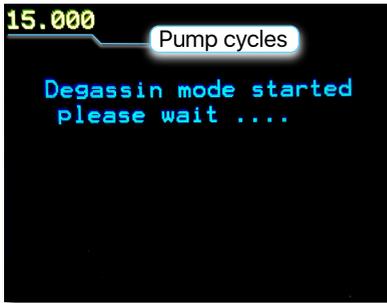


- ① Reset controller button.
- ② ON/OFF automatic "Degassing" button.
- ③ Automatic "Degassing menu" settings button.
- ④ ON/OFF automatic "Alarm CO2" tank button.
- ⑤ ON/OFF "Standalone" working mode button (when turn ON pump is running without connected optical sensor).
- ⑥ Reactor water refills manual mode enable button.

### Degass Menu



- ① Manual enable degassing button.
- ② Degassing setting once per week.
- ③ Degassing setting twice per week.
- ④ Degassing setting every day.
- ⑤ Degass Menu Exit button.



### Manual degassing screen

The controller **pump work cycles** are counted in the upper left corner. The degassing process takes **200** cycles.



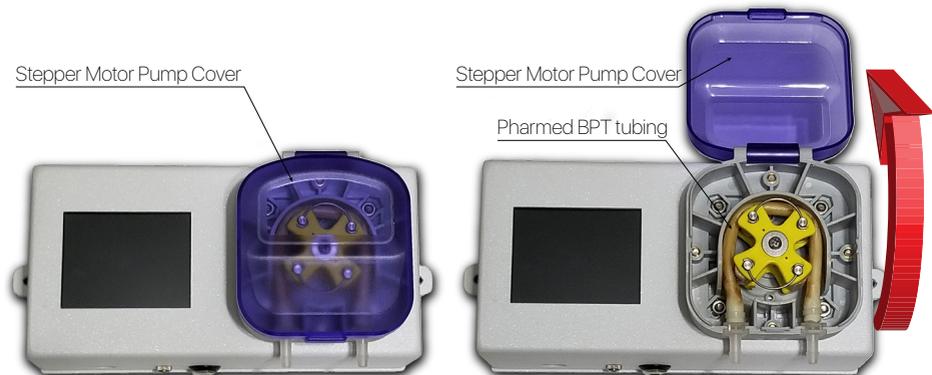
### Reactor manual water refills screen

In order to Turn OFF the refilling process, press and hold the „**Turn off refill mode**“ button for **3** seconds.

## 5.2. Controller Maintenance

Stepper motor allows for heavy-duty work **24/7** without any limits. The controller allows to set the rate at which calcium and carbonate are dosed in the tank from **100 ml/h to 7200 ml/h**.

Please remember about regular tubing inspections and maintenance. Used Pharmed BPT tubing has an **MTBF (Mean Time Before Failure)** of average **2000 hours** and needs to be replaced after that time. Regular lubrication by using silicone grease will extend tubing lifespan and protect the device against leaking and damage.



## 6. Original Package with CalcFeeder PRO includes

- 1) Calcium reactor with Main Circulation Pump and Optical Sensor assembled in the reactor body (Mixing Chamber).
- 2) CalcFeeder PRO Controller with stepper motor dosing pump and internal computer for CO<sub>2</sub> Solenoid Valve and Optical Sensor control.
- 3) Solenoid valve: 12V with 6.3mm plug.
- 4) Power supply for CalcFeeder PRO controller.
- 5) Connection tubings.
- 6) Two tubing holders for input/output tubings (input/output water).
- 7) The Key-tool for the optical sensor assembly.

## 7. Additional Items Required for Reactor Setup

The following items are required to install, operate and tune the CalcFeeder Calcium Reactor:

- 1) Medium/Large grain reactor media (we recommend CaribSea ARM Coarse or Two Little Fishies ReBorn).
- 2) CO<sub>2</sub> system complete with tank, regulator and needle valve.
- 3) Calcium and Alkalinity test kits.
- 4) Additional Degassing Column (NOT included in regular package):
  - **DC-1** dedicated for Calcium Reactors models **AC1/AC2**.
  - **DC-2** dedicated for Calcium Reactors models **AC3/AC4**.

## 8. Calcium Reactor Placement

Place the Calcium Reactor as **close to your sump and CO<sub>2</sub> tank as possible**. The longer the tube length the longer it will take for adjustments to take effect. This makes adjusting a calcium reactor more difficult.

## 9. How Calcium Reactors Work

It is very important to maintain the proper amounts of calcium and alkalinity in a reef tank. Both can be quickly depleted by growing organisms, and need to be supplemented in order to maintain levels equivalent to natural seawater. A calcium carbonate reactor is the easiest and most accurate method of maintaining calcium and alkalinity.

A calcium reactor works by dissolving small amounts of solid calcium carbonate media into liquid form, which is then dosed back to the tank. The concentrated liquid that is added back to the tank contains the correct ratio of calcium to alkalinity, which is essential to maintain the proper balance of water chemistry. Unlike most additives or kalkwasser, a properly functioning calcium reactor should maintain the appropriate balance between calcium and alkalinity over the long term.

The reactor is filled with calcium carbonate media (such as reef sand, shells, ready to use media like ARM from CaribSea or ReBorn from Two Little Fishies) and saltwater. We recommend a grain size of **8-10mm** or greater (**12-15mm**) as this creates a better flow and will avoid partial compression of the granules at the bottom of the reactor. The following picture is showing two examples of the calcium reactor media.



Comparison between CaribSea ARM Coarse and Two Little Fishies ReBorn Calcium Rector Media

A small amount of carbon dioxide is added to the water inside the reactor, which lowers the pH to a range of **6.5-6.8**. At such a low pH, the calcium carbonate aragonite media begins to dissolve, thereby releasing the calcium and alkalinity ions so that they can be dosed back to the aquarium. This solution is very concentrated, so only a small amount of liquid, or effluent, needs to be dripped back to the aquarium.

### **Acceptable Range for Calcium and Alkalinity**

**4.0 meq/L (7-11 dKH) Alkalinity and 375-450 ppm Calcium**

**Do not proceed if your results fall outside this range!**

Over time, both the calcium media and carbon dioxide gas will become depleted.

The rate of calcium reactor media consumption will depend on your aquarium's calcium demand, but in most cases, you can expect the reactor to work for several months without any major maintenance.

It is important to periodically check the CO<sub>2</sub> input rate (measured in bubbles per minute) and the effluent drip rate, to make sure that everything is flowing smoothly. Also, it is critical that you test your aquarium's calcium and alkalinity levels with a reliable test kit on a regular basis.

## 10. CalcFeeder PRO Connections and Start-up

### 10.1. Tubing preparation and installation

When cutting connection tubing, make sure that the tubing cut is very clean with no nicks that can cause leaks, without any deformation in the tubing and the cut is 90°.

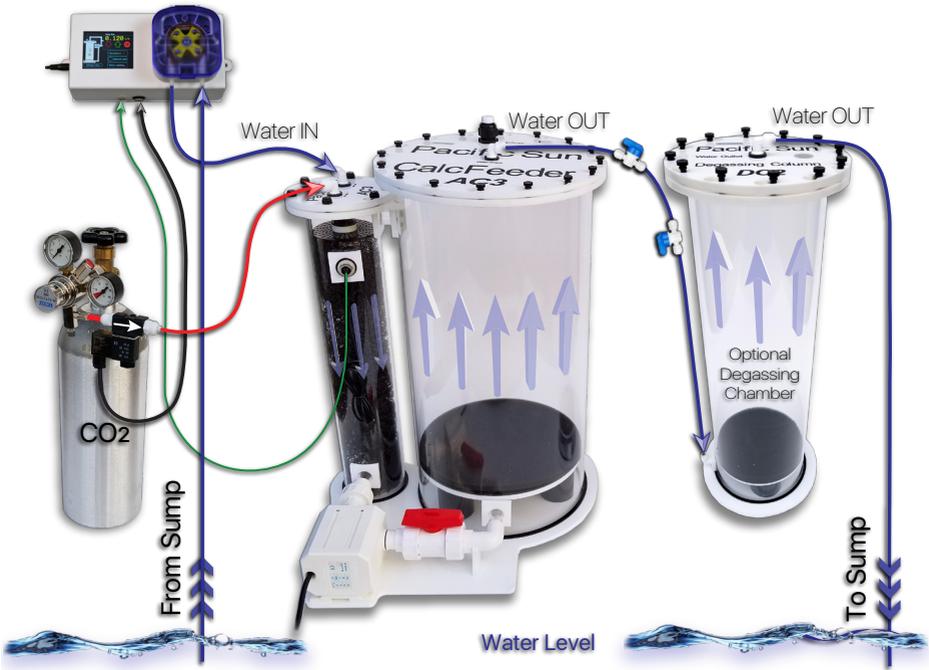


To secure all connections it's highly recommended to use one of the following Connector Locking Clips. They keep the tubing release from getting pushed in by accident.

Push connect fittings need the tubing to go in straight or a leak may be possible. Tube clips keep the collet on the fitting locked out to hold the tube into the fitting to help prevent leaks. Anytime you have a tight bend going into a fitting we highly recommend tubing clips for safety.



## 10.2. Connections and placement



CalcFeeder PRO - Complete Setup



CalcFeeder PRO and Degassing Column - Top View with Labels

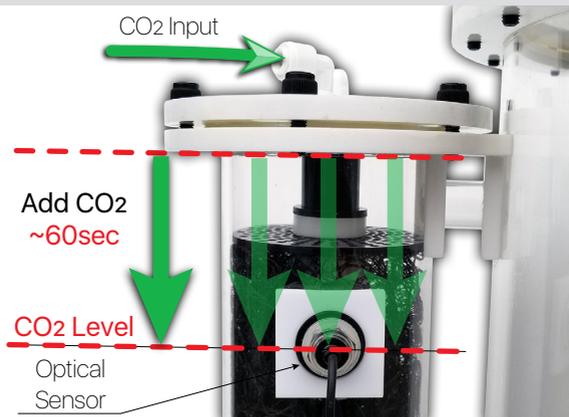
### 10.3. Preparation for start-up

- 1) Remove the top covers from both reactor columns (**Mixing** and **Reaction/Media Chamber**).
- 2) Flush the main reactor columns and pour calcium reactor media into the Reaction, main chamber maximum up to **20mm (~1.5")** below the tube that combines both chambers of the reactor (**Mixing** and **Reaction/Media** chambers).
- 3) Flood the CO2 **Mixing Column** with aquarium water to completely remove the air and close the cover of the Mixing Column (with floss net or bio-balls).
- 4) Make sure that the **Mixing Column** gasket is in place and secure. Tighten the **Mixing Column** bolts to make a leak-proof seal. Tighten the **opposite** bolts alternately to distribute the closing load evenly.
- 5) Pour aquarium water into the column with calcium media to the very top of the **Reaction/Media Column**.
- 6) Make sure that the **Reaction/Media Column** gasket is in place. Carefully close the cover of the calcium media Reaction Column and tighten the bolts alternately.
- 7) Connect the **CalcFeeder PRO controller**. Do not connect the Solenoid Valve at this stage.
- 8) Start the **Main Circulation Pump** (white, fastened to the reactor's base). Water will start to circulate in the reactor's circuit (through **Reaction/Media** and CO2 **Mixing Chambers**).
- 9) Start the CalcFeeder PRO controller and run the "**Refill Mode**" to remove air residues present under the cover of the reactor's main column.
- 10) Connect the **Solenoid Valve** to the **CO2 Cylinder** (equipped with a pressure gauge and precise CO2 outflow regulator).



#### Important!

We recommend setting the cylinder pressure such that the CO2 feed at the regulator output is about 5-10 bubbles per second. We suggest filling in the CO2 Mixing Chamber with the CO2 gas from the **Top** to the **Optical Sensor level** within **~60** seconds, but no longer than that time.

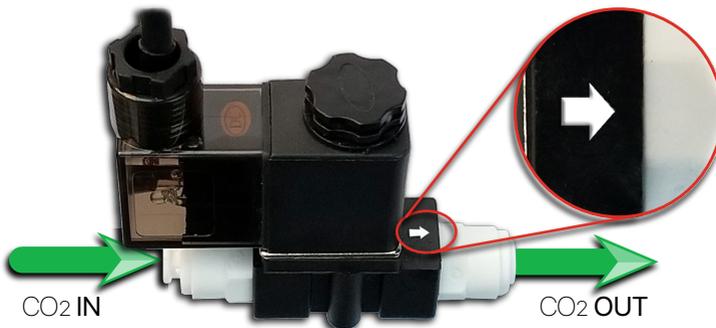




### Important!

You need to wait a few minutes (if regulator output is set for about 5-10 bubbles per second) for reaching the proper CO<sub>2</sub> level in the mixing chamber. If during regular use, the Optical Sensor does not read CO<sub>2</sub> and the screen controller displays an ERROR - simply restart it (disconnect for a few seconds from the power supply and connect again). Repeat this procedure until the sensor is able to read the proper carbon dioxide level and dosing pump activates (optical sensor status will illuminate **GREEN**).

- 11) After setting the correct gas pressure, connect the CO<sub>2</sub> Solenoid Valve (supplied with the reactor) observing the correct **gas flow direction** from the cylinder to the reactor as indicated by a **small arrow** on the solenoid valve housing. See the following picture:



- 12) Make sure the connections are tight, re-tighten the connectors if necessary but do not use excessive force as this can damage them.
- 13) Connect the solenoid valve to the **Mixing Column** connector with label "**CO<sub>2</sub> Input**".
- 14) Connect the hose from **CalcFeeder PRO controller** to the **Mixing Column** connector with the label "**Water Input**".
- 15) The hose supplying water to the metering pump should be fastened in a dedicated holder.
- 16) Route the "**Water Output**" from the reactor (**Reaction/Media Column**) back to the sump or to the optional DC-1 or DC-2 degassing column (bottom connector on the column).



### Important!

The hose end coming out from the reactor or from degassing column DC-1 or DC-2 has to be below the sump water level at all times. This will prevent from pumping the air to the reactor.

## 10.4. Starting the Reactor

After making proper connections you can start your reactor. Proceed as follows:

- 1) Make sure CO<sub>2</sub> is connected and the valve is open (the solenoid valve should be disconnected from the controller and the controller should be disconnected from the power supply).
- 2) The main circulation pump should run and no air should be present in the reactor's column.
- 3) Connect the solenoid valve to the CalcFeeder PRO controller and plug in the optical sensor placed in the reactor's CO<sub>2</sub> **Mixing Column**.
- 4) Connect the power supply to the CalcFeeder PRO controller. After the preliminary test, the device is ready for operation. If there is no CO<sub>2</sub> in the reactor's column, the indicator light on the optical sensor will start to flash **RED**, and after a few seconds, the solenoid valve will open and supply CO<sub>2</sub> to the reactor's column.
- 5) After a few CO<sub>2</sub> feed cycles, it's level should be adequate which will be indicated by the optical sensor light on the LCD display (transitioning from **RED** to **GREEN**).
- 6) During the first dozen or so hours of reactor operation, the controller will feed CO<sub>2</sub> and start the solenoid valve rather often until the water in the reactor's column becomes sufficiently saturated with gas. Later the starts/stops of the solenoid valve will be much less frequent and will depend only on the amount of water supplied by the reactor to the filtration system in your aquarium.
- 7) In the first days of reactor operation set the CalcFeeder PRO controller metering pump flow to **100-200**ml/h and after that increase slowly according to your specific needs.
- 8) Upon **24** hours, re-check reflux pH. If it's too high, then CO<sub>2</sub> flow should be increased by 1-2 bubbles per second. Optionally you can mount pH probe in the top cover of the main **Reaction/Media Chamber (pH Probe** slot with label on the top cover).



### Important!

It is strongly recommended to run **Degassing Mode** **minimum twice per week** by using CalcFeeder Pro controller.

If pH is **increasing** between degassing, then run **Degassing Mode every day**, it means then that the Calcium Reactor Media is releasing a lot of neutral gases that take space in the Mixing Chamber instead of CO<sub>2</sub>.

## 10.5. Calcium Reactor effluent Alkalinity (KH) test

In order to check the reactors effluent Alkalinity (KH) value, you can test it by using one of several simple KH titration test kits. Expected reactors effluent Alkalinity value range is **50-85dKH** and should be around **60dKH**. As an example, you can refer to the following procedure on how to test KH by using e.g. Salifert KH/Alkalinity titration Test Kit:

- ① Use the 5ml syringe to add **4ml** of Calcium Reactor effluent water into the test vial.
- ② Shake the KH-Ind dropping bottle a few times and add **4 drops** of the KH-Ind fluid to the test vial.
- ③ Put the plastic tip firmly on the 1ml syringe and draw into the syringe the KH reagent (ensure that the end of the plastic tip is constantly submersed in the KH reagent) until the lower end of the black part of the piston is exactly at the 1.0 ml mark. There will be some air present just below the piston. This is the air which was present between the end of the plastic tip and the piston. This will not influence the test result.
- ④ **Add all the KH reagent** to the water in the test tube and swirl a few seconds after that. The water color in the test vial should not change. By adding **1ml** of the reagent to the test vial, the KH=**15.7dKH**.
- ⑤ **Add next 1ml** of the reagent to the test vial with water. The water color still shouldn't change. Now the KH=**31.4dKH**.
- ⑥ **Repeat adding 1ml** of the reagent until the water color in the test vial will change from blue/green to **orange-red** or **pink** color (whichever color is observed first).
- ⑦ Hold the syringe with the tip facing upward and read the position of the, now the upper end, of the black part of the piston. The syringe has graduations of 0.01ml. Read the KH or alkalinity value from the table.

### EXAMPLE:

1ml reagent multiplied by the number of used ml:

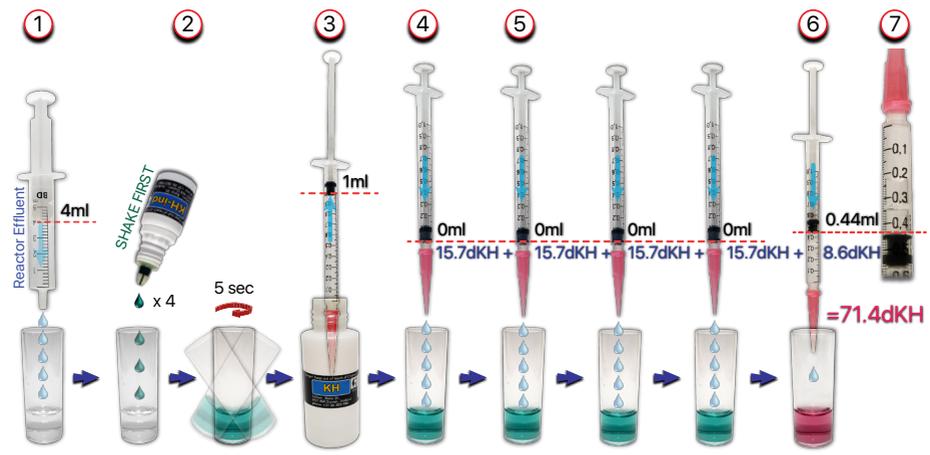
1ml x **4** = 4ml where 1ml  $\square$  **15.7dKH**

**4** x **15.7dKH** = **62.8dKH**

and 0.44ml  $\square$  **8.6dKH**

Total Alkalinity (KH) value can be calculated as follow:

**62.8dKH** + **8.6dKH** = **71.4dKH**



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## 11. Safety information

- The reactor unit should not be run **24/7 on small tanks** (due to the pH-lowering effects of a calcium reactor).
- To obtain the best results, run the unit for **8-10 hours** per day. The reactor should start to run 4 hours after the lights have turned on. This will enable the highest pH to be maintained within the aquarium.
- If the reactor is running at maximum capacity, then to reduce the likelihood of carrying over of excess CO<sub>2</sub> into the tank, run the outlet through a further cup of reactor media to degas the water before it returns to the tank.
- Use equipment only for its intended use.
- Do **NOT** install outdoors or near sources of extreme heat. Avoid exposure to the UV light.
- **Keep out of the reach of children** - special attention should be given to ensure children cannot access the CO<sub>2</sub>.
- Check the reactor every **3 months**, or at least when refilling. It is recommended to check the reactor output flow rate and pH on a weekly basis.
- Use media with a grain size of at least **8-10mm**, and preferably **12-15mm** or larger. This ensures optimum flow behavior.
- Media contains CO<sub>2</sub> insoluble compounds and over time these will collect as "sludge" on the bottom of the reactor and should be removed at regular cleaning intervals.
- **Regularly check the circulation pump and impeller.** To do this, drain the reactor and disconnect all cables. The pump motor can easily be removed from the impeller housing by twisting in a counterclockwise direction.

## 12. Troubleshooting

Problems	Solutions
<b>The reactor gets the air in and there is too much CO2 in the system</b>	<p>Make sure the pressure in the CO2 cylinder is correct and the gas metering is not faster than 10 bubbles per second. If your pressure gauge does not allow a precise adjustment, we suggest that you buy a sufficiently accurate valve, as the reliable and correct operation of the whole system largely depends on this component.</p> <p>Make sure the optical sensor is correctly plugged into the controller.</p>
<b>The optical sensor does not indicate a correct CO2 level – an error message appears on the controller display</b>	<p>Make sure the pressure in the CO2 cylinder is correct and the valve on the cylinder is not closed. Recheck the gas flow between the cylinder and the solenoid valve. Make sure the solenoid valve is plugged correctly into the controller.</p> <p>Set the water flow at the pump according to the requirements of your aquarium. We suggest that you start minimum first 24h from <b>100-200</b>ml/h and increase slowly according to your specific needs.</p> <p>Remember that before starting the reactor, the water parameters such as Ca and KH should be adequately proportional relative to each other. The reactor is not designed for balancing the parameters, but rather for supplementing them in proportional amounts.</p>
<b>Circulation pump not running (no water circulation in the reactor)</b>	<p>Airlock in the reactor – turn off circulation pump then release gas build-up by loosening gas collection trap screw. Before turning the pump on, completely refill reactor with water. Check the CO2 supply rate.</p> <p>Verify that the impeller is not jammed with media/sludge.</p>
<b>Circulation pump is too hot during operation</b>	See above.
<b>Circulation pump rattles</b>	Remove the circulation pump motor. Clean out any granular particles or debris.
<b>Discharge from the reactor is too low</b>	Check flow in and flow out for blockages - replace the hoses if necessary. Check dosing pump tubing for any potential damage.
<b>No bubbles in the bubble counter</b>	Verify that the CO2 bottle is not empty. Check supply hoses for leaks



*Pacific Sun*

If you need technical support - please contact with [service@pacific-sun.eu](mailto:service@pacific-sun.eu)

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